Prepared for:

Flood Control District of Maricopa County

# Buckeye Candidate Assessment Report

*Project Engineering Consultants, Ltd.*

June 2004

Prepared for:

Flood Control District of Maricopa County

# Buckeye Candidate Assessment Report

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Project Engineering Consultants, Ltd.


June 2004

# Buckeye Candidate Assessment Report

Buckeye, Arizona

Prepared for:

**Flood Control District of Maricopa County**

Prepared by:

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June 2004

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# 1.0 INTRODUCTION AND PROJECT BACKGROUND

## 1.1 Location of Project Limits

The Buckeye Candidate Assessment Report (CAR) project is centered in the historic downtown area of Buckeye, Arizona. The Town of Buckeye is located in central Maricopa County approximately 30 miles west of Phoenix and several miles south of Interstate 10. The contributing drainage area is bounded by the Buckeye Irrigation District (BID) Canal to the north, Miller Road to the west, a drainage divide just east of where Baseline Road intersects with Monroe Avenue/County Highway 85 (MC 85) to the east and Beloat Road to the south. Beloat Road is also known as Irwin Avenue and Lower River Road in this area. The study area includes all or part of Sections 4, 5, 8 and 9 of Township 1 South, Range 3 West of the Gila and Salt River Base and Meridian.

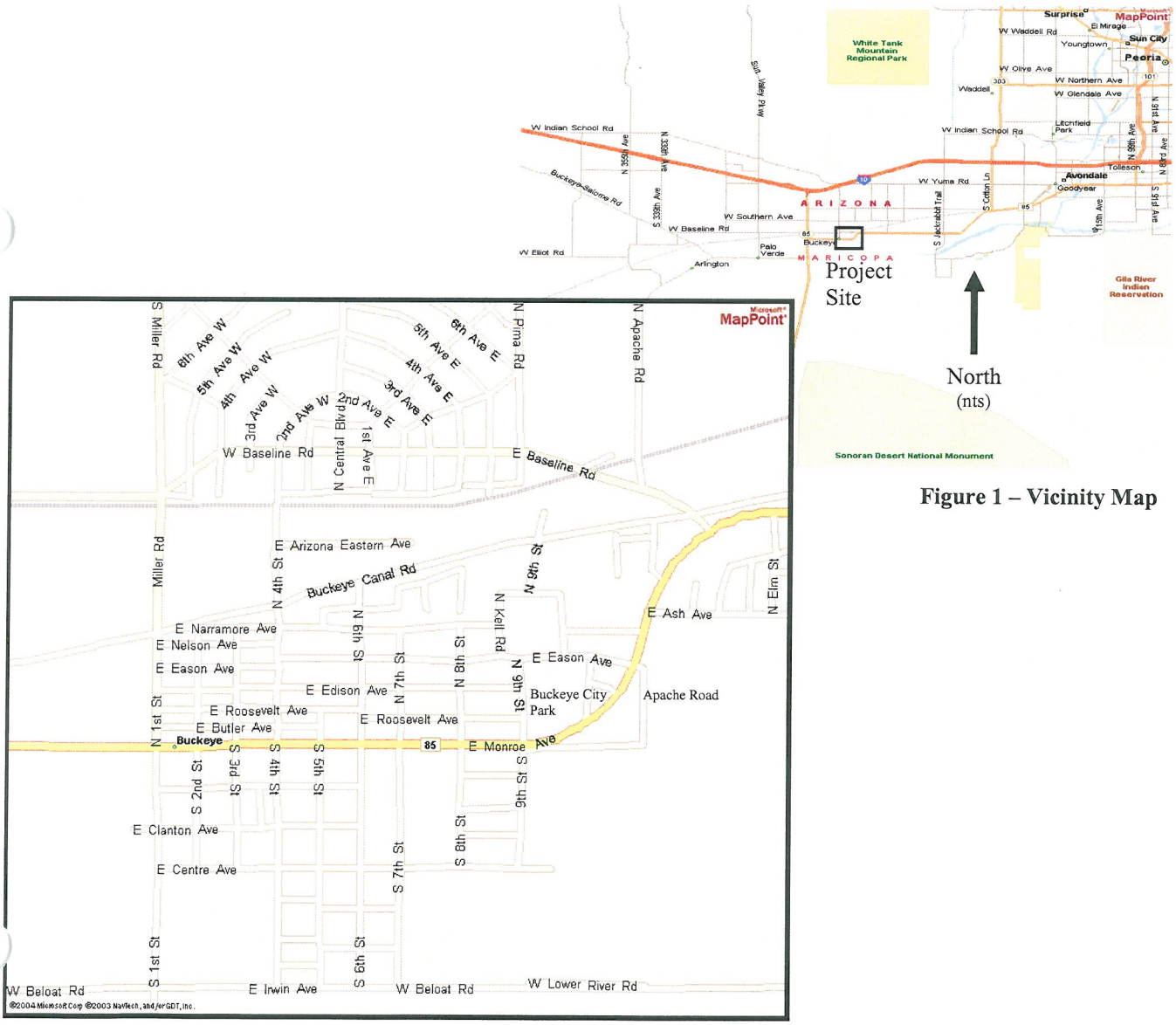



**Figure 1 – Vicinity Map**

In addition to the above described boundaries, two existing BID surface drains outside this study area were analyzed as possible outfalls for this project. Both are located along Beloat Road, the first at 7th Street, and the second at the Apache Road Alignment. The specific condition and location of these drains are discussed further in Section 2.1 and 3.3 of this report.

## 1.2 Scope and Purpose of Study

The Town of Buckeye submitted this project to the Flood Control District of Maricopa County (FCDMC) for evaluation as part of their Capital Improvement Projects (CIP) prioritization procedure. FCDMC has asked Project Engineering Consultants, Ltd. (PEC) to evaluate the Buckeye submittal as part of FCDMC's Candidate Assessment Report (CAR) program. Additionally, PEC was asked to determine if there were acceptable solutions for Town of Buckeye's drainage problems. Buckeye's initial request consisted of a cost sharing partnership with FCDMC on the construction of a regional detention basin at the current location of the Buckeye City Park. FCDMC authorized this CAR project to determine the feasibility of the Town's proposal. This feasibility assessment includes the analysis of the proposed site, estimated costs, potential outfall locations and utility conflict identification. In addition, other alternatives were also analyzed. These analyses are also presented in this report.

This study lies within the project boundaries of a much larger, regional study currently ongoing for FCDMC. *The Buckeye/Sun Valley Area Drainage Master Study (ADMS)* includes the upstream (northern) extents of the Buckeye CAR contributing watershed. While the ADMS, and subsequent Area Drainage Master Plan (ADMP), may propose regional drainage improvements in the downtown Buckeye area, the regional nature and timeline of these projects do not lend themselves to immediate solutions. The results from this study can be used by the Town to focus on immediate improvements, as well as by the ADMS to identify regional solutions to the Town's flooding problems.

In order to accurately assess the feasibility of the Town's proposal, PEC collected all pertinent data for the study area. This data includes existing hydrology and hydraulic studies, aerial photos, as-built plans, utility quarter section maps, GIS data from FCDMC and in-person interviews with Town and BID staff. All pertinent data previously collected for *the Buckeye/Sun Valley ADMS* was also obtained. PEC utilized this data to develop hydrologic and preliminary hydraulic analyses of the study area. Results of these analyses were then used to formulate several flooding mitigation alternatives in addition to evaluate the original proposal by the Town. These results can also be used by the ongoing ADMS as previously mentioned. Cost and efficiency of each alternative were then analyzed and a preferred alternative selected. Photos taken of the study area are included in Appendix A. A data collection summary, along with collected data and meeting minutes, is included in Appendix B.

# 2.0 HYDROLOGY

## 2.1 Watershed Description

The contributing watershed to the study area totals 0.92 square miles. The watershed consists mostly of residential and commercial development, with some farmland in the southern portion. Most of the watershed slopes north to south. Some farmlands slope northwest to southeast. The average slope is approximately 0.6 %. **Exhibit A** is the **Drainage Area and Hydrologic Model Map**.

There are two distinct outfalls for the study area watershed. The first is at 7th Street and Beloat Road. Runoff generated northwest of 7th Street and MC 85 that exceeds the capacity of the storm drain and stormwater conveyance capacity of MC 85, and all runoff generated south of MC 85 and west of 7th Street concentrates at this location. The concentrated flow ponds here until eventually draining into a BID surface drain via several small pipe culverts. The drain discharges into the Arlington Canal several miles to the southwest. Arlington Canal runs east to west, and crosses Miller road approximately one mile south of Beloat road. The BID surface drain at this location is an auxiliary drain to the main drain that runs east to west.

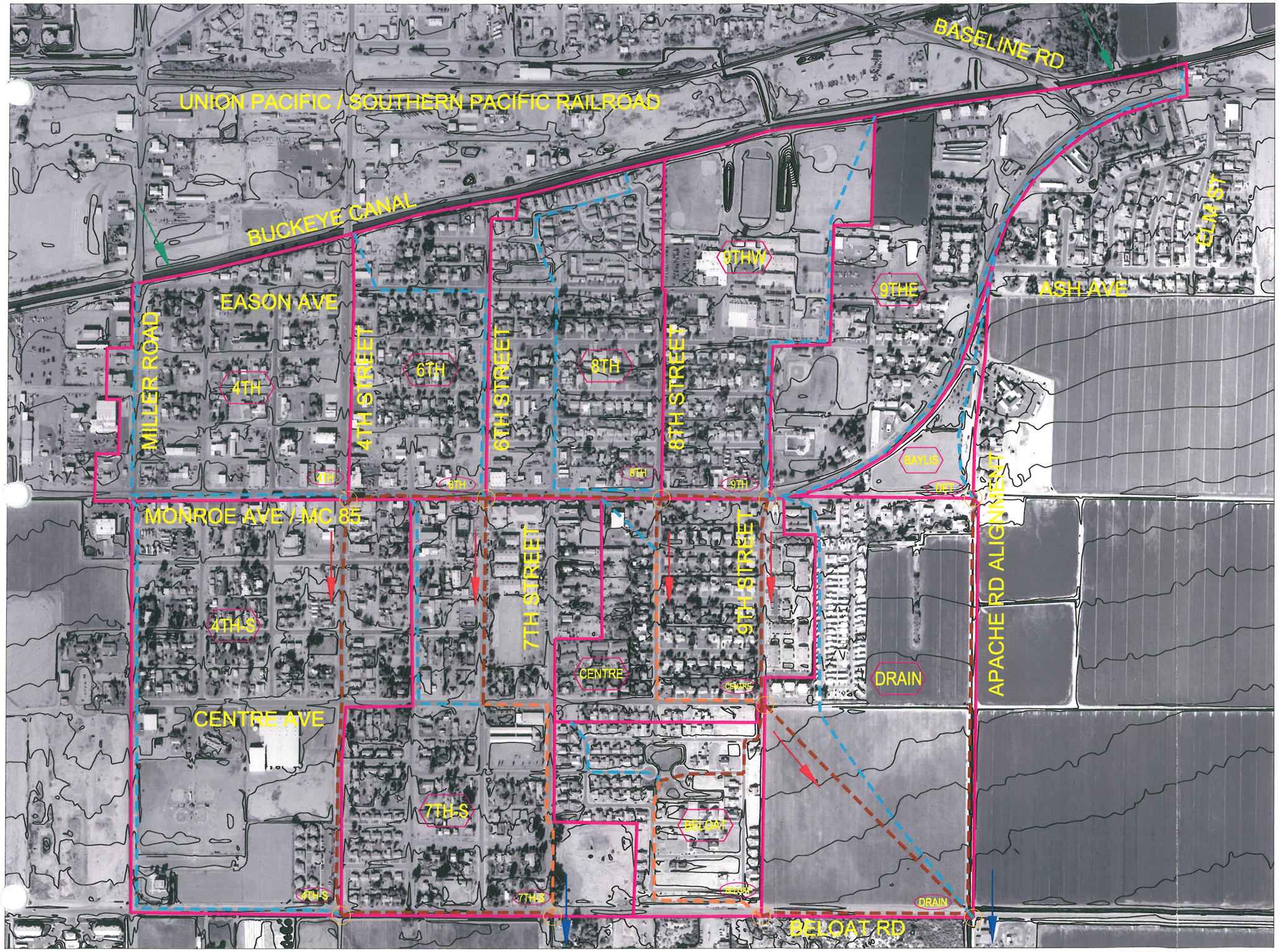
**BID Surface Drain at 7th Street and Beloat Road**

The second outfall is located at Beloat Road and the Apache Road alignment. Runoff from the remainder of the watershed concentrates and drains into the main BID surface drain at this location. This flow is then routed to the Arlington Canal. The main BID surface drain has a base flow due to the discharge of groundwater wells in the area used by the BID to lower the water table. This enables crop production in areas with excessively high groundwater.

**BID Surface Drain at Beloat Road and the Apache Road Alignment**

## 2.2 Existing Hydrologic Models

There are no known existing hydrologic models available for the study area. There is however, the upstream *Buckeye Area Floodplain Delineation Study (FDS),* McLaughlin Kmetty Engineers, Ltd., (1992), whose southern study boundary is along the BID canal. The results of the FDS study were used as the source for canal overtopping peak flows and volumes for this CAR. The *Buckeye Area FDS* used a simplified analysis for

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# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## BUCKEYE DETENTION BASIN CANDIDATE ASSESSMENT REPORT

LEGEND

- SUB BASIN BOUNDARY
- Tc FLOW PATH
- ROUTING REACH
- COMBINED Tc/ROUTE
- 9THW — SUB BASIN DESIGNATION
- CONCENTRATION POINT (CP)
- 9W — CP DESIGNATION
- CANAL OVERFLOW (FIS)
- FLOW DIVERSION
- PROJECT AREA OUTFALL

SCALE 1"=300'

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PHOENIX, ARIZONA 85021

## EXHIBIT A
## DRAINAGE AREA AND HYDROLOGIC MODEL MAP

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| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

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CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 1

determining canal overtopping. This methodology resulted in peak flows, but no volume or hydrograph data. PEC used the results of the FDS to estimate hydrograph characteristics for the canal overtopping flows. Hydrograph diversion routines were used to mimic the hand calculations performed in the *FDS.* The resulting hydrographs were input into the hydrologic model for this study. The modified *FDS* model is included in Appendix C.

## 2.3 Hydrology

### General Information and Methodology

The U.S. Army Corps of Engineers HEC-1 Flood Hydrograph Package and the Watershed Modeling System (WMS) software were used to develop the study area response to hypothetical rainfall storms representing the 10, 50 and 100-year, 6-hour events.

National Oceanographic and Atmospheric Administration (NOAA) Atlas 2, Volume VIII precipitation data was used to determine point rainfall values for the analyzed storm events. This data was obtained from the *Drainage Design Manual for Maricopa County, Arizona – Hydrology.*

Rainfall losses were developed using GIS soils and land use data provided by FCDMC.

Two-foot contour interval mapping used for this project was provided by FCDMC and was developed for the ongoing *Buckeye/Sun Valley ADMS* project.

Sub-basin delineation, time of concentration calculations and model hydrograph routing parameters were developed using the 2-foot contour interval topographic data.

### Basins and Hydrograph Routing

The watershed was divided into eleven sub-basins with concentration points at strategic locations. A computation interval (NMIN) of 2 minutes was used to correspond to the criteria set forth in the *Drainage Design Manual for Maricopa County, Arizona – Hydrology.* Normal depth procedures were used for hydrograph routing between concentration points, with typical street sections used as routing cross sections. **Exhibit A** illustrates the sub-basin delineation, concentration point location, time of concentration flow path alignments and routing paths used to develop the existing conditions hydrologic model for this project. **Tables 1 and 2** below list the calculated sub basin and routing parameters used in model development.

**Table 1 - Sub-Basin Parameters**

| Sub Basin | Area ($mi^2$) | Flow Path Length (mi) | Flow Path Slope (ft/ft) | Lca Length (mi) | Basin Lag (min) |
|---|---|---|---|---|---|
| $4^{TH}$ | 0.082 | 0.52 | 0.0055 | 0.40 | 23.8 |
| $6^{TH}$ | 0.057 | 0.46 | 0.0050 | 0.17 | 16.8 |
| $8^{TH}$ | 0.079 | 0.60 | 0.0052 | 0.31 | 23.2 |
| $9^{TH}$ W | 0.081 | 0.54 | 0.0063 | 0.32 | 21.6 |
| $9^{TH}$ E | 0.096 | 0.77 | 0.0040 | 0.39 | 29.4 |
| BAYLIS | 0.016 | 0.30 | 0.0083 | 0.08 | 9.4 |
| $4^{TH}$-S | 0.146 | 0.74 | 0.0053 | 0.50 | 30.1 |
| $7^{TH}$-S | 0.128 | 0.66 | 0.0063 | 0.33 | 23.8 |
| CENTRE | 0.067 | 0.40 | 0.0054 | 0.23 | 17.6 |
| BELOAT | 0.049 | 0.44 | 0.0044 | 0.25 | 19.4 |
| DRAIN | 0.118 | 0.59 | 0.0070 | 0.26 | 20.4 |

**Table 2 - Routing Parameters**

| Reach | HEC-1 Reach Name | Length (ft) | Slope (ft/ft) | HEC-1 NSTP |
|---|---|---|---|---|
| Canal Overflow to $4^{th}$ | BID4TH | 2722 | 0.0055 | 2 |
| Canal Overflow to $9^{th}$ | BID9TH | 4082 | 0.004 | 3 |
| $4^{th}$ to $6^{th}$ | 4TH6TH | 872 | 0.002 | 1 |
| $6^{th}$ to $8^{th}$ | 6TH8TH | 1116 | 0.002 | 2 |
| $8^{th}$ to $9^{th}$ | 8TH9TH | 680 | 0.002 | 1 |
| DET to DRAIN | DETDRN | 2657 | 0.0065 | 2 |
| $8^{th}$ to CENTRE | 8THCEN | 1967 | 0.007 | 2 |
| $9^{th}$ to CENTRE | 9THCEN | 1300 | 0.008 | 1 |
| CENTRE to BELOAT | CENBEL | 2542 | 0.005 | 2 |
| BELOAT to DRAIN | BELDRN | 1343 | 0.0011 | 1 |
| CENTRE to DRAIN | CENDRN | 1888 | 0.005 | 2 |
| $4^{TH}$ to $4^{TH}$-S | 4TH4S | 2629 | 0.015 | 2 |
| $4^{TH}$ to $7^{TH}$-S | 4TH7TH | 1339 | 0.0028 | 1 |
| $6^{TH}$ to $7^{TH}$-S | 6TH7TH | 3061 | 0.0059 | 2 |

**Rainfall Data**
Point rainfall values were determined from the precipitation isopluvials published in the *Drainage Design Manual for Maricopa County, Arizona – Hydrology.* The original source of this data is the NOAA Atlas 2, Volume VIII. One hundred, 50 and 10-year, 6-hour point rainfall values of 3.3", 2.9" and 2.1" respectively were used. The 6-hour, Pattern 1 temporal distribution curve was used for developing the PC cards in the HEC-1 hydrologic model. S-graph procedures, using the Phoenix Valley S-graph, were used to develop unit hydrographs. Aerial reduction was not employed due to the small size of the study watershed. Rainfall loss parameters were calculated using Green and Ampt procedures and the criteria set forth in the *Drainage Design Manual for Maricopa County, Arizona – Hydrology.*

**Soils Information**
Soils data for this study was provided by FCDMC in dxf format. This data was compiled for hydrologic modeling purposes using the WMS software. The soils data was originally compiled from the Soil Survey of Central Maricopa County, Arizona.

**Land Use Information**
Land use data for this study was provided by FCDMC in dxf format. This data was compiled for hydrologic modeling purposes using the WMS software. The provided land use data was only modified when obvious changes or errors were apparent.

**Flow Splits**
Field inspection of the study area revealed that flow splits occur at each intersection along MC 85 during frequent storm events. MC 85 slopes west to east, but the prominent slope of the study area is north to south. Runoff concentrating along MC 85 is conveyed to the east via roadway section and storm drain. At the MC 85 intersections, however, some or all of the runoff on the south side of the MC 85 roadway crown will split and flow to the south. Because of this, diversions were included in the hydrologic models at each concentration point along MC 85. Flow splits at these locations were assumed to be 50% to the east, and 50% to the south. A detailed split flow analysis was beyond the scope for this project.

Another flow split included in the hydrologic models was at Centre Street and 9$^{th}$ Street. At this location, runoff in excess of the existing catch basin capacity ponds until it either spills into the adjacent sub division or adjacent farm field. The entry road into the sub division is elevated so that runoff spills into this development at approximately the same ponding depth required for runoff to spill into the farm field. Therefore, this flow split was also assumed to be 50/50. The catch basin capacity was not considered in the hydrologic model.

**HEC-1 Hydrologic Modeling Results**

Table 3 below lists the results of the existing conditions hydrologic modeling for the 100, 50 and 10-year, 6-hour storm events. The HEC-1 model output is provided in Appendix C.

**Table 3 - Hydrologic Modeling Results**

| Concentration Point | 10-YR Peak Flow (cfs) | 50-YR Peak Flow (cfs) | 100-YR Peak Flow w/o Canal Overtopping (cfs) | 100-YR Peak Flow w/ Canal Overtopping (cfs) |
|---|---|---|---|---|
| 4TH | 101 | 152 | 178 | 1076 |
| 6TH | 130 | 193 | 225 | 533 |
| 8TH | 174 | 254 | 294 | 294 |
| 9TH | 314 | 458 | 530 | 578 |
| DET | 36 | 50 | 57 | 57 |
| CENTRE | 446 | 655 | 759 | 759 |
| BELOAT | 232 | 343 | 398 | 398 |
| DRAIN | 379 | 600 | 714 | 714 |
| 4TH-S | 214 | 321 | 374 | 532 |
| 7TH-S | 369 | 560 | 658 | 780 |

# 3.0 PRELIMINARY HYDRAULICS

## 3.1 Storm Drain Design

Preliminary storm drain design for alternative development was completed using Haestad Method's *StormCad* software package. Due to very large peak flows, the storm drain size was limited to a 10-year design. The storm drain was sized such that the hydraulic grade line did not extend above the ground surface at manholes or inlets. Inlets were not analyzed or designed as part of this study. Other assumptions included that the outfall detention basins were to be 10' deep with a tailwater depth of 5', or half the overall basin depth. It was also assumed that flow would split equally between each catch basin in a sub-basin. Combined peak flows at the downstream concentration point were used to distribute among catch basins in that sub-basin. Catch basins were assumed to be located at the upstream corners of each intersection along the storm drain run. Generally, there were multiple catch basins within each sub-basin. Storm drain design sizes are also presented in Appendix E as part of each proposed alternative cost analysis. *StormCad* output files are included in Appendix D of this report.

### 3.2 Detention Basin Design

The Buckeye City Park detention basin design consisted of analyzing the available volume in the park per the original request by the Town of Buckeye. The criteria were 4:1 side slopes and 3 foot maximum ponding depth. Based on these criteria, maximum available volume in the Park site is approximately 6.8 ac-ft. Available volume was reduced significantly because existing ground at the park is 2 foot above adjacent ground. The detention basin alternative analysis is presented in Section 5.1. Volume calculations are included in Appendix D.

Other detention basin locations were proposed as part of several alternatives. These basins were generally located at concentration points, and sized based on the hydrologic modeling. The first general location is in the existing farm fields along the Apache Road alignment. Town staff indicated that this may be a feasible location. The second general location is at or near the concentration point at 7th Street and Beloat Road. These basins were not included in the hydrologic models, but were sized using the results of the hydrologic modeling. The criteria used were 10' deep square basins with 4:1 side slopes. Basins were sized for the entire 10-year storm event, and were used to estimate land acquisition costs for comparing the total estimated cost of each alternative.

**Buckeye City Park**

Other detention basin designs include development of detention basin outlet curves for several pipe sizes both at the park and for the other basin locations along the Apache Road alignment. Outlet curves are based on outlet pipes extending from the Buckeye City Park to the BID surface drain at Beloat Road and the Apache Road alignment, approximately 3685'. In addition, outlet curves were developed for a shorter pipe length correlating to a new detention basin in the existing farm fields adjacent to the Apache Road alignment, approximately 2833'. It was the Town and BID staff's preference that any outfall along Apache Road would have to be piped underground to Beloat Road. The outlet curve data was used as the input parameters into the hydrologic models for the park site. Park detention was analyzed for the 100-, 50- and 10-year storm events. These curves, along with the HEC-1 alternative model outputs, are included in Appendix C of this report.

### 3.3 Outfall Channels

The study area has two outfall locations, both are at existing BID surface drains. Since existing storm water is accepted into and conveyed by these surface drains, they make the most reasonable outfalls for any proposed stormwater alternatives. Discussions with BID staff indicate that discharging to their existing surface drains would most likely be allowed. A preliminary hydraulic analysis of these existing channels was performed to

ensure their capacity was greater than the capacity of the proposed detention basin outlet pipes. This analysis also provides a baseline for any additional outlet pipe design. The estimated capacity calculations were performed using Haestad Method's *FlowMaster* software package and Manning's equation. The capacity of the drain at Beloat Road and Apache Road is approximately 300 cfs. The capacity of the local drain at 7th Street and Beloat is approximately 150 cfs. These capacities are well in excess of the capacity required to drain the basins at either location. The surface drain at Beloat Road and the Apache Road alignment is a regional drain running east to west eventually flowing into the Arlington Canal several miles southwest of downtown Buckeye. The surface drain at 7th Street and Beloat flows into the regional surface drain several hundred feet to the south. The *FlowMaster* output summaries are included in Appendix D of this report.

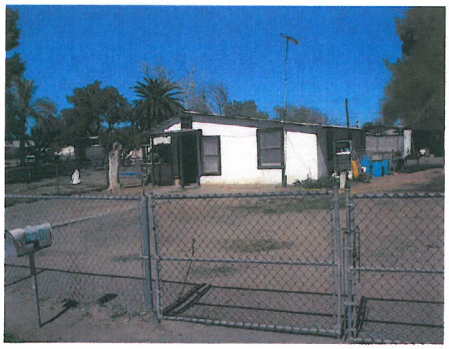
# 4.0 EXISTING CONDITIONS

## 4.1 Historic Flooding

The original request by the Town of Buckeye submitted to FCDMC cited flooding problems in two locations. The first was at MC 85 and 9th Street. The second was at 9th Street and Centre Avenue. The Town indicated that the flooding occurring at 9th Street and Centre Avenue was due to the spill over of excess runoff at MC 85 and 9th Street. Field inspections confirmed that this is most likely the case. At MC 85 and 9th Street, runoff in excess of the storm drain system capacity ponds until it spills over the MC 85 roadway crown and is conveyed south along 9th Street. At 9th Street and Centre Avenue, excess runoff exceeds the capacity of a small catch basin at the southwest corner of the intersection. Ponded flow splits both into the adjacent farm field to the southeast, causing erosion problems, and into the downstream subdivision. Off-site flow into the subdivision overtaxes the onsite retention basins at 8th Street and at Beloat Road.

**Catch Basin at 9th Street and Centre Avenue**

Site inspections with the Buckeye Street Superintendent also revealed several other flood prone areas in or around the study area. The one of main concerns was at 7th Street and Beloat Road. One nearby resident experiences flooding in his home every couple of years. At this location, the capacity of



**Home Which Experiences Periodic Flooding Near 7th Street and Beloat Road**

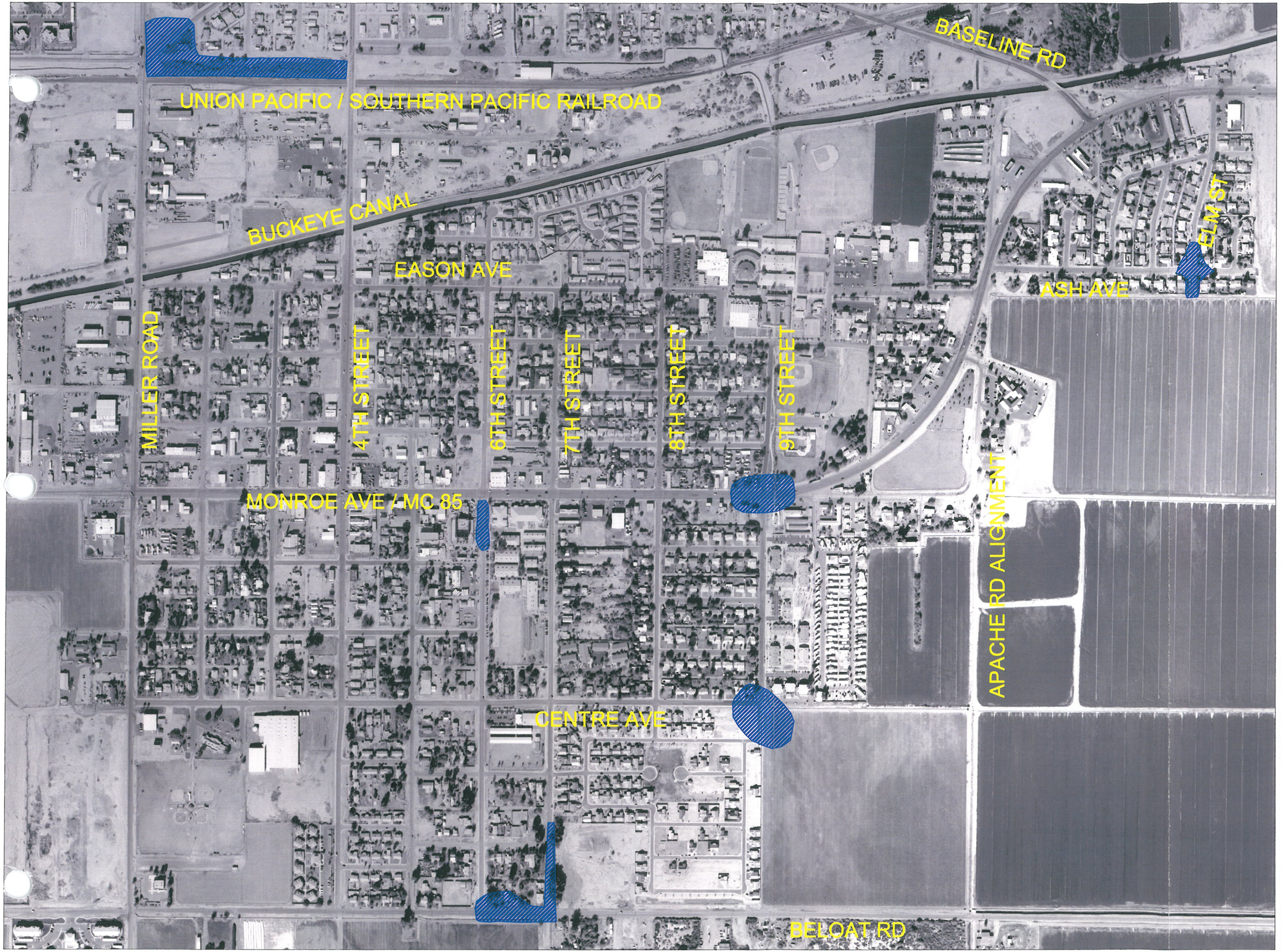
several small pipe culverts designed to convey runoff into the BID surface drain are insufficient resulting in upstream ponding. Several at grade homes in the area are at significant risk of 'getting wet' when this ponding occurs. The finished floor elevations of these homes appear to be at or below the adjacent roadway crown elevations. The other areas noted by the Street Superintendent are outside the study area, and outside this project's scope. They are shown, along with the flood prone areas within the study boundaries, on **Exhibit B - Historic Flooding**. This exhibit also shows an additional flood prone area on 6th Street just south of MC 85. According to the Street Superintendent, the grate at this location acts as a relief outlet for the storm drain system along MC 85. During storm events that exceed the capacity of the storm drain upstream of the grate, storm water flows out of the grate and is conveyed to the south along 6th Street to Beloat Road and into the BID surface drain.

## 4.2 Existing Drainage Features

Downtown Buckeye is approximately 1.5 miles north of the Gila River. The Town is an agrarian farm community, and sits atop old river deposits and valley alluvium. The land slopes north to south at approximately 0.6%. Much of the study area is made up of residential and commercial development, with existing farmland surrounding the Town. Farmland and development have replaced historic stormwater conveyance.

Rainfall runoff generated within the study area is conveyed to the south via the street network. Most of the residential and commercial development pre-dates current stormwater retention requirements. Several onsite retention basins are incorporated in newer developments. MC 85/Monroe Avenue runs east and west directly through the study area. MC 85 acts as a stormwater flow collector, directing north/south flows either east or west to 9th Street. A storm drain was constructed as part of the original MC 85 project in the 1950's. This storm drain system extends from approximately Miller Road to 9th Street. At 9th Street, the storm drain turns south to Centre Avenue. At Centre Avenue, the storm drain again turns east, and discharges at the tail water ditch running along the Apache Road alignment. Flows that exceed the capacity of the MC 85 street capacity and the storm drain system capacity are diverted to the south at each street intersection, and are conveyed to the south to Beloat Road. **Exhibit C** shows drainage features within the study area.

Rainfall runoff upstream of the study area is captured behind the BID canal embankment to the north. According to the *Buckeye Area FDS,* excess runoff overtops the BID canal for both the 100-year 6-hour, and 24-hour storm events. Greater frequency storm events were not analyzed for that study. Canal overtopping was incorporated into the hydrologic modeling for this study as described in Section 2.2 of this report.




# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## BUCKEYE DETENTION BASIN CANDIDATE ASSESSMENT REPORT

LEGEND

HISTORIC FLOODING LOCATIONS OR DRAINAGE PROBLEM AREAS

(SOURCE: TOWN OF BUCKEYE PUBLIC WORKS DIRECTOR AND STREETS SUPERINTENDENT)

SCALE 1"=300'

0 150 300 600

| DATE | REVISION | BY |
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## EXHIBIT B
## HISTORIC FLOODING

| | BY | DATE |
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| DESIGN | GSB | 5/04 |
| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

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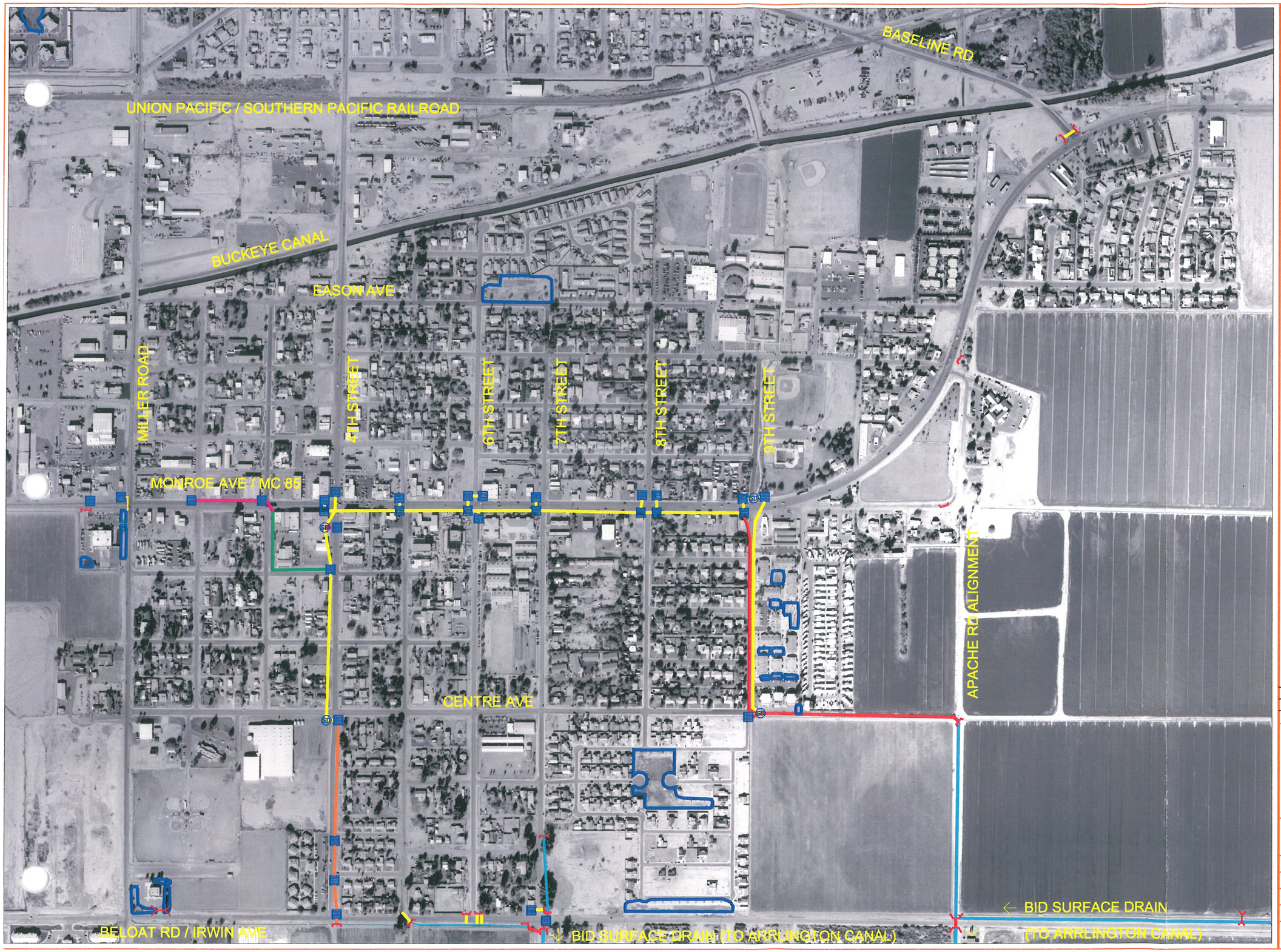
SHEET 1 OF 1




# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## BUCKEYE DETENTION BASIN CANDIDATE ASSESSMENT REPORT

LEGEND

EXISTING FACILITIES

- RETENTION BASINS
- HEADWALLS
- 12" STORM DRAIN/CULVERTS
- 15" STORM DRAIN/CULVERTS
- 18" STORM DRAIN/CULVERTS
- 24" STORM DRAIN/CULVERTS
- 30" STORM DRAIN/CULVERTS
- SURFACE DRAIN/IRR. DITCH
- CATCH BASIN
- STORM DRAIN MANHOLE

SCALE 1"=300'

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EXHIBIT C
EXISTING FACILITIES

| | BY | DATE |
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| DESIGN | GSB | 5/04 |
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| PLANS | GSB | 5/04 |
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SHEET 1 OF 1

**Description of Storm Drain**

As previously stated, storm drain was installed as part of the original MC 85 construction project. MC 85 was originally constructed as the Buckeye-Phoenix State Highway by the State Highway Department (ADOT). Ownership of the highway was later transferred to the County. As-built plans for MC 85 obtained for this study are dated May 1, 1959. Through field inspections and interviews with Town staff, it is clear that the original storm drain system along MC 85 has not been improved since its installation. **Exhibit C** shows pipe sizes and catch basin locations for this system. The storm drain capacity was not analyzed as part of this project, but was assumed to be fairly insignificant for storm event of 10-year or greater due to pipe size and pipe lengths.

**Typical Catch Basin along MC 85/Beloat Road**

Subsequent to the construction of MC 85, additional storm drains have been constructed by the Town along 4th Street and along 9th Street. An 18" storm drain line connects to the MC 85 system, and runs down 4th Street to Centre Avenue. At Centre Avenue, the 18" line connects to a newer 30" line constructed as part of a recent roadway improvement project along the east side of the 4th Street. The 30" line runs from Centre Avenue to Beloat Road, and outfalls in the irrigation supply ditch running west to east along the south side of Beloat Road.

Along 9th Street, the Town extended the original 24" line from MC 85 to Centre Avenue, and added a second 18"± line parallel to the original line. Both lines run from MC 85 to a manhole at Centre Avenue. From the manhole, a 24" line runs to the east to an irrigation tailwater ditch running north/south along the Apache Road alignment.

**Storm Drain Outlet in Irrigation Ditch along Beloat Road**

In addition to the storm drain system within the study area, several small pipe culverts convey storm water under Beloat Road to a drainage swale running along the south side of the road to the BID surface drain. The drain eventually dumps into the Arlington Canal several miles southwest of downtown Buckeye.

**Existing Retention Basins**

Most of the Town was developed before current retention requirements were established. There are several more recent developments that have on-site retention within the study area. It is assumed that these basins provide 100-year, 2-hour on-site retention volume. These basins were not included in the hydrologic models due to lack of specific retention volumes for each basin, and because they provide a relatively small storage volume in

relation to the total runoff volumes generated within the study area. These retention basins are shown in **Exhibit C**.

### 4.3 Existing Flood Mapping

The current FEMA Flood Insurance Rate Maps (FIRM) for this project, map numbers 04013C2040 F and 04013C2505 G (effective date July 19, 2001) show the entire study area in special flood hazard Zone X. Zone X is defined as *Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.* Immediately adjacent to the study boundaries are Zone AH and Zone AE special flood hazard areas. The Zone AH areas represent ponding flood hazards upstream of the BID canal, and were mapped as part of the *Buckeye Area FDS* in 1992. Zone AH is defined as *Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.* The Zone AE special flood hazard areas represent the floodway fringe of the Gila River, and extend right to the southeast corner of the study boundary. Zone AE is defined as special flood hazard areas inundated by 100-year flood; *Base flood elevations determined.* The FIRM panels for the study area are included in Appendix B.

### 4.4 Current Plans for Facilities by Others

At this time, there are no known drainage conveyance facilities planned by others. There is the ongoing *Buckeye/Sun Valley ADMS* being conducted by FCDMC that encompasses the Buckeye CAR study area as noted in Section 1.2. This large regional study may lead to an ADMP that may propose drainage improvements that could affect the project area. Drainage improvement alternatives proposed by this report could be designed and constructed long before any ADMP recommendations could be implemented.

## 5.0 TOWN OF BUCKEYE PROPOSED DRAINAGE SYSTEM ANALYSIS

### 5.1 Buckeye City Park Detention

The original request by the Town of Buckeye was for funding through FCDMC's CIP prioritization procedure for a detention basin in the existing Buckeye City Park. Buckeye's request stated a total estimated project cost of $1.5 million, with a 50% cost share between the Town and FCDMC. FCDMC asked PEC to evaluate this request from a technical feasibility standpoint. This evaluation consisted of applicable hydrologic and hydraulic analyses, as well as the identification of potential utility conflicts and other fatal flaws. In addition, PEC completed feasibility level cost estimates for the

construction of a detention basin in the City Park along with feasibility level cost estimates for other proposed alternatives.

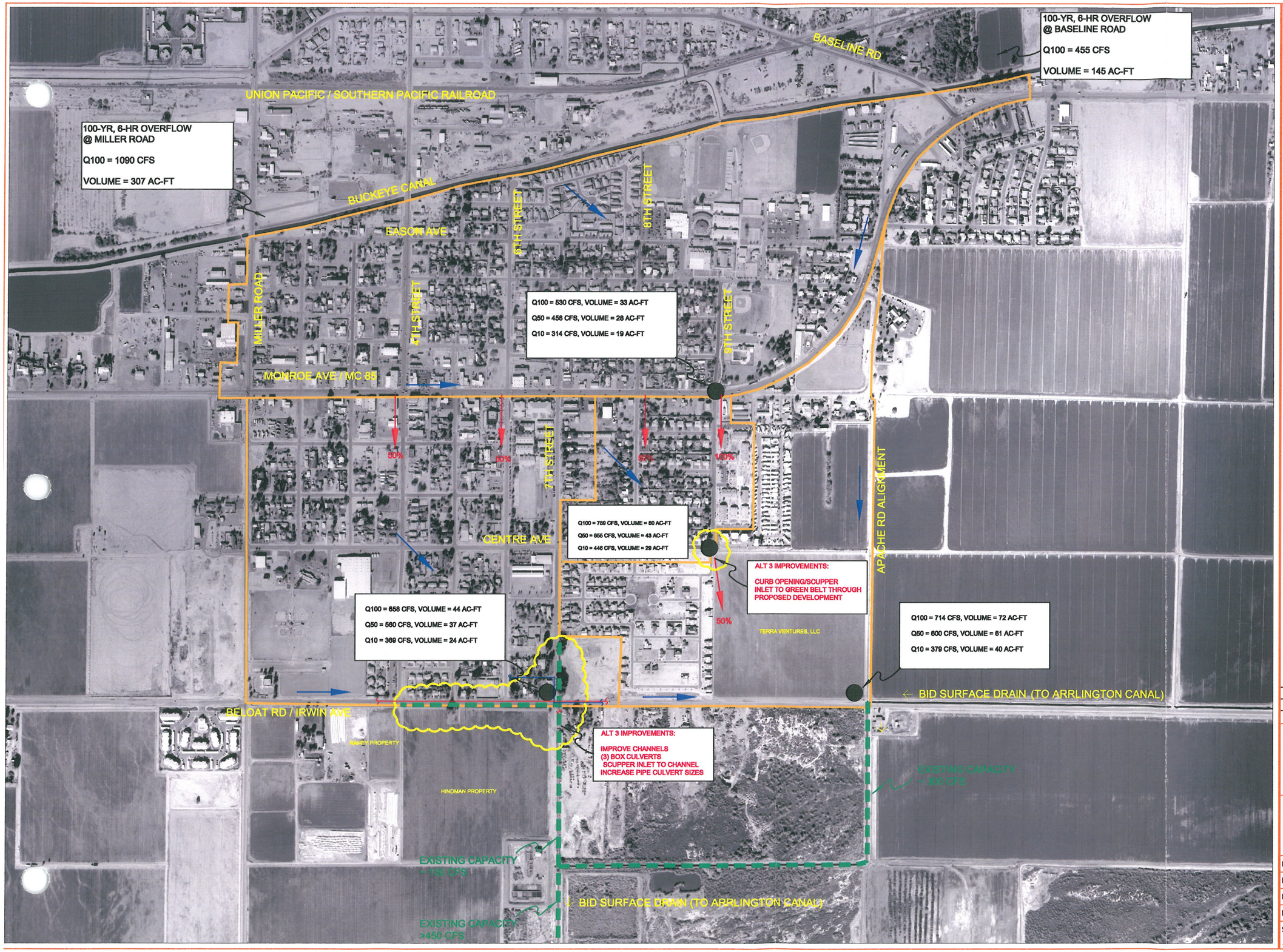
During the initial site visits and meetings with the Town, several limiting factors were observed or established for the proposed site. The first is that the park is approximately 2' above existing ground. This makes storm water storage in the most efficient (the top) portion of any basin excavation very difficult. In order to utilize this portion of the basin excavation, inlets to the basin would have to be located far enough upstream to match the top of basin elevation. While this may be somewhat feasible upstream to the east along MC 85, it would not be practical to the west along MC 85. Much of the upstream contributing area to the west could not be captured. Freeboard requirements would also limit the use of the top of the basin.

Another limiting parameter is the area available in the park. Approximately 2.9 acres of surface area is available for the detention basin. Sloping at 4:1 to a depth of 2' reduces the available area to approximately 2.5 acres. The Town of Buckeye's drainage criteria limits side slopes to 4:1, and ponding depths to 3'. Based on these criteria, the maximum available volume in the park is approximately 6.8 acre-ft using the average end method. For comparison, the existing conditions 100 and 10-year, 6-hour volumes at 9$^{th}$ Street and MC 85 are 33 and 19 acre-ft respectively.

PEC used these parameters to analyze the affects of the proposed detention basin in the hydrologic models. **Exhibit D** shows the existing conditions peak flow and volumes at several prominent concentration points. The concentration points are located at the three points of flooding previously described and the study area outfalls. **Exhibit E** shows the peak flow and volumes at the concentration points with the detention basin included in the hydrologic models. The results of this comparison show that the basin would only be effective for smaller storm events. For the 10-year, 6-hour storm event, peak flow and volume at 9$^{th}$ Street and Centre Avenue would be reduced by approximately half, but would still be substantial at 291 cfs and 14 ac-ft. For larger storm events, the basin has little effect. It was assumed that there was no BID canal overflow for this alternative. Runoff ponding against both the BID canal and the railroad tracks is better handled regionally before overtopping occurs. These overflows should be addressed in the *Buckeye/Sun Valley ADMS* and the future ADMP.

At the concentration point adjacent to the park (basin site), inlet improvements would be effective in reducing ponded flow for storms up to the 10-year event. Larger storm events would still cause considerable ponding due to the lack of available detention volume and inlet capacity.

At 7$^{th}$ Street and Beloat Road, the third point of flooding identified during this study, the proposed detention basin has no affect.




# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## BUCKEYE DETENTION BASIN CANDIDATE ASSESSMENT REPORT

### LEGEND

- AREA OF PROPOSED IMPROVEMENTS
- CONCENTRATION POINTS
- POTENTIAL EXISTING OPEN CHANNEL OUTFALLS
- FLOW DIRECTION
- FLOW SPLITS (50%)
- CONTRIBUTING AREA BOUNDARIES
- SOUTHWEST GAS UNDERGROUND UTILITY
- QWEST COMMUNICATIONS UNDERGROUND UTILITY

SCALE 1"=400'

0 200 400 800

| DATE | REVISION | BY |
|---|---|---|
| | | |
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PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4
PHOENIX, ARIZONA 85021

## EXHIBIT D
## PROPOSED ALTERNATIVES
## EXISTING CONDITIONS (ALT 1), ALT 3
## LOCALIZED DRAINAGE IMPROVEMENTS

| | BY | DATE |
|---|---|---|
| DESIGN | GSB | 5/04 |
| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

SUBMITTED BY: DATE:

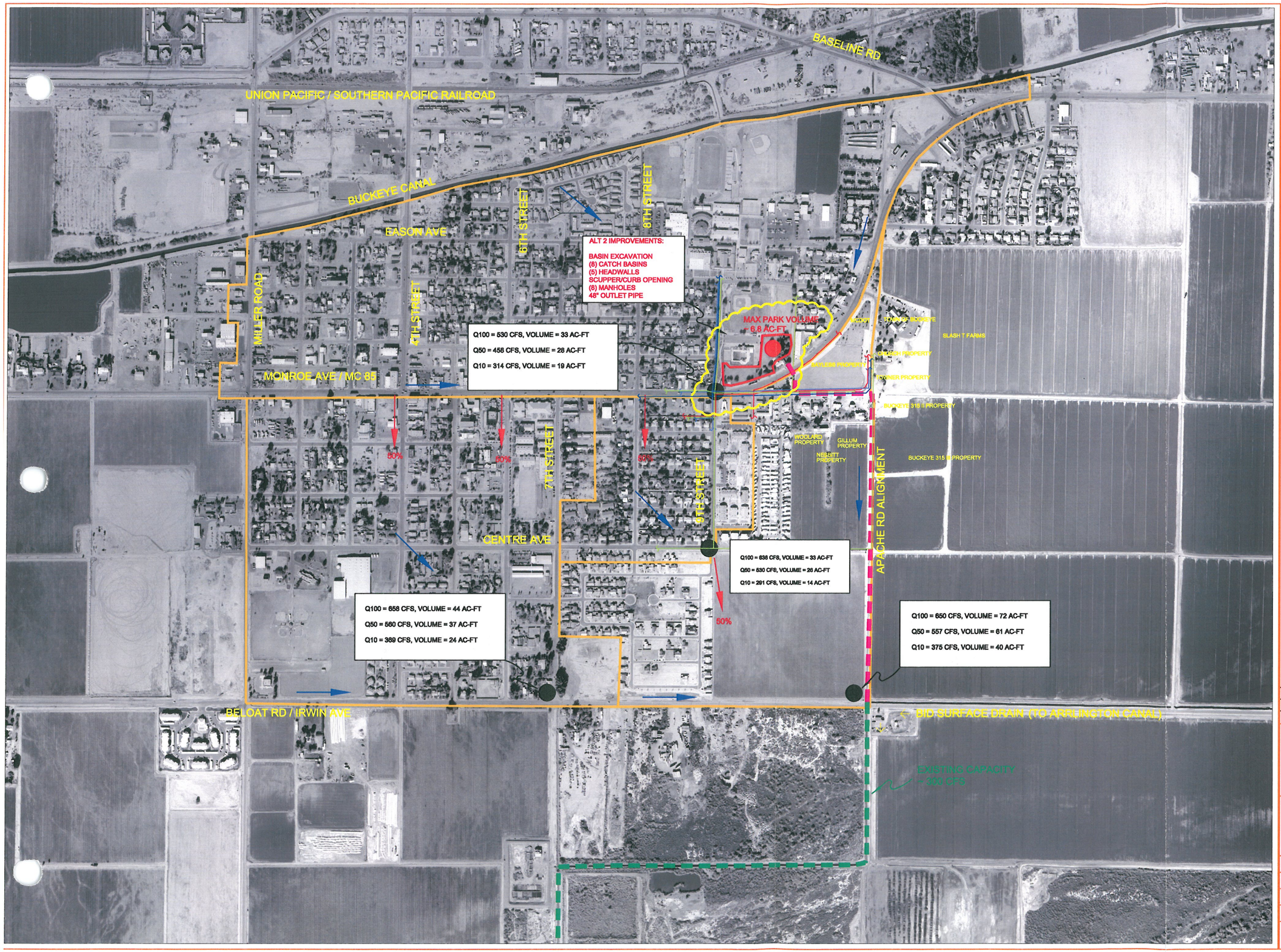
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 1




# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## BUCKEYE DETENTION BASIN CANDIDATE ASSESSMENT REPORT

### LEGEND

- AREA OF PROPOSED IMPROVEMENTS
- POTENTIAL DETENTION LOCATIONS
- CONCENTRATION POINTS
- POTENTIAL EXISTING OPEN CHANNEL OUTFALLS
- POTENTIAL PIPE OUTFALL ALIGNMENTS
- FLOW DIRECTION
- FLOW SPLITS (50%)
- CONTRIBUTING AREA BOUNDARIES
- TOWN OF BUCKEYE WATER
- TOWN OF BUCKEYE SEWER
- SOUTHWEST GAS UNDERGROUND UTILITY
- QWEST COMMUNICATIONS UNDERGROUND UTILITY

SCALE 1"=400'

0 200 400 800

| DATE | REVISION | BY |
|---|---|---|

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4
PHOENIX, ARIZONA 85021

## EXHIBIT E
## PROPOSED ALTERNATIVES
## ALT 2–PARK DETENTION

| | BY | DATE |
|---|---|---|
| DESIGN | GSB | 5/04 |
| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 1

Based on these analyses, a detention basin located in the Buckeye City Park would have very limited affect for storms greater than the 10-year event. The proposed detention basin could provide the required volume for somewhere between a 2 and 5 year storm event. These higher frequency storms were not analyzed as part of this project. The proposed basin could be designed to effectively detain the 10-year, 6-hour storm event, but ponding depths would have to be increased to approximately 8'. This would generate approximately 12 ac-ft of storage. While this would provide an acceptable level of protection for the 10-year storm event at two of the three flood prone areas identified as part of this study, it would have no affect at the third. Utility alignments adjacent to the park are shown on **Exhibit E**. Cost analysis for the proposed basin is included with the cost analysis for other proposed alternative in Section 6.2.

# 6.0 ALTERNATIVES

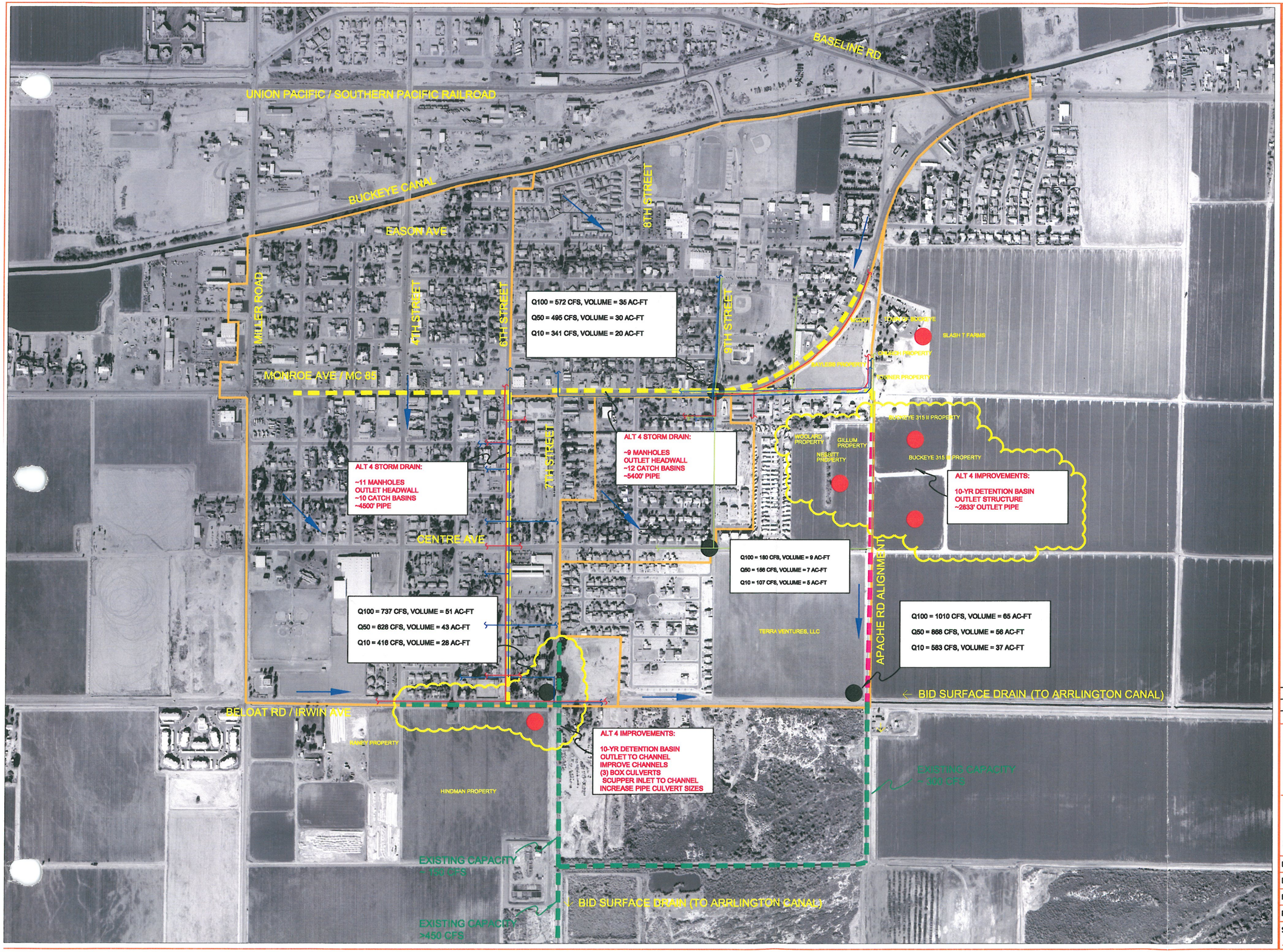
## 6.1 Proposed Alternatives

The following is a list and description of the proposed alternatives, in addition to the City Park detention basin, analyzed for this project. The development of these alternatives was based on the hydrologic and hydraulic analyses described above. **Exhibits D** through **G** highlight graphically each proposed alternative. These Exhibits also show land ownership and potential underground utility conflicts adjacent to the proposed improvements. Land ownership information is only shown for areas where detention basins may be located. Data on the Town of Buckeye's water and sewer infrastructure was only obtained adjacent to the City Park. It is likely that both water and sewer lines run along all or part of MC 85. Utility conflicts will have to be analyzed during future design activities. It was assumed that there was no BID canal overflow for these alternatives. Runoff ponding against both the BID canal and the railroad tracks is better handled regionally before overtopping occurs. These overflows should be addressed in the *Buckeye/Sun Valley ADMS* and the future ADMP.

**Alt 1 – Do Nothing** – This alternative would be to do nothing to mitigate or alleviate existing flooding problems. Although there is no capital improvement cost associated with this alternative, there are the costs associated with damages sustained in the case of flooding. **Exhibit D** shows the existing conditions peak flows and volumes at the flood prone locations and study area outfalls.

**Alt 2 – Park Detention and Outfall** – See **Exhibit E** and **Section 5.1**

**Alt 3 – Localized Drainage Conveyance Improvements at Points of Flooding** – This alternative was developed as an economical stop-gap fix to the main existing flooding problems. Flooding at 7$^{th}$ Street and Beloat Road and at 9$^{th}$ Street and Centre Avenue is mainly due to undersized storm drain and/or outfall conveyance. By increasing




# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## BUCKEYE DETENTION BASIN CANDIDATE ASSESSMENT REPORT

### LEGEND

- AREA OF PROPOSED IMPROVEMENTS
- POTENTIAL DETENTION LOCATIONS
- CONCENTRATION POINTS
- POTENTIAL EXISTING OPEN CHANNEL OUTFALLS
- POTENTIAL PIPE OUTFALL ALIGNMENTS
- POTENTIAL STORM DRAIN ALIGNMENTS
- FLOW DIRECTION
- CONTRIBUTING AREA BOUNDARIES
- TOWN OF BUCKEYE WATER
- TOWN OF BUCKEYE SEWER
- SOUTHWEST GAS UNDERGROUND UTILITY
- QWEST COMMUNICATIONS UNDERGROUND UTILITY

SCALE 1"=400'

0 200 400 800

| DATE | REVISION | BY |
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PHOENIX, ARIZONA 85021

## EXHIBIT F
## PROPOSED ALTERNATIVES
## ALT 4– STORM DRAIN AND DETENTION

| | BY | DATE |
|---|---|---|
| DESIGN | GSB | 5/04 |
| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

SUBMITTED BY: DATE:

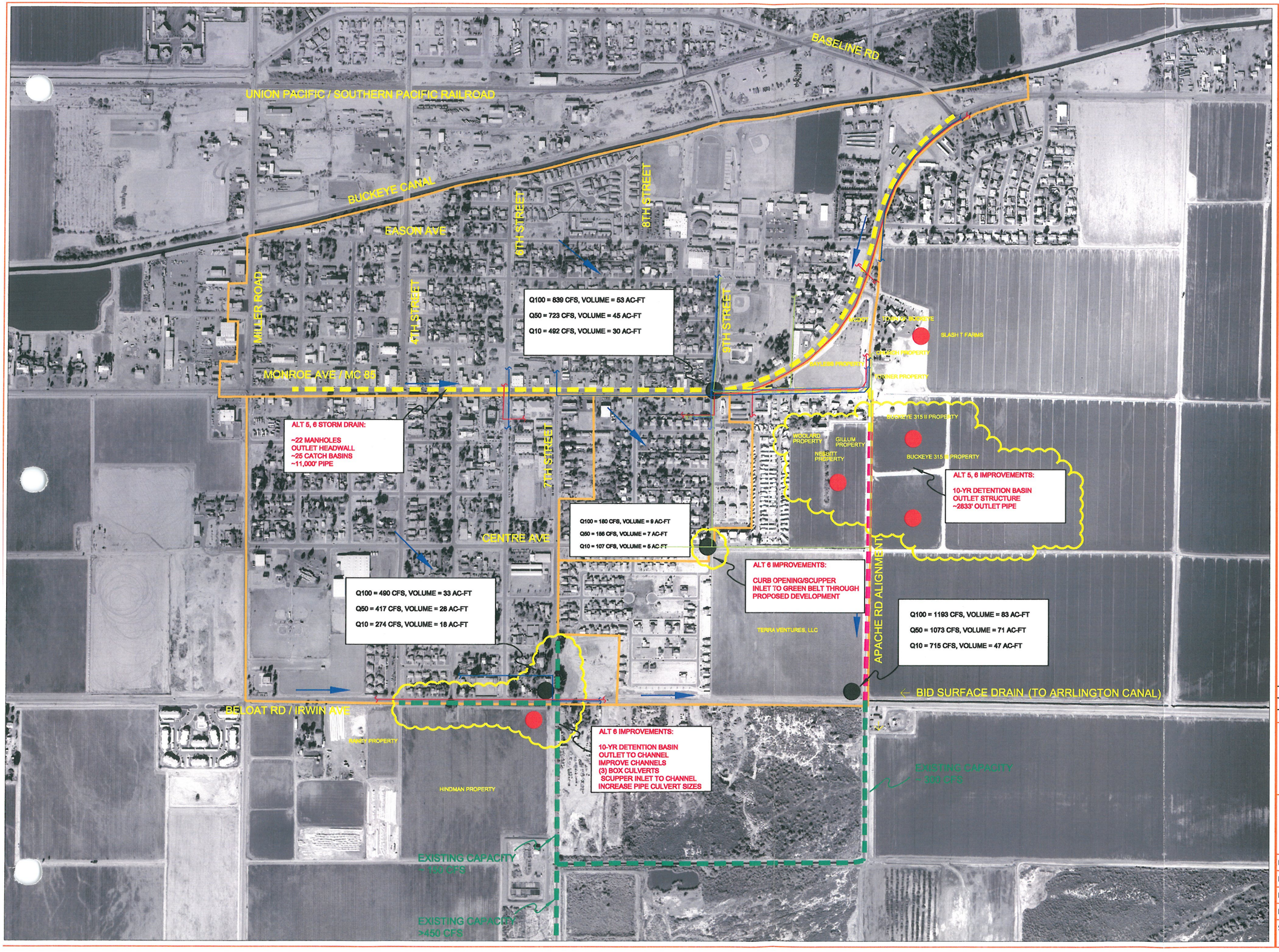
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 1




# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## BUCKEYE DETENTION BASIN CANDIDATE ASSESSMENT REPORT

### LEGEND

- AREA OF PROPOSED IMPROVEMENTS
- POTENTIAL DETENTION LOCATIONS
- CONCENTRATION POINTS
- POTENTIAL EXISTING OPEN CHANNEL OUTFALLS
- POTENTIAL PIPE OUTFALL ALIGNMENTS
- POTENTIAL STORM DRAIN ALIGNMENTS
- FLOW DIRECTION
- CONTRIBUTING AREA BOUNDARIES
- TOWN OF BUCKEYE WATER
- TOWN OF BUCKEYE SEWER
- SOUTHWEST GAS UNDERGROUND UTILITY
- QWEST COMMUNICATIONS UNDERGROUND UTILITY

SCALE 1"=400'

0 200 400 800

| DATE | REVISION | BY |
|---|---|---|

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4
PHOENIX, ARIZONA 85021

## EXHIBIT G
## PROPOSED ALTERNATIVES
## ALT 5, 6
## STORM DRAIN AND DETENTION

| | BY | DATE |
|---|---|---|
| DESIGN | GSB | 5/04 |
| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 1

conveyance capacity, flooding frequency can be significantly reduced. At 7th Street and Beloat Road, this means replacing existing pipe culverts with larger pipes and box culverts. At 9th Street and Centre Avenue, this would mean providing conveyance to the study area outfall at Beloat Road and the Apache Road alignment. This could be accomplished by adding a scupper or curb opening inlet in place of the existing catch basin, then requiring the proposed development to the southeast to provide a means of conveyance through or around the planned development. Although it is unknown how far along in the platting process this planned development is, it is a general requirement of most jurisdictions that offsite flows are to be routed through or around the project site and returned to their historic location and condition. **Exhibit D** graphically highlights the key features of this alternative.

**Alt 4 – 10-year Storm Drain with 10-year Basins at 7th Street/Beloat Road and along the Apache Road Alignment** – This alternative was developed in an effort to gauge the effectiveness of a storm drain backbone and additional detention basin capacity at key locations. This includes a preliminary 10-year storm drain design running along MC 85 from Miller Road to 6th Street. From there, the storm drain turns south, and runs along 6th Street to the outlet at Beloat Road. The first detention basin would be located at or near this location. An additional storm drain line begins along MC 85 just east of 6th Street, and continues to a second proposed detention basin site somewhere adjacent to the Apache Road alignment. Storm drain design was limited to 10-year because pipe sizes and cost for less frequent storm events would be very large. The existing conditions HEC-1 hydrologic model was modified for this alternative to determine the resulting peak flows and volumes at each potential detention basin site based on the rerouting of historic flow patterns due to the proposed storm drain. Land acquisition costs for the detention basins were estimated based on 10' deep square basins. **Exhibit F** illustrates the components of this alternative. The HEC-1 model output and storm drain design output are included in Appendix C.

**Alt 5 – 10-year Storm Drain with 10-year basin along the Apache Road Alignment** – This alternative was developed in an effort to gauge the effectiveness of a storm drain backbone running through downtown Buckeye west to east either along either MC 85 or Centre Street or both. The storm drain system would outlet to a single basin located somewhere adjacent to or near the Apache Road alignment. Again, storm drain size was limited to a 10-year design. The existing conditions HEC-1 hydrologic model was modified for this alternative to determine the resulting peak flows and volumes at each potential detention basin site based on the rerouting of historic flow patterns due to the proposed storm drain. Land acquisition cost for the detention basin was estimated based on a 10' deep square basin. **Exhibit G** illustrates the components of this alternative. The HEC-1 model output and storm drain design output are included in Appendix C.

**Alt 6 – Combination of Alt 3 and Alt 5** – This alternative was developed because Alternative 5 does not provide an adequate level of protection at 7th Street and Beloat

Road. While Alternative 5 would cut off all runoff upstream of MC 85 impacting 7th Street and Beloat Road, runoff generated south of MC 85 is still significant. This alternative would provide a backbone storm drain and detention basin system for downtown Buckeye in addition to providing drainage improvements at the noted points of flooding. **Exhibit G** is a schematic representation of this alternative.

## 6.2 Utilities

Utility information for this study was collected to aid in the development of feasible alternative locations. The following is a summary of this information.

**Town of Buckeye** – The Town of Buckeye provides water and sewer service in the project area. Appendix F contains the water and sewer maps provided by the Town for the area immediately adjacent to the Buckeye Town Park. This area was targeted for potential improvements in the original proposal by the Town. The Town also maintains the storm drain infrastructure in the downtown area. Storm drain sizes and horizontal alignment are shown on **Exhibit B**.

**Arizona Public Service** – Arizona Public Service (APS) provide electrical service to the study area. Most of the service lines are overhead. Underground lines are located mostly at service connections.

**Qwest** – Qwest provides telephone service to the study area. Qwest's infrastructure is mostly underground, and will have to be considered for most of the mitigation alternatives developed as part of this study. Utility maps provided by Qwest are included in Appendix F.

**Southwest Gas** – Southwest Gas provides natural gas service in the study area. Gas line relocation will have to be considered for most of the mitigation alternatives developed as part of this study. Utility maps provided by Southwest Gas are included in Appendix F.

**Cox Communications** – Cox provides cable television service to the study area. Most cable television service lines are above ground.

## 6.3 Cost Analysis

A feasibility level capital improvement project (CIP) cost analysis for each alternative was performed. These analyses were then used to help rank each alternative. The CIP cost analyses were estimates of the major items, and do not include many of the details needed for an accurate bid. These estimates do represent a reasonable number for the CIP

cost of each proposed alternative. They also provide the means to compare the relative CIP cost of each proposed alternative. **Table 4** lists the estimated CIP cost of each alternative. The detailed cost estimate sheets are included in Appendix E.

**Table 4 - Alternative Cost Estimates**

| Alternative | Estimated CIP Cost |
|---|---|
| Alt 1 | $0 |
| Alt 2 | $726,595 |
| Alt 3 | $353,359 |
| Alt 4 | $3,578,750 |
| Alt 5 | $3,279,200 |
| Alt 6 | $3,789,249 |

While there is no associated CIP cost for Alt 1, there is the cost to repair any damage sustained during a storm event. At MC 85 and 9th Street, excess ponding due to storm water runoff mainly results in traffic disruptions. Cost of these disruptions would be very difficult to quantify. At 9th Street and Centre Avenue, flooding results in erosion to the adjacent farm field. The adjacent farm field is slated for proposed development, currently in the planning stages. It is unknown how the existing peak flows and volumes would effect the development if unaccounted for in the proposed design. At 7th Street and Beloat Road, flooding results in at least one residence experiencing flood damage inside the structure. The homeowner of this structure stated that damage occurs "every couple of years." This would seem to indicate that damage to the structure occurs even for higher frequency events. The cost to buy out this home is estimated at $65,000 based on similar homes in the area. If flood damage totals 10% of the home's value, cost to repair the damage would be $6,500 every "couple of years." Because many homes in the area are at or just slightly above grade, it is also reasonable to assume that damage could occur to many more homes during very large storm events.

## 6.4 Ranking of Alternatives

To aid in the ranking of alternatives, and in an effort to establish a preferred alternative, two slightly different ranking schemes were used. In the first, alternatives were ranked first to last in cost and level of protection at the three flood prone locations. The three locations are 7th Street and Beloat Road, 9th Street and Centre Avenue and 9th Street and MC 85. These three locations were chosen because they were cited as the areas which experienced fairly regular flooding in the original request by the Town of Buckeye. The value of each category was summed to determine an overall rank. The level of protection rank at 7th Street and Beloat Road was weighted by 1.5 because at least one residence at this location experiences flooding approximately once every two years according to the home owner. At the other locations, flooding mostly results in road closures, farm field damage and nuisances to motorists. **Table 5** below lists the results of this ranking scheme.

**Table 5 - Alternative Rankings #1**

| Alternative (Description) | CIP Cost | Cost Rank | Level of Protection Rank @ 7th and Beloat (x1.5) | Level of Protection Rank @ 9th and Centre | Level of Protection Rank @ 9th and Monroe | Total | Overall Rank |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| Alt 1 (Do Nothing) | $0 | 1 | 5 (7.5) | 5 | 3 | 16.5 | 5 |
| Alt 2 (Park Detention) | $726,595 | 3 | 5 (7.5) | 4 | 2 | 16.5 | 5 |
| Alt 3 ( Localized drainage improvements at points of flooding) | $353,359 | 2 | 3 (4.5) | 2 | 3 | 11.5 | 3 |
| Alt 4 (10-yr storm drain w/ 10-yr basins @ 7th/Beloat and Apache) | $3,578,750 | 5 | 2 (3) | 1 | 1 | 10 | 2 |
| Alt 5 (10-yr storm drain w/ 10-yr basin @ Apache) | $3,279,185 | 4 | 4 (6) | 3 | 1 | 14 | 4 |
| Alt 6 (Combination of Alt 2 and Alt 5) | $3,789,249 | 6 | 1 (1.5) | 1 | 1 | 9.5 | 1 |

The second ranking scheme is exactly the same as the first except cost is weighted by a factor of 2.

**Table 6 - Alternative Rankings #2**

| Alternative (Description) | CIP Cost | Cost Rank (x2) | Level of Protection Rank @ 7th and Beloat (x1.5) | Level of Protection Rank @ 9th and Centre | Level of Protection Rank @ 9th and Monroe | Total | Overall Rank |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| Alt 1 (Do Nothing) | $0 | 1 (2) | 5 (7.5) | 5 | 3 | 17.5 | 4 |
| Alt 2 (Park Detention) | $726,595 | 3 (6) | 5 (7.5) | 4 | 2 | 19.5 | 6 |
| Alt 3 ( Localized drainage improvements at points of flooding) | $353,359 | 2 (4) | 3 (4.5) | 2 | 3 | 13.5 | 1 |
| Alt 4 (10-yr storm drain w/ 10-yr basins @ 7th/Beloat and Apache) | $3,578,750 | 5 (10) | 2 (3) | 1 | 1 | 15 | 2 |
| Alt 5 (10-yr storm drain w/ 10-yr basin @ Apache) | $3,279,185 | 4 (8) | 4 (6) | 3 | 1 | 18 | 5 |
| Alt 6 (Combination of Alt 2 and Alt 5) | $3,789,249 | 6 (12) | 1 (1.5) | 1 | 1 | 15.5 | 3 |

# 7.0 RECOMMENDATIONS

## 7.1 Recommended Alternatives

There are several factors to consider when choosing a preferred alternative. If cost were not a factor, Alts 4 and 6 both provide the best level of protection for the three noted flood prone locations. These alternatives also provide a beneficial backbone storm drain and detention basin system for downtown Buckeye. Both alternatives are similar, but have different storm drain alignments. Alt 4 routes storm drain along MC 85 and 6th Street in two separate runs. Because of this, an additional detention basin is required at or near 7th Street and Beloat Road. This means additional property acquisition. Alt 6 consists of a single storm drain run along MC 85 to a detention basin somewhere along the Apache Road alignment. Alt 6 could also be designed as two parallel storm drain alignments, one along MC 85 and a second along Centre Avenue. This would decrease the required pipe sizes for a minimal increase in cost, but would still only require a single detention basin.

In the absence of available funding, Alt 3 provides reasonable levels of protection at a fraction of the cost of Alts 4 and 6. This alternative is contingent, however, on the ability of the planned development southeast of 9th Street and Centre Avenue to convey offsite flows through or around the project site. This alternative also does not provide conveyance improvements at any locations other than the two most problematic points of flooding. It would, however, mitigate the repetitive flooding damage experienced at both locations. Alt 3 improvements would also provide permanent conveyance upgrades at these two locations no matter what improvements are constructed in the future. Because the two points of flooding are located at study area low points, they will always experience significant storm water flows, even if it is highly localized. Since Alt 3 is part of Alt 6, Alt 3 improvements could be constructed as the first phases of the overall improvement project.

Other consideration in the determination of a viable alternative include the presence of 100-year FEMA designated floodway fringe at Beloat Road and the Apache Road alignment. The presence of a FEMA Special Flood Hazard Area does not prohibit discharging at this location. It does, however, present additional regulatory considerations.

Based on these factors, and the above analyses, **Alt 6** is the recommended alternative. **Alt 6** provides the best level of protection combined with the most effective storm drain alignment and minimized land acquisition requirements. Since **Alt 6** incorporates Alt 3, it also provides immediate cost effective localized improvements coupled with longer term downtown wide backbone improvements.

## 7.2 Recommendations and Future Studies

It became clear over the course of this study that the Town's drainage infrastructure is either undersized, or nonexistent. This is the primary reason for the likelihood of flooding in the noted locations. A detention basin at the present day City Park begins to address these problems, but does not adequately satisfy flooding concerns in all locations. The same is true for upgrading the storm drain system along MC 85. Through discussions with Town staff, it was learned that other detention basin locations of adequate size are feasible. This would also be a positive start, but still require significant conveyance infrastructure. Alts 4 and 6 begin to examine the infrastructure and costs necessary to incorporate these types of improvements. The Town generally has good slope, and drains well. A 10-year storm drain system would significantly reduce the likelihood of flooding during a high percentage of storm events. Even during a large event, a 10-year storm drain design would take the 'edge' off of runoff, allowing the Town's positive slope to drain the remaining storm water quickly. In light of this, any infrastructure improvements must be carefully designed to prevent blocking existing flow paths and creating additional flooding problems.

It should be noted that none of the proposed alternatives provide 100-year conveyance improvements for all or even part of downtown Buckeye. 100-year storm drain sizes for a collection system along MC 85 or any point downstream would become prohibitively large and expensive. A more widely distributed system with multiple outlets/detention basins would be much more efficient. These analyses are beyond the scope of this study however. If 100-year protection is desired for the downtown area, a drainage master plan would provide invaluable analyses and data. A drainage master plan would allow the Town to take advantage of existing street conveyance and storm drain capacity, determine the necessity of additional street conveyance improvements, identify potential neighborhood detention basin locations and the best possible location for addition storm drain. The benefits of a drainage master plan would not be limited to 100-year design improvements. A drainage master plan would simply allow the Town to maximize existing topographic and drainage features while efficiently designing necessary improvements. The ongoing *Buckeye/Sun Valley ADMS* and subsequent ADMP will provide a regional drainage master plan. The level of detail may not be sufficient, however, to implement specific drainage improvements within this study are and downtown Buckeye.

An addendum to this report is currently in the process of being completed. The addendum will break up the proposed improvements for the recommended alternative, Alt 6, into a four year implementation schedule. The break down will be based on a logical construction/land acquisition sequence, as well as fiscal year expenditures. The addendum should be completed by early July, 2004.

# APPENDIX A

**Study Area Photos**
**(Photos attached in electronic format)**

# APPENDIX B

**Data Collection / Meeting Notes**

**Data collection Summary Report**

PBS&J

- Original MC85 as-builts.
- Buckeye Area Floodplain Delineation Study Hydrology Report.
- Buckeye Area Floodplain Delineation Study Hydraulic Report.
- Buckeye Area Floodplain Delineation Study Work Maps.
- Aerial photos from ongoing Buckeye/Sun Valley ADMS.
- Historic aerial photos of Buckeye area.
- Survey points in text file along Buckeye Irrigation District Canal.
- Data collection summary from the ongoing Buckeye/Sun Valley ADMS.

FCDMC

- Dtm data in point files and line files from Buckeye/Sun valley ADMS and Salt/Gila River Master Plan.
- Aerial photos in several resolutions for the project area in electronic tiff and MrSid format.
- Dxf files representing 2 and 4-foot contours, land use, soils, streets, structures, land ownership, survey control, floodplain and other data.
- 6 hour and 24 hour HEC-1 electronic input files from Buckeye Area Floodplain Delineation Study.

Utilities

- Quarter Section utility maps from Qwest – hard copy
- Quarter Section utility maps from APS – hard copy
- Quarter Section utility maps from Southwest Gas – electronic tiff files
- Quarter Section utility maps from Cox Cable – hard copy
- 8.5" x 11" nts exhibit showing approximate location and size of City sewer lines around the Buckeye Town Park.
- 8.5" x 11" nts exhibit showing approximate location and size of City water lines around the Buckeye Town Park.

Miscellaneous

- Several Buckeye Valley brochures from the Buckeye Chamber of Commerce
- Map of lands within Buckeye Water Conservation and Drainage District serviced by Buckeye Irrigation Company showing main canals and company laterals, surface drains, and wells as of Sept. 1, 1959.

**Field Visit Summary**

**12/15/03**

- Electrical power to park is provided by APS
- There is a storm drain outlet at 4th Street and Beloat Rd that appears to come from MC85 along 4th Street.
- There is an earthen outlet channel at 7th Street and South Street. The channel runs south to the river from that point.
- The park is elevated substantially above the adjacent streets.
- Residential streets NW of park: East/west streets flow either east or west with high points in the middle of blocks. North/south streets flow south to MC85
- Storm drain appears to have been modified in several locations since original construction.
- Need to acquire historic flood data (museum, town engineer) and drainage reports.
- Need better understanding of storm drain system.
- Questions for Town Engineer:
    - Do you have any hydrology reports for the study area other than the FDS (drainage reports from development)?
    - As-built plans for storm drain, explanation of system, sizes and outfalls
    - Planned drainage improvements?
    - Historic flooding?
    - Design criteria for detention basin? How much of park is usable? Depth, side slopes etc.
    - Utility locations (sewer) that may conflict with design alternatives.

**Phone log**

1/21/04

Called Valerie Swick to request electronic HEC-1 files from the Buckeye Area FIS. Left message.

Received call from Julie Cox of FCDMC. She emailed the requested HEC-1 files immediately after phone call.

1/27/04

Called Carroll Reynolds, Public Works Director for the Town of Buckeye, and set up meeting for 1/29/04 at 11 AM. We will meet at The Buckeye Public Works Department.

Called Valerie Swick to inform her about the meeting. Left message which she returned promptly. She will also attend the meeting on 1/29/04.

Called Buckeye Irrigation District and left Message for Jacki Meck. I said we were working on a FCDMC project in Buckeye and that we would like to meet with BID. Would be in Buckeye on Thursday for a meeting with the City in the morning and would like to meet with BID in the afternoon.

Called Roosevelt District and spoke with Stan Ashby. I told him that we are working on a FCDMC project in Buckeye. I gave him the boundaries and asked it the RID district was included. Stan said that there were not. The RID district ends at the north side of BID canal.

2/3/04

Called Mike Williamson of the Town of Buckeye. According to Carroll Reynolds, Mike has extensive knowledge about the Town's storm drain system and historic flood locations. Mike was home sick. I told him I would call him back in a couple days.

2/4/04

Called Michael Sullivan, Archaeologist for the Buckeye Valley Historical and Archaeological Museum, to inquire about information on historic flooding. After explaining our project parameters and the flooding locations, Michael didn't think they had any information in their archives pertaining to this project. He was going to check however, and call me back.

2/10/04

Called Mike Williamson of the Town of Buckeye. Set up meeting for 2/11/04 at 9 AM. I'm to meet him at the Public Works Department office. Mike will show me the storm drain system, historic flooding locations and provide me with water and sewer utility maps.

2/10/04

Called Phil Garthright, senior planner for the Town of Buckeye, to see about getting drainage reports for several sub divisions within the project area. Left message. Will stop by while out there 2/11/04.

Memorandum

**PROJECT ENGINEERING CONSULTANTS, LTD.**
ENGINEERS • PLANNERS • SURVEYORS

Project Name:
Date: Wednesday, May 05, 2004
From:
To:
Regarding: Buckeye Basin CAR meeting with Buckeye Water Conservation & Drainage District

On Wednesday February 11, 2004 PEC met with Larry Owens and Jackie Meck of the Buckeye Water Conservation & Drainage District in the district offices.

The meeting was to discuss the FCDMC Candidate Assessment Report (CAR) requesting a proposed basin at the south edge of Buckeye Town Park near the pool. The project was proposed by the Town as a part of the FCDMC Capitol Improvement Project listing. This was explained to Mr. Owens and Mr. Meck and then some questions and comments were exchanged. This memo summarized that meeting.

The following items were discussed during the meeting:

- The purpose of the meeting was to find out the name of the large surface drain south of town. Apparently, the drain has no name, neither officially nor unofficially.

- During the conversation, both Mr. Owens and Mr. Meck stated that outfalling a detention basin to any existing irrigation tailwater ditch was unacceptable to BID. Mr. Meck stated that piping storm water to the surface drain was ok however.

- During the conversation it was also revealed that the farmer who owns the property south of Irwin Ave. between 4th and 7th has been upset for year with the City for dumping storm water into his irrigation ditch at 4th Street. Anything that could be done to remedy this situation would be appreciated by both the property owner and BID.

Memorandum

**PROJECT ENGINEERING CONSULTANTS, LTD.**
ENGINEERS • PLANNERS • SURVEYORS

Project Name:
Date: Wednesday, May 05, 2004
From:
To:
Regarding: Buckeye Basin CAR

On Thursday January 29, 2004 PEC met with Carroll Reynolds of the Town of Buckeye. Mr. Reynolds is the Public Works Director. Valerie Swick from the Maricopa County Flood Control District was also present.

The meeting was to discuss the FCDMC Candidate Assessment Report (CAR) requesting a proposed basin at the south edge of Buckeye Town Park near the pool. The project was proposed by the Town as a part of the FCDMC Capitol Improvement Project listing.

The following items were discussed during the meeting:

- The major flooding problem he is aware of is at MC85 and 9th Street (local sag in the roadway). Waters flow here from the east and the west. Floodwaters overtop the roadway and flow south on 9th Street to Centre Street; about a quarter of a mile to the south. Floodwaters then are split and travel into the subdivision on the west side and the agricultural field on the east. A block wall keeps the waters separate from that point on. The subdivision has a basin system for their on-site flow. This basin system eventually will over top to Beloat Road/Irwin Avenue/Ash Street on its south side.

- The city does not have a file of citizen complaints for flooding or for work orders due to flooding or any kind of files as far as Mr. Reynolds knows.

- The city has no idea about the geometry of the existing storm drain in MC85.

- Mr. Reynolds was not sure where the storm drain along 9th Street outlets. Mr. Reynolds referred to Mike Williamson, Street Superintendent, as the expert in this area. There are no manholes along 9th Street.

- The patch on 7th Street that looks as if it connects to the MC85 storm drain was for a water line and not a storm drain. It appears that this patch was done to relieve the storm drain and connected to a drain further down the street.

- We should meet with Mike Williamson who is the Streets Superintendent and knows everything about drainage in the town.

- There are no other hydrology studies that Mr. Reynolds knows about. Only the canal studies we already know about.

- There are currently no drainage projects planned by the town.

- The town requires the 100-year, 2-hour storm be retained for new subdivisions.

- The volume of storage required shown in the towns request to the District is not correct. Still the volume is large and probably can not fit in the site suggested at the park. Mr. Reynolds said that the field across the street is also available to be used for storm water storage. The field is now set up to be a soccer field. The field is City Owned.

- The Town would like to see 4:1 side slopes, 3' deep basins if possible (standard design criteria).

- We should look into groundwater data for the area to see how deep the basins can be as well as weather drywells can be used.

- The DWR is looking into a groundwater study in the area of the Hassayampa Basin.

- The large drainage ditch south of town is operated by the BID. There is one canal further south called the Arlington Canal.

- Waste water treatment plant discharges into the Arrlington Canal.

- An outfall from the basins could run along East Monroe to Apache Road and south to the BID's drainage ditch.

- There is a sewer line running down the Apache Road alignment. This alignment was identified as a possible outfall location from the basin south of MC 85.

- Questions for Michael Williamson:

    - Where does culvert under MC85 near the City Offices start?
    - Where does the 9th Street storm drain discharge?
    - Where does the catch basin at the knuckle of 9th and Centre go?
    - Are there any other storm drains in the City, specifically this area?
    - Where are there historic flooding locations in the City?
    - Drainage Manual?

Memorandum

**PROJECT ENGINEERING CONSULTANTS, LTD.**
ENGINEERS • PLANNERS • SURVEYORS

Project Name:
Date: Wednesday, May 05, 2004
From:
To:
Regarding: Buckeye Basin CAR meeting with Buckeye Water Conservation & Drainage District

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The meeting was to discuss the FCDMC Candidate Assessment Report (CAR) requesting a proposed basin at the south edge of Buckeye Town Park near the pool. The project was proposed by the Town as a part of the FCDMC Capitol Improvement Project listing. This was explained to Mr. Owens and then some questions and comments were exchanged. This memo summarized that meeting.

The following items were discussed during the meeting:

- The BID Canal just north of the downtown area has never overtopped due to storm water. There have been some canal breaches, but not overtopping from storm flows. Mr. Owens believed that none of the breaches were in the downtown area.

- Mr. Owens was not aware of any storm drain connections to their system of pipes or ditches other than the connection at the end of 4th Street. He did not believe that the storm drain at the end of 9th Street and Centre connected to the ditch there. He said that was a private ditch and would be surprised if it was connected.

- The large drain ditch that crosses through the area south of town collects much of the tail water from the BID fields. It would also collect much storm water that is conveyed south towards the Gila River. We asked if the District would be open to having a metered storm drain discharge to the ditch. Generally Mr. Owens did not think that there would be an objection but it would have to be brought up to the Districts Board of Directors. Mr. Owens suggested when we know more about the system and what might be discharged to the drain ditch we should talk to Mr. Jackie Meck who is the General Manager for the District and a member of the Buckeye City Council.

- Mr. Owens provided us with a map of district facilities

Memorandum

**PROJECT ENGINEERING CONSULTANTS, LTD.**
ENGINEERS • PLANNERS • SURVEYORS

Project Name:
Date: Wednesday, May 05, 2004
From:
To:
Regarding: Buckeye Basin CAR

On Wednesday, February 11, 2004 PEC met with Mike Williamson of the Town of Buckeye. Mr. Williamson is the Street Superintendent.

The meeting was a follow up to the first meeting with Mr. Reynolds, Public Works Director. Mr. Williamson has more first hand knowledge of flooding locations, and the conditions of existing facilities within the project area. Much of the meeting was spent driving around with Mr. Williamson to show PEC problem facilities locations.

The following items were discussed during the meeting:

- Flooding occurs in three locations relative to this project. The first is at 7th Street and Irwin Ave. This flooding occurs because of the back water effect of water trying to flow through the culvert under 7th St. on the south side of Irwin. Several homes here get wet approximately every two years. The second location is at 9th Street and Centre Ave. Here, ponded storm water splits and flows into the sub division to the southwest and the ag. field to the southeast. This off-site flow quickly fills the on-site retention basins of the sub division and ultimately spills onto Beloat Road to the south. The third location is adjacent to the Park at MC 85 and 9th Street. There is a dip section in MC 85 at this location, and storm water ponds until it spills to the south down 9th Street. There are three catch basins at or near this location. Two are on the southwest and north west corners along MC 85. The third is a grate inlet on the north side of MC 85 adjacent to the park. The grate inlet is clogged with debris.

- Mr. Williamson pointed out two other locations near downtown that experience flooding as well. One is at Miller Road and Baseline Road in the Valencia sub division.. Here storm water ponds up against the railroad causing road closures during bigger storm events. The second location was at Ash and Elm in the Shepard Estates sub division. Here street flow leaves the sub division along Elm, but gets pretty deep and threatens several adjacent homes. The construction of Ironwood Vista to the east actually mitigates this problem by providing conveyance and retention.

- Mr Williamson explained the City's storm drain system, and how it is interconnected. In addition, Mr. Williamson provided, to the best of his ability, pipe sizes throughout the system.

- Two storm drain lines terminate at the manhole at 9th Street and Centre Ave. In addition, the catch basin also runs into this manhole. From there, the storm drain line runs parallel to the irrigation ditch east to the tailwater ditch running south along the Apache Road alignment.

- The grate on 6th Street south of Monroe is connected to the SD line running down Monroe. This grate acts as an outlet to relieve some of the flow in the SD system.

- Contrary to what Mr. Reynolds told PEC last meeting, the large field across from the town park is private property owned by a Mr. Bayliss.

- The area of the Buckeye City Park where detention is feasible has an old swimming pool buried under it.

- The large drainage ditch south of town operated by the BID has no name, neither officially nor casually.

- The culvert under MC 85 near the City Offices was plugged and abandoned.

- There are no other storm drains in or around the downtown area of Buckeye.

- Buckeye does not have their own design standards manual. They most closely associate with Avondale's.

Memorandum

**PROJECT ENGINEERING CONSULTANTS, LTD.**
ENGINEERS • PLANNERS • SURVEYORS

Project Name: Buckeye CAR
Date: Monday, February 23, 2004
From: MDH
To: File
Regarding: Buckeye Basin CAR

On Monday, February 23, 2004 PEC met with Ms. Valerie Swick of the Flood Control District of Maricopa County for the Buckeye CAR Progress Meeting No. 1. Others in attendance: Mike Heaton, PEC and Geoff Brownell, PEC.

The meeting was for PEC to inform the County of the status of the project that began on January 8, 2004. The meeting was held at PEC in the main conference room.

The following items were discussed during the meeting:

- Geoff explained the present status of the project. Site visits had been made and collection of data from the Town was complete. Copies of the meeting memos and data collection log was presented to Valerie. The data collection is complete and the modeling is nearly complete. There is still some tweaking necessary on the model, but it is fundamentally all done. Mike had done a review and Geoff was still working on the comments. At this point, the project is transitioning to the Alternative evaluation stage. A copy of the model was given to Valerie for her review.

- Geoff explained the exhibits that have been prepared. The Historic Flooding Exhibit, the Existing Facilities Exhibit, and the Planned Facilities Exhibit are complete. Copies of the exhibits were presented to Valerie for her review.

- Valerie said that notices about the project have been sent out to the residents in the Town of Bucieye. She said that some of them have been returned with comments. She said the she will send us a copy of their comments, especially from those residents who have seen or been affected by flooding.

- Valerie said that she had not seen an invoice from us yet and requested that we get one to her soon. We told her that we had sent one, but it was in the wrong format and it was sent back. We will get it sent out this week.

Town of Buckeye
Public Works Department
423 Arizona Eastern
Buckeye AZ 85326
(623) 386-2487 phone
(623) 386-7851 fax

# MEMORANDUM

**To:** Flood Control District of Maricopa County

**From:** Carroll Reynolds, P.E. CERegnolds

**Date:** July 18, 2003

**Subject:** FY 03 /04 CIP Prioritization.

Attached are eight (8) copies of the Town of Buckeye submittal for the Flood Control District's (FCD) FY 03 / 04 CIP Prioritization Procedure.

This is the Town of Buckeye first request for funding through FCD's CIP Prioritization Procedure. The Town believes the project is of regional significance in providing flooding protection for the Town's portion of MC-85 and providing beneficial protection to the Downtown area of Buckeye. The project is believed to provide a significant cost-benefit ratio that optimizes the expenditure of FCD and Town funds.

The Town appreciates your consideration of this valuable project as it becomes incorporated into the Area Drainage Master Study currently underway. Should you have questions regarding this submittal I can be reached at (623) 386-2487 office, (623) 764-5025 cell phone, or by email at **cereynolds@aol.com**.

FLOOD CONTROL DISTRICT
RECEIVED
JUL 18 '03

| | |
|---|---|
| CHIEF | FINANCE |
| PIO | LANDS |
| ADMIN | O & M |
| REG | P & PM |
| ENG | FILE |
| CONTRACTS | |
| ROUTING | |

# LOI (Letter of Intent)
# FY 03/04 CIP Prioritization Procedure

City/Agency Proposing Partnership: Town of Buckeye/FCD

**1. Project Name:** MC-85 Detention Basin & Channel

A. Project Description & Limits: Mitigate Flooding in downtown area Miller Road to Watson Road & North of MC-85 to South of Beloat Road.

B. Estimated Project Cost: $1,500,000

**2. Proposed Lead City/Agency For: (check appropriate column)**

| | FCD | City/Agency | Other: | | N/A |
|---|---|---|---|---|---|
| A. Study | ☐ | ☑ | ☐ | | ☐ |
| B. Design | ☐ | ☑ | ☐ | | ☐ |
| C. R/W Acquisition | ☑ | ☑ | ☐ | | ☐ |
| D. Construction | ☑ | ☐ | ☐ | | ☐ |
| E. Constr. Management | ☑ | ☐ | ☐ | | ☐ |
| F. Ops & Maintenance | ☐ | ☑ | ☐ | | ☐ |

**3. Proposed Cost Share:**

| | FCD | City/Agency | Other: | Total: |
|---|---|---|---|---|
| A. Percentage - % | 50 | 50 | | 100 |
| B. Funding - $ | 750,000 | 750,000 | | 1,500,000 |

**4. Availability of City/Agency Funding ($):**

| FY 03/04 | FY 04/05 | FY 05/06 | FY 06/07 | FY 07/08 | Later FYs |
|---|---|---|---|---|---|
| 375,000 | 375,000 | | | | |

**5. City/Agency Adoption of ADMS/ADMP/WCMP: (Name: )**

☐ Yes ☑ Not yet, but willing to ☐ Not associated with Study or Plan

**6. Signature:** (City Engineer, Public Works Director, or Agency Manager)

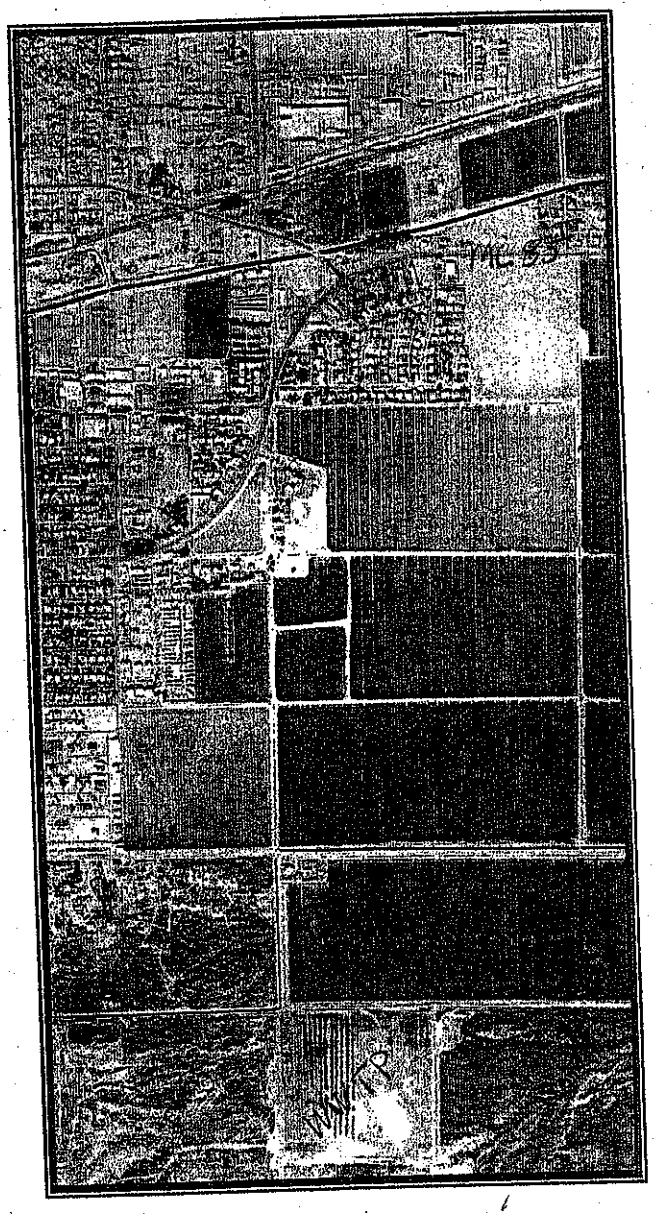
Name: C E Reynolds (C E Reynolds)

Title: Public Works Director 7/18/03 Date

**7. Remarks/Comments: (use additional sheet if necessary)**

Signature: Thomas D. Johnson P.E., R.L.S.
Deputy Chief Engineer
Date
Flood Control District of Maricopa County

# TOWN OF BUCKEYE
# PROJECT PROPOSAL
# MC-85 DETENTION BASIN PROJECT




**SUBMITTED JULY 2003**

# FLOOD CONTROL DISTRICT
# PROJECT PROPOSAL
# FOR
# MC-85 DETENTION BASIN AND CHANNEL

## PROJECT DESCRIPTION:

The Town of Buckeye experiences flooding conditions in several areas within the community. Storm Water problems within the downtown area of the community flooding occurs in the vicinity of Monroe Avenue (MC 85) with increasingly intense flood conditions down to Beloat Road. In order to alleviate the conditions in this area the Town has identified the potential for implementing a 23,000 AF Detention Basin located on the North side of MC-85 and east of 9th Street ~~with basin~~ drainage de-watering the basin. The basin location is within an existing Town park.

**Project Goal** – The goal of the project is to provide area wide improvements in public safety by providing controls for storm water in the vicinity of 9th Street and MC 85 to eliminate the storm flows intruding across MC-85 and exacerbating flood conditions throughout this portion of the Town and the 100 year Flood Plain. The approach is intended to be consistent with the Flood Control District Area Drainage Master Study that is currently under development.

**Problem to be addressed** – Area Wide impacts resulting from insufficient storm water control create traffic flow problems along MC-85, 9TH Street, and ultimately entering farm property and passing over Irwin Avenue creating an exacerbated condition associated with the flood plain. Storm water flows in this area have been stated as being as high as 2-3 ft in depth by Town staff. Additionally storm water flows have entered private farmland at 9th Street and Centre creating erosion and destructive conditions on the property.

**Relationship to other projects** – This project is intended to provide an area wide solution that is consistent with the Buckeye Area Drainage Master Study that is currently

being developed by the Flood Control District. Data from the Area Drainage Master Study will be available to develop a solution to this project.

1. **Agency Priority**

   1.1. The project is identified as a priority for the Town of Buckeye and is the only direct request from the Town. The Flood Control District has instituted projects north of I-10 primarily intended to protect against flooding as a benefit to the ADOT owned and operated Interstate 10.

2. **Master Plan Element**

   2.1. The ADMS is currently ongoing with orthographic projections in final completion stage. Findings this study will include modeling and evaluation of this area.

3. **Hydrologic/Hydraulic Significance**

   3.1. Drainage area is an unintended drainage created at MC85 due to storm water channeling. This channeling collects water from approximately 239th Avenue and transmits it to the 9th Street area where it crosses MC85 (See **Figure 1.**) and is transmitted by surface flow to Beloat Road where it exacerbates conditions in the 100 year flood plain.

**Figure 1.** Location of storm water crossing at MC85.

3.1.1. This is currently a non-delineated flood prone area that enters the 100 year delineated flood plain at Beloat Road in the vicinity of 8th and 9th Streets. See **Figure 2.**

3.1.2. The flooding area directly impacts the planned lake that is receiving state funds.

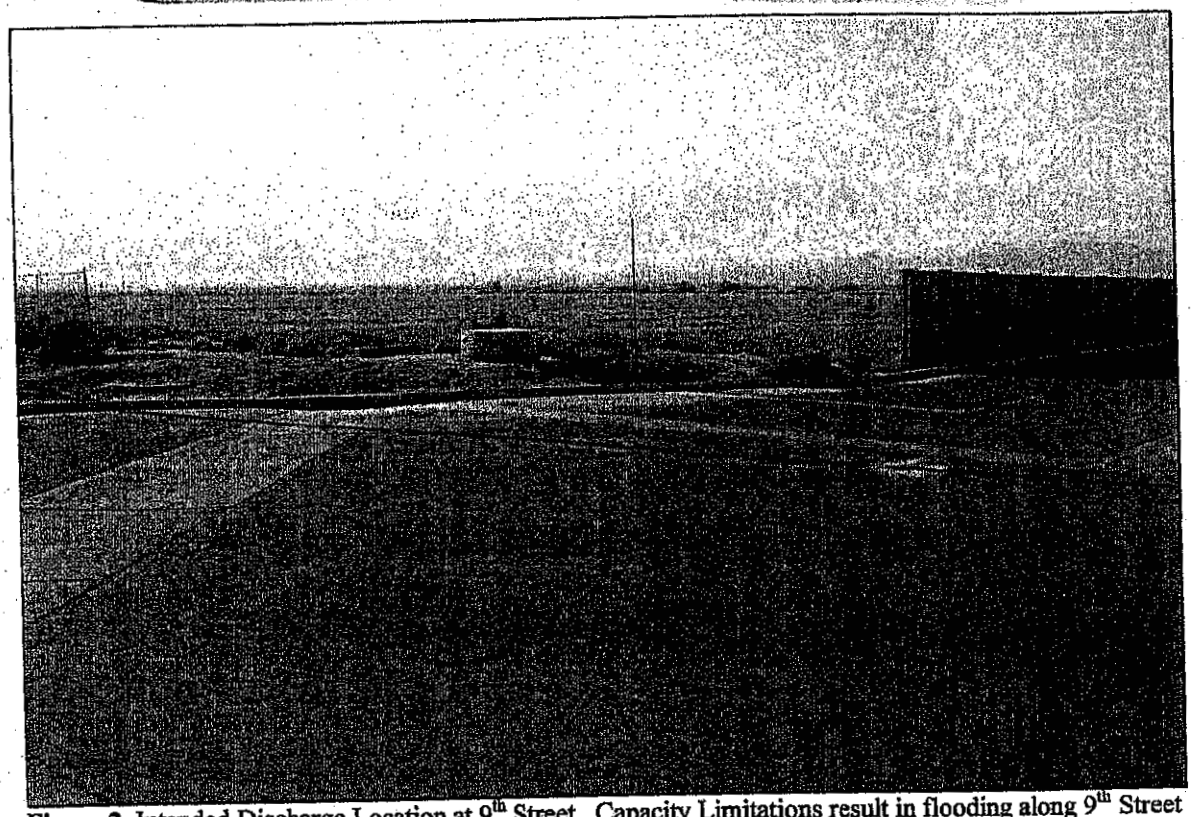


**Figure 2.** Intended Discharge Location at 9th Street. Capacity Limitations result in flooding along 9th Street and through the development to the right of the picture.

3.2. Location in delineated floodway/floodway fringe area or non-delineated flood prone area.

3.2.1. The location of the flooding area is shown on the FCDMC Map **Figure 3.**

3.3. Peak discharge and frequency of flooding events.

3.3.1. Storm water flows are [700 CFS] for a 100 year storm event and [300 CFS] for the 10 year storm event.

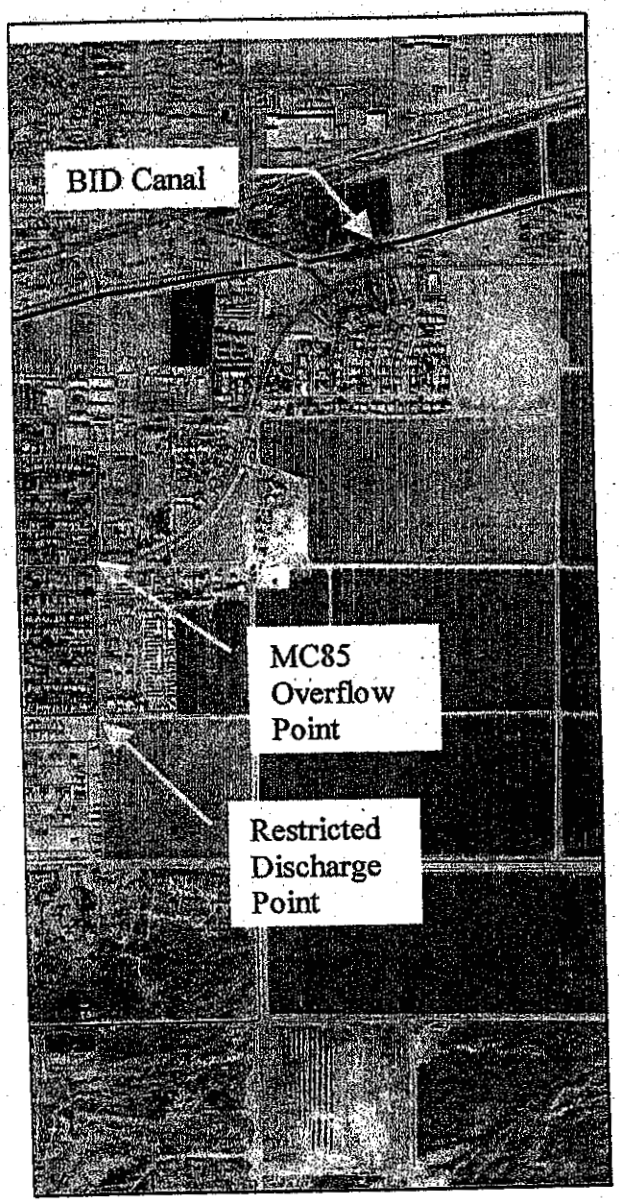



**Figure 3. General Storm Water Drainage Area.**

3.4. Contributing water shed characteristics

3.4.1. The watershed is in the area south of the Buckeye Irrigation District Canal. The flows are captured by MC85 and transmitted along the North side of the road from approximately 239th Avenue to 9th Street. At 9th Street the flow cross MC 85 and enter 9th Street flowing south to Beloat Rd. where it enters and exacerbates the 100 year flood plain.

3.5. Existing outfall characteristics.

3.5.1. Outfall from the storm water drainage is moderately undefined. During minimal storm events the drainage is contained in existing storm water drains and effectively transmitted to Centre Ave. where it splits and discharges through 9th St. and through a cultivated field to Beloat Rd. The drain capacity is frequently exceeded causing in street flow resulting in an unplanned surface discharge through residential areas, farmlands, and ultimately into the 100-year flood plain at Beloat Rd.

3.6. Other factors

3.6.1. MC 85 was originally operated by ADOT and later dedicated to Maricopa County. Eventually the Town received possession of the roadway in the vicinity referenced in this document.

**4. Level of Protection**

4.1. The proposed improvements will improve the protection of both residential properties and government facilities. The Government facilities include the existing wastewater treatment plant, proposed Town Lake, and numerous residents currently exposed to risk of flooding.

4.2. The use of a detention basin at 9th Street & MC 85 will reduce the sizing requirements for a drainage line and will keep the 10 year flooding event within the back of curb in the roadway thereby enhancing the effective level of protection.

**5. Area Protected**

5.1. The number and estimated value of residential, commercial and industrial buildings to be protected that are located in delineated floodways or 100 year floodplains.

5.1.1. This proposed project would protect approximately 100 residential properties, Commercial properties, and apartment complexes with an approximate total value of 13 million dollars.

5.2. The number and estimated value of residential, commercial and industrial buildings to be protected that are not located in delineated floodplains.

5.2.1. Properties that will benefits from the project, although not directly located in the project area include three publicly owned schools, commercial

enterprise, one manufacturing facility, residential properties. The approximate value of the benefited properties is $21.5 Million.

5.3. Number of public buildings (schools, libraries, churches, etc.) to be protected.

5.3.1. Three Schools will receive indirect protection as will the Towns wastewater treatment facility.

5.4. Amount of infrastructure (roads, drainage/flood control or wastewater facilities, etc.) to be protected or enhanced (e.g., storm drain capacity increase from 2-10 years.)

5.4.1. Preliminary assessment of the project appears to increase the storm drain capacity to a 10-year event.

5.5. Amount of cultivated area to be protected by the project.

5.5.1. Cultivated lands are approximately ¼ of a square mile.

5.6. Acreage of developed, agricultural and undeveloped land to be removed from the 100-year floodplain.

5.6.1. Actual acreage of land removed from the 100-year flood plain will be determined by the ADMS.

5.7. Percentage of agency's jurisdictional area (developed and undeveloped) to be protected.

5.7.1. The percent of developed area protected by the project is approximately 2%. The approximate area based on undeveloped property is very low in relationship to the 200 square mile area the Town currently covers however future improvement in most of these areas will be required of developers as the Towns infrastructure is developed.

5.8. Identify the population directly and indirectly benefited by the project.

5.8.1. The approximate residential population within the benefit areas is approximately 1,000 with school population of approximately 2,000 students.

5.9. Age of development and length of time flooding problem has existed.

5.9.1. The condition and facilities have existed for more than ten years. This ongoing problem has existed though out the time frame.

5.10. Year drainage regulations and/or floodplain delineation were adopted.

5.10.1. August 19, 1996.

5.11. Will completion of the project result in a reduction of the floodplain and/or an improvement in the community's floodplain rating? And,

5.11.1. The project will reduce flooding and the risk impact to surface transportation. The degree of reduction on the 100 year flood event is unclear however will be determined in the ADMS.

5.12. Other.

5.12.1. Reduction in storm water flooding through this project will enhance the quality of life for residents. Additionally, the implementation of a retention system at the Town of Buckeye Park may provide an opportunity to improve aesthetics within a highly traveled area of the community.

**6. Environmental Quality-detail on how project may immediately or potentially benefit existing conditions in the areas of:**

6.1. Water Quality (e.g. will storm water be managed through basins or wetlands prior to discharge to receiving waters)

6.1.1. The project will reduce the peak flow resulting in a reduced quantity and velocity of water discharge resulting in reduced erosion and improvements to desert habitat.

6.2. Vegetation and wildlife habitat (eg will an existing wildlife corridor be maintain/enhanced, or will new habitat areas be created through provisions of dedicated drainage/open space areas?)

6.2.1. By reducing the 100-year flood plain and the intensity of discharge vegetation and wildlife habitat will be better protected from flooding events.

6.3. Environmental sensitive areas (designated wildlife areas, riparian corridors, etc.) to be protected.

6.3.1. The projected Town Lake will receive protection by reducing the floodway exposure. This lake will be utilized for both a park and wildlife habitat area.

## 7. Area Wide Benefit

7.1. Multiple-use features, benefits and contributions such as ground water enhancement (wither through groundwater percolation or direct recharge) support for alternative forms of transportation such as trails and bike paths, support for recreation opportunities, restoration of riparian and other habitat, and other open space uses and activities.

7.1.1. The project will implement a dual use facility at the existing park that may include the development of a soccer field within the facility. Further the retention basin will allow a degree of percolation that results in improved groundwater conditions.

7.2. Contributions to the visual quality of the environment through preservation or enhancement of the natural character of the landscapes of Maricopa County and/or enhancement of local community character.

7.2.1. By reducing peak flow intensity desert landscaping will be protected and the development of a Town Lake will become viable improving community character.

7.3. Contribution to the MAG desert Spaces Open Space Management Plan, community transportation plans, park plans, open space plans and general plans.

7.3.1. MC 85 is a primary transportation corridor south of I-10 and connecting to SR 85. Eliminating the water conditions that occur within this area will improve road safety and support the Town's transportation plan. The use of the existing park area as a detention site provides improvements to the quality of life by instituting a usable soccer field or other compatible sports related opportunities.

7.4. Improvement of quality of life indicators such as, but not limited to, preservation or enhancement of cultural and historic resources, and opportunities for conservation education within the community.

7.4.1. The project improves the Towns ability to institute a Town Lake that provides opportunities for conservation education that could include Audubon support.

7.5. Qualifies for grant funding such as transportation enhancement funds, water protection funding, wildlife habitat improvement funding or other specific grant funding.

7.5.1. None Known

**8. Total Project Cost**

8.1. Estimate the total design, land acquisition, and construction costs, and provide a projection of the amount of time necessary to complete each phase. At a minimum qualitative information on environmental permitting mitigation and aesthetic/public acceptance costs should be included.

8.1.1. The total estimated cost of the project is $ 1,500,000. The estimate includes;

- construction of a detention basin with outfall piping to drain the basin within the required time frames. The proposed construction assumes the ability to utilize existing storm drains within the 9th Street right of way.
- Construction of basin structures to control flows into the basin and the discharge rate from the basin.
- Construction of detention basin drain to deliver the flows to the Gila River.

**9. Level of Partner Participation-pertinent information of the availability of other agency resources to assist with project implementation.**

9.1. Direct agency matching dollars available.

9.1.1. The Town will fund 50% of the project cost in accordance with FCDMC guidelines.

9.2. An agency's financial capabilities and ad-velorem tax contributions to the District.

9.2.1. The Town has available property tax and in the process of imposing impact fees for numerous town requirements. Additionally, the Town has successfully implemented improvement districts to address needed improvements.

9.3. Availability of non-cash contributions (R/W donations, etc.)

9.3.1. The improvements are within properties owned by the Town. These properties and rights of way are available for non-cash contributions.

9.4. Previous agency flood control expenditures in the project area.

9.4.1. None Known.

9.5. The availability of funds from other sources, such as federal matching funds or private contributions, and.

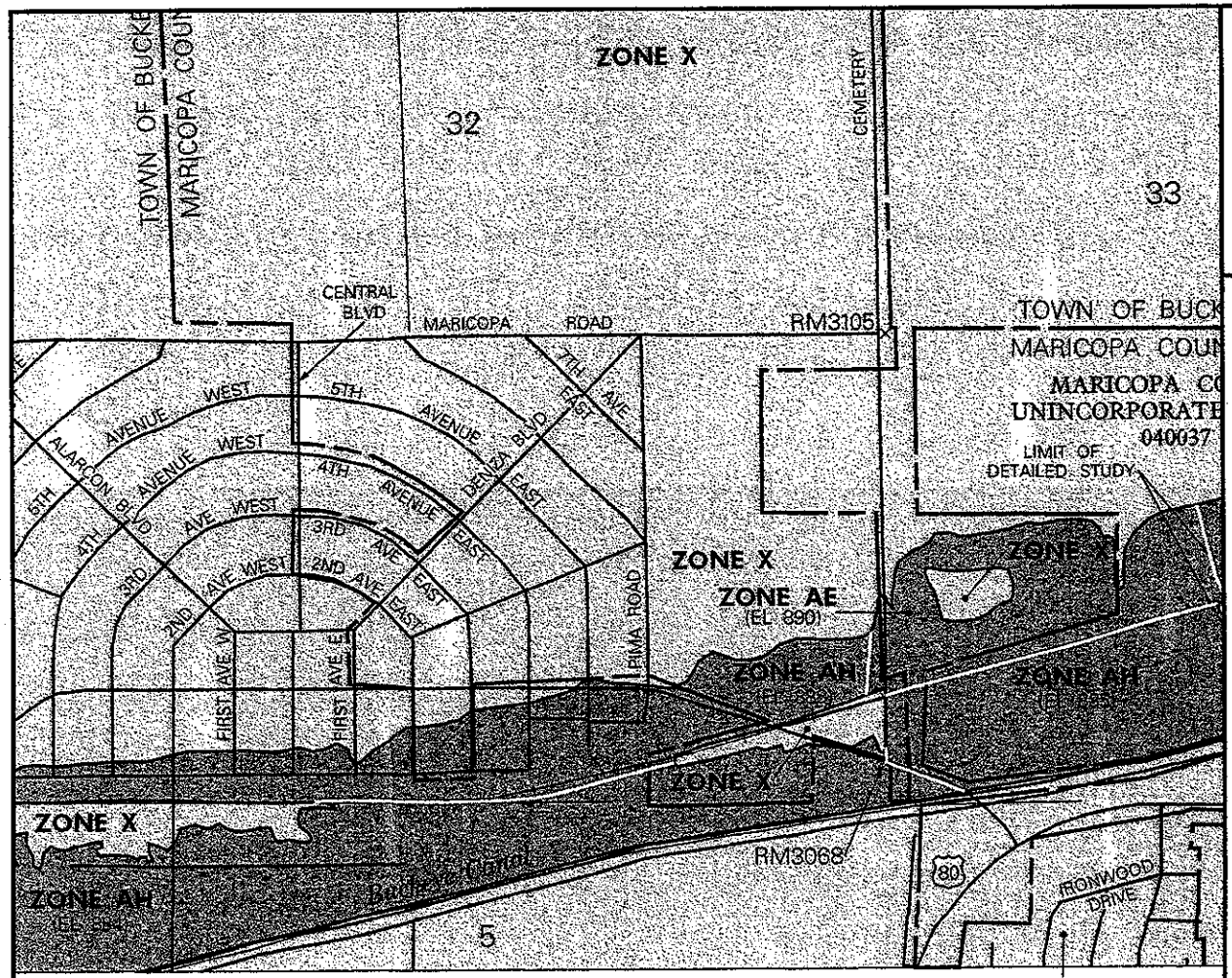
9.5.1. None Known.

**10. Operation & Maintenance Costs – request should qualitatively address expected future public costs for the O&M of the project.**

10.1. The cost of O&M for the project is estimated to be $35,000 per year. The costs will be budgeted in the Town's Public Works budget.

**11. Operation and Maintenance Responsibility-describe in detail which agency will be responsible for the operation and maintenance of the completed project. The discussion should include whether the District, the requesting agency, or others will be expected to assume responsibility for operations maintenance and replacement.**

11.1. The Town will accept full responsibility for the improved facilities including maintenance and operations as well as replacement when required. Maintenance and operation of the facility will be based on the O&M Manual that will be developed during the design process.




APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM

## FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

**PANEL 2040 OF 4350**

(SEE MAP INDEX FOR PANELS NOT PRINTED)

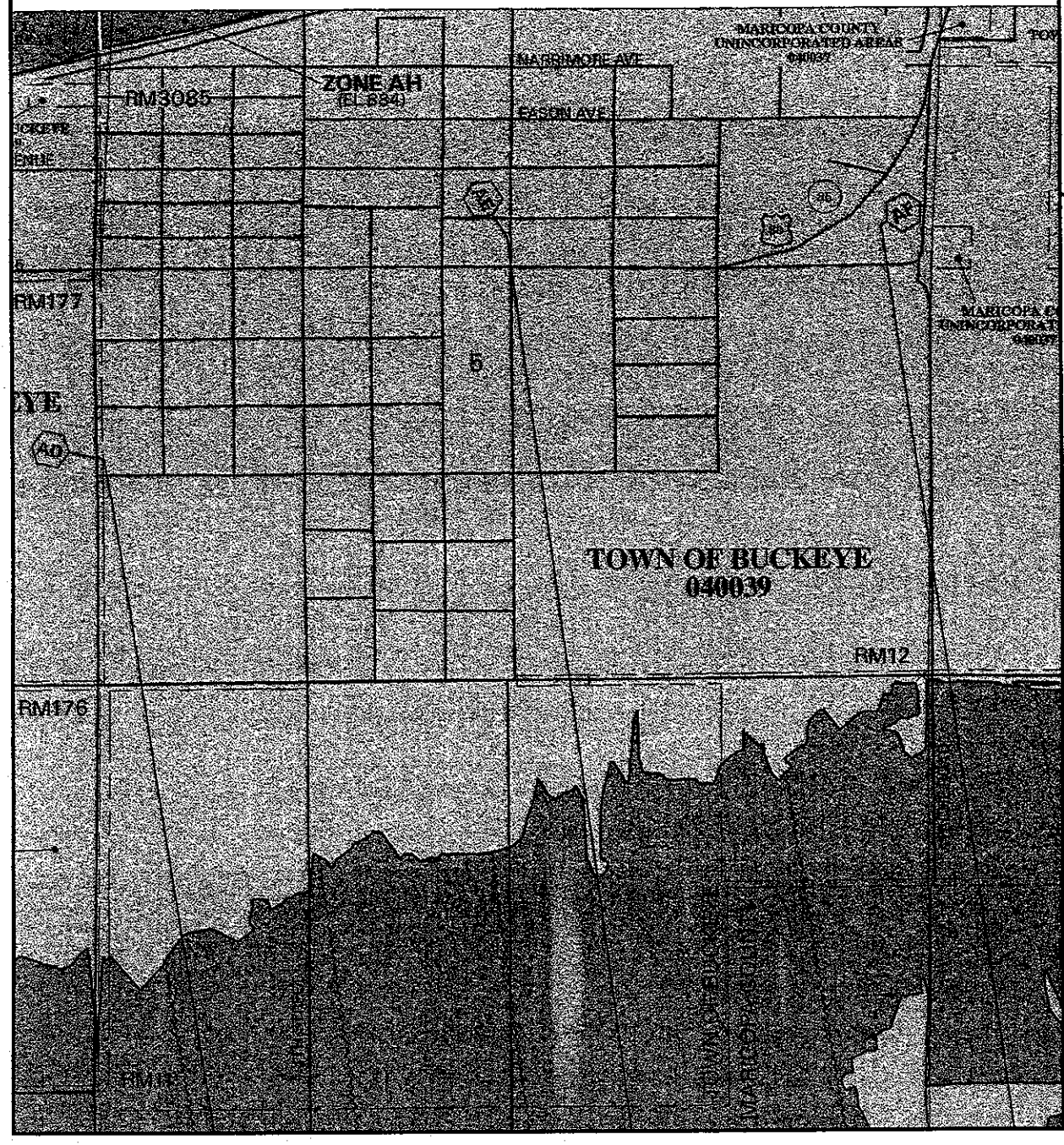
| CONTAINS: COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| BUCKEYE, TOWN OF | 040039 | 2040 | F |
| MARICOPA COUNTY, UNINCORPORATED AREAS | 040037 | 2040 | F |

**MAP NUMBER 04013C2040 F**

**MAP REVISED: JULY 19, 2001**

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov




APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

# FIRM
## FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

**PANEL 2505 OF 4350**
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

| COMMUNITY | NUMBER | PANEL | SUFFIX |
|---|---|---|---|
| BUCKEYE, TOWN OF | 040039 | 2505 | G |
| MARICOPA COUNTY, UNINCORPORATED AREAS | 040037 | 2505 | G |

**MAP NUMBER**
**04013C2505 G**

**MAP REVISED:**
**JULY 19, 2001**

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

# APPENDIX C

**Hydrologic Model Output**

# Modified 100-yr, 6-hr Buckeye Area FIS Model

```
1****************************************                                    ****************************************
 *                                      *                                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN   1998              *                                    *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1               *                                    *          609 SECOND STREET           *
 *                                      *                                    *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   30MAR04  TIME  15:25:08  *                                    *           (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

                    *DIAGRAM
        1           ID  BUCKEYE CAR - PROJECT ENGINEERING CONSULTANTS - MARCH 2004
        2           ID  DEVELOPED FROM BUCKEYE FIS, D.T. PHELPS FOR G.V. SABOL, 11 JUNE 92
        3           ID  100 YEAR 6 HOUR GENERAL STORM WITH A DEPTH OF 3.3 INCHES
        4           ID  TRUNCATED TO ONLY BASINS UPSTREAM OF CANAL OVERFLOW INTO PROJECT AREA
        5           ID  CONVERTED TO 2 MIN COMPUTATION INTERVAL
        6           IT       2 01JAN04    1200    2000
        7           IO       5
        8           IN      15
        9           JD    3.30    0.01
       10           PC    .000    .008    .016    .025    .033    .041    .050    .058    .066    .074
       11           PC    .087    .099    .118    .138    .216    .377    .834    .911    .931    .950
       12           PC    .962    .972    .983    .991   1.000
       13           JD    3.28    0.50
       14           JD    3.23    2.80
       15           PC    .000    .009    .016    .025    .034    .042    .051    .059    .067    .076
       16           PC    .087    .100    .120    .163    .252    .451    .694    .837    .900    .938
       17           PC    .950    .963    .975    .988   1.000
       18           JD    3.04    16.0
       19           PC    .000    .015    .020    .030    .048    .063    .076    .090    .105    .119
       20           PC    .135    .152    .175    .222    .304    .472    .670    .796    .868    .912
       21           PC    .946    .960    .973    .987   1.000
       22           JD    2.79    61.0
       23           PC    .000    .020    .032    .046    .066    .082    .098    .117    .134    .151
       24           PC    .169    .190    .219    .268    .351    .494    .661    .778    .847    .893
       25           PC    .931    .948    .966    .983   1.000

       26           KK      12
       27           KM  ****************************************************************************
       28           KM  *************************  SUB-WATERSHED O  *******************************
       29           KM  ****************************************************************************
       30           KM  BASIN 12
       31           KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
       32           KM  L=     1.37  Lca=      .76   S=   77.0  Kn= .050  LAG=  32.0
       33           KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
       34           BA     .98
       35           LG     .35     .35    3.50    .264     .00
       36           UI     103     103     103     179     350     414     488     537     589     636
       37           UI     703     781     866    1042    1265    1328    1130     995     904     829
       38           UI     757     676     614     554     497     438     345     271     182     181
       39           UI     169     169     109     103     103      87      32      32      32      32
       40           UI      32      32      32      32      32      32      32       0       0       0
       41           UI       0       0       0       0       0       0       0       0       0       0

       42           KK  RO1-O3
       43           KM  ROUTE RUNOFF FROM 12 AT O1 TO O3  (CHANNEL A)
       44           RD    2600    .008    .025            TRAP       0     100

       45           KK      24
       46           KM  BASIN 24
       47           KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
       48           KM  L=    .9    Lca=     .5    S=      15.0       Kn= .200       LAG= 127.0
       49           KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
       50           BA     .49
       51           LG     .20     .25    3.66     .28     7.5
1                                                HEC-1 INPUT                                                    PAGE  2

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

       52           UI      13      13      13      13      13      13      13      13      13      13
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```
 53          UI      13      13      13      13      25      43      43      43      43      49
 54          UI      50      50      51      60      60      60      63      64      64      69
 55          UI      69      70      73      73      75      77      77      81      81      85
 56          UI      85      88      91      93      96      98     100     102     103     109
 57          UI     111     120     125     130     136     155     154     146     166     176
 58          UI     176     167     160     153     148     142     136     133     130     124
 59          UI     122     120     115     114     111     108     107     104     103     100
 60          UI      99      93      93      88      88      84      83      81      79      78
 61          UI      75      75      71      68      68      64      64      64      60      60
 62          UI      60      53      50      50      50      39      37      37      37      37
 63          UI      26      23      23      23      23      23      23      23      22      21
 64          UI      21      21      21      21      21      21      21      16      13      13
 65          UI      13      13      13      13      13      13      13      13      13      13
 66          UI      13      13       4       4       4       4       4       4       4       4
 67          UI       4       4       4       4       4       4       4       4       4       4
 68          UI       4       4       4       4       4       4       4       4       4       4
 69          UI       4       4       4       4       4       4       4       4       4       4
 70          UI       4       4       4       4       4       4       4       4       4       0
 71          UI       0       0       0       0       0       0       0       0       0       0
 72          UI       0       0       0       0       0       0       0       0       0       0

 73          KK     @O3
 74          KM  COMBINE THE ROUTED HYDROGRAPH FORM O1 WITH RUNOFF FROM 24 AT O3
 75          HC       2

 76          KK  RO3-O4
 77          KM  ROUTE COMBINED HYDROGRAPH FROM O3 TO O4  (CHANNEL A)
 78          RD    4200    .005     .10            TRAP       0     100

 79          KK      13
 80          KM  BASIN 13
 81          KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 82          KM  L=      1.57  Lca=       .86   S=   73.0  Kn= .050  LAG=  36.0
 83          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 84          BA     .45
 85          LG     .35     .35    4.08     .38     .00
 86          UI      42      42      42      42     125     152     178     201     221     239
 87          UI     256     279     307     330     379     464     518     539     464     415
 88          UI     377     349     326     294     268     248     224     204     185     154
 89          UI     121      86      74      72      69      69      45      42      42      42
 90          UI      20      13      13      13      13      13      13      13      13      13
 91          UI      13      13      13       0       0       0       0       0       0       0
 92          UI       0       0       0       0       0       0       0       0       0       0

 93          KK  RO2-O4
 94          KM  ROUTE RUNOFF FROM 13 AT O2 TO O4  (CHANNEL B)
 95          RD
 96          RC     .10    .020     .10    3400    .007
 97          RX       0    1000    1006    1010    1050    1054    1060    2060
 98          RY      10       0       0       1       1       0       0      10
1                                          HEC-1 INPUT                                                    PAGE  3

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


 99          KK      25
100          KM  BASIN 25
101          KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
102          KM  L=       1.3  Lca=        .6   S=   22.0  Kn= .200  LAG= 149.0
103          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
104          BA     .27
105          LG     .50     .08    4.14     .61     .00
106          UI       6       6       6       6       6       6       6       6       6       6
107          UI       6       6       6       6       6       6       9      20      20      20
108          UI      20      21      24      24      24      24      27      29      29      29
109          UI      30      30      30      32      33      33      34      35      35      36
110          UI      37      37      38      39      39      41      41      42      43      43
111          UI      46      46      47      48      49      49      51      53      55      57
112          UI      60      62      65      70      79      68      74      80      84      84
113          UI      81      78      75      72      70      68      65      64      62      60
114          UI      60      57      57      55      55      53      53      51      51      49
115          UI      49      48      48      45      45      43      42      42      40      40
116          UI      39      38      38      36      36      36      33      33      33      31
117          UI      30      30      30      29      29      29      26      24      24      24
118          UI      23      18      18      18      18      18      16      11      11      11
119          UI      11      11      11      11      11      11      10      10      10      10
120          UI      10      10      10      10      10      10       8       6       6       6
121          UI       6       6       6       6       6       6       6       6       6       6
122          UI       6       6       6       3       2       2       2       2       2       2
123          UI       2       2       2       2       2       2       2       2       2       2
124          UI       2       2       2       2       2       2       2       2       2       2
125          UI       2       2       2       2       2       2       2       2       2       2
126          UI       2       2       2       2       2       2       2       2       2       2
127          UI       2       2       2       2       2       2       2       0       0       0
128          UI       0       0       0       0       0       0       0       0       0       0

129          KK     @O4
130          KM  COMBINE ROUTED HYDROGRAPHS FROM O2 AND O3 WITH RUNOFF FROM 25 AT O4
131          HC       3

132          KK  SR@R-O
133          KM  STORAGE ROUTE AT ROOSEVELT CANAL BETWEEN RAINBOW AND WATSON ROADS (SUB 25 SR)
134          RS       1    ELEV  995.25
135          SA       0     7.5     8.9      10    11.1    13.4      16      18    19.6
136          SQ       0       0      59     184     354     806    1395    2204    3567
137          SE  995.25   995.9   996.0   996.1   996.2   996.4   996.6   996.8   997.0

138          KK  RO4-O5
```

```
 139        KM  ROUTE COMBINED HYDROGRAPH FROM ROOSEVELT CANAL AT O4 TO O5  (CHANNEL B)
 140        RD
 141        RC     .10    .020     .10    4300    .009
 142        RX       0    1000    1006    1010    1050    1054    1060    2060
 143        RY      10       0       0       1       1       0       0      10
1                                        HEC-1 INPUT                                                    PAGE  4

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


 144        KK      39
 145        KM  BASIN 39
 146        KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 147        KM  L=      1.5  Lca=        .8   S=   25.0  Kn= .200  LAG= 165.0
 148        KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 149        BA     .71
 150        LG     .50     .08    3.98     .56     .00
 151        UI      14      14      14      14      14      14      14      14      14      14
 152        UI      14      14      14      14      14      14      14      14      14      40
 153        UI      47      47      47      47      47      54      55      55      55      55
 154        UI      65      66      66      66      69      70      70      70      76      77
 155        UI      77      77      80      80      80      84      84      84      87      89
 156        UI      89      91      94      94      97     100     100     105     106     107
 157        UI     110     110     112     114     116     122     122     132     132     143
 158        UI     143     150     156     183     165     157     181     188     194     194
 159        UI     187     182     173     169     165     158     156     150     148     143
 160        UI     141     137     135     132     131     127     126     122     122     118
 161        UI     118     116     114     113     110     110     106     103     103      98
 162        UI      97      97      91      91      91      87      87      87      83      82
 163        UI      82      79      75      75      75      71      70      70      70      66
 164        UI      66      66      66      58      55      55      55      55      45      41
 165        UI      41      41      41      41      40      25      25      25      25      25
 166        UI      25      25      25      25      25      25      24      24      24      24
 167        UI      24      24      24      24      24      24      24      19      14      14
 168        UI      14      14      14      14      14      14      14      14      14      14
 169        UI      14      14      14      14      14      14      11       4       4       4
 170        UI       4       4       4       4       4       4       4       4       4       4
 171        UI       4       4       4       4       4       4       4       4       4       4
 172        UI       4       4       4       4       4       4       4       4       4       4
 173        UI       4       4       4       4       4       4       4       4       4       4
 174        UI       4       4       4       4       4       4       4       4       4       4
 175        UI       4       4       4       4       4       4       4       4       4       0
 176        UI       0       0       0       0       0       0       0       0       0       0
 177        UI       0       0       0       0       0       0       0       0       0       0

 178        KK     @O5
 179        KM  COMBINE STORAGE ROUTED HYDROGRAPH FROM O4 WITH RUNOFF FROM 39 AT O5
 180        HC       2

 181        KK  RO5-O6
 182        KM  ROUTE COMBINED HYDROGRAPH FROM O5 TO O6  (CHANNEL B)
 183        RD
 184        RC     .10    .020     .10    5280    .011
 185        RX       0    1000    1006    1010    1050    1054    1060    2060
 186        RY      10       0       0       1       1       0       0      10

 187        KK      50
 188        KM  BASIN 50
 189        KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 190        KM  L=      1.98  Lca=       .98   S=   31.0  Kn= .200  LAG= 193.0
 191        KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 192        BA    1.00
 193        LG     .50     .08    4.08     .60     .00
 194        UI      17      17      17      17      17      17      17      17      17      17
1                                        HEC-1 INPUT                                                    PAGE  5

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

 195        UI      17      17      17      17      17      17      17      17      17      17
 196        UI      17      17      50      57      57      57      57      57      58      67
 197        UI      67      67      67      67      70      80      80      80      80      82
 198        UI      85      85      85      85      93      93      93      93      97      98
 199        UI      98      98     102     103     103     103     108     108     108     111
 200        UI     115     115     115     122     122     122     129     129     129     133
 201        UI     134     134     138     138     141     149     149     156     160     163
 202        UI     174     174     182     182     217     219     191     194     223     228
 203        UI     236     236     235     223     219     211     206     201     195     191
 204        UI     186     182     179     174     173     167     167     161     160     158
 205        UI     154     154     149     149     147     143     143     140     138     138
 206        UI     134     134     134     126     125     125     119     118     118     114
 207        UI     111     111     111     106     106     106     103     100     100     100
 208        UI      95      91      91      91      89      85      85      85      85      81
 209        UI      80      80      80      80      67      67      67      67      67      64
 210        UI      50      50      50      50      50      50      50      41      31      31
 211        UI      31      31      31      31      31      31      31      31      31      31
 212        UI      29      29      29      29      29      29      29      29      29      29
 213        UI      29      29      29      24      17      17      17      17      17      17
 214        UI      17      17      17      17      17      17      17      17      17      17
 215        UI      17      17      17      17      17      15       5       5       5       5
 216        UI       5       5       5       5       5       5       5       5       5       5
 217        UI       5       5       5       5       5       5       5       5       5       5
 218        UI       5       5       5       5       5       5       5       5       5       5
 219        UI       5       5       5       5       5       5       5       5       5       5
 220        UI       5       5       5       5       5       5       5       5       5       5
 221        UI       5       5       5       5       5       5       5       5       5       5
 222        UI       5       5       5       5       5       5       5       5       0       0
 223        UI       0       0       0       0       0       0       0       0       0       0
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```
224          KK     @O6
225          KM  COMBINE ROUTED HYDROGRAPH FROM O5 WITH RUNOFF FROM 50 AT O6
226          HC       2

227          KK  RO6-O7
228          KM  ROUTE COMBINED HYDROGRAPH FROM O6 TO O7  (CHANNEL B)
229          RD
230          RC     .10    .020     .10    3500    .003
231          RX       0    1000    1006    1010    1050    1054    1060    2060
232          RY      10       0       0       1       1       0       0      10

233          KK      57
234          KM  BASIN 57
235          KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
236          KM  L=      1.3  Lca=       .6   S=   22.0  Kn= .200  LAG= 148.0
237          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
238          BA     .51
239          LG     .50     .08    4.03     .58     .00
240          UI      12      12      12      12      12      12      12      12      12      12
241          UI      12      12      12      12      12      12      17      39      39      39
242          UI      39      39      45      45      45      45      52      54      54      54
243          UI      58      58      58      61      63      63      64      66      66      68
244          UI      69      69      72      73      73      77      77      79      82      82
245          UI      87      87      89      90      92      93      96     100     104     108
246          UI     114     118     123     132     150     129     139     152     159     159
1                                          HEC-1 INPUT                                          PAGE  6

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

247          UI     153     147     142     135     132     129     123     121     118     114
248          UI     113     108     108     104     103     100      99      97      96      93
249          UI      93      90      90      85      85      82      80      79      75      75
250          UI      73      71      71      69      68      68      63      61      61      59
251          UI      58      58      57      54      54      54      50      45      45      45
252          UI      44      34      34      34      34      34      30      21      21      21
253          UI      21      21      21      21      21      21      20      19      19      19
254          UI      19      19      19      19      19      19      15      12      12      12
255          UI      12      12      12      12      12      12      12      12      12      12
256          UI      12      12      12       5       4       4       4       4       4       4
257          UI       4       4       4       4       4       4       4       4       4       4
258          UI       4       4       4       4       4       4       4       4       4       4
259          UI       4       4       4       4       4       4       4       4       4       4
260          UI       4       4       4       4       4       4       4       4       4       4
261          UI       4       4       4       4       4       4       4       0       0       0
262          UI       0       0       0       0       0       0       0       0       0       0

263          KK     @O7
264          KM  COMBINE ROUTED HYDROGRAPH FROM O6 WITH RUNOFF FROM 57 AT O7
265          HC       2

266          KK    To71
267          KM  Diversion over Watson Road to Sub Basin 56
268          DT    To56
269          DI       0    1331
270          DQ       0    1098

271          KK  SR@S-O
272          KM  STORAGE ROUTE @ SPRR FROM RAINBOW TO WATSON ROADS (SUB 57 STORAGE ROUTING)
273          KM  OVERTOPING STARTS @ Q=139cfs, EL=892.3 (OVERTOPING = 0.11 ft)
274          RS       1    ELEV     889
275          SA       0     .05      .1      15      18    21.4      26      30    33.7
276          SQ       0      78      85     151     248     540     954    1560    2334
277          SE     889     891   891.3   892.4   892.6  892.87   893.1   893.3  893.48

278          KK  RO7-O8
279          KM  ROUTE HYDROGRAPH FROM SPRR AT O7 TO O8  (CHANNEL A)
280          RD    1600    .001     .10            TRAP       0     100

281          KK      71
282          KM  BASIN 71
283          KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
284          KM  L=       .6  Lca=       .3   S=    5.0  Kn= .200  LAG= 112.0
285          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
286          BA     .14
287          LG     .50     .08    3.50     .41     .00
288          UI       4       4       4       4       4       4       4       4       4       4
289          UI       4       4       7      14      14      14      15      16      16      16
290          UI      20      20      20      21      21      22      23      23      24      24
291          UI      25      25      26      26      28      28      29      30      31      32
292          UI      33      33      34      36      38      39      42      44      50      50
293          UI      50      56      57      56      53      50      48      46      44      42
294          UI      41      40      39      38      37      36      35      34      34      33
295          UI      32      31      30      29      28      27      26      26      25      24
296          UI      24      22      22      21      21      21      20      20      18      16
1                                          HEC-1 INPUT                                          PAGE  7

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

297          UI      16      16      12      12      12      12       9       8       8       8
298          UI       8       8       8       7       7       7       7       7       7       7
299          UI       7       5       4       4       4       4       4       4       4       4
300          UI       4       4       4       4       2       1       1       1       1       1
301          UI       1       1       1       1       1       1       1       1       1       1
302          UI       1       1       1       1       1       1       1       1       1       1
303          UI       1       1       1       1       1       1       1       1       1       1
304          UI       1       1       1       1       1       0       0       0       0       0
305          UI       0       0       0       0       0       0       0       0       0       0
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306          KK     @O8
307          KM  COMBINE ROUTED HYDROGRAPH FROM O7 WITH RUNOFF FROM 71 AT O8
308          HC       2    0.91

309          KK    Out1
310          KM  Diversion over Watson road to Sub Basin 70
311          DT    To70
312          DI       0     973
313          DQ       0     235

314          KK  SR@B-O
315          KM  STORAGE ROUTE AT THE BUCKEYE CANAL BETWEEN RAINBOW AND WATSON ROADS (SUB 71)
316          RS       1    ELEV  885.62
317          SA       0      54      57    60.5      63    66.5      72      78    79.8
318          SQ       0       0       4      24      74     172     581    1344    2534
319          SE  885.62   887.4   887.5   887.6   887.7   887.8   888.0   888.2   888.4
320          KM  ******************************************************************************
321          KM  *************************  SUB-WATERSHED N  ******************************
322          KM  ******************************************************************************

323          KK      11
324          KM  BASIN 11
325          KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
326          KM  L=      1.63  Lca=       .78   S=   63.0  Kn= .050  LAG=  36.0
327          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
328          BA    1.27
329          LG     .35     .35    3.71    .306     .00
330          UI     119     119     119     119     352     429     503     568     623     675
331          UI     722     789     867     932    1068    1309    1461    1520    1309    1172
332          UI    1065     986     921     830     756     700     632     575     522     433
333          UI     341     243     210     204     195     195     127     119     119     119
334          UI      57      36      36      36      36      36      36      36      36      36
335          UI      36      36      36       0       0       0       0       0       0       0
336          UI       0       0       0       0       0       0       0       0       0       0

337          KK  RN1-N2
338          KM  ROUTE RUNOFF FROM 11 AT N1 TO N2  (CHANNEL B)
339          RD
340          RC     .10    .020     .10    2300    .007
341          RX       0    1000    1006    1010    1050    1054    1060    2060
342          RY      10       0       0       1       1       0       0      10
1                                          HEC-1 INPUT                                          PAGE  8

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


343          KK      23
344          KM  BASIN 23
345          KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
346          KM  L=      1.6  Lca=        .8   S=   16.0  Kn= .200  LAG= 184.0
347          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
348          BA     .53
349          LG     .50     .08    4.30     .66     .00
350          UI      10      10      10      10      10      10      10      10      10      10
351          UI      10      10      10      10      10      10      10      10      10      10
352          UI      10      20      31      31      31      31      31      31      36      37
353          UI      37      37      37      39      44      44      44      44      46      47
354          UI      47      47      48      51      51      51      52      54      54      54
355          UI      55      56      56      56      59      59      59      60      63      63
356          UI      63      67      67      67      71      71      71      73      73      74
357          UI      76      76      79      81      81      88      88      93      95      98
358          UI     100     110     122     108     105     119     123     129     129     129
359          UI     122     120     116     113     110     106     105     101     100      97
360          UI      95      94      91      91      88      88      85      84      83      81
361          UI      81      79      78      78      76      76      74      73      73      70
362          UI      69      69      65      65      65      62      61      61      60      58
363          UI      58      58      56      55      55      55      50      50      50      50
364          UI      47      47      47      47      45      44      44      44      44      38
365          UI      37      37      37      37      35      27      27      27      27      27
366          UI      27      27      20      17      17      17      17      17      17      17
367          UI      17      17      17      17      16      16      16      16      16      16
368          UI      16      16      16      16      16      16      16      13      10      10
369          UI      10      10      10      10      10      10      10      10      10      10
370          UI      10      10      10      10      10      10      10      10      10       3
371          UI       3       3       3       3       3       3       3       3       3       3
372          UI       3       3       3       3       3       3       3       3       3       3
373          UI       3       3       3       3       3       3       3       3       3       3
374          UI       3       3       3       3       3       3       3       3       3       3
375          UI       3       3       3       3       3       3       3       3       3       3
376          UI       3       3       3       3       3       3       3       3       3       3
377          UI       3       3       3       3       3       3       3       3       3       0
378          UI       0       0       0       0       0       0       0       0       0       0
379          UI       0       0       0       0       0       0       0       0       0       0

380          KK     @N2
381          KM  COMBINE ROUTED HYDROGRAPH FROM N1 WITH RUNOFF FROM 23 AT N2
382          HC       2

383          KK  SR@R-N
384          KM  STORAGE ROUTE AT ROOSEVELT CANAL BETWEEN WATSON & CEMETERY ROADS (SUB 23 SR)
385          RS       1    ELEV  995.32
386          SA       0      .1       3     5.5       8    10.5      13    15.6      19
387          SQ       0      70     165     300     530     925    1440    1960    3127
388          SE  995.32  995.68   995.8   995.9   996.0   996.1   996.2   996.3  996.42
1                                          HEC-1 INPUT                                          PAGE  9

LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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KK  RN2-N3
KM  ROUTE HYDROGRAPH FROM ROOSEVELT CANAL AT N2 TO N3  (CHANNEL B)
RD
RC     .10    .020     .10    3500    .008
RX       0    1000    1006    1010    1050    1054    1060    2060
RY      10       0       0       1       1       0       0      10

KK      38
KM  BASIN 38
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=      1.3  Lca=       .7   S=   22.0  Kn= .200  LAG= 153.0
KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .52
LG     .50     .08    4.30     .66     .00
UI      11      11      11      11      11      11      11      11      11      11
UI      11      11      11      11      11      11      11      19      37      37
UI      37      37      37      43      44      44      44      46      52      52
UI      52      54      56      56      56      60      61      61      62      64
UI      64      65      67      67      68      71      71      73      75      75
UI      78      79      81      84      84      87      87      89      90      92
UI      97      99     105     108     114     117     119     141     136     125
UI     142     149     154     154     147     142     138     131     128     125
UI     120     118     114     112     109     107     105     102     101      98
UI      97      95      93      92      90      90      87      87      83      82
UI      80      77      77      74      73      73      69      69      69      65
UI      65      65      60      59      59      57      56      56      56      52
UI      52      52      51      44      44      44      44      38      33      33
UI      33      33      33      29      20      20      20      20      20      20
UI      20      20      20      20      19      19      19      19      19      19
UI      19      19      19      19      15      11      11      11      11      11
UI      11      11      11      11      11      11      11      11      11      11
UI      11      11       5       3       3       3       3       3       3       3
UI       3       3       3       3       3       3       3       3       3       3
UI       3       3       3       3       3       3       3       3       3       3
UI       3       3       3       3       3       3       3       3       3       3
UI       3       3       3       3       3       3       3       3       3       0
UI       3       3       3       3       3       3       3       3       3       0
UI       0       0       0       0       0       0       0       0       0       0
UI       0       0       0       0       0       0       0       0       0       0

KK     @N3
KM  COMBINE STORAGE ROUTED HYDROGRAPH FROM N2 WITH RUNOFF FROM 38 AT N3
HC       2

KK  RN3-N4
KM  ROUTE COMBINED HYDROGRAPH FROM N3 TO N4  (CHANNEL B)
RD
RC     .10    .020     .10    5280    .009
RX       0    1000    1006    1010    1050    1054    1060    2060
RY      10       0       0       1       1       0       0      10
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1
                                HEC-1 INPUT

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

KK      49
KM  BASIN 49
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=      1.98  Lca=      .98   S=   27.0  Kn= .200  LAG= 198.0
KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA    1.00
LG     .50     .08    4.30     .66     .00
UI      17      17      17      17      17      17      17      17      17      17
UI      17      17      17      17      17      17      17      17      17      17
UI      17      17      26      56      56      56      56      56      56      59
UI      65      65      65      65      65      70      78      78      78      78
UI      80      83      83      83      83      89      91      91      91      93
UI      95      95      95      98     100     100     100     103     106     106
UI     106     111     112     112     115     119     119     120     126     126
UI     127     130     130     131     135     135     138     145     145     152
UI     156     158     170     170     177     178     204     217     190     186
UI     211     218     230     230     230     222     217     207     206     196
UI     195     186     186     178     178     172     170     167     163     162
UI     156     156     153     150     150     145     145     143     140     140
UI     137     135     135     132     130     130     124     122     122     118
UI     115     115     113     109     109     109     105     103     103     103
UI      98      98      98      98      89      89      89      89      85      83
UI      83      83      83      78      78      78      78      78      65      65
UI      65      65      65      64      49      49      49      49      49      49
UI      49      46      30      30      30      30      30      30      30      30
UI      30      30      30      30      30      28      28      28      28      28
UI      28      28      28      28      28      28      28      28      23      17
UI      17      17      17      17      17      17      17      17      17      17
UI      17      17      17      17      17      17      17      17      17      17
UI      17      10       5       5       5       5       5       5       5       5
UI       5       5       5       5       5       5       5       5       5       5
UI       5       5       5       5       5       5       5       5       5       5
UI       5       5       5       5       5       5       5       5       5       5
UI       5       5       5       5       5       5       5       5       5       5
UI       5       5       5       5       5       5       5       5       5       5
UI       5       5       5       5       5       5       5       5       5       5
UI       5       5       5       5       5       0       0       0       0       0

KK     @N4
KM  COMBINE ROUTED HYDROGRAPH FROM N3 WITH RUNOFF FROM 49 AT N4
HC       2
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476          KK  RN4-N5
477          KM  ROUTE COMBINED HYDROGRAPH FROM N4 TO N5  (CHANNEL B)
478          RD
479          RC     .10    .020     .10    4500    .008
480          RX       0    1000    1006    1010    1050    1054    1060    2060
481          RY      10       0       0       1       1       0       0      10
1                                          HEC-1 INPUT                                                    PAGE 11

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


482          KK      56
483          KM  BASIN 56
484          KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
485          KM  L=       1.6  Lca=        .8   S=    21.0  Kn= .200  LAG= 177.0
486          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
487          BA     .74
488          LG     .50     .08    4.24     .65     .00
489          UI      14      14      14      14      14      14      14      14      14      14
490          UI      14      14      14      14      14      14      14      14      14      14
491          UI      35      46      46      46      46      46      50      54      54      54
492          UI      54      55      65      65      65      65      68      69      69      69
493          UI      72      75      75      75      78      79      79      79      83      83
494          UI      83      86      88      88      89      93      93      94      98      98
495          UI     100     104     104     107     108     108     112     112     115     120
496          UI     120     130     130     139     141     146     147     174     174     154
497          UI     164     180     188     190     190     182     178     170     166     162
498          UI     156     154     148     147     141     141     136     135     131     130
499          UI     127     125     123     120     120     116     116     114     112     112
500          UI     109     108     107     101     101      99      95      95      94      90
501          UI      90      89      85      85      85      82      81      81      79      74
502          UI      74      74      72      69      69      69      68      65      65      65
503          UI      65      57      54      54      54      54      48      40      40      40
504          UI      40      40      40      35      25      25      25      25      25      25
505          UI      25      25      25      25      25      23      23      23      23      23
506          UI      23      23      23      23      23      23      23      19      14      14
507          UI      14      14      14      14      14      14      14      14      14      14
508          UI      14      14      14      14      14      14      14      13       4       4
509          UI       4       4       4       4       4       4       4       4       4       4
510          UI       4       4       4       4       4       4       4       4       4       4
511          UI       4       4       4       4       4       4       4       4       4       4
512          UI       4       4       4       4       4       4       4       4       4       4
513          UI       4       4       4       4       4       4       4       4       4       4
514          UI       4       4       4       4       4       4       4       4       4       4
515          UI       4       4       4       4       0       0       0       0       0       0
516          UI       0       0       0       0       0       0       0       0       0       0

517          KK  FROM57
518          KM  Retrieve Diversion from Sub Basin 57
519          DR    To56

520          KK     @N5
521          KM  COMBINE ROUTED HYDROGRAPH FROM N4 WITH RUNOFF FROM 56 AT N5
522          HC       3     7.7

523          KK  SR@S-N
524          KM  STORAGE ROUTE @ SPRR FROM WATSON TO APACHE ROADS (SUB 56 STORAGE ROUTING)
525          KM  OVERTOPING STARTS @ Q=664cfs, EL=889.7 (OVERTOPING = 0.17 ft)
526          RS       1    ELEV     883
527          SA       0     .03     .06      .1      15    23.7    37.3      39    41.1
528          SQ       0      80     233     335     495     700    1020    1308    1731
529          SE     883     885     886  886.78     888   888.8  890.08   890.2  890.32
1                                          HEC-1 INPUT                                                    PAGE 12

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


530          KK  RN5-N6
531          KM  ROUTE HYDROGRAPH FROM SPRR AT N5 TO N6  (CHANNEL A)
532          RD     700    .001     .10            TRAP       0     100

533          KK      70
534          KM  BASIN 70
535          KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
536          KM  L=        .9  Lca=        .4   S=     5.0  Kn= .200  LAG= 144.0
537          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
538          BA     .17
539          LG     .50     .08    3.92     .55     .00
540          UI       4       4       4       4       4       4       4       4       4       4
541          UI       4       4       4       4       4       4       8      13      13      13
542          UI      13      14      15      15      15      15      18      18      18      19
543          UI      19      19      20      21      21      21      22      22      22      23
544          UI      23      24      25      25      26      26      26      28      28      29
545          UI      29      30      30      31      32      32      34      35      37      38
546          UI      40      41      44      51      44      46      51      54      54      52
547          UI      50      48      46      44      43      42      41      40      38      38
548          UI      37      36      35      35      34      33      33      32      32      31
549          UI      30      30      29      29      27      27      26      25      25      24
550          UI      24      24      23      23      22      21      21      21      19      19
551          UI      19      19      18      18      18      15      15      15      15      12
552          UI      11      11      11      11      11       7       7       7       7       7
553          UI       7       7       7       7       7       7       7       7       7       7
554          UI       7       7       7       7       5       4       4       4       4       4
555          UI       4       4       4       4       4       4       4       4       4       4
556          UI       4       1       1       1       1       1       1       1       1       1
557          UI       1       1       1       1       1       1       1       1       1       1
558          UI       1       1       1       1       1       1       1       1       1       1
559          UI       1       1       1       1       1       1       1       1       1       1
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560   UI      1      1      1      1      1      1      1      1      1      1
561   UI      1      1      1      1      0      0      0      0      0      0
562   UI      0      0      0      0      0      0      0      0      0      0

563   KK  FROM71
564   KM  Retrieve Diversion from Sub Basin 71
565   DR    To70

566   KK     @N6
567   KM  COMBINE ROUTED HYDROGRAPH FROM N5 WITH RUNOFF FROM 70 AT N6
568   HC      3    8.09

569   KK    OUT2
570   KM  Diversion over Apache/Cemetery Road to Sub Basin 69
571   DT    To69
572   DI      0   1565
573   DQ      0   1099
1                                HEC-1 INPUT                                    PAGE 13

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


574   KK  SR@B-N
575   KM  STORAGE ROUTE AT THE BUCKEYE CANAL BETWEEN WATSON AND CEMETERY ROADS (SUB 70)
576   RS      1    ELEV  883.23
577   SA      0    23.5      26      28      31      33      35      38    40.5      45
578   SQ      0       0       9     102     276     507     787    1114    1484    2352
579   SE  883.23   884.2   884.3   884.4   884.5   884.6   884.7   884.8   884.9   885.1
580   KO                                     22
581   ZW   A=FIS  B=BIDE  C=FLOW  E=2MIN
582   KM  ******************************************************************************
583   KM  *************************  SUB-WATERSHED L  ******************************
584   KM  ******************************************************************************

585   KK     10
586   KM  BASIN 10
587   KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
588   KM  L=      1.6  Lca=    106.0   S=   47.0  Kn= .050  LAG=  42.0
589   KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
590   BA    1.32
591   LG     .32     .34    4.14     .38    1.73
592   UI     106     106     106     106     147     348     388     441     499     537
593   UI     580     613     653     708     767     820     896    1034    1216    1366
594   UI    1341    1176    1065     980     913     855     804     736     680     631
595   UI     584     535     501     447     383     304     241     187     187     176
596   UI     174     174     114     106     106     106     103      32      32      32
597   UI      32      32      32      32      32      32      32      32      32      32
598   UI      32      32       0       0       0       0       0       0       0       0
599   UI       0       0       0       0       0       0       0       0       0       0

600   KK  RL1-L2
601   KM  ROUTE RUNOFF FROM 10 CONCENTRATED AT L1 TO L2  (CHANNEL B)
602   RD
603   RC     .10    .020     .10    2640    .009
604   RX       0    1000    1006    1010    1050    1054    1060    2060
605   RY      10       0       0       1       1       0       0      10

606   KK     22
607   KM  BASIN 22
608   KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
609   KM  L=      1.5  Lca=       .7   S=   20.0  Kn= .200  LAG= 167.0
610   KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
611   BA     .58
612   LG     .50     .08    4.24     .65     .00
613   UI      12      12      12      12      12      12      12      12      12      12
614   UI      12      12      12      12      12      12      12      12      12      36
615   UI      39      39      39      39      39      45      45      45      45      46
616   UI      54      54      54      54      57      58      58      58      63      63
617   UI      63      64      66      66      66      69      69      69      73      73
618   UI      73      76      77      77      81      82      83      87      87      89
619   UI      90      90      93      93      98     100     104     108     112     118
620   UI     120     123     140     148     129     137     150     158     159     159
621   UI     150     146     142     135     133     129     125     123     119     118
622   UI     113     113     109     108     105     104     102     100      99      97
623   UI      96      93      93      91      90      89      85      85      82      80
624   UI      80      76      75      75      72      71      71      69      68      68
1                                HEC-1 INPUT                                    PAGE 14

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

625   UI      66      61      61      61      59      58      58      58      55      54
626   UI      54      54      49      45      45      45      45      39      34      34
627   UI      34      34      34      34      22      21      21      21      21      21
628   UI      21      21      21      21      21      19      19      19      19      19
629   UI      19      19      19      19      19      19      16      12      12      12
630   UI      12      12      12      12      12      12      12      12      12      12
631   UI      12      12      12      12      12       8       4       4       4       4
632   UI       4       4       4       4       4       4       4       4       4       4
633   UI       4       4       4       4       4       4       4       4       4       4
634   UI       4       4       4       4       4       4       4       4       4       4
635   UI       4       4       4       4       4       4       4       4       4       4
636   UI       4       4       4       4       4       4       4       4       4       4
637   UI       4       4       4       4       4       4       4       0       0       0
638   UI       0       0       0       0       0       0       0       0       0       0

639   KK     @L2
640   KM  COMBINE ROUTED HYDROGRAPH FROM L1 WITH RUNOFF FROM 22 AT L2
641   HC      2
```

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KK  SR@R-L
KM  STORAGE ROUTE AT ROOSEVELT CANAL BETWEEN APACHE AND MILLER ROADS (SUB 22 SR)
RS       1    ELEV     993
SA       0     .03     .05     .08      .1     5.6    14.4      17
SQ       0      40     180     320     630    1580    2979    3846
SE     993   993.6   994.4   994.7  994.91   995.2  995.47  995.57

KK  RL2-L3
KM  ROUTE HYDROGRAPH FROM ROOSEVELT CANAL AT L2 TO L3  (CHANNEL B)
RD
RC     .10    .020     .10    7600    .009
RX       0    1000    1006    1010    1050    1054    1060    2060
RY      10       0       0       1       1       0       0      10

KK      36
KM  BASIN 36
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=      1.9  Lca=        .9   S=   36.0  Kn= .200  LAG= 179.0
KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .68
LG     .50     .08    4.30     .66     .00
UI      13      13      13      13      13      13      13      13      13      13
UI      13      13      13      13      13      13      13      13      13      13
UI      25      42      42      42      42      42      43      49      49      49
UI      49      49      57      59      59      59      60      63      63      63
UI      63      68      68      68      69      72      72      72      74      75
UI      75      76      80      80      80      83      84      84      87      89
UI      89      93      95      95      98      98      99     101     101     106
UI     109     111     118     118     128     128     133     134     162     155
UI     140     151     163     172     173     173     165     162     155     151
UI     147     142     140     135     134     129     128     124     123     119
UI     118     116     113     113     109     109     106     105     104     101
UI     101     100      98      98      93      92      92      87      87      87
UI      82      82      82      78      77      77      76      74      74      74
UI      68      67      67      67      63      63      63      63      60      59
UI      59      59      57      49      49      49      49      49      39      37
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

UI      37      37      37      37      37      28      23      23      23      23
UI      23      23      23      23      23      23      23      21      21      21
UI      21      21      21      21      21      21      21      21      21      17
UI      13      13      13      13      13      13      13      13      13      13
UI      13      13      13      13      13      13      13      13      13      13
UI       5       4       4       4       4       4       4       4       4       4
UI       4       4       4       4       4       4       4       4       4       4
UI       4       4       4       4       4       4       4       4       4       4
UI       4       4       4       4       4       4       4       4       4       4
UI       4       4       4       4       4       4       4       4       4       4
UI       4       4       4       4       4       4       4       4       4       4
UI       4       4       4       4       4       4       4       0       0       0
UI       0       0       0       0       0       0       0       0       0       0

KK     @L3
KM  COMBINE STORAGE ROUTED HYDROGRAPH FROM L2 WITH RUNOFF FROM 36 AT L3
HC       2

KK  RL3-L4
KM  ROUTE COMBINED HYDROGRAPH FROM L3 TO L4  (CHANNEL B)
RD
RC     .10    .020     .10    6000    .006
RX       0    1000    1006    1010    1050    1054    1060    2060
RY      10       0       0       1       1       0       0      10

KK      47
KM  BASIN 47
KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM  L=      1.4  Lca=        .7   S=   27.0  Kn= .200  LAG= 152.0
KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA     .62
LG     .50     .08    3.77     .50     .00
UI      14      14      14      14      14      14      14      14      14      14
UI      14      14      14      14      14      14      14      26      45      45
UI      45      45      45      52      52      52      52      57      63      63
UI      63      65      67      67      67      73      73      73      76      77
UI      77      79      80      80      83      85      85      89      90      90
UI      95      95      99     101     102     105     105     108     108     114
UI     116     122     126     134     136     142     152     174     152     157
UI     174     184     185     181     174     166     161     157     150     147
UI     143     138     136     131     130     126     125     121     120     116
UI     116     112     112     108     108     105     105     102      98      98
UI      92      92      90      87      87      84      83      83      79      78
UI      78      74      71      71      70      67      67      67      64      63
UI      63      63      53      52      52      52      48      39      39      39
UI      39      39      36      24      24      24      24      24      24      24
UI      24      24      24      22      22      22      22      22      22      22
UI      22      22      22      18      14      14      14      14      14      14
UI      14      14      14      14      14      14      14      14      14      14
UI      14       5       4       4       4       4       4       4       4       4
UI       4       4       4       4       4       4       4       4       4       4
UI       4       4       4       4       4       4       4       4       4       4
UI       4       4       4       4       4       4       4       4       4       4
UI       4       4       4       4       4       4       4       4       4       4
UI       4       4       4       4       4       4       4       4       0       0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 728          UI       0       0       0       0       0       0       0       0       0       0

 729          KK     @L4
 730          KM  COMBINE ROUTED HYDROGRAPH FROM L3 WITH RUNOFF FROM 47 AT L4
 731          HC       2

 732          KK    To66
 733          KM  Diversion over Miller Road to Sub Basin 67
 734          DT    To67
 735          DI       0    1214
 736          DQ       0     477

 737          KK  SR@S-L
 738          KM  STORAGE ROUTE @ SPRR FROM MILLER TO ROOKS ROADS (SUB 47 STORAGE ROUTING)
 739          KM  OVERTOPING STARTS @ Q=286cfs, EL=889.6 (OVERTOPING = 0.18 ft)
 740          RS       1    ELEV   884.2
 741          SA       0     .03     .06      .1    14.7    18.5    22.2    26.0    29.6
 742          SQ       0      59     172     230     323     480     769    1218    1828
 743          SE   884.2     886     888  888.94   889.7   889.9   890.1   890.3   890.5

 744          KK  RL4-L5
 745          KM  ROUTE HYDROGRAPH FROM SPRR AT L4 TO L5  (CHANNEL A)
 746          RD    1500    .005     .10            TRAP       0     100

 747          KK      66
 748          KM  BASIN 66
 749          KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 750          KM  L=        .7  Lca=        .4   S=   12.0  Kn= .200  LAG= 109.0
 751          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 752          BA     .29
 753          LG     .50     .08    3.92     .55     .00
 754          UI       9       9       9       9       9       9       9       9       9       9
 755          UI       9       9      14      29      29      29      31      34      34      34
 756          UI      40      40      41      43      43      46      47      48      49      49
 757          UI      52      52      54      55      57      58      61      61      65      66
 758          UI      67      69      70      75      78      82      88      91     104     103
 759          UI     103     115     119     115     109     104      99      95      92      88
 760          UI      85      83      81      78      76      75      72      71      70      68
 761          UI      66      63      62      60      58      56      54      53      52      51
 762          UI      49      46      46      44      43      43      40      40      38      34
 763          UI      34      33      25      25      25      25      19      16      16      16
 764          UI      16      16      16      15      14      14      14      14      14      14
 765          UI      14      11       9       9       9       9       9       9       9       9
 766          UI       9       9       9       9       3       3       3       3       3       3
 767          UI       3       3       3       3       3       3       3       3       3       3
 768          UI       3       3       3       3       3       3       3       3       3       3
 769          UI       3       3       3       3       3       3       3       3       3       3
 770          UI       3       3       3       3       3       0       0       0       0       0
 771          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

 772          KK     @L5
 773          KM  COMBINE ROUTED HYDROGRAPH FROM L4 WITH RUNOFF FROM 66 AT L5
 774          HC       2    2.23

 775          KK  SR@B-L
 776          KM  STORAGE ROUTE AT THE BUCKEYE CANAL BETWEEN MILLER AND ROOKS ROADS (SUB 66 SR)
 777          RS       1    ELEV  878.35
 778          SA       0    75.5    78.5      81    83.5      86      91      96     101
 779          SQ       0       0       7      40     111     228     630    1324    2378
 780          SE  878.35   881.3   881.4   881.5   881.6   881.7   881.9   882.1   882.3
 781          KM  ******************************************************************************
 782          KM  ****************************  SUB-WATERSHED M  ******************************
 783          KM  ******************************************************************************

 784          KK      37
 785          KM  BASIN 37
 786          KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 787          KM  L=       2.4  Lca=       1.2   S=   30.0  Kn= .200  LAG= 223.0
 788          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 789          BA    1.44
 790          LG     .50     .08    4.19     .63     .00
 791          UI      21      79     122     172     255     186     133      89      41      28
 792          UI      14       7       7       7       0       0       0       0       0       0
 793          UI       0       0       0       0       0       0       0       0       0       0

 794          KK  RM1-M2
 795          KM  ROUTE RUNOFF FROM 37 AT M1 TO M2  (CHANNEL A)
 796          RD    2600    .009     .10            TRAP       0     100

 797          KK      48
 798          KM  BASIN 48
 799          KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 800          KM  L=       1.0  Lca=        .5   S=   22.0  Kn= .200  LAG= 121.0
 801          KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 802          BA     .49
 803          LG     .50     .08    3.92     .55     .00
 804          UI      13      13      13      13      13      13      13      13      13      13
 805          UI      13      13      13      13      40      44      44      44      48      51
 806          UI      51      51      60      62      62      65      66      66      71      72
 807          UI      73      75      75      78      79      81      83      84      88      88
 808          UI      93      93      99     100     103     103     106     109     114     120
 809          UI     125     134     139     152     165     147     171     180     181     174
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810        UI    165    158    152    147    140    136    133    129    125    122
811        UI    119    116    114    110    109    106    105    103     99     96
812        UI     93     91     88     86     84     81     81     77     77     73
813        UI     70     70     66     66     66     62     62     62     53     51
814        UI     51     49     39     39     39     39     35     24     24     24
815        UI     24     24     24     24     23     22     22     22     22     22
816        UI     22     22     22     17     13     13     13     13     13     13
817        UI     13     13     13     13     13     13     13      9      4      4
818        UI      4      4      4      4      4      4      4      4      4      4
819        UI      4      4      4      4      4      4      4      4      4      4
820        UI      4      4      4      4      4      4      4      4      4      4
821        UI      4      4      4      4      4      4      4      4      4      4
1                                   HEC-1 INPUT                                          PAGE 18

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

822        UI      4      4      4      0      0      0      0      0      0      0
823        UI      0      0      0      0      0      0      0      0      0      0

824        KK    @M2
825        KM  COMBINE ROUTED HYDROGRAPH FROM M1 WITH RUNOFF FROM 48 AT M2
826        HC      2

827        KK  RM2-M3
828        KM  ROUTE COMBINED HYDROGRAPH FROM M2 TO M3  (CHANNEL A)
829        RD   3500    .007    .025            TRAP      0    100

830        KK     67
831        KM  BASIN 67
832        KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
833        KM  L=       .9  Lca=       .4   S=   25.0  Kn= .200  LAG= 106.0
834        KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
835        BA    .49
836        LG    .20    .25   3.92    .33  22.50
837        UI     16     16     16     16     16     16     16     16     16     16
838        UI     16     16     44     51     51     52     60     60     60     71
839        UI     72     73     76     76     82     83     85     87     89     92
840        UI     93     97     98    102    105    108    113    116    119    121
841        UI    123    132    138    145    156    162    191    175    191    208
842        UI    211    199    188    179    171    164    158    153    148    143
843        UI    139    135    132    128    125    123    119    116    112    107
844        UI    105    100     99     94     94     89     89     82     81     78
845        UI     76     76     72     72     67     60     60     56     45     45
846        UI     45     45     28     28     28     28     28     28     27     26
847        UI     26     26     26     26     26     26     19     16     16     16
848        UI     16     16     16     16     16     16     16     16     10      5
849        UI      5      5      5      5      5      5      5      5      5      5
850        UI      5      5      5      5      5      5      5      5      5      5
851        UI      5      5      5      5      5      5      5      5      5      5
852        UI      5      5      5      5      5      5      5      5      0      0
853        UI      0      0      0      0      0      0      0      0      0      0

854        KK  FROM47
855        KM  Retrieve Diversion from Sub Basin 47
856        DR    To67

857        KK    @M3
858        KM  COMBINE ROUTED HYDROGRAPH FROM M2 WITH RUNOFF FROM 67 AT M3
859        HC      3   3.68

860        KK  SR@S-M
861        KM  STORAGE ROUTE @ SPRR FROM APACHE TO MILLER ROADS (SUB 67 STORAGE ROUTING)
862        KM  OVERTOPING STARTS @ Q=226cfs, EL=887.2 (OVERTOPING = 0.12 ft)
863        RS      1    ELEV   881.5
864        SA      0     .03     .06      .1       3       8      12    15.5
865        SQ      0      42     135     200     226     465    1010    1703
866        SE  881.5     883     885  887.06   887.2   887.4   887.6  887.77
1                                   HEC-1 INPUT                                          PAGE 19

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

867        KK  RM3-M4
868        KM  ROUTE HYDROGRAPH FROM SPRR AT M3 TO M4  (CHANNEL A)
869        RD    400    .001    .025            TRAP      0    100

870        KK     69
871        KM  BASIN 69
872        KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
873        KM  L=       .9  Lca=       .4   S=    5.0  Kn= .200  LAG= 147.0
874        KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
875        BA    .14
876        LG    .20    .25   3.71    .29  22.50
877        UI      3      3      3      3      3      3      3      3      3      3
878        UI      3      3      3      3      3      3      7     11     11     11
879        UI     11     11     13     13     13     13     15     15     15     16
880        UI     16     16     16     18     18     18     18     18     18     19
881        UI     19     20     20     20     21     22     22     23     23     24
882        UI     24     25     25     25     26     26     28     28     30     31
883        UI     33     34     36     42     36     38     42     44     44     43
884        UI     41     40     38     37     36     34     34     33     32     31
885        UI     30     30     29     29     28     27     27     26     26     26
886        UI     25     25     24     24     22     22     22     21     21     20
887        UI     20     20     19     19     18     17     17     17     16     16
888        UI     16     15     15     15     15     13     13     13     13     10
889        UI      9      9      9      9      9      6      6      6      6      6
890        UI      6      6      6      6      6      5      5      5      5      5
891        UI      5      5      5      5      4      3      3      3      3      3
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892          UI      3      3      3      3      3      3      3      3      3      3
893          UI      3      1      1      1      1      1      1      1      1      1
894          UI      1      1      1      1      1      1      1      1      1      1
895          UI      1      1      1      1      1      1      1      1      1      1
896          UI      1      1      1      1      1      1      1      1      1      1
897          UI      1      1      1      1      1      1      1      1      1      1
898          UI      1      1      1      1      0      0      0      0      0      0
899          UI      0      0      0      0      0      0      0      0      0      0

900          KK  FROM70
901          KM  Retrieve Diversion from Sub Basin 70
902          DR    To69

903          KK     @M4
904          KM  COMBINE ROUTED HYDROGRAPH FROM M3 WITH RUNOFF FROM 69 AT M4
905          HC      3     9.5

906          KK    OUT3
907          KM  Diversion over Miller Road to Sub Basin 66
908          DT    To66
909          DI      0    1879
910          DQ      0     732
1                                        HEC-1 INPUT                                          PAGE 20

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


911          KK  SR@B-M
912          KM  STORAGE ROUTE AT THE BUCKEYE CANAL BETWEEN CEMETERY AND MILLER ROADS (SUB 69)
913          RS      1    ELEV   879.0
914          SA      0    64.5    65.8      67    68.5      70      72      74    75.5    77.5
915          SQ      0       0      18      71     170     324     540     862    1402    2093
916          SE    879   883.5   883.6   883.7   883.8   883.9   884.0   884.1   884.2   884.3
917          KO                                     22
918          ZW   A=FIS  B=BIDW  C=FLOW  E=2MIN
919          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  26          12
               V
               V
  42      RO1-03
               .
               .
  45           .          24
               .           .
               .           .
  73         @03............
               V
               V
  76      RO3-04
               .
               .
  79           .          13
               .           V
               .           V
  93           .      RO2-04
               .           .
               .           .
  99           .           .          25
               .           .           .
               .           .           .
 129         @04........................
               V
               V
 132      SR@R-O
               V
               V
 138      RO4-05
               .
               .
 144           .          39
               .           .
               .           .
 178         @05............
               V
               V
 181      RO5-06
               .
               .
 187           .          50
               .           .
               .           .
 224         @06............
               V
               V
 227      RO6-07
               .
               .
 233           .          57
               .           .
               .           .
 263         @07............
```

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                .
                .
268             .-------->    To56
266          To71
                V
                V
271        SR@S-O
                V
                V
278        RO7-O8
                .
                .
281             .          71
                .           .
                .           .
306          @O8............
                .
                .
311             .-------->    To70
309          Out1
                V
                V
314        SR@B-O
                .
                .
323             .          11
                .           V
                .           V
337             .      RN1-N2
                .           .
                .           .
343             .           .          23
                .           .           .
                .           .           .
380             .         @N2............
                .           V
                .           V
383             .      SR@R-N
                .           V
                .           V
389             .      RN2-N3
                .           .
                .           .
395             .           .          38
                .           .           .
                .           .           .
427             .         @N3............
                .           V
                .           V
430             .      RN3-N4
                .           .
                .           .
436             .           .          49
                .           .           .
                .           .           .
473             .         @N4............
                .           V
                .           V
476             .      RN4-N5
                .           .
                .           .
482             .           .          56
                .           .           .
                .           .           .
519             .           .           .          .<-------    To56
517             .           .           .      FROM57
                .           .           .           .
                .           .           .           .
520             .         @N5........................
                .           V
                .           V
523             .      SR@S-N
                .           V
                .           V
530             .      RN5-N6
                .           .
                .           .
533             .           .          70
                .           .           .
                .           .           .
565             .           .           .          .<-------    To70
563             .           .           .      FROM71
                .           .           .           .
                .           .           .           .
566             .         @N6........................
                .           .
                .           .
571             .           .-------->    To69
569             .        OUT2
                .           V
                .           V
574             .      SR@B-N
                .           .
                .           .
585             .           .          10
                .           .           V
                .           .           V
600             .           .      RL1-L2
```

```
606                          22
                              .
                              .
639                   @L2............
                         V
                         V
642                 SR@R-L
                         V
                         V
648                 RL2-L3
                         .
                         .
654                          36
                              .
                              .
689                   @L3............
                         V
                         V
692                 RL3-L4
                         .
                         .
698                          47
                              .
                              .
729                   @L4............
                         .
                         .
734                      .------->    To67
732                 To66
                         V
                         V
737                 SR@S-L
                         V
                         V
744                 RL4-L5
                         .
                         .
747                          66
                              .
                              .
772                   @L5............
                         V
                         V
775                 SR@B-L
                         .
                         .
784                          37
                              V
                              V
794                      RM1-M2
                              .
                              .
797                                   48
                              .        .
                              .        .
824                      @M2............
                              V
                              V
827                      RM2-M3
                              .
                              .
830                                   67
                              .        .
                              .        .
856                                    .<-------    To67
854                                    .      FROM47
                              .        .           .
                              .        .           .
857                      @M3........................
                              V
                              V
860                      SR@S-M
                              V
                              V
867                      RM3-M4
                              .
                              .
870                                   69
                              .        .
                              .        .
902                                    .<-------    To69
900                                    .      FROM70
                              .        .           .
                              .        .           .
903                      @M4........................
                              .
                              .
908                           .------->    To66
906                      OUT3
                              V
                              V
911                      SR@B-M
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 | 12 | 1406. | 4.40 | 167. | 42. | 15. | .98 | | |
| + | ROUTED TO | RO1-O3 | 1404. | 4.50 | 167. | 42. | 15. | .98 | | |
| + | HYDROGRAPH AT | 24 | 292. | 5.83 | 100. | 25. | 9. | .49 | | |
| + | 2 COMBINED AT | @O3 | 1404. | 4.50 | 256. | 64. | 23. | 1.47 | | |
| + | ROUTED TO | RO3-O4 | 1183. | 5.17 | 250. | 63. | 23. | 1.47 | | |
| + | HYDROGRAPH AT | 13 | 607. | 4.47 | 70. | 17. | 6. | .45 | | |
| + | ROUTED TO | RO2-O4 | 574. | 4.90 | 72. | 18. | 6. | .45 | | |
| + | HYDROGRAPH AT | 25 | 118. | 6.13 | 44. | 11. | 4. | .27 | | |
| + | 3 COMBINED AT | @O4 | 1487. | 5.17 | 332. | 84. | 30. | 2.19 | | |
| + | ROUTED TO | SR@R-O | 1454. | 5.23 | 331. | 83. | 30. | 2.19 | | |
| + | ROUTED TO | RO4-O5 | 1426. | 5.63 | 337. | 85. | 30. | 2.19 | | |
| + | HYDROGRAPH AT | 39 | 269. | 6.53 | 113. | 29. | 10. | .71 | | |
| + | 2 COMBINED AT | @O5 | 1464. | 5.70 | 414. | 106. | 38. | 2.90 | | |
| + | ROUTED TO | RO5-O6 | 1651. | 6.23 | 421. | 108. | 39. | 2.90 | | |
| + | HYDROGRAPH AT | 50 | 306. | 6.93 | 144. | 38. | 14. | 1.00 | | |
| + | 2 COMBINED AT | @O6 | 1532. | 6.23 | 508. | 134. | 48. | 3.90 | | |
| + | ROUTED TO | RO6-O7 | 1256. | 7.13 | 506. | 134. | 48. | 3.90 | | |
| + | HYDROGRAPH AT | 57 | 226. | 6.13 | 85. | 21. | 8. | .51 | | |
| + | 2 COMBINED AT | @O7 | 1316. | 7.17 | 530. | 147. | 53. | 4.41 | | |
| + | DIVERSION TO | To56 | 1085. | 7.17 | 438. | 121. | 44. | 4.41 | | |
| + | HYDROGRAPH AT | To71 | 230. | 7.17 | 93. | 26. | 9. | 4.41 | | |
| + | ROUTED TO | SR@S-O | 171. | 7.77 | 93. | 26. | 9. | 4.41 | | |
| + | ROUTED TO | RO7-O8 | 150. | 8.73 | 91. | 26. | 9. | 4.41 | | |
| + | HYDROGRAPH AT | 71 | 89. | 5.60 | 27. | 7. | 2. | .14 | | |
| + | 2 COMBINED AT | @O8 | 193. | 8.40 | 122. | 38. | 14. | .91 | | |
| + | DIVERSION TO | To70 | 47. | 8.40 | 30. | 9. | 3. | .91 | | |
| + | HYDROGRAPH AT | Out1 | 147. | 8.40 | 93. | 29. | 10. | .91 | | |
| + | ROUTED TO | SR@B-O | 43. | 11.67 | 29. | 11. | 4. | .91 | | |
| + | HYDROGRAPH AT | 11 | 1518. | 4.47 | 197. | 49. | 18. | 1.27 | | |
| + | ROUTED TO | RN1-N2 | 1484. | 4.67 | 198. | 50. | 18. | 1.27 | | |
| + | HYDROGRAPH AT | 23 | 177. | 6.83 | 80. | 21. | 8. | .53 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | 2 COMBINED AT | @N2 | 1480. | 4.67 | 264. | 67. | 24. | 1.80 |
| + | ROUTED TO | SR@R-N | 1392. | 4.70 | 256. | 65. | 23. | 1.80 |
| + | ROUTED TO | RN2-N3 | 1360. | 5.07 | 261. | 66. | 24. | 1.80 |
| + | HYDROGRAPH AT | 38 | 207. | 6.33 | 80. | 20. | 7. | .52 |
| + | 2 COMBINED AT | @N3 | 1358. | 5.07 | 315. | 80. | 29. | 2.32 |
| + | ROUTED TO | RN3-N4 | 1390. | 5.67 | 322. | 83. | 30. | 2.32 |
| + | HYDROGRAPH AT | 49 | 284. | 7.00 | 135. | 36. | 13. | 1.00 |
| + | 2 COMBINED AT | @N4 | 1339. | 5.67 | 410. | 108. | 39. | 3.32 |
| + | ROUTED TO | RN4-N5 | 1142. | 6.27 | 415. | 109. | 39. | 3.32 |
| + | HYDROGRAPH AT | 56 | 247. | 6.70 | 108. | 28. | 10. | .74 |
| + | HYDROGRAPH AT | FROM57 | 1085. | 7.17 | 438. | 121. | 44. | 4.41 |
| + | 3 COMBINED AT | @N5 | 1771. | 7.20 | 811. | 224. | 81. | 7.70 |
| + | ROUTED TO | SR@S-N | 1336. | 7.50 | 810. | 224. | 81. | 7.70 |
| + | ROUTED TO | RN5-N6 | 1278. | 7.97 | 804. | 223. | 80. | 7.70 |
| + | HYDROGRAPH AT | 70 | 79. | 6.10 | 29. | 7. | 3. | .17 |
| + | HYDROGRAPH AT | FROM71 | 47. | 8.40 | 30. | 9. | 3. | .91 |
| + | 3 COMBINED AT | @N6 | 1297. | 7.97 | 828. | 233. | 84. | 8.09 |
| + | DIVERSION TO | To69 | 911. | 7.97 | 582. | 163. | 59. | 8.09 |
| + | HYDROGRAPH AT | OUT2 | 386. | 7.97 | 247. | 69. | 25. | 8.09 |
| + | ROUTED TO | SR@B-N | 381. | 8.13 | 240. | 65. | 24. | 8.09 |
| + | HYDROGRAPH AT | 10 | 1302. | 4.53 | 187. | 47. | 17. | 1.32 |
| + | ROUTED TO | RL1-L2 | 1283. | 4.80 | 188. | 47. | 17. | 1.32 |
| + | HYDROGRAPH AT | 22 | 213. | 6.50 | 88. | 23. | 8. | .58 |
| + | 2 COMBINED AT | @L2 | 1283. | 4.80 | 258. | 65. | 24. | 1.90 |
| + | ROUTED TO | SR@R-L | 1226. | 4.83 | 252. | 64. | 23. | 1.90 |
| + | ROUTED TO | RL2-L3 | 1233. | 5.63 | 264. | 67. | 24. | 1.90 |
| + | HYDROGRAPH AT | 36 | 226. | 6.70 | 99. | 26. | 9. | .68 |
| + | 2 COMBINED AT | @L3 | 1278. | 5.63 | 328. | 85. | 31. | 2.58 |
| + | ROUTED TO | RL3-L4 | 981. | 6.60 | 332. | 87. | 31. | 2.58 |
| + | HYDROGRAPH AT | 47 | 270. | 6.23 | 106. | 27. | 10. | .62 |
| + | 2 COMBINED AT | @L4 | 1086. | 6.60 | 382. | 106. | 38. | 3.20 |
| + | DIVERSION TO | To67 | 427. | 6.60 | 150. | 42. | 15. | 3.20 |
| | HYDROGRAPH AT | | | | | | | |

```
+                        To66      659.   6.60      232.      64.      23.     3.20

         ROUTED TO
+                      SR@S-L      528.   7.00      232.      64.      23.     3.20

         ROUTED TO
+                      RL4-L5      517.   7.33      232.      64.      23.     3.20

         HYDROGRAPH AT
+                          66      169.   5.60       50.      13.       5.      .29

         2 COMBINED AT
+                         @L5      580.   7.27      275.      79.      28.     2.23

         ROUTED TO
+                      SR@B-L      215.   9.60      127.      39.      15.     2.23

         HYDROGRAPH AT
+                          37      120.   4.03        8.       2.       1.     1.44

         ROUTED TO
+                      RM1-M2      104.   4.60        8.       2.       1.     1.44

         HYDROGRAPH AT
+                          48      260.   5.80       84.      21.       8.      .49

         2 COMBINED AT
+                         @M2      210.   5.80       79.      20.       7.     1.93

         ROUTED TO
+                      RM2-M3      209.   6.03       79.      20.       7.     1.93

         HYDROGRAPH AT
+                          67      351.   5.53      107.      27.      10.      .49

         HYDROGRAPH AT
+                      FROM47      427.   6.60      150.      42.      15.     3.20

         3 COMBINED AT
+                         @M3      657.   6.60      301.      82.      30.     3.68

         ROUTED TO
+                      SR@S-M      636.   6.67      301.      82.      30.     3.68

         ROUTED TO
+                      RM3-M4      614.   6.73      301.      82.      30.     3.68

         HYDROGRAPH AT
+                          69       79.   6.10       31.       8.       3.      .14

         HYDROGRAPH AT
+                      FROM70      911.   7.97      582.     163.      59.     8.09

         3 COMBINED AT
+                         @M4     1182.   7.53      801.     236.      85.     9.50

         DIVERSION TO
+                        To66      461.   7.53      312.      92.      33.     9.50

         HYDROGRAPH AT
+                        OUT3      722.   7.53      489.     144.      52.     9.50

         ROUTED TO
+                      SR@B-M      547.   8.83      339.      95.      34.     9.50
1

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


    -----DSS---ZCLOSE Unit:  71,   File: BCAR6.DSS
              Pointer Utilization:   .25
              Number of Records:     10
              File Size:     60.9  Kbytes
              Percent Inactive:    .0
```

# Existing Conditions Models

```
1****************************************                                    ****************************************
 *                                      *                                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *             JUN   1998               *                                    *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1                *                                    *         609 SECOND STREET            *
 *                                      *                                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   13MAY04  TIME  08:11:18  *                                    *          (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  BUCKEYE CAR
        2           ID  10 YEAR, 6 HOUR EXISTING CONDITIONS MODEL
        3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
        4           ID  NO OVERFLOW FROM NORTH OVER BID CANAL
        5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
        6           ID  RAINFALL LOSSES - GREEN AND AMPT
        7           ID  CHANNEL ROUTING - NORMAL DEPTH
        8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON
        9           ID  FIELD VISIT 01/29/04
                    *DIAGRAM
       10           IT       2 01JAN04    1200    2000
       11           IO       5
       12           IN      15
       13           JD     2.1    0.01
                    * 6-hour distribution, pattern 1.0
       14           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
       15           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
       16           PC   0.962   0.972   0.983   0.991     1.0
       17           JD    2.09     0.5
       18           JD    2.07     1.0
       19           JD    2.02     5.0
       20           JD    1.97    10.0
       21           JD    1.91    20.0
       22           JD    1.87    30.0
       23           JD    1.83    40.0
       24           JD    1.68   100.0
                    *

       25           KK     4TH
       26           KM  SUB BASIN 4TH
       27           KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
       28           KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
       29           KO       0       0     0.0       1      22
       30           BA   0.082
       31           IN      15 01JAN04       0
       32           LG   0.282   0.264    5.16   0.322  43.403
       33           UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
       34           UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
       35           UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
       36           UI    3.56    3.56    3.56    3.56    3.56    3.56       0
                    *

       37           KK   TO6TH
       38           KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
       39           DT  TO4THS
       40           DI       0     100    1000    2000
       41           DQ       0      50     500    1000
                    *

       42           KK  4TH6TH
       43           KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
       44           KO       0       0     0.0       0      22
       45           RS       1    FLOW     0.0     0.0
       46           RC    0.05   0.015    0.05  871.82   0.002     2.0
       47           RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
1                                                HEC-1 INPUT                                                          PAGE  2

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

       48           RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
```

```
                *

 49             KK     6TH
 50             KM  SUB BASIN 6TH
 51             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 52             KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
 53             KO       0       0     0.0       1      22
 54             BA  0.0565
 55             LG   0.325   0.152   7.592   0.121   41.38
 56             UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
 57             UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
 58             UI    3.51    3.51    3.51    3.51    3.51    3.51
                *

 59             KK     6TH
 60             KM  CP @ 6TH AND MONROE
 61             KO       0       0     0.0       0      22
 62             HC       2
                *

 63             KK   TO8TH
 64             KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 65             DT  TO7THS
 66             DI       0     100    1000    2000
 67             DQ       0      50     500    1000
                *

 68             KK  6TH8TH
 69             KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
 70             KO       0       0     0.0       0      22
 71             RS       2    FLOW     0.0     0.0
 72             RC    0.05   0.015    0.05 1116.33   0.002     2.0
 73             RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
 74             RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                *

 75             KK     8TH
 76             KM  SUB BASIN 8TH
 77             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 78             KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
 79             KO       0       0     0.0       1      22
 80             BA  0.0792
 81             LG    0.31   0.145   8.765   0.075  32.587
 82             UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
 83             UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
 84             UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
 85             UI    3.52    3.52    3.52    3.52    3.52       0
                *
1                                          HEC-1 INPUT                                          PAGE  3
LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 86             KK     8TH
 87             KM  CP @ 8TH AND MONROE
 88             KO       0       0     0.0       0      22
 89             HC       2
                *

 90             KK   TO9TH
 91             KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 92             DT  TOCEN1
 93             DI       0     100    1000    2000
 94             DQ       0      50     500    1000
                *

 95             KK  8TH9TH
 96             KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
 97             KO       0       0     0.0       0      22
 98             RS       1    FLOW     0.0     0.0
 99             RC    0.05   0.015    0.05  680.42   0.002     2.0
100             RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
101             RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                *

102             KK    9THE
103             KM  SUB BASIN 9THE
104             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
105             KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
106             KO       0       0     0.0       1      22
107             BA   0.096
108             IN      15 01JAN04       0
109             LG   0.385   0.113   8.599   0.087  33.259
110             UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
111             UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
112             UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
113             UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
114             UI    3.37    3.37    3.37    3.37       0
                *

115             KK    9THW
116             KM  SUB BASIN 9THW
117             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
118             KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
119             KO       0       0     0.0       1      22
120             BA  0.0814
121             LG   0.309     0.1    8.39   0.099  35.997
122             UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
```

```
 123          UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
 124          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
 125          UI    3.87    3.87    3.87
              *
1                                          HEC-1 INPUT                                          PAGE  4

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


 126          KK     9TH
 127          KM  CP @ 9TH AND MONROE
 128          KO       0       0     0.0       0      22
 129          HC       3
              *

 130          KK  TO DET
 131          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 132          DT  TOCEN2
 133          DI       0     100    1000    2000
 134          DQ       0     100    1000    2000
              *

 135          KK  BAYLIS
 136          KM  SUB BASIN BAYLIS
 137          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 138          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
 139          KO       0       0     0.0       1      22
 140          BA   0.016
 141          LG   0.223   0.022     9.7    0.07   4.895
 142          UI     0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
 143          UI    7.39     3.9    1.75    1.75    1.75
              *

 144          KK     DET
 145          KM  CP @ BAYLISS PROPERTY SOUTH OF MONROE
 146          KO       0       0     0.0       0      22
 147          HC       2
              *
              * KKDETBAS
              * KMPROPOSEDDETENTION BASIN ANALYSI       S
              * RS     1    STOR       0
              * SA   3.2     3.5     3.7       4     4.3     4.6     4.9     5.3     5.7
              * SA   6.3
              * SE    56      57      58      59      60      61      62      63      64
              * SE    66
              * SQ     0       0      34      66     100     140     182     228     274     3
              * SQ   364
              * KO                                    22
              *

 148          KK  DETDRN
 149          KM  FLOW ROUTED FROM CP DET TO CP DRAIN
 150          KO       0       0     0.0       0      22
 151          RS       2    FLOW     0.0     0.0
 152          RC    0.05    0.03    0.05    2657  0.0065       9
 153          RX     0.0      50     100     108     110     118     168     218
 154          RY       9     8.5       8       0       0       8     8.5       9
              *
1                                          HEC-1 INPUT                                          PAGE  5

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


 155          KK  FRM8TH
 156          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
 157          DR  TOCEN1
              *

 158          KK  8THCEN
 159          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
 160          KO       0       0     0.0       0      22
 161          RS       2    FLOW     0.0     0.0
 162          RC    0.05   0.015    0.05    1967   0.007     2.0
 163          RX     0.0   100.0   100.0  111.99     112     124     124     224
 164          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 165          KK  FRM9TH
 166          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
 167          DR  TOCEN2
              *

 168          KK  9THCEN
 169          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
 170          KO       0       0     0.0       0      22
 171          RS       1    FLOW     0.0     0.0
 172          RC    0.05   0.015    0.05    1300   0.008     2.0
 173          RX     0.0   100.0   100.0  111.99     112     124     124     224
 174          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 175          KK  CENTRE
 176          KM  SUB BASIN CENTRE
 177          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 178          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
 179          KO       0       0     0.0       1      22
 180          BA   0.067
 181          IN      15 01JAN04       0
```

```
 182          LG   0.248   0.159   6.909   0.151  32.636
 183          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
 184          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
 185          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
              *

 186          KK  CENTRE
 187          KM  CP @ CENTRE AND 9TH
 188          KO       0       0     0.0       0      22
 189          HC       3
              *

 190          KK  TOBELO
 191          KM  FLOW SPLIT AT CENTRE AND 9TH
 192          DT  TO DRN
 193          DI       0     100    1000    2000
 194          DQ       0      50     500    1000
              *
1                                        HEC-1 INPUT                                          PAGE  6

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

 195          KK  CENBEL
 196          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
 197          KO       0       0     0.0       0      22
 198          RS       2    FLOW     0.0     0.0
 199          RC    0.05   0.015    0.05    2542   0.005     2.0
 200          RX     0.0   100.0   100.0  111.99     112     124     124     224
 201          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 202          KK  BELOAT
 203          KM  SUB BASIN BELOAT
 204          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 205          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
 206          KO       0       0     0.0       1      22
 207          BA   0.049
 208          IN      15 01JAN04       0
 209          LG    0.25   0.151   9.213   0.065  29.636
 210          UI     0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
 211          UI   105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
 212          UI   10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
              *

 213          KK  BELOAT
 214          KM  CP @ BELOAT AND 9TH
 215          KO       0       0     0.0       0      22
 216          HC       2
              *

 217          KK  BELDRN
 218          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
 219          KO       0       0     0.0       0      22
 220          RS       1    FLOW     0.0     0.0
 221          RC   0.035   0.015   0.035    1343  0.0011       4
 222          RX     0.0     108     120  131.99     132     144     156     264
 223          RY       8       0       3    3.24    3.24       3       0       8
              *

 224          KK  FRMCEN
 225          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
 226          DR  TO DRN
              *

 227          KK  CENDRN
 228          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
 229          KO       0       0     0.0       0      22
 230          RS       2    FLOW     0.0     0.0
 231          RC    0.05    0.05    0.05    1888   0.005       4
 232          RX     0.0     300     600     900    1200    1500    1800    2100
 233          RY       1    0.67    0.33       0       0    0.33    0.67       1
              *
1                                        HEC-1 INPUT                                          PAGE  7

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

 234          KK   DRAIN
 235          KM  SUB BASIN DRAIN
 236          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 237          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
 238          KO       0       0     0.0       1      22
 239          BA   0.118
 240          IN      15 01JAN04       0
 241          LG   0.447   0.155   9.461   0.074   8.034
 242          UI     0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
 243          UI  246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
 244          UI   32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
 245          UI    5.98
              *

 246          KK   DRAIN
 247          KM  CP @ BELOAT AND APACHE
 248          KO       0       0     0.0       0      22
 249          HC       4
              *
```

```
250          KK  FRM4TH
251          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
252          DR  TO4THS
             *

253          KK   4TH4S
254          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
255          KO       0       0     0.0       0      22
256          RS       2    FLOW     0.0     0.0
257          RC    0.05   0.015    0.05    2629   0.015     2.0
258          RX     0.0   100.0   100.0  111.99     112     124     124     224
259          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

260          KK   4TH-S
261          KM  SUB BASIN 4TH-S
262          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
263          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
264          KO       0       0     0.0       1      22
265          BA   0.146
266          IN      15 01JAN04       0
267          LG   0.215   0.166   6.501    0.19  28.927
268          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
269          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
270          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
271          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
272          UI       5       5       5       5       5       0
             *
```

1 HEC-1 INPUT PAGE 8

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

273          KK   4TH-S
274          KM  CP @ 4TH AND BELOAT
275          KO       0       0     0.0       0      22
276          HC       2
             *

277          KK  4TH7TH
278          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
279          KO       0       0     0.0       0      22
280          RS       1    FLOW     0.0     0.0
281          RC    0.05   0.015    0.05    1339  0.0028     2.0
282          RX     0.0   100.0   100.0  111.99     112     124     124     224
283          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

284          KK  FRM6TH
285          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
286          DR  TO7THS
             *

287          KK  6TH7TH
288          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
289          KO       0       0     0.0       0      22
290          RS       2    FLOW     0.0     0.0
291          RC    0.05   0.015    0.05    3061  0.0059     2.0
292          RX     0.0   100.0   100.0  111.99     112     124     124     224
293          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

294          KK   7TH-S
295          KM  SUB BASIN 7TH-S
296          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
297          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
298          KO       0       0     0.0       1      22
299          BA   0.128
300          LG   0.243    0.26   5.219   0.296  29.957
301          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
302          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
303          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
304          UI    5.56    5.56    5.56    5.56    5.56    5.56
             *

305          KK   7TH-S
306          KM  CP @ 7TH AND BELOAT
307          KO       0       0     0.0       0      22
308          HC       3
             *
309          ZZ
```

1

```
          SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE    (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   25        4TH
              .
              .
   39         .-------->  TO4THS
   37      TO6TH
              V
              V
   42      4TH6TH
              .
              .
```

```
 49          .         6TH
             .           .
             .           .
 59        6TH............
             .
             .
 65          .-------> TO7THS
 63      TO8TH
           V
           V
 68     6TH8TH
             .
             .
 75          .         8TH
             .           .
             .           .
 86        8TH............
             .
             .
 92          .-------> TOCEN1
 90      TO9TH
           V
           V
 95     8TH9TH
             .
             .
102          .        9THE
             .           .
             .           .
115          .           .        9THW
             .           .           .
             .           .           .
126        9TH........................
             .
             .
132          .-------> TOCEN2
130     TO DET
             .
             .
135          .      BAYLIS
             .           .
             .           .
144        DET............
             V
             V
148     DETDRN
             .
             .
157          .           .<-------  TOCEN1
155          .      FRM8TH
             .           V
             .           V
158          .      8THCEN
             .           .
             .           .
167          .           .           .<-------  TOCEN2
165          .           .      FRM9TH
             .           .           V
             .           .           V
168          .           .      9THCEN
             .           .           .
             .           .           .
175          .           .           .      CENTRE
             .           .           .           .
             .           .           .           .
186          .      CENTRE........................
             .           .
             .           .
192          .           .-------> TO DRN
190          .      TOBELO
             .           V
             .           V
195          .      CENBEL
             .           .
             .           .
202          .           .      BELOAT
             .           .           .
             .           .           .
213          .      BELOAT............
             .           V
             .           V
217          .      BELDRN
             .           .
             .           .
226          .           .           .<-------  TO DRN
224          .           .      FRMCEN
             .           .           V
             .           .           V
227          .           .      CENDRN
             .           .           .
             .           .           .
234          .           .           .       DRAIN
             .           .           .           .
             .           .           .           .
246       DRAIN....................................
             .
             .
252          .           .<-------  TO4THS
```

```
  250          .      FRM4TH
               .          V
               .          V
  253          .       4TH4S
               .          .
               .          .
  260          .          .       4TH-S
               .          .           .
               .          .           .
  273          .       4TH-S............
               .          V
               .          V
  277          .      4TH7TH
               .          .
               .          .
  286          .          .           .<-------  TO7THS
  284          .          .      FRM6TH
               .          .          V
               .          .          V
  287          .          .      6TH7TH
               .          .           .
               .          .           .
  294          .          .           .       7TH-S
               .          .           .           .
               .          .           .           .
  305          .       7TH-S........................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 | 4TH | 101. | 4.30 | 11. | 3. | 1. | .08 | | |
| + | DIVERSION TO | TO4THS | 50. | 4.30 | 6. | 1. | 1. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 50. | 4.30 | 6. | 1. | 1. | .08 | | |
| + | ROUTED TO | 4TH6TH | 47. | 4.37 | 6. | 1. | 1. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 96. | 4.17 | 9. | 2. | 1. | .06 | | |
| + | 2 COMBINED AT | 6TH | 130. | 4.23 | 15. | 4. | 1. | .14 | | |
| + | DIVERSION TO | TO7THS | 65. | 4.23 | 7. | 2. | 1. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 65. | 4.23 | 7. | 2. | 1. | .14 | | |
| + | ROUTED TO | 6TH8TH | 61. | 4.30 | 7. | 2. | 1. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 113. | 4.27 | 12. | 3. | 1. | .08 | | |
| + | 2 COMBINED AT | 8TH | 174. | 4.30 | 20. | 5. | 2. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 87. | 4.30 | 10. | 2. | 1. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 87. | 4.30 | 10. | 2. | 1. | .22 | | |
| + | ROUTED TO | 8TH9TH | 84. | 4.33 | 10. | 2. | 1. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 119. | 4.37 | 15. | 4. | 1. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 122. | 4.23 | 13. | 3. | 1. | .08 | | |
| + | 3 COMBINED AT | 9TH | 314. | 4.33 | 38. | 9. | 3. | .40 | | |
| + | DIVERSION TO | TOCEN2 | 314. | 4.33 | 38. | 9. | 3. | .40 | | |
| + | HYDROGRAPH AT | TO DET | 0. | .00 | 0. | 0. | 0. | .40 | | |
| + | HYDROGRAPH AT | BAYLIS | 36. | 4.07 | 3. | 1. | 0. | .02 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | 2 COMBINED AT | DET | 36. | 4.07 | 3. | 1. | 0. | .41 |
| + | ROUTED TO | DETDRN | 29. | 4.17 | 3. | 1. | 0. | .41 |
| + | HYDROGRAPH AT | FRM8TH | 87. | 4.30 | 10. | 2. | 1. | .22 |
| + | ROUTED TO | 8THCEN | 82. | 4.40 | 10. | 2. | 1. | .22 |
| + | HYDROGRAPH AT | FRM9TH | 314. | 4.33 | 38. | 9. | 3. | .40 |
| + | ROUTED TO | 9THCEN | 298. | 4.37 | 37. | 9. | 3. | .40 |
| + | HYDROGRAPH AT | CENTRE | 107. | 4.17 | 10. | 2. | 1. | .07 |
| + | 3 COMBINED AT | CENTRE | 446. | 4.30 | 57. | 14. | 5. | .07 |
| + | DIVERSION TO | TO DRN | 223. | 4.30 | 29. | 7. | 3. | .07 |
| + | HYDROGRAPH AT | TOBELO | 223. | 4.30 | 29. | 7. | 3. | .07 |
| + | ROUTED TO | CENBEL | 200. | 4.50 | 29. | 7. | 3. | .07 |
| + | HYDROGRAPH AT | BELOAT | 78. | 4.20 | 8. | 2. | 1. | .05 |
| + | 2 COMBINED AT | BELOAT | 232. | 4.43 | 36. | 9. | 3. | .12 |
| + | ROUTED TO | BELDRN | 211. | 4.57 | 36. | 9. | 3. | .12 |
| + | HYDROGRAPH AT | FRMCEN | 223. | 4.30 | 29. | 7. | 3. | .07 |
| + | ROUTED TO | CENDRN | 140. | 4.73 | 28. | 7. | 3. | .07 |
| + | HYDROGRAPH AT | DRAIN | 167. | 4.23 | 14. | 4. | 1. | .12 |
| + | 4 COMBINED AT | DRAIN | 379. | 4.53 | 80. | 20. | 7. | .65 |
| + | HYDROGRAPH AT | FRM4TH | 50. | 4.30 | 6. | 1. | 1. | .08 |
| + | ROUTED TO | 4TH4S | 49. | 4.37 | 6. | 1. | 1. | .08 |
| + | HYDROGRAPH AT | 4TH-S | 165. | 4.40 | 20. | 5. | 2. | .15 |
| + | 2 COMBINED AT | 4TH-S | 214. | 4.37 | 26. | 7. | 2. | .15 |
| + | ROUTED TO | 4TH7TH | 190. | 4.50 | 26. | 7. | 2. | .15 |
| + | HYDROGRAPH AT | FRM6TH | 65. | 4.23 | 7. | 2. | 1. | .14 |
| + | ROUTED TO | 6TH7TH | 58. | 4.37 | 7. | 2. | 1. | .14 |
| + | HYDROGRAPH AT | 7TH-S | 150. | 4.30 | 16. | 4. | 1. | .13 |
| + | 3 COMBINED AT | 7TH-S | 369. | 4.37 | 49. | 12. | 4. | .27 |

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

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   25MAR04  TIME  14:23:39  *
 *                                      *
 ****************************************
```

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

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

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

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

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1                                          HEC-1 INPUT                                                    PAGE  1

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

        1           ID  BUCKEYE CAR
        2           ID  50 YEAR, 6 HOUR EXISTING CONDITIONS MODEL
        3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
        4           ID  NO OVERFLOW FROM NORTH OVER BID CANAL
        5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
        6           ID  RAINFALL LOSSES - GREEN AND AMPT
        7           ID  CHANNEL ROUTING - NORMAL DEPTH
        8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON
        9           ID  FIED VISIT 01/29/04
                    *DIAGRAM
       10           IT       2 01JAN04    1200    2000
       11           IO       3
       12           IN      15
       13           JD     2.9    0.01
                    * 6-hour distribution, pattern 1.0
       14           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
       15           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
       16           PC   0.962   0.972   0.983   0.991     1.0
       17           JD    2.88     0.5
       18           JD    2.86     1.0
       19           JD    2.78     5.0
       20           JD    2.73    10.0
       21           JD    2.64    20.0
       22           JD    2.58    30.0
       23           JD    2.52    40.0
       24           JD    2.32   100.0
                    *

       25           KK     4TH
       26           KM  SUB BASIN 4TH
       27           KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
       28           KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
       29           KO       0       0     0.0       1      22
       30           BA   0.082
       31           IN      15 01JAN04       0
       32           LG   0.282   0.264    5.16   0.322  43.403
       33           UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
       34           UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
       35           UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
       36           UI    3.56    3.56    3.56    3.56    3.56    3.56       0
                    *

       37           KK   TO6TH
       38           KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
       39           DT  TO4THS
       40           DI       0     100    1000    2000
       41           DQ       0      50     500    1000
                    *

       42           KK  4TH6TH
       43           KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
       44           KO       0       0     0.0       0      22
       45           RS       1    FLOW     0.0     0.0
       46           RC    0.05   0.015    0.05  871.82   0.002     2.0
       47           RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
1                                          HEC-1 INPUT                                                    PAGE  2

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

       48           RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
```

```
                *

 49             KK     6TH
 50             KM  SUB BASIN 6TH
 51             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 52             KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
 53             KO       0       0     0.0       1      22
 54             BA  0.0565
 55             LG   0.325   0.152   7.592   0.121   41.38
 56             UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
 57             UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
 58             UI    3.51    3.51    3.51    3.51    3.51    3.51
                *

 59             KK     6TH
 60             KM  CP @ 6TH AND MONROE
 61             KO       0       0     0.0       0      22
 62             HC       2
                *

 63             KK   TO8TH
 64             KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 65             DT  TO7THS
 66             DI       0     100    1000    2000
 67             DQ       0      50     500    1000
                *

 68             KK  6TH8TH
 69             KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
 70             KO       0       0     0.0       0      22
 71             RS       2    FLOW     0.0     0.0
 72             RC    0.05   0.015    0.05 1116.33   0.002     2.0
 73             RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
 74             RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                *

 75             KK     8TH
 76             KM  SUB BASIN 8TH
 77             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 78             KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
 79             KO       0       0     0.0       1      22
 80             BA  0.0792
 81             LG    0.31   0.145   8.765   0.075  32.587
 82             UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
 83             UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
 84             UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
 85             UI    3.52    3.52    3.52    3.52    3.52       0
                *
1                                          HEC-1 INPUT                                          PAGE  3

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

 86             KK     8TH
 87             KM  CP @ 8TH AND MONROE
 88             KO       0       0     0.0       0      22
 89             HC       2
                *

 90             KK   TO9TH
 91             KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 92             DT  TOCEN1
 93             DI       0     100    1000    2000
 94             DQ       0      50     500    1000
                *

 95             KK  8TH9TH
 96             KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
 97             KO       0       0     0.0       0      22
 98             RS       1    FLOW     0.0     0.0
 99             RC    0.05   0.015    0.05  680.42   0.002     2.0
100             RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
101             RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                *

102             KK    9THE
103             KM  SUB BASIN 9THE
104             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
105             KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
106             KO       0       0     0.0       1      22
107             BA   0.096
108             IN      15 01JAN04       0
109             LG   0.385   0.113   8.599   0.087  33.259
110             UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
111             UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
112             UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
113             UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
114             UI    3.37    3.37    3.37    3.37       0
                *

115             KK    9THW
116             KM  SUB BASIN 9THW
117             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
118             KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
119             KO       0       0     0.0       1      22
120             BA  0.0814
121             LG   0.309     0.1    8.39   0.099  35.997
122             UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
```

```
 123          UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
 124          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
 125          UI    3.87    3.87    3.87
              *
1                                          HEC-1 INPUT                                          PAGE  4

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


 126          KK     9TH
 127          KM  CP @ 9TH AND MONROE
 128          KO       0       0     0.0       0      22
 129          HC       3
              *

 130          KK  TO DET
 131          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 132          DT  TOCEN2
 133          DI       0     100    1000    2000
 134          DQ       0     100    1000    2000
              *

 135          KK  BAYLIS
 136          KM  SUB BASIN BAYLIS
 137          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 138          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
 139          KO       0       0     0.0       1      22
 140          BA   0.016
 141          LG   0.223   0.022     9.7    0.07   4.895
 142          UI     0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
 143          UI    7.39     3.9    1.75    1.75    1.75
              *

 144          KK     DET
 145          KM  CP @ BAYLISS PROPERTY SOUTH OF MONROE
 146          KO       0       0     0.0       0      22
 147          HC       2
              *
              * KKDETBAS
              * KMPROPOSEDDETENTION BASIN ANALYSI       S
              * RS     1    STOR       0
              * SA   3.2     3.5     3.7       4     4.3     4.6     4.9     5.3     5.7
              * SA   6.3
              * SE    56      57      58      59      60      61      62      63      64
              * SE    66
              * SQ     0       0      34      66     100     140     182     228     274     3
              * SQ   364
              * KO                                    22
              *

 148          KK  DETDRN
 149          KM  FLOW ROUTED FROM CP DET TO CP DRAIN
 150          KO       0       0     0.0       0      22
 151          RS       2    FLOW     0.0     0.0
 152          RC    0.05    0.03    0.05    2657  0.0065       9
 153          RX     0.0      50     100     108     110     118     168     218
 154          RY       9     8.5       8       0       0       8     8.5       9
              *
1                                          HEC-1 INPUT                                          PAGE  5

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


 155          KK  FRM8TH
 156          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
 157          DR  TOCEN1
              *

 158          KK  8THCEN
 159          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
 160          KO       0       0     0.0       0      22
 161          RS       2    FLOW     0.0     0.0
 162          RC    0.05   0.015    0.05    1967   0.007     2.0
 163          RX     0.0   100.0   100.0  111.99     112     124     124     224
 164          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 165          KK  FRM9TH
 166          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
 167          DR  TOCEN2
              *

 168          KK  9THCEN
 169          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
 170          KO       0       0     0.0       0      22
 171          RS       1    FLOW     0.0     0.0
 172          RC    0.05   0.015    0.05    1300   0.008     2.0
 173          RX     0.0   100.0   100.0  111.99     112     124     124     224
 174          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 175          KK  CENTRE
 176          KM  SUB BASIN CENTRE
 177          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 178          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
 179          KO       0       0     0.0       1      22
 180          BA   0.067
 181          IN      15 01JAN04       0
```

```
 182          LG   0.248   0.159   6.909   0.151  32.636
 183          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
 184          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
 185          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
              *

 186          KK  CENTRE
 187          KM  CP @ CENTRE AND 9TH
 188          KO       0       0     0.0       0      22
 189          HC       3
              *

 190          KK  TOBELO
 191          KM  FLOW SPLIT AT CENTRE AND 9TH
 192          DT  TO DRN
 193          DI       0     100    1000    2000
 194          DQ       0      50     500    1000
              *
1                                          HEC-1 INPUT                                          PAGE  6

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

 195          KK  CENBEL
 196          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
 197          KO       0       0     0.0       0      22
 198          RS       2    FLOW     0.0     0.0
 199          RC    0.05   0.015    0.05    2542   0.005     2.0
 200          RX     0.0   100.0   100.0  111.99     112     124     124     224
 201          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 202          KK  BELOAT
 203          KM  SUB BASIN BELOAT
 204          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 205          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
 206          KO       0       0     0.0       1      22
 207          BA   0.049
 208          IN      15 01JAN04       0
 209          LG    0.25   0.151   9.213   0.065  29.636
 210          UI     0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
 211          UI   105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
 212          UI   10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
              *

 213          KK  BELOAT
 214          KM  CP @ BELOAT AND 9TH
 215          KO       0       0     0.0       0      22
 216          HC       2
              *

 217          KK  BELDRN
 218          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
 219          KO       0       0     0.0       0      22
 220          RS       1    FLOW     0.0     0.0
 221          RC   0.035   0.015   0.035    1343  0.0011       4
 222          RX     0.0     108     120  131.99     132     144     156     264
 223          RY       8       0       3    3.24    3.24       3       0       8
              *

 224          KK  FRMCEN
 225          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
 226          DR  TO DRN
              *

 227          KK  CENDRN
 228          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
 229          KO       0       0     0.0       0      22
 230          RS       2    FLOW     0.0     0.0
 231          RC    0.05    0.05    0.05    1888   0.005       4
 232          RX     0.0     300     600     900    1200    1500    1800    2100
 233          RY       1    0.67    0.33       0       0    0.33    0.67       1
              *
1                                          HEC-1 INPUT                                          PAGE  7

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

 234          KK   DRAIN
 235          KM  SUB BASIN DRAIN
 236          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 237          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
 238          KO       0       0     0.0       1      22
 239          BA   0.118
 240          IN      15 01JAN04       0
 241          LG   0.447   0.155   9.461   0.074   8.034
 242          UI     0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
 243          UI  246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
 244          UI   32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
 245          UI    5.98
              *

 246          KK   DRAIN
 247          KM  CP @ BELOAT AND APACHE
 248          KO       0       0     0.0       0      22
 249          HC       4
              *
```

```
250          KK  FRM4TH
251          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
252          DR  TO4THS
             *

253          KK   4TH4S
254          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
255          KO       0       0     0.0       0      22
256          RS       2    FLOW     0.0     0.0
257          RC    0.05   0.015    0.05    2629   0.015     2.0
258          RX     0.0   100.0   100.0  111.99     112     124     124     224
259          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

260          KK   4TH-S
261          KM  SUB BASIN 4TH-S
262          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
263          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
264          KO       0       0     0.0       1      22
265          BA   0.146
266          IN      15 01JAN04       0
267          LG   0.215   0.166   6.501    0.19  28.927
268          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
269          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
270          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
271          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
272          UI       5       5       5       5       5       0
             *
1                                          HEC-1 INPUT                                          PAGE  8

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

273          KK   4TH-S
274          KM  CP @ 4TH AND BELOAT
275          KO       0       0     0.0       0      22
276          HC       2
             *

277          KK  4TH7TH
278          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
279          KO       0       0     0.0       0      22
280          RS       1    FLOW     0.0     0.0
281          RC    0.05   0.015    0.05    1339  0.0028     2.0
282          RX     0.0   100.0   100.0  111.99     112     124     124     224
283          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

284          KK  FRM6TH
285          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
286          DR  TO7THS
             *

287          KK  6TH7TH
288          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
289          KO       0       0     0.0       0      22
290          RS       2    FLOW     0.0     0.0
291          RC    0.05   0.015    0.05    3061  0.0059     2.0
292          RX     0.0   100.0   100.0  111.99     112     124     124     224
293          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

294          KK   7TH-S
295          KM  SUB BASIN 7TH-S
296          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
297          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
298          KO       0       0     0.0       1      22
299          BA   0.128
300          LG   0.243    0.26   5.219   0.296  29.957
301          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
302          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
303          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
304          UI    5.56    5.56    5.56    5.56    5.56    5.56
             *

305          KK   7TH-S
306          KM  CP @ 7TH AND BELOAT
307          KO       0       0     0.0       0      22
308          HC       3
             *
309          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   25        4TH
               .
               .
   39          .-------> TO4THS
   37      TO6TH
               V
               V
   42      4TH6TH
               .
               .
```

```
 49          .         6TH
             .           .
             .           .
 59        6TH............
             .
             .
 65          .-------> TO7THS
 63      TO8TH
             V
             V
 68     6TH8TH
             .
             .
 75          .         8TH
             .           .
             .           .
 86        8TH............
             .
             .
 92          .-------> TOCEN1
 90      TO9TH
             V
             V
 95     8TH9TH
             .
             .
102          .        9THE
             .           .
             .           .
115          .           .        9THW
             .           .           .
             .           .           .
126       9TH........................
             .
             .
132          .-------> TOCEN2
130     TO DET
             .
             .
135          .      BAYLIS
             .           .
             .           .
144       DET............
             V
             V
148     DETDRN
             .
             .
157          .           .<-------  TOCEN1
155          .      FRM8TH
             .           V
             .           V
158          .      8THCEN
             .           .
             .           .
167          .           .           .<-------  TOCEN2
165          .           .      FRM9TH
             .           .           V
             .           .           V
168          .           .      9THCEN
             .           .           .
             .           .           .
175          .           .           .      CENTRE
             .           .           .           .
             .           .           .           .
186          .      CENTRE........................
             .           .
             .           .
192          .           .-------> TO DRN
190          .      TOBELO
             .           V
             .           V
195          .      CENBEL
             .           .
             .           .
202          .           .      BELOAT
             .           .           .
             .           .           .
213          .      BELOAT............
             .           V
             .           V
217          .      BELDRN
             .           .
             .           .
226          .           .           .<-------  TO DRN
224          .           .      FRMCEN
             .           .           V
             .           .           V
227          .           .      CENDRN
             .           .           .
             .           .           .
234          .           .           .       DRAIN
             .           .           .           .
             .           .           .           .
246      DRAIN....................................
             .
             .
252          .           .<-------  TO4THS
```

```
250          .      FRM4TH
             .          V
             .          V
253          .      4TH4S
             .          .
             .          .
260          .          .       4TH-S
             .          .           .
             .          .           .
273          .      4TH-S............
             .          V
             .          V
277          .      4TH7TH
             .          .
             .          .
286          .          .           .<-------  TO7THS
284          .          .      FRM6TH
             .          .          V
             .          .          V
287          .          .      6TH7TH
             .          .           .
             .          .           .
294          .          .           .       7TH-S
             .          .           .           .
             .          .           .           .
305          .      7TH-S........................
```

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 | 4TH | 152. | 4.30 | 17. | 4. | 2. | .08 | | |
| + | DIVERSION TO | TO4THS | 76. | 4.30 | 9. | 2. | 1. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 76. | 4.30 | 9. | 2. | 1. | .08 | | |
| + | ROUTED TO | 4TH6TH | 72. | 4.37 | 9. | 2. | 1. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 138. | 4.17 | 13. | 3. | 1. | .06 | | |
| + | 2 COMBINED AT | 6TH | 193. | 4.23 | 22. | 6. | 2. | .14 | | |
| + | DIVERSION TO | TO7THS | 97. | 4.23 | 11. | 3. | 1. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 97. | 4.23 | 11. | 3. | 1. | .14 | | |
| + | ROUTED TO | 6TH8TH | 91. | 4.30 | 11. | 3. | 1. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 164. | 4.27 | 18. | 5. | 2. | .08 | | |
| + | 2 COMBINED AT | 8TH | 254. | 4.30 | 29. | 7. | 3. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 127. | 4.30 | 15. | 4. | 1. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 127. | 4.30 | 15. | 4. | 1. | .22 | | |
| + | ROUTED TO | 8TH9TH | 123. | 4.33 | 15. | 4. | 1. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 174. | 4.37 | 22. | 6. | 2. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 175. | 4.23 | 19. | 5. | 2. | .08 | | |
| + | 3 COMBINED AT | 9TH | 458. | 4.30 | 56. | 14. | 5. | .40 | | |
| + | DIVERSION TO | TOCEN2 | 458. | 4.30 | 56. | 14. | 5. | .40 | | |
| + | HYDROGRAPH AT | TO DET | 0. | .00 | 0. | 0. | 0. | .40 | | |
| + | HYDROGRAPH AT | BAYLIS | 50. | 4.07 | 4. | 1. | 0. | .02 | | |
| + | 2 COMBINED AT | DET | 50. | 4.07 | 4. | 1. | 0. | .41 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | ROUTED TO | DETDRN | 43. | 4.17 | 4. | 1. | 0. | .41 |
| + | HYDROGRAPH AT | FRM8TH | 127. | 4.30 | 15. | 4. | 1. | .22 |
| + | ROUTED TO | 8THCEN | 120. | 4.40 | 15. | 4. | 1. | .22 |
| + | HYDROGRAPH AT | FRM9TH | 458. | 4.30 | 56. | 14. | 5. | .40 |
| + | ROUTED TO | 9THCEN | 437. | 4.37 | 56. | 14. | 5. | .40 |
| + | HYDROGRAPH AT | CENTRE | 156. | 4.17 | 15. | 4. | 1. | .07 |
| + | 3 COMBINED AT | CENTRE | 655. | 4.30 | 86. | 21. | 8. | .07 |
| + | DIVERSION TO | TO DRN | 328. | 4.30 | 43. | 11. | 4. | .07 |
| + | HYDROGRAPH AT | TOBELO | 328. | 4.30 | 43. | 11. | 4. | .07 |
| + | ROUTED TO | CENBEL | 295. | 4.50 | 43. | 11. | 4. | .07 |
| + | HYDROGRAPH AT | BELOAT | 112. | 4.20 | 11. | 3. | 1. | .05 |
| + | 2 COMBINED AT | BELOAT | 343. | 4.43 | 54. | 14. | 5. | .12 |
| + | ROUTED TO | BELDRN | 316. | 4.57 | 54. | 14. | 5. | .12 |
| + | HYDROGRAPH AT | FRMCEN | 328. | 4.30 | 43. | 11. | 4. | .07 |
| + | ROUTED TO | CENDRN | 219. | 4.70 | 42. | 11. | 4. | .07 |
| + | HYDROGRAPH AT | DRAIN | 250. | 4.23 | 23. | 6. | 2. | .12 |
| + | 4 COMBINED AT | DRAIN | 600. | 4.47 | 122. | 31. | 11. | .65 |
| + | HYDROGRAPH AT | FRM4TH | 76. | 4.30 | 9. | 2. | 1. | .08 |
| + | ROUTED TO | 4TH4S | 74. | 4.37 | 9. | 2. | 1. | .08 |
| + | HYDROGRAPH AT | 4TH-S | 247. | 4.37 | 31. | 8. | 3. | .15 |
| + | 2 COMBINED AT | 4TH-S | 321. | 4.37 | 40. | 10. | 4. | .15 |
| + | ROUTED TO | 4TH7TH | 288. | 4.47 | 40. | 10. | 4. | .15 |
| + | HYDROGRAPH AT | FRM6TH | 97. | 4.23 | 11. | 3. | 1. | .14 |
| + | ROUTED TO | 6TH7TH | 84. | 4.37 | 11. | 3. | 1. | .14 |
| + | HYDROGRAPH AT | 7TH-S | 231. | 4.30 | 25. | 6. | 2. | .13 |
| + | 3 COMBINED AT | 7TH-S | 560. | 4.37 | 75. | 19. | 7. | .27 |

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

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN  1998               *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   06APR04  TIME  15:37:25  *
 *                                      *
 ****************************************
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```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
****************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
```

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

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

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1                                          HEC-1 INPUT                                                    PAGE  1

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

        1           ID  BUCKEYE CAR
        2           ID  100 YEAR, 6 HOUR EXISTING CONDITIONS MODEL
        3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
        4           ID  NO OVERFLOW FROM NORTH OVER BID CANAL
        5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
        6           ID  RAINFALL LOSSES - GREEN AND AMPT
        7           ID  CHANNEL ROUTING - NORMAL DEPTH
        8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON
        9           ID  FIELD VISIT 01/29/04
                    *DIAGRAM
       10           IT       2 01JAN04    1200    2000
       11           IO       5
       12           IN      15
       13           JD     3.3    0.01
                    * 6-hour distribution, pattern 1.0
       14           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
       15           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
       16           PC   0.962   0.972   0.983   0.991     1.0
       17           JD    3.28     0.5
       18           JD   3.257     1.0
       19           JD   3.168     5.0
       20           JD   3.102    10.0
       21           JD   3.003    20.0
       22           JD   2.937    30.0
       23           JD   2.871    40.0
       24           JD    2.64   100.0
                    *

       25           KK     4TH
       26           KM  SUB BASIN 4TH
       27           KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
       28           KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
       29           KO       0       0     0.0       1      22
       30           BA   0.082
       31           IN      15 01JAN04       0
       32           LG   0.282   0.264    5.16   0.322  43.403
       33           UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
       34           UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
       35           UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
       36           UI    3.56    3.56    3.56    3.56    3.56    3.56       0
                    *

       37           KK   TO6TH
       38           KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
       39           DT  TO4THS
       40           DI       0     100    1000    2000
       41           DQ       0      50     500    1000
                    *

       42           KK  4TH6TH
       43           KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
       44           KO       0       0     0.0       0      22
       45           RS       1    FLOW     0.0     0.0
       46           RC    0.05   0.015    0.05  871.82   0.002     2.0
       47           RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
1                                          HEC-1 INPUT                                                    PAGE  2

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

       48           RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
```

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                *

 49             KK     6TH
 50             KM  SUB BASIN 6TH
 51             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 52             KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
 53             KO       0       0     0.0       1      22
 54             BA  0.0565
 55             LG   0.325   0.152   7.592   0.121   41.38
 56             UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
 57             UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
 58             UI    3.51    3.51    3.51    3.51    3.51    3.51
                *

 59             KK     6TH
 60             KM  CP @ 6TH AND MONROE
 61             KO       0       0     0.0       0      22
 62             HC       2
                *

 63             KK   TO8TH
 64             KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 65             DT  TO7THS
 66             DI       0     100    1000    2000
 67             DQ       0      50     500    1000
                *

 68             KK  6TH8TH
 69             KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
 70             KO       0       0     0.0       0      22
 71             RS       2    FLOW     0.0     0.0
 72             RC    0.05   0.015    0.05 1116.33   0.002     2.0
 73             RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
 74             RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                *

 75             KK     8TH
 76             KM  SUB BASIN 8TH
 77             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 78             KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
 79             KO       0       0     0.0       1      22
 80             BA  0.0792
 81             LG    0.31   0.145   8.765   0.075  32.587
 82             UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
 83             UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
 84             UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
 85             UI    3.52    3.52    3.52    3.52    3.52       0
                *
1                                          HEC-1 INPUT                                          PAGE  3

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

 86             KK     8TH
 87             KM  CP @ 8TH AND MONROE
 88             KO       0       0     0.0       0      22
 89             HC       2
                *

 90             KK   TO9TH
 91             KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 92             DT  TOCEN1
 93             DI       0     100    1000    2000
 94             DQ       0      50     500    1000
                *

 95             KK  8TH9TH
 96             KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
 97             KO       0       0     0.0       0      22
 98             RS       1    FLOW     0.0     0.0
 99             RC    0.05   0.015    0.05  680.42   0.002     2.0
100             RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
101             RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                *

102             KK    9THE
103             KM  SUB BASIN 9THE
104             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
105             KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
106             KO       0       0     0.0       1      22
107             BA   0.096
108             IN      15 01JAN04       0
109             LG   0.385   0.113   8.599   0.087  33.259
110             UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
111             UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
112             UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
113             UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
114             UI    3.37    3.37    3.37    3.37       0
                *

115             KK    9THW
116             KM  SUB BASIN 9THW
117             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
118             KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
119             KO       0       0     0.0       1      22
120             BA  0.0814
121             LG   0.309     0.1    8.39   0.099  35.997
122             UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
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 123          UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
 124          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
 125          UI    3.87    3.87    3.87
              *
1                                          HEC-1 INPUT                                          PAGE  4

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


 126          KK     9TH
 127          KM  CP @ 9TH AND MONROE
 128          KO       0       0     0.0       0      22
 129          HC       3
              *

 130          KK  TO DET
 131          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 132          DT  TOCEN2
 133          DI       0     100    1000    2000
 134          DQ       0     100    1000    2000
              *

 135          KK  BAYLIS
 136          KM  SUB BASIN BAYLIS
 137          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 138          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
 139          KO       0       0     0.0       1      22
 140          BA   0.016
 141          LG   0.223   0.022     9.7    0.07   4.895
 142          UI     0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
 143          UI    7.39     3.9    1.75    1.75    1.75
              *

 144          KK     DET
 145          KM  CP @ BAYLISS PROPERTY SOUTH OF MONROE
 146          KO       0       0     0.0       0      22
 147          HC       2
              *
              * KKDETBAS
              * KMPROPOSEDDETENTION BASIN ANALYSI        S
              * RS     1    STOR       0
              * SA   3.2     3.5     3.7       4     4.3     4.6     4.9     5.3     5.7
              * SA   6.3
              * SE    56      57      58      59      60      61      62      63      64
              * SE    66
              * SQ     0       0      34      66     100     140     182     228     274     3
              * SQ   364
              * KO                                    22
              *

 148          KK  DETDRN
 149          KM  FLOW ROUTED FROM CP DET TO CP DRAIN
 150          KO       0       0     0.0       0      22
 151          RS       2    FLOW     0.0     0.0
 152          RC    0.05    0.03    0.05    2657  0.0065       9
 153          RX     0.0      50     100     108     110     118     168     218
 154          RY       9     8.5       8       0       0       8     8.5       9
              *
1                                          HEC-1 INPUT                                          PAGE  5

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


 155          KK  FRM8TH
 156          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
 157          DR  TOCEN1
              *

 158          KK  8THCEN
 159          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
 160          KO       0       0     0.0       0      22
 161          RS       2    FLOW     0.0     0.0
 162          RC    0.05   0.015    0.05    1967   0.007     2.0
 163          RX     0.0   100.0   100.0  111.99     112     124     124     224
 164          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 165          KK  FRM9TH
 166          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
 167          DR  TOCEN2
              *

 168          KK  9THCEN
 169          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
 170          KO       0       0     0.0       0      22
 171          RS       1    FLOW     0.0     0.0
 172          RC    0.05   0.015    0.05    1300   0.008     2.0
 173          RX     0.0   100.0   100.0  111.99     112     124     124     224
 174          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 175          KK  CENTRE
 176          KM  SUB BASIN CENTRE
 177          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 178          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
 179          KO       0       0     0.0       1      22
 180          BA   0.067
 181          IN      15 01JAN04       0
```

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 182          LG   0.248   0.159   6.909   0.151  32.636
 183          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
 184          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
 185          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
              *

 186          KK  CENTRE
 187          KM  CP @ CENTRE AND 9TH
 188          KO       0       0     0.0       0      22
 189          HC       3
              *

 190          KK  TOBELO
 191          KM  FLOW SPLIT AT CENTRE AND 9TH
 192          DT  TO DRN
 193          DI       0     100    1000    2000
 194          DQ       0      50     500    1000
              *
1                                          HEC-1 INPUT                                          PAGE  6

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


 195          KK  CENBEL
 196          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
 197          KO       0       0     0.0       0      22
 198          RS       2    FLOW     0.0     0.0
 199          RC    0.05   0.015    0.05    2542   0.005     2.0
 200          RX     0.0   100.0   100.0  111.99     112     124     124     224
 201          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 202          KK  BELOAT
 203          KM  SUB BASIN BELOAT
 204          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 205          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
 206          KO       0       0     0.0       1      22
 207          BA   0.049
 208          IN      15 01JAN04       0
 209          LG    0.25   0.151   9.213   0.065  29.636
 210          UI     0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
 211          UI   105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
 212          UI   10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
              *

 213          KK  BELOAT
 214          KM  CP @ BELOAT AND 9TH
 215          KO       0       0     0.0       0      22
 216          HC       2
              *

 217          KK  BELDRN
 218          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
 219          KO       0       0     0.0       0      22
 220          RS       1    FLOW     0.0     0.0
 221          RC   0.035   0.015   0.035    1343  0.0011       4
 222          RX     0.0     108     120  131.99     132     144     156     264
 223          RY       8       0       3    3.24    3.24       3       0       8
              *

 224          KK  FRMCEN
 225          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
 226          DR  TO DRN
              *

 227          KK  CENDRN
 228          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
 229          KO       0       0     0.0       0      22
 230          RS       2    FLOW     0.0     0.0
 231          RC    0.05    0.05    0.05    1888   0.005       4
 232          RX     0.0     300     600     900    1200    1500    1800    2100
 233          RY       1    0.67    0.33       0       0    0.33    0.67       1
              *
1                                          HEC-1 INPUT                                          PAGE  7

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


 234          KK   DRAIN
 235          KM  SUB BASIN DRAIN
 236          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 237          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
 238          KO       0       0     0.0       1      22
 239          BA   0.118
 240          IN      15 01JAN04       0
 241          LG   0.447   0.155   9.461   0.074   8.034
 242          UI     0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
 243          UI  246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
 244          UI   32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
 245          UI    5.98
              *

 246          KK   DRAIN
 247          KM  CP @ BELOAT AND APACHE
 248          KO       0       0     0.0       0      22
 249          HC       4
              *
```

```
 250          KK  FRM4TH
 251          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
 252          DR  TO4THS
              *

 253          KK   4TH4S
 254          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
 255          KO       0       0     0.0       0      22
 256          RS       2    FLOW     0.0     0.0
 257          RC    0.05   0.015    0.05    2629   0.015     2.0
 258          RX     0.0   100.0   100.0  111.99     112     124     124     224
 259          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 260          KK   4TH-S
 261          KM  SUB BASIN 4TH-S
 262          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 263          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
 264          KO       0       0     0.0       1      22
 265          BA   0.146
 266          IN      15 01JAN04       0
 267          LG   0.215   0.166   6.501    0.19  28.927
 268          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
 269          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
 270          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
 271          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
 272          UI       5       5       5       5       5       0
              *
1                                          HEC-1 INPUT                                          PAGE  8

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

 273          KK   4TH-S
 274          KM  CP @ 4TH AND BELOAT
 275          KO       0       0     0.0       0      22
 276          HC       2
              *

 277          KK  4TH7TH
 278          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
 279          KO       0       0     0.0       0      22
 280          RS       1    FLOW     0.0     0.0
 281          RC    0.05   0.015    0.05    1339  0.0028     2.0
 282          RX     0.0   100.0   100.0  111.99     112     124     124     224
 283          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 284          KK  FRM6TH
 285          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
 286          DR  TO7THS
              *

 287          KK  6TH7TH
 288          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
 289          KO       0       0     0.0       0      22
 290          RS       2    FLOW     0.0     0.0
 291          RC    0.05   0.015    0.05    3061  0.0059     2.0
 292          RX     0.0   100.0   100.0  111.99     112     124     124     224
 293          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 294          KK   7TH-S
 295          KM  SUB BASIN 7TH-S
 296          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 297          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
 298          KO       0       0     0.0       1      22
 299          BA   0.128
 300          LG   0.243    0.26   5.219   0.296  29.957
 301          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
 302          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
 303          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
 304          UI    5.56    5.56    5.56    5.56    5.56    5.56
              *

 305          KK   7TH-S
 306          KM  CP @ 7TH AND BELOAT
 307          KO       0       0     0.0       0      22
 308          HC       3
              *
 309          ZZ
1
            SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   25         4TH
                .
                .
   39           .-------> TO4THS
   37       TO6TH
                V
                V
   42       4TH6TH
                .
                .
```

```
 49          .         6TH
             .           .
             .           .
 59        6TH............
             .
             .
 65          .-------> TO7THS
 63      TO8TH
             V
             V
 68     6TH8TH
             .
             .
 75          .         8TH
             .           .
             .           .
 86        8TH............
             .
             .
 92          .-------> TOCEN1
 90      TO9TH
             V
             V
 95     8TH9TH
             .
             .
102          .        9THE
             .           .
             .           .
115          .           .        9THW
             .           .           .
             .           .           .
126       9TH........................
             .
             .
132          .-------> TOCEN2
130     TO DET
             .
             .
135          .      BAYLIS
             .           .
             .           .
144       DET............
             V
             V
148     DETDRN
             .
             .
157          .           .<-------  TOCEN1
155          .      FRM8TH
             .           V
             .           V
158          .      8THCEN
             .           .
             .           .
167          .           .           .<-------  TOCEN2
165          .           .      FRM9TH
             .           .           V
             .           .           V
168          .           .      9THCEN
             .           .           .
             .           .           .
175          .           .           .      CENTRE
             .           .           .           .
             .           .           .           .
186          .      CENTRE........................
             .           .
             .           .
192          .           .-------> TO DRN
190          .      TOBELO
             .           V
             .           V
195          .      CENBEL
             .           .
             .           .
202          .           .      BELOAT
             .           .           .
             .           .           .
213          .      BELOAT............
             .           V
             .           V
217          .      BELDRN
             .           .
             .           .
226          .           .           .<-------  TO DRN
224          .           .      FRMCEN
             .           .           V
             .           .           V
227          .           .      CENDRN
             .           .           .
             .           .           .
234          .           .           .       DRAIN
             .           .           .           .
             .           .           .           .
246      DRAIN....................................
             .
             .
252          .           .<-------  TO4THS
```

```
250          .      FRM4TH
             .          V
             .          V
253          .      4TH4S
             .          .
             .          .
260          .          .       4TH-S
             .          .           .
             .          .           .
273          .      4TH-S............
             .          V
             .          V
277          .     4TH7TH
             .          .
             .          .
286          .          .           .<-------  TO7THS
284          .          .     FRM6TH
             .          .          V
             .          .          V
287          .          .     6TH7TH
             .          .           .
             .          .           .
294          .          .           .       7TH-S
             .          .           .           .
             .          .           .           .
305          .      7TH-S........................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 | 4TH | 178. | 4.27 | 20. | 5. | 2. | .08 | | |
| + | DIVERSION TO | TO4THS | 89. | 4.27 | 10. | 3. | 1. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 89. | 4.27 | 10. | 3. | 1. | .08 | | |
| + | ROUTED TO | 4TH6TH | 84. | 4.37 | 10. | 3. | 1. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 159. | 4.17 | 16. | 4. | 1. | .06 | | |
| + | 2 COMBINED AT | 6TH | 225. | 4.23 | 26. | 6. | 2. | .14 | | |
| + | DIVERSION TO | TO7THS | 112. | 4.23 | 13. | 3. | 1. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 112. | 4.23 | 13. | 3. | 1. | .14 | | |
| + | ROUTED TO | 6TH8TH | 107. | 4.30 | 13. | 3. | 1. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 189. | 4.27 | 22. | 5. | 2. | .08 | | |
| + | 2 COMBINED AT | 8TH | 294. | 4.30 | 34. | 9. | 3. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 147. | 4.30 | 17. | 4. | 2. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 147. | 4.30 | 17. | 4. | 2. | .22 | | |
| + | ROUTED TO | 8TH9TH | 142. | 4.33 | 17. | 4. | 2. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 201. | 4.37 | 26. | 6. | 2. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 201. | 4.23 | 22. | 6. | 2. | .08 | | |
| + | 3 COMBINED AT | 9TH | 530. | 4.30 | 65. | 16. | 6. | .40 | | |
| + | DIVERSION TO | TOCEN2 | 530. | 4.30 | 65. | 16. | 6. | .40 | | |
| + | HYDROGRAPH AT | TO DET | 0. | .00 | 0. | 0. | 0. | .40 | | |
| + | HYDROGRAPH AT | BAYLIS | 57. | 4.07 | 4. | 1. | 0. | .02 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | 2 COMBINED AT | DET | 57. | 4.07 | 4. | 1. | 0. | .41 |
| + | ROUTED TO | DETDRN | 49. | 4.17 | 4. | 1. | 0. | .41 |
| + | HYDROGRAPH AT | FRM8TH | 147. | 4.30 | 17. | 4. | 2. | .22 |
| + | ROUTED TO | 8THCEN | 138. | 4.40 | 17. | 4. | 2. | .22 |
| + | HYDROGRAPH AT | FRM9TH | 530. | 4.30 | 65. | 16. | 6. | .40 |
| + | ROUTED TO | 9THCEN | 506. | 4.37 | 65. | 16. | 6. | .40 |
| + | HYDROGRAPH AT | CENTRE | 180. | 4.17 | 18. | 4. | 2. | .07 |
| + | 3 COMBINED AT | CENTRE | 759. | 4.30 | 100. | 25. | 9. | .07 |
| + | DIVERSION TO | TO DRN | 379. | 4.30 | 50. | 13. | 5. | .07 |
| + | HYDROGRAPH AT | TOBELO | 379. | 4.30 | 50. | 13. | 5. | .07 |
| + | ROUTED TO | CENBEL | 342. | 4.50 | 50. | 13. | 5. | .07 |
| + | HYDROGRAPH AT | BELOAT | 129. | 4.20 | 13. | 3. | 1. | .05 |
| + | 2 COMBINED AT | BELOAT | 398. | 4.43 | 63. | 16. | 6. | .12 |
| + | ROUTED TO | BELDRN | 370. | 4.57 | 63. | 16. | 6. | .12 |
| + | HYDROGRAPH AT | FRMCEN | 379. | 4.30 | 50. | 13. | 5. | .07 |
| + | ROUTED TO | CENDRN | 260. | 4.70 | 50. | 13. | 5. | .07 |
| + | HYDROGRAPH AT | DRAIN | 291. | 4.23 | 27. | 7. | 2. | .12 |
| + | 4 COMBINED AT | DRAIN | 714. | 4.47 | 143. | 36. | 13. | .65 |
| + | HYDROGRAPH AT | FRM4TH | 89. | 4.27 | 10. | 3. | 1. | .08 |
| + | ROUTED TO | 4TH4S | 86. | 4.37 | 10. | 3. | 1. | .08 |
| + | HYDROGRAPH AT | 4TH-S | 288. | 4.37 | 37. | 9. | 3. | .15 |
| + | 2 COMBINED AT | 4TH-S | 374. | 4.37 | 47. | 12. | 4. | .15 |
| + | ROUTED TO | 4TH7TH | 338. | 4.47 | 47. | 12. | 4. | .15 |
| + | HYDROGRAPH AT | FRM6TH | 112. | 4.23 | 13. | 3. | 1. | .14 |
| + | ROUTED TO | 6TH7TH | 97. | 4.37 | 13. | 3. | 1. | .14 |
| + | HYDROGRAPH AT | 7TH-S | 272. | 4.27 | 29. | 7. | 3. | .13 |
| + | 3 COMBINED AT | 7TH-S | 658. | 4.37 | 89. | 22. | 8. | .27 |

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

```
1****************************************                                    ****************************************
 *                                      *                                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *             JUN   1998               *                                    *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1                *                                    *         609 SECOND STREET            *
 *                                      *                                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   25MAR04  TIME  13:50:38  *                                    *         (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  BUCKEYE CAR
        2           ID  100 YEAR, 6 HOUR EXISTING CONDITIONS MODEL
        3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
        4           ID  OVERFLOW HYDROGRAPHS FROM NORTH OF BID CANAL INPUT DIRECTLY
        5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
        6           ID  RAINFALL LOSSES - GREEN AND AMPT
        7           ID  CHANNEL ROUTING - NORMAL DEPTH
        8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON
        9           ID  FIELD VISIT 01/29/04
                    *DIAGRAM
       10           IT       2 01JAN04    1200    2000
       11           IO       3
       12           IN      15
       13           JD     3.3    0.01
                    * 6-hour distribution, pattern 1.0
       14           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
       15           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
       16           PC   0.962   0.972   0.983   0.991     1.0
       17           JD    3.28     0.5
       18           JD   3.257     1.0
       19           JD   3.168     5.0
       20           JD   3.102    10.0
       21           JD   3.003    20.0
       22           JD   2.937    30.0
       23           JD   2.871    40.0
       24           JD    2.64   100.0
                    *

       25           KK  OVBIDW
       26           KM  OVERTOPPING OF THE BID FOR THE 100-YEAR, 6-HOUR
       27           KM  HYDROGRAPH DEVELOPED FROM THE BUCKEYE AREA FIS
       28           KO                                      22
       29           BA   0.001
       30           IN      15
       31           QI       0       0       0       0       0       0       0       0       0       0
       32           QI       0       0       0       0       0       0       0       0       0       0
       33           QI       0       0       0       0       0       0       0     4.6    45.6     288
       34           QI     666   985.5  1090.3  1034.9   949.7   860.4   794.8   732.6   679.7   633.9
       35           QI   592.8   553.9   521.7   488.4   451.1   410.3   367.7   325.1   290.4   251.4
       36           QI     212     177   153.7   134.2   116.2   100.2    85.8    72.7    65.3    59.2
       37           QI    53.3    47.6    42.4    37.6    33.2    29.3    25.6    22.2    19.1    17.4
       38           QI    16.5    15.6    14.7    13.9    13.1    12.4    11.7    11.1    10.4     9.9
       39           QI     9.3     8.8     8.3     7.8     7.4       7     6.6     6.2     5.9     5.6
       40           QI     5.3       5     4.7     4.4     4.2       4     3.7     3.5     3.3     3.1
       41           QI       3     2.8     2.7     2.5     2.4     2.2     2.1       2     1.9     1.8
       42           QI     1.7     1.6     1.5     1.4     1.3     1.3     1.2     1.1     1.1       1
       43           QI     0.9     0.9     0.8     0.8     0.8     0.7     0.7     0.6     0.6     0.6
       44           QI     0.5     0.5     0.5     0.5     0.4     0.4     0.4     0.4     0.3     0.3
       45           QI     0.3     0.3     0.3     0.3     0.2     0.2     0.2     0.2     0.2     0.2
                    *
1                                                HEC-1 INPUT                                                    PAGE  2

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

       46           KK  BID4TH
       47           KM  WEST BID CANAL OVERFLOW ROUTED TO CP 4TH
       48           KO       0       0     0.0       0      22
       49           RS       2    FLOW     0.0     0.0
       50           RC    0.05   0.015    0.05    2722  0.0055     2.0
```

```
 51          RX     0.0       0    40.5      68      68    95.5     136     136
 52          RY      10    0.61     0.0    0.55    0.55     0.0    0.61      10
             *

 53          KK     4TH
 54          KM  SUB BASIN 4TH
 55          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
 56          KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
 57          KO       0       0     0.0       1      22
 58          BA   0.082
 59          IN      15 01JAN04       0
 60          LG   0.282   0.264    5.16   0.322  43.403
 61          UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
 62          UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
 63          UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
 64          UI    3.56    3.56    3.56    3.56    3.56    3.56       0
             *

 65          KK     4TH
 66          KM  CP @ 4TH AND MONROE
 67          KO                                      22
 68          HC       2
             *

 69          KK   TO6TH
 70          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 71          DT  TO4THS
 72          DI       0     100    1000    2000
 73          DQ       0      50     500    1000
             *

 74          KK  4TH6TH
 75          KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
 76          KO       0       0     0.0       0      22
 77          RS       1    FLOW     0.0     0.0
 78          RC    0.05   0.015    0.05  871.82   0.002     2.0
 79          RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
 80          RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
             *

 81          KK     6TH
 82          KM  SUB BASIN 6TH
 83          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 84          KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
 85          KO       0       0     0.0       1      22
 86          BA  0.0565
 87          LG   0.325   0.152   7.592   0.121   41.38
 88          UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
 89          UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
1                                          HEC-1 INPUT                                          PAGE  3

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

 90          UI    3.51    3.51    3.51    3.51    3.51    3.51
             *

 91          KK     6TH
 92          KM  CP @ 6TH AND MONROE
 93          KO       0       0     0.0       0      22
 94          HC       2
             *

 95          KK   TO8TH
 96          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 97          DT  TO7THS
 98          DI       0     100    1000    2000
 99          DQ       0      50     500    1000
             *

100          KK  6TH8TH
101          KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
102          KO       0       0     0.0       0      22
103          RS       2    FLOW     0.0     0.0
104          RC    0.05   0.015    0.05 1116.33   0.002     2.0
105          RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
106          RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
             *

107          KK     8TH
108          KM  SUB BASIN 8TH
109          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
110          KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
111          KO       0       0     0.0       1      22
112          BA  0.0792
113          LG    0.31   0.145   8.765   0.075  32.587
114          UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
115          UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
116          UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
117          UI    3.52    3.52    3.52    3.52    3.52       0
             *

118          KK     8TH
119          KM  CP @ 8TH AND MONROE
120          KO       0       0     0.0       0      22
121          HC       2
             *

122          KK   TO9TH
```

```
123          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
124          DT  TOCEN1
125          DI       0     100    1000    2000
126          DQ       0      50     500    1000
             *
1                                    HEC-1 INPUT                                                    PAGE  4

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

127          KK  8TH9TH
128          KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
129          KO       0       0     0.0       0      22
130          RS       1    FLOW     0.0     0.0
131          RC    0.05   0.015    0.05  680.42   0.002     2.0
132          RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
133          RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
             *

134          KK    9THE
135          KM  SUB BASIN 9THE
136          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
137          KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
138          KO       0       0     0.0       1      22
139          BA   0.096
140          IN      15 01JAN04       0
141          LG   0.385   0.113   8.599   0.087  33.259
142          UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
143          UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
144          UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
145          UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
146          UI    3.37    3.37    3.37    3.37       0
             *

147          KK    9THW
148          KM  SUB BASIN 9THW
149          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
150          KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
151          KO       0       0     0.0       1      22
152          BA  0.0814
153          LG   0.309     0.1    8.39   0.099  35.997
154          UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
155          UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
156          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
157          UI    3.87    3.87    3.87
             *

158          KK  OVBIDE
159          KM  OVERTOPPING OF THE BID FOR THE 100 YEAR, 6 HOUR STORM
160          KM  HYDROGRAPH DEVELOPED FROM THE BUCKEYE AREA FIS
161          KM  ADDITION O CFS CELLS AT BEGINNING OF HYDROGRAPH ARE A
162          KM  WORK AROUND TO GET PROGRAM TO BEGIN COMPUTATIONS AT
163          KM  THE RIGHT PLACE
164          KO                                      22
165          BA    0.01
166          IN      15
167          QI       0       0       0       0       0       0       0       0       0       0
168          QI       0       0       0       0       0       0       0       0       0       0
169          QI       0       0       0       0       0       0       0       0       0       0
170          QI       0       0       0       0       0       0       0       0       0       0
171          QI       0       0       0       0       0       0       0       0       0       0
172          QI       0       0       0       0       0       0       0       0       0       0
173          QI       0       0       0       0       0       0       0       0       0       0
174          QI       0       0       0     5.6   58.28  126.56  196.61  287.45  389.42  446.37
1                                    HEC-1 INPUT                                                    PAGE  5

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

175          QI  455.36  437.26  407.24  374.68  345.43  322.98  306.28  291.89  278.06   264.1
176          QI  249.43  232.79   214.2  193.92  172.53  149.72  125.59  101.07      84   69.82
177          QI   57.45   47.23   38.87   32.55    27.3    22.6   18.62   15.46   12.64    9.64
178          QI    8.77     8.4    7.98    7.53    7.08    6.63    6.18    5.75    5.34    4.96
179          QI    4.61    4.28    3.97    3.68    3.41    3.17    2.94    2.72    2.53    2.34
180          QI    2.17    2.02    1.87    1.73    1.61    1.49    1.38    1.28    1.19     1.1
181          QI    1.02    0.95    0.88    0.82    0.76     0.7    0.65    0.61    0.56    0.52
182          QI    0.48    0.45    0.42    0.39    0.36    0.33    0.31    0.29    0.26    0.25
183          QI    0.23    0.21     0.2    0.18    0.17    0.16    0.14    0.13    0.12    0.12
184          QI    0.11     0.1    0.09    0.09    0.08    0.07    0.07    0.06    0.06    0.05
185          QI    0.05    0.05    0.04    0.04    0.04    0.03    0.03    0.03    0.03    0.03
186          QI    0.02    0.02    0.02    0.02    0.02    0.02    0.02    0.01
             *

187          KK  BID9TH
188          KM  EAST BID CANAL OVERFLOW ROUTED TO CP 9TH
189          KO       0       0     0.0       0      22
190          RS       3    FLOW     0.0     0.0
191          RC    0.05   0.015    0.05    4082   0.004     2.0
192          RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
193          RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
             *

194          KK     9TH
195          KM  CP @ 9TH AND MONROE
196          KO       0       0     0.0       0      22
197          HC       4
             *

198          KK  TO DET
```

```
199          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
200          DT  TOCEN2
201          DI       0     100    1000    2000
202          DQ       0     100    1000    2000
             *

203          KK  BAYLIS
204          KM  SUB BASIN BAYLIS
205          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
206          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
207          KO       0       0     0.0       1      22
208          BA   0.016
209          LG   0.223   0.022     9.7    0.07   4.895
210          UI     0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
211          UI    7.39     3.9    1.75    1.75    1.75
             *

212          KK     DET
213          KM  CP @ BAYLISS PROPERTY SOUTH OF MONROE
214          KO       0       0     0.0       0      22
215          HC       2
             *
             * KKDETBAS
             * KMPROPOSEDDETENTION BASIN ANALYSI       S
             * RS     1    STOR       0
             * SA   3.2     3.5     3.7       4     4.3     4.6     4.9     5.3     5.7
             * SA   6.3
             * SE    56      57      58      59      60      61      62      63      64
             * SE    66
             * SQ     0       0      34      66     100     140     182     228     274     3
             * SQ   364
             * KO                                    22
             *
1                                          HEC-1 INPUT                                          PAGE  6

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

216          KK  DETDRN
217          KM  FLOW ROUTED FROM CP DET TO CP DRAIN
218          KO       0       0     0.0       0      22
219          RS       2    FLOW     0.0     0.0
220          RC    0.05    0.03    0.05    2657  0.0065       9
221          RX     0.0      50     100     108     110     118     168     218
222          RY       9     8.5       8       0       0       8     8.5       9
             *

223          KK  FRM8TH
224          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
225          DR  TOCEN1
             *

226          KK  8THCEN
227          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
228          KO       0       0     0.0       0      22
229          RS       2    FLOW     0.0     0.0
230          RC    0.05   0.015    0.05    1967   0.007     2.0
231          RX     0.0   100.0   100.0  111.99     112     124     124     224
232          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

233          KK  FRM9TH
234          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
235          DR  TOCEN2
             *

236          KK  9THCEN
237          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
238          KO       0       0     0.0       0      22
239          RS       1    FLOW     0.0     0.0
240          RC    0.05   0.015    0.05    1300   0.008     2.0
241          RX     0.0   100.0   100.0  111.99     112     124     124     224
242          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

243          KK  CENTRE
244          KM  SUB BASIN CENTRE
245          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
246          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
247          KO       0       0     0.0       1      22
248          BA   0.067
249          IN      15 01JAN04       0
250          LG   0.248   0.159   6.909   0.151  32.636
251          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
252          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
253          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
             *
1                                          HEC-1 INPUT                                          PAGE  7

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

254          KK  CENTRE
255          KM  CP @ CENTRE AND 9TH
256          KO       0       0     0.0       0      22
257          HC       3
             *
```

```
258          KK  TOBELO
259          KM  FLOW SPLIT AT CENTRE AND 9TH
260          DT  TO DRN
261          DI       0     100    1000    2000
262          DQ       0      50     500    1000
             *

263          KK  CENBEL
264          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
265          KO       0       0     0.0       0      22
266          RS       2    FLOW     0.0     0.0
267          RC    0.05   0.015    0.05    2542   0.005     2.0
268          RX     0.0   100.0   100.0  111.99     112     124     124     224
269          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

270          KK  BELOAT
271          KM  SUB BASIN BELOAT
272          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
273          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
274          KO       0       0     0.0       1      22
275          BA   0.049
276          IN      15 01JAN04       0
277          LG    0.25   0.151   9.213   0.065  29.636
278          UI     0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
279          UI   105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
280          UI   10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
             *

281          KK  BELOAT
282          KM  CP @ BELOAT AND 9TH
283          KO       0       0     0.0       0      22
284          HC       2
             *

285          KK  BELDRN
286          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
287          KO       0       0     0.0       0      22
288          RS       1    FLOW     0.0     0.0
289          RC   0.035   0.015   0.035    1343  0.0011       4
290          RX     0.0     108     120  131.99     132     144     156     264
291          RY       8       0       3    3.24    3.24       3       0       8
             *
```



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

292          KK  FRMCEN
293          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
294          DR  TO DRN
             *

295          KK  CENDRN
296          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
297          KO       0       0     0.0       0      22
298          RS       2    FLOW     0.0     0.0
299          RC    0.05    0.05    0.05    1888   0.005       4
300          RX     0.0     300     600     900    1200    1500    1800    2100
301          RY       1    0.67    0.33       0       0    0.33    0.67       1
             *

302          KK   DRAIN
303          KM  SUB BASIN DRAIN
304          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
305          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
306          KO       0       0     0.0       1      22
307          BA   0.118
308          IN      15 01JAN04       0
309          LG   0.447   0.155   9.461   0.074   8.034
310          UI     0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
311          UI  246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
312          UI   32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
313          UI    5.98
             *

314          KK   DRAIN
315          KM  CP @ BELOAT AND APACHE
316          KO       0       0     0.0       0      22
317          HC       4
             *

318          KK  FRM4TH
319          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
320          DR  TO4THS
             *

321          KK   4TH4S
322          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
323          KO       0       0     0.0       0      22
324          RS       2    FLOW     0.0     0.0
325          RC    0.05   0.015    0.05    2629   0.015     2.0
326          RX     0.0   100.0   100.0  111.99     112     124     124     224
327          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

328          KK   4TH-S
329          KM  SUB BASIN 4TH-S
```

```
 330          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 331          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
 332          KO       0       0     0.0       1      22
 333          BA   0.146
1                                          HEC-1 INPUT                                                    PAGE  9

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

 334          IN      15 01JAN04       0
 335          LG   0.215   0.166   6.501    0.19  28.927
 336          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
 337          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
 338          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
 339          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
 340          UI       5       5       5       5       5       0
              *

 341          KK   4TH-S
 342          KM  CP @ 4TH AND BELOAT
 343          KO       0       0     0.0       0      22
 344          HC       2
              *

 345          KK  4TH7TH
 346          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
 347          KO       0       0     0.0       0      22
 348          RS       1    FLOW     0.0     0.0
 349          RC    0.05   0.015    0.05    1339  0.0028     2.0
 350          RX     0.0   100.0   100.0  111.99     112     124     124     224
 351          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 352          KK  FRM6TH
 353          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
 354          DR  TO7THS
              *

 355          KK  6TH7TH
 356          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
 357          KO       0       0     0.0       0      22
 358          RS       2    FLOW     0.0     0.0
 359          RC    0.05   0.015    0.05    3061  0.0059     2.0
 360          RX     0.0   100.0   100.0  111.99     112     124     124     224
 361          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 362          KK   7TH-S
 363          KM  SUB BASIN 7TH-S
 364          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 365          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
 366          KO       0       0     0.0       1      22
 367          BA   0.128
 368          LG   0.243    0.26   5.219   0.296  29.957
 369          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
 370          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
 371          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
 372          UI    5.56    5.56    5.56    5.56    5.56    5.56
              *
1                                          HEC-1 INPUT                                                    PAGE 10

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

 373          KK   7TH-S
 374          KM  CP @ 7TH AND BELOAT
 375          KO       0       0     0.0       0      22
 376          HC       3
              *
 377          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   25      OVBIDW
                V
                V
   46      BID4TH
                .
                .
   53           .         4TH
                .           .
                .           .
   65         4TH............
                .
                .
   71           .-------> TO4THS
   69       TO6TH
                V
                V
   74      4TH6TH
                .
                .
   81           .         6TH
                .           .
                .           .
```

```
 91         6TH............
              .
              .
 97           .-------> TO7THS
 95       TO8TH
              V
              V
100       6TH8TH
              .
              .
107           .         8TH
              .           .
              .           .
118         8TH............
              .
              .
124           .-------> TOCEN1
122       TO9TH
              V
              V
127       8TH9TH
              .
              .
134           .        9THE
              .           .
              .           .
147           .           .        9THW
              .           .           .
              .           .           .
158           .           .           .      OVBIDE
              .           .           .           V
              .           .           .           V
187           .           .           .      BID9TH
              .           .           .           .
              .           .           .           .
194         9TH.................................
              .
              .
200           .-------> TOCEN2
198       TO DET
              .
              .
203           .      BAYLIS
              .           .
              .           .
212         DET............
              V
              V
216       DETDRN
              .
              .
225           .           .<-------  TOCEN1
223           .      FRM8TH
              .           V
              .           V
226           .      8THCEN
              .           .
              .           .
235           .           .           .<-------  TOCEN2
233           .           .      FRM9TH
              .           .           V
              .           .           V
236           .           .      9THCEN
              .           .           .
              .           .           .
243           .           .           .      CENTRE
              .           .           .           .
              .           .           .           .
254           .      CENTRE......................
              .           .
              .           .
260           .           .-------> TO DRN
258           .      TOBELO
              .           V
              .           V
263           .      CENBEL
              .           .
              .           .
270           .           .      BELOAT
              .           .           .
              .           .           .
281           .      BELOAT............
              .           V
              .           V
285           .      BELDRN
              .           .
              .           .
294           .           .           .<-------  TO DRN
292           .           .      FRMCEN
              .           .           V
              .           .           V
295           .           .      CENDRN
              .           .           .
              .           .           .
302           .           .           .       DRAIN
              .           .           .           .
              .           .           .           .
314       DRAIN.................................
```

```
                .
                .
  320           .          .<-------  TO4THS
  318           .     FRM4TH
                .          V
                .          V
  321           .      4TH4S
                .          .
                .          .
  328           .          .       4TH-S
                .          .           .
                .          .           .
  341           .      4TH-S............
                .          V
                .          V
  345           .     4TH7TH
                .          .
                .          .
  354           .          .           .<-------  TO7THS
  352           .          .      FRM6TH
                .          .           V
                .          .           V
  355           .          .      6TH7TH
                .          .           .
                .          .           .
  362           .          .           .       7TH-S
                .          .           .           .
                .          .           .           .
  373           .      7TH-S........................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 | OVBIDW | 1090. | 8.00 | 562. | 154. | 56. | .00 | | |
| + | ROUTED TO | BID4TH | 1076. | 8.10 | 560. | 154. | 56. | .00 | | |
| + | HYDROGRAPH AT | 4TH | 178. | 4.27 | 20. | 5. | 2. | .08 | | |
| + | 2 COMBINED AT | 4TH | 1076. | 8.10 | 560. | 159. | 58. | .08 | | |
| + | DIVERSION TO | TO4THS | 538. | 8.10 | 280. | 79. | 29. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 538. | 8.10 | 280. | 79. | 29. | .08 | | |
| + | ROUTED TO | 4TH6TH | 533. | 8.17 | 280. | 79. | 29. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 159. | 4.17 | 16. | 4. | 1. | .06 | | |
| + | 2 COMBINED AT | 6TH | 533. | 8.17 | 280. | 83. | 30. | .14 | | |
| + | DIVERSION TO | TO7THS | 267. | 8.17 | 140. | 42. | 15. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 267. | 8.17 | 140. | 42. | 15. | .14 | | |
| + | ROUTED TO | 6TH8TH | 265. | 8.30 | 140. | 42. | 15. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 189. | 4.27 | 22. | 5. | 2. | .08 | | |
| + | 2 COMBINED AT | 8TH | 294. | 4.30 | 140. | 47. | 17. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 147. | 4.30 | 70. | 23. | 9. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 147. | 4.30 | 70. | 23. | 9. | .22 | | |
| + | ROUTED TO | 8TH9TH | 142. | 4.33 | 70. | 23. | 9. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 201. | 4.37 | 26. | 6. | 2. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 201. | 4.23 | 22. | 6. | 2. | .08 | | |
| + | HYDROGRAPH AT | OVBIDE | 455. | 8.00 | 268. | 73. | 26. | .01 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | ROUTED TO | BID9TH | 448. | 8.23 | 268. | 73. | 26. | .01 |
| + | 4 COMBINED AT | 9TH | 578. | 8.30 | 335. | 108. | 39. | .41 |
| + | DIVERSION TO | TOCEN2 | 578. | 8.30 | 335. | 108. | 39. | .41 |
| + | HYDROGRAPH AT | TO DET | 0. | .00 | 0. | 0. | 0. | .41 |
| + | HYDROGRAPH AT | BAYLIS | 57. | 4.07 | 4. | 1. | 0. | .02 |
| + | 2 COMBINED AT | DET | 57. | 4.07 | 4. | 1. | 0. | .42 |
| + | ROUTED TO | DETDRN | 49. | 4.17 | 4. | 1. | 0. | .42 |
| + | HYDROGRAPH AT | FRM8TH | 147. | 4.30 | 70. | 23. | 9. | .22 |
| + | ROUTED TO | 8THCEN | 138. | 4.40 | 70. | 23. | 9. | .22 |
| + | HYDROGRAPH AT | FRM9TH | 578. | 8.30 | 335. | 108. | 39. | .41 |
| + | ROUTED TO | 9THCEN | 576. | 8.37 | 335. | 108. | 39. | .41 |
| + | HYDROGRAPH AT | CENTRE | 180. | 4.17 | 18. | 4. | 2. | .07 |
| + | 3 COMBINED AT | CENTRE | 759. | 4.30 | 403. | 136. | 49. | .07 |
| + | DIVERSION TO | TO DRN | 379. | 4.30 | 201. | 68. | 25. | .07 |
| + | HYDROGRAPH AT | TOBELO | 379. | 4.30 | 201. | 68. | 25. | .07 |
| + | ROUTED TO | CENBEL | 348. | 8.60 | 201. | 68. | 25. | .07 |
| + | HYDROGRAPH AT | BELOAT | 129. | 4.20 | 13. | 3. | 1. | .05 |
| + | 2 COMBINED AT | BELOAT | 403. | 4.43 | 201. | 72. | 26. | .12 |
| + | ROUTED TO | BELDRN | 370. | 4.57 | 201. | 71. | 26. | .12 |
| + | HYDROGRAPH AT | FRMCEN | 379. | 4.30 | 201. | 68. | 25. | .07 |
| + | ROUTED TO | CENDRN | 336. | 8.83 | 198. | 68. | 25. | .07 |
| + | HYDROGRAPH AT | DRAIN | 291. | 4.23 | 27. | 7. | 2. | .12 |
| + | 4 COMBINED AT | DRAIN | 714. | 4.47 | 398. | 147. | 53. | .66 |
| + | HYDROGRAPH AT | FRM4TH | 538. | 8.10 | 280. | 79. | 29. | .08 |
| + | ROUTED TO | 4TH4S | 532. | 8.23 | 280. | 79. | 29. | .08 |
| + | HYDROGRAPH AT | 4TH-S | 288. | 4.37 | 37. | 9. | 3. | .15 |
| + | 2 COMBINED AT | 4TH-S | 532. | 8.23 | 280. | 89. | 32. | .15 |
| + | ROUTED TO | 4TH7TH | 522. | 8.40 | 279. | 88. | 32. | .15 |
| + | HYDROGRAPH AT | FRM6TH | 267. | 8.17 | 140. | 42. | 15. | .14 |
| + | ROUTED TO | 6TH7TH | 259. | 8.47 | 139. | 42. | 15. | .14 |
| + | HYDROGRAPH AT | 7TH-S | 272. | 4.27 | 29. | 7. | 3. | .13 |
| + | 3 COMBINED AT | 7TH-S | 780. | 8.40 | 419. | 137. | 50. | .27 |

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

# Alt 2 - Park Detention Models

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   13MAY04  TIME  09:08:18  *
*                                      *
****************************************
```

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

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

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

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

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1                                   HEC-1 INPUT                                                    PAGE  1

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

    1           ID  BUCKEYE CAR
    2           ID  10 YEAR, 6 HOUR EXISTING CONDITIONS MODEL WITH PARK DETENTION AND 48" OUTLET
    3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
    4           ID  NO OVERFLOW FROM NORTH OF BID CANAL INPUT
    5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
    6           ID  RAINFALL LOSSES - GREEN AND AMPT
    7           ID  CHANNEL ROUTING - NORMAL DEPTH
    8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON
    9           ID  FIELD VISIT 01/29/04
                *DIAGRAM
   10           IT       2 01JAN04    1200    2000
   11           IO       3
   12           IN      15
   13           JD     2.1    0.01
                * 6-hour distribution, pattern 1.0
   14           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
   15           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
   16           PC   0.962   0.972   0.983   0.991     1.0
   17           JD    2.09     0.5
   18           JD    2.07     1.0
   19           JD    2.02     5.0
   20           JD    1.97    10.0
   21           JD    1.91    20.0
   22           JD    1.87    30.0
   23           JD    1.83    40.0
   24           JD    1.68   100.0
                *

   25           KK     4TH
   26           KM  SUB BASIN 4TH
   27           KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
   28           KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
   29           KO       0       0     0.0       1      22
   30           BA   0.082
   31           IN      15 01JAN04       0
   32           LG   0.282   0.264    5.16   0.322  43.403
   33           UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
   34           UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
   35           UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
   36           UI    3.56    3.56    3.56    3.56    3.56    3.56       0
                *

   37           KK   TO6TH
   38           KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
   39           DT  TO4THS
   40           DI       0     100    1000    2000
   41           DQ       0      50     500    1000
                *

   42           KK  4TH6TH
   43           KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
   44           KO       0       0     0.0       0      22
   45           RS       1    FLOW     0.0     0.0
   46           RC    0.05   0.015    0.05  871.82   0.002     2.0
   47           RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
1                                   HEC-1 INPUT                                                    PAGE  2

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

   48           RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
```

```
                *

 49             KK     6TH
 50             KM  SUB BASIN 6TH
 51             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 52             KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
 53             KO       0       0     0.0       1      22
 54             BA  0.0565
 55             LG   0.325   0.152   7.592   0.121   41.38
 56             UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
 57             UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
 58             UI    3.51    3.51    3.51    3.51    3.51    3.51
                *

 59             KK     6TH
 60             KM  CP @ 6TH AND MONROE
 61             KO       0       0     0.0       0      22
 62             HC       2
                *

 63             KK   TO8TH
 64             KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 65             DT  TO7THS
 66             DI       0     100    1000    2000
 67             DQ       0      50     500    1000
                *

 68             KK  6TH8TH
 69             KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
 70             KO       0       0     0.0       0      22
 71             RS       2    FLOW     0.0     0.0
 72             RC    0.05   0.015    0.05 1116.33   0.002     2.0
 73             RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
 74             RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                *

 75             KK     8TH
 76             KM  SUB BASIN 8TH
 77             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 78             KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
 79             KO       0       0     0.0       1      22
 80             BA  0.0792
 81             LG    0.31   0.145   8.765   0.075  32.587
 82             UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
 83             UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
 84             UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
 85             UI    3.52    3.52    3.52    3.52    3.52       0
                *
1                                          HEC-1 INPUT                                          PAGE  3

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

 86             KK     8TH
 87             KM  CP @ 8TH AND MONROE
 88             KO       0       0     0.0       0      22
 89             HC       2
                *

 90             KK   TO9TH
 91             KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 92             DT  TOCEN1
 93             DI       0     100    1000    2000
 94             DQ       0      50     500    1000
                *

 95             KK  8TH9TH
 96             KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
 97             KO       0       0     0.0       0      22
 98             RS       1    FLOW     0.0     0.0
 99             RC    0.05   0.015    0.05  680.42   0.002     2.0
100             RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
101             RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                *

102             KK    9THE
103             KM  SUB BASIN 9THE
104             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
105             KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
106             KO       0       0     0.0       1      22
107             BA   0.096
108             IN      15 01JAN04       0
109             LG   0.385   0.113   8.599   0.087  33.259
110             UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
111             UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
112             UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
113             UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
114             UI    3.37    3.37    3.37    3.37       0
                *

115             KK    9THW
116             KM  SUB BASIN 9THW
117             KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
118             KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
119             KO       0       0     0.0       1      22
120             BA  0.0814
121             LG   0.309     0.1    8.39   0.099  35.997
122             UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
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 123          UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
 124          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
 125          UI    3.87    3.87    3.87
              *
1                                          HEC-1 INPUT                                          PAGE  4

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


 126          KK     9TH
 127          KM  CP @ 9TH AND MONROE
 128          KO       0       0     0.0       0      22
 129          HC       3
              *

 130          KK    PARK
 131          KM  FLOW AT CP 9TH ROUTED THROUGH MAX POSSIBLE DETENTION AT PARK
 132          RS       1    STOR       0
 133          SA    1.99    2.17    2.35    2.54    2.58
 134          SE     863     864     865     866   866.2
 135          SQ       0       8      32      66     314
 136          KO                                     22
              *

 137          KK    PIPE
 138          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 139          DT  TOCEN2
 140          DI       0     102     103     500    1000    2000
 141          DQ       0       0       1     398     898    1898
              *

 142          KK  DETDRN
 143          KM  48" DETENTION OUTLET TO DRAIN
 144          RK    3685   0.006   0.013            CIRC       4
 145          KO                                     22
              *

 146          KK  FRM8TH
 147          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
 148          DR  TOCEN1
              *

 149          KK  8THCEN
 150          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
 151          KO       0       0     0.0       0      22
 152          RS       2    FLOW     0.0     0.0
 153          RC    0.05   0.015    0.05    1967   0.007     2.0
 154          RX     0.0   100.0   100.0  111.99     112     124     124     224
 155          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 156          KK  FRM9TH
 157          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
 158          DR  TOCEN2
              *

 159          KK  9THCEN
 160          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
 161          KO       0       0     0.0       0      22
 162          RS       1    FLOW     0.0     0.0
 163          RC    0.05   0.015    0.05    1300   0.008     2.0
 164          RX     0.0   100.0   100.0  111.99     112     124     124     224
 165          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *
1                                          HEC-1 INPUT                                          PAGE  5

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


 166          KK  CENTRE
 167          KM  SUB BASIN CENTRE
 168          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 169          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
 170          KO       0       0     0.0       1      22
 171          BA   0.067
 172          IN      15 01JAN04       0
 173          LG   0.248   0.159   6.909   0.151  32.636
 174          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
 175          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
 176          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
              *

 177          KK  CENTRE
 178          KM  CP @ CENTRE AND 9TH
 179          KO       0       0     0.0       0      22
 180          HC       3
              *

 181          KK  TOBELO
 182          KM  FLOW SPLIT AT CENTRE AND 9TH
 183          DT  TO DRN
 184          DI       0     100    1000    2000
 185          DQ       0      50     500    1000
              *

 186          KK  CENBEL
 187          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
 188          KO       0       0     0.0       0      22
```

```
 189          RS       2    FLOW     0.0     0.0
 190          RC    0.05   0.015    0.05    2542   0.005     2.0
 191          RX     0.0   100.0   100.0  111.99     112     124     124     224
 192          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 193          KK  BELOAT
 194          KM  SUB BASIN BELOAT
 195          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 196          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
 197          KO       0       0     0.0       1      22
 198          BA   0.049
 199          IN      15 01JAN04       0
 200          LG    0.25   0.151   9.213   0.065  29.636
 201          UI     0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
 202          UI   105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
 203          UI   10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
              *

 204          KK  BELOAT
 205          KM  CP @ BELOAT AND 9TH
 206          KO       0       0     0.0       0      22
 207          HC       2
              *
1                                          HEC-1 INPUT                                          PAGE  6

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

 208          KK  BELDRN
 209          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
 210          KO       0       0     0.0       0      22
 211          RS       1    FLOW     0.0     0.0
 212          RC   0.035   0.015   0.035    1343  0.0011       4
 213          RX     0.0     108     120  131.99     132     144     156     264
 214          RY       8       0       3    3.24    3.24       3       0       8
              *

 215          KK  FRMCEN
 216          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
 217          DR  TO DRN
              *

 218          KK  CENDRN
 219          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
 220          KO       0       0     0.0       0      22
 221          RS       2    FLOW     0.0     0.0
 222          RC    0.05    0.05    0.05    1888   0.005       4
 223          RX     0.0     300     600     900    1200    1500    1800    2100
 224          RY       1    0.67    0.33       0       0    0.33    0.67       1
              *

 225          KK   DRAIN
 226          KM  SUB BASIN DRAIN
 227          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 228          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
 229          KO       0       0     0.0       1      22
 230          BA   0.118
 231          IN      15 01JAN04       0
 232          LG   0.447   0.155   9.461   0.074   8.034
 233          UI     0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
 234          UI  246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
 235          UI   32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
 236          UI    5.98
              *

 237          KK  BAYLIS
 238          KM  SUB BASIN BAYLIS
 239          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 240          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
 241          KO       0       0     0.0       1      22
 242          BA   0.016
 243          LG   0.223   0.022     9.7    0.07   4.895
 244          UI     0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
 245          UI    7.39     3.9    1.75    1.75    1.75
              *

 246          KK  BAYDRN
 247          KM  FLOW ROUTED FROM BAYLISS TO CP DRAIN
 248          KO       0       0     0.0       0      22
 249          RS       2    FLOW     0.0     0.0
 250          RC    0.05    0.03    0.05    2657  0.0065       9
 251          RX     0.0      50     100     108     110     118     168     218
1                                          HEC-1 INPUT                                          PAGE  7

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

 252          RY       9     8.5       8       0       0       8     8.5       9
              *

 253          KK   DRAIN
 254          KM  CP @ BELOAT AND APACHE
 255          KO       0       0     0.0       0      22
 256          HC       5
              *

 257          KK  FRM4TH
 258          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
```

```
 259          DR  TO4THS
              *

 260          KK   4TH4S
 261          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
 262          KO       0       0     0.0       0      22
 263          RS       2    FLOW     0.0     0.0
 264          RC    0.05   0.015    0.05    2629   0.015     2.0
 265          RX     0.0   100.0   100.0  111.99     112     124     124     224
 266          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 267          KK   4TH-S
 268          KM  SUB BASIN 4TH-S
 269          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 270          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
 271          KO       0       0     0.0       1      22
 272          BA   0.146
 273          IN      15 01JAN04       0
 274          LG   0.215   0.166   6.501    0.19  28.927
 275          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
 276          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
 277          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
 278          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
 279          UI       5       5       5       5       5       0
              *

 280          KK   4TH-S
 281          KM  CP @ 4TH AND BELOAT
 282          KO       0       0     0.0       0      22
 283          HC       2
              *

 284          KK  4TH7TH
 285          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
 286          KO       0       0     0.0       0      22
 287          RS       1    FLOW     0.0     0.0
 288          RC    0.05   0.015    0.05    1339  0.0028     2.0
 289          RX     0.0   100.0   100.0  111.99     112     124     124     224
 290          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *
1                                          HEC-1 INPUT                                          PAGE  8

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


 291          KK  FRM6TH
 292          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
 293          DR  TO7THS
              *

 294          KK  6TH7TH
 295          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
 296          KO       0       0     0.0       0      22
 297          RS       2    FLOW     0.0     0.0
 298          RC    0.05   0.015    0.05    3061  0.0059     2.0
 299          RX     0.0   100.0   100.0  111.99     112     124     124     224
 300          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 301          KK   7TH-S
 302          KM  SUB BASIN 7TH-S
 303          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 304          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
 305          KO       0       0     0.0       1      22
 306          BA   0.128
 307          LG   0.243    0.26   5.219   0.296  29.957
 308          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
 309          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
 310          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
 311          UI    5.56    5.56    5.56    5.56    5.56    5.56
              *

 312          KK   7TH-S
 313          KM  CP @ 7TH AND BELOAT
 314          KO       0       0     0.0       0      22
 315          HC       3
              *
 316          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   25        4TH
               .
               .
   39          .-------->  TO4THS
   37      TO6TH
             V
             V
   42     4TH6TH
               .
               .
   49          .         6TH
               .           .
```

```
                .          .
 59          6TH............
                .
                .
 65             .-------> TO7THS
 63         TO8TH
                V
                V
 68        6TH8TH
                .
                .
 75             .         8TH
                .           .
                .           .
 86          8TH............
                .
                .
 92             .-------> TOCEN1
 90         TO9TH
                V
                V
 95        8TH9TH
                .
                .
102             .        9THE
                .           .
                .           .
115             .           .        9THW
                .           .          .
                .           .          .
126          9TH........................
                V
                V
130         PARK
                .
                .
139             .-------> TOCEN2
137         PIPE
                V
                V
142        DETDRN
                .
                .
148             .           .<-------  TOCEN1
146             .      FRM8TH
                .           V
                .           V
149             .      8THCEN
                .           .
                .           .
158             .           .           .<-------  TOCEN2
156             .           .      FRM9TH
                .           .           V
                .           .           V
159             .           .      9THCEN
                .           .           .
                .           .           .
166             .           .           .      CENTRE
                .           .           .           .
                .           .           .           .
177             .      CENTRE........................
                .           .
                .           .
183             .           .-------> TO DRN
181             .      TOBELO
                .           V
                .           V
186             .      CENBEL
                .           .
                .           .
193             .           .      BELOAT
                .           .           .
                .           .           .
204             .      BELOAT............
                .           V
                .           V
208             .      BELDRN
                .           .
                .           .
217             .           .           .<-------  TO DRN
215             .           .      FRMCEN
                .           .           V
                .           .           V
218             .           .      CENDRN
                .           .           .
                .           .           .
225             .           .           .      DRAIN
                .           .           .           .
                .           .           .           .
237             .           .           .           .      BAYLIS
                .           .           .           .           V
                .           .           .           .           V
246             .           .           .           .      BAYDRN
                .           .           .           .           .
                .           .           .           .           .
253          DRAIN.............................................
                .
                .
```

```
 259          .          .<-------  TO4THS
 257          .      FRM4TH
              .          V
              .          V
 260          .      4TH4S
              .          .
              .          .
 267          .          .       4TH-S
              .          .           .
              .          .           .
 280          .      4TH-S............
              .          V
              .          V
 284          .      4TH7TH
              .          .
              .          .
 293          .          .           .<-------  TO7THS
 291          .          .      FRM6TH
              .          .          V
              .          .          V
 294          .          .      6TH7TH
              .          .           .
              .          .           .
 301          .          .           .       7TH-S
              .          .           .           .
              .          .           .           .
 312          .      7TH-S........................
```

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 | 4TH | 101. | 4.30 | 11. | 3. | 1. | .08 | | |
| + | DIVERSION TO | TO4THS | 50. | 4.30 | 6. | 1. | 1. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 50. | 4.30 | 6. | 1. | 1. | .08 | | |
| + | ROUTED TO | 4TH6TH | 47. | 4.37 | 6. | 1. | 1. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 96. | 4.17 | 9. | 2. | 1. | .06 | | |
| + | 2 COMBINED AT | 6TH | 130. | 4.23 | 15. | 4. | 1. | .14 | | |
| + | DIVERSION TO | TO7THS | 65. | 4.23 | 7. | 2. | 1. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 65. | 4.23 | 7. | 2. | 1. | .14 | | |
| + | ROUTED TO | 6TH8TH | 61. | 4.30 | 7. | 2. | 1. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 113. | 4.27 | 12. | 3. | 1. | .08 | | |
| + | 2 COMBINED AT | 8TH | 174. | 4.30 | 20. | 5. | 2. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 87. | 4.30 | 10. | 2. | 1. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 87. | 4.30 | 10. | 2. | 1. | .22 | | |
| + | ROUTED TO | 8TH9TH | 84. | 4.33 | 10. | 2. | 1. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 119. | 4.37 | 15. | 4. | 1. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 122. | 4.23 | 13. | 3. | 1. | .08 | | |
| + | 3 COMBINED AT | 9TH | 314. | 4.33 | 38. | 9. | 3. | .40 | | |
| + | ROUTED TO | PARK | 308. | 4.37 | 35. | 9. | 3. | .40 | | |
| + | DIVERSION TO | TOCEN2 | 206. | 4.37 | 9. | 2. | 1. | .40 | | |
| + | HYDROGRAPH AT | PIPE | 102. | 4.30 | 26. | 7. | 3. | .40 | | |
| | ROUTED TO | | | | | | | | | |

```
+                    DETDRN    102.   4.37      26.       7.       3.      .40

        HYDROGRAPH AT
+                    FRM8TH     87.   4.30      10.       2.       1.      .22

        ROUTED TO
+                    8THCEN     82.   4.40      10.       2.       1.      .22

        HYDROGRAPH AT
+                    FRM9TH    206.   4.37       9.       2.       1.      .40

        ROUTED TO
+                    9THCEN    169.   4.47       9.       2.       1.      .40

        HYDROGRAPH AT
+                    CENTRE    107.   4.17      10.       2.       1.      .07

        3 COMBINED AT
+                    CENTRE    291.   4.43      29.       7.       3.      .07

        DIVERSION TO
+                    TO DRN    146.   4.43      14.       4.       1.      .07

        HYDROGRAPH AT
+                    TOBELO    146.   4.43      14.       4.       1.      .07

        ROUTED TO
+                    CENBEL    121.   4.57      14.       4.       1.      .07

        HYDROGRAPH AT
+                    BELOAT     78.   4.20       8.       2.       1.      .05

        2 COMBINED AT
+                    BELOAT    143.   4.30      22.       6.       2.      .12

        ROUTED TO
+                    BELDRN    131.   4.63      22.       6.       2.      .12

        HYDROGRAPH AT
+                    FRMCEN    146.   4.43      14.       4.       1.      .07

        ROUTED TO
+                    CENDRN     61.   4.83      14.       4.       1.      .07

        HYDROGRAPH AT
+                     DRAIN    167.   4.23      14.       4.       1.      .12

        HYDROGRAPH AT
+                    BAYLIS     36.   4.07       3.       1.       0.      .02

        ROUTED TO
+                    BAYDRN     30.   4.17       3.       1.       0.      .02

        5 COMBINED AT
+                     DRAIN    375.   4.37      77.      20.       7.      .65

        HYDROGRAPH AT
+                    FRM4TH     50.   4.30       6.       1.       1.      .08

        ROUTED TO
+                     4TH4S     49.   4.37       6.       1.       1.      .08

        HYDROGRAPH AT
+                     4TH-S    165.   4.40      20.       5.       2.      .15

        2 COMBINED AT
+                     4TH-S    214.   4.37      26.       7.       2.      .15

        ROUTED TO
+                    4TH7TH    190.   4.50      26.       7.       2.      .15

        HYDROGRAPH AT
+                    FRM6TH     65.   4.23       7.       2.       1.      .14

        ROUTED TO
+                    6TH7TH     58.   4.37       7.       2.       1.      .14

        HYDROGRAPH AT
+                     7TH-S    150.   4.30      16.       4.       1.      .13

        3 COMBINED AT
+                     7TH-S    369.   4.37      49.      12.       4.      .27
1


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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN   1998              *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   13MAY04  TIME  09:09:12  *
*                                      *
****************************************
```

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

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

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

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

```
1                                          HEC-1 INPUT                                                    PAGE  1

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

    1           ID  BUCKEYE CAR
    2           ID  50 YEAR, 6 HOUR EXISTING CONDITIONS MODEL WITH PARK DETENTION AND 48" OUTLET
    3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
    4           ID  NO OVERFLOW FROM NORTH OF BID CANAL INPUT
    5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
    6           ID  RAINFALL LOSSES - GREEN AND AMPT
    7           ID  CHANNEL ROUTING - NORMAL DEPTH
    8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON
    9           ID  FIELD VISIT 01/29/04
                *DIAGRAM
   10           IT       2 01JAN04    1200    2000
   11           IO       3
   12           IN      15
   13           JD     2.9    0.01
                * 6-hour distribution, pattern 1.0
   14           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
   15           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
   16           PC   0.962   0.972   0.983   0.991     1.0
   17           JD    2.88     0.5
   18           JD    2.86     1.0
   19           JD    2.78     5.0
   20           JD    2.73    10.0
   21           JD    2.64    20.0
   22           JD    2.58    30.0
   23           JD    2.52    40.0
   24           JD    2.32   100.0
                *

   25           KK     4TH
   26           KM  SUB BASIN 4TH
   27           KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
   28           KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
   29           KO       0       0     0.0       1      22
   30           BA   0.082
   31           IN      15 01JAN04       0
   32           LG   0.282   0.264    5.16   0.322  43.403
   33           UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
   34           UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
   35           UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
   36           UI    3.56    3.56    3.56    3.56    3.56    3.56       0
                *

   37           KK   TO6TH
   38           KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
   39           DT  TO4THS
   40           DI       0     100    1000    2000
   41           DQ       0      50     500    1000
                *

   42           KK  4TH6TH
   43           KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
   44           KO       0       0     0.0       0      22
   45           RS       1    FLOW     0.0     0.0
   46           RC    0.05   0.015    0.05  871.82   0.002     2.0
   47           RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
1                                          HEC-1 INPUT                                                    PAGE  2

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

   48           RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
```

```
                 *

 49              KK     6TH
 50              KM  SUB BASIN 6TH
 51              KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 52              KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
 53              KO       0       0     0.0       1      22
 54              BA  0.0565
 55              LG   0.325   0.152   7.592   0.121   41.38
 56              UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
 57              UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
 58              UI    3.51    3.51    3.51    3.51    3.51    3.51
                 *

 59              KK     6TH
 60              KM  CP @ 6TH AND MONROE
 61              KO       0       0     0.0       0      22
 62              HC       2
                 *

 63              KK   TO8TH
 64              KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 65              DT  TO7THS
 66              DI       0     100    1000    2000
 67              DQ       0      50     500    1000
                 *

 68              KK  6TH8TH
 69              KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
 70              KO       0       0     0.0       0      22
 71              RS       2    FLOW     0.0     0.0
 72              RC    0.05   0.015    0.05 1116.33   0.002     2.0
 73              RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
 74              RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                 *

 75              KK     8TH
 76              KM  SUB BASIN 8TH
 77              KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 78              KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
 79              KO       0       0     0.0       1      22
 80              BA  0.0792
 81              LG    0.31   0.145   8.765   0.075  32.587
 82              UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
 83              UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
 84              UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
 85              UI    3.52    3.52    3.52    3.52    3.52       0
                 *
1                                          HEC-1 INPUT                                          PAGE  3
LINE             ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 86              KK     8TH
 87              KM  CP @ 8TH AND MONROE
 88              KO       0       0     0.0       0      22
 89              HC       2
                 *

 90              KK   TO9TH
 91              KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 92              DT  TOCEN1
 93              DI       0     100    1000    2000
 94              DQ       0      50     500    1000
                 *

 95              KK  8TH9TH
 96              KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
 97              KO       0       0     0.0       0      22
 98              RS       1    FLOW     0.0     0.0
 99              RC    0.05   0.015    0.05  680.42   0.002     2.0
100              RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
101              RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                 *

102              KK    9THE
103              KM  SUB BASIN 9THE
104              KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
105              KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
106              KO       0       0     0.0       1      22
107              BA   0.096
108              IN      15 01JAN04       0
109              LG   0.385   0.113   8.599   0.087  33.259
110              UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
111              UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
112              UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
113              UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
114              UI    3.37    3.37    3.37    3.37       0
                 *

115              KK    9THW
116              KM  SUB BASIN 9THW
117              KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
118              KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
119              KO       0       0     0.0       1      22
120              BA  0.0814
121              LG   0.309     0.1    8.39   0.099  35.997
122              UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
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```
 123          UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
 124          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
 125          UI    3.87    3.87    3.87
              *
1                                          HEC-1 INPUT                                          PAGE  4

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


 126          KK     9TH
 127          KM  CP @ 9TH AND MONROE
 128          KO       0       0     0.0       0      22
 129          HC       3
              *

 130          KK    PARK
 131          KM  FLOW AT CP 9TH ROUTED THROUGH MAX POSSIBLE DETENTION AT PARK
 132          RS       1    STOR       0
 133          SA    1.99    2.17    2.35    2.54    2.58
 134          SE     863     864     865     866   866.2
 135          SQ       0       8      32      66     458
 136          KO                                     22
              *

 137          KK    PIPE
 138          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 139          DT  TOCEN2
 140          DI       0     102     103     500    1000    2000
 141          DQ       0       0       1     398     898    1898
              *

 142          KK  DETDRN
 143          KM  48" DETENTION OUTLET TO DRAIN
 144          RK    3685   0.006   0.013            CIRC       4
 145          KO                                     22
              *

 146          KK  FRM8TH
 147          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
 148          DR  TOCEN1
              *

 149          KK  8THCEN
 150          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
 151          KO       0       0     0.0       0      22
 152          RS       2    FLOW     0.0     0.0
 153          RC    0.05   0.015    0.05    1967   0.007     2.0
 154          RX     0.0   100.0   100.0  111.99     112     124     124     224
 155          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 156          KK  FRM9TH
 157          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
 158          DR  TOCEN2
              *

 159          KK  9THCEN
 160          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
 161          KO       0       0     0.0       0      22
 162          RS       1    FLOW     0.0     0.0
 163          RC    0.05   0.015    0.05    1300   0.008     2.0
 164          RX     0.0   100.0   100.0  111.99     112     124     124     224
 165          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *
1                                          HEC-1 INPUT                                          PAGE  5

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


 166          KK  CENTRE
 167          KM  SUB BASIN CENTRE
 168          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 169          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
 170          KO       0       0     0.0       1      22
 171          BA   0.067
 172          IN      15 01JAN04       0
 173          LG   0.248   0.159   6.909   0.151  32.636
 174          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
 175          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
 176          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
              *

 177          KK  CENTRE
 178          KM  CP @ CENTRE AND 9TH
 179          KO       0       0     0.0       0      22
 180          HC       3
              *

 181          KK  TOBELO
 182          KM  FLOW SPLIT AT CENTRE AND 9TH
 183          DT  TO DRN
 184          DI       0     100    1000    2000
 185          DQ       0      50     500    1000
              *

 186          KK  CENBEL
 187          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
 188          KO       0       0     0.0       0      22
```

```
189          RS       2    FLOW     0.0     0.0
190          RC    0.05   0.015    0.05    2542   0.005     2.0
191          RX     0.0   100.0   100.0  111.99     112     124     124     224
192          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

193          KK  BELOAT
194          KM  SUB BASIN BELOAT
195          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
196          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
197          KO       0       0     0.0       1      22
198          BA   0.049
199          IN      15 01JAN04       0
200          LG    0.25   0.151   9.213   0.065  29.636
201          UI     0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
202          UI   105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
203          UI   10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
             *

204          KK  BELOAT
205          KM  CP @ BELOAT AND 9TH
206          KO       0       0     0.0       0      22
207          HC       2
             *
1                                        HEC-1 INPUT                                          PAGE  6

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

208          KK  BELDRN
209          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
210          KO       0       0     0.0       0      22
211          RS       1    FLOW     0.0     0.0
212          RC   0.035   0.015   0.035    1343  0.0011       4
213          RX     0.0     108     120  131.99     132     144     156     264
214          RY       8       0       3    3.24    3.24       3       0       8
             *

215          KK  FRMCEN
216          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
217          DR  TO DRN
             *

218          KK  CENDRN
219          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
220          KO       0       0     0.0       0      22
221          RS       2    FLOW     0.0     0.0
222          RC    0.05    0.05    0.05    1888   0.005       4
223          RX     0.0     300     600     900    1200    1500    1800    2100
224          RY       1    0.67    0.33       0       0    0.33    0.67       1
             *

225          KK   DRAIN
226          KM  SUB BASIN DRAIN
227          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
228          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
229          KO       0       0     0.0       1      22
230          BA   0.118
231          IN      15 01JAN04       0
232          LG   0.447   0.155   9.461   0.074   8.034
233          UI     0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
234          UI  246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
235          UI   32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
236          UI    5.98
             *

237          KK  BAYLIS
238          KM  SUB BASIN BAYLIS
239          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
240          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
241          KO       0       0     0.0       1      22
242          BA   0.016
243          LG   0.223   0.022     9.7    0.07   4.895
244          UI     0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
245          UI    7.39     3.9    1.75    1.75    1.75
             *

246          KK  BAYDRN
247          KM  FLOW ROUTED FROM BAYLISS TO CP DRAIN
248          KO       0       0     0.0       0      22
249          RS       2    FLOW     0.0     0.0
250          RC    0.05    0.03    0.05    2657  0.0065       9
251          RX     0.0      50     100     108     110     118     168     218
1                                        HEC-1 INPUT                                          PAGE  7

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

252          RY       9     8.5       8       0       0       8     8.5       9
             *

253          KK   DRAIN
254          KM  CP @ BELOAT AND APACHE
255          KO       0       0     0.0       0      22
256          HC       5
             *

257          KK  FRM4TH
258          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
```

```
 259          DR  TO4THS
              *

 260          KK   4TH4S
 261          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
 262          KO       0       0     0.0       0      22
 263          RS       2    FLOW     0.0     0.0
 264          RC    0.05   0.015    0.05    2629   0.015     2.0
 265          RX     0.0   100.0   100.0  111.99     112     124     124     224
 266          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 267          KK   4TH-S
 268          KM  SUB BASIN 4TH-S
 269          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 270          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
 271          KO       0       0     0.0       1      22
 272          BA   0.146
 273          IN      15 01JAN04       0
 274          LG   0.215   0.166   6.501    0.19  28.927
 275          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
 276          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
 277          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
 278          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
 279          UI       5       5       5       5       5       0
              *

 280          KK   4TH-S
 281          KM  CP @ 4TH AND BELOAT
 282          KO       0       0     0.0       0      22
 283          HC       2
              *

 284          KK  4TH7TH
 285          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
 286          KO       0       0     0.0       0      22
 287          RS       1    FLOW     0.0     0.0
 288          RC    0.05   0.015    0.05    1339  0.0028     2.0
 289          RX     0.0   100.0   100.0  111.99     112     124     124     224
 290          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *
1                                          HEC-1 INPUT                                                    PAGE  8

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


 291          KK  FRM6TH
 292          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
 293          DR  TO7THS
              *

 294          KK  6TH7TH
 295          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
 296          KO       0       0     0.0       0      22
 297          RS       2    FLOW     0.0     0.0
 298          RC    0.05   0.015    0.05    3061  0.0059     2.0
 299          RX     0.0   100.0   100.0  111.99     112     124     124     224
 300          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 301          KK   7TH-S
 302          KM  SUB BASIN 7TH-S
 303          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 304          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
 305          KO       0       0     0.0       1      22
 306          BA   0.128
 307          LG   0.243    0.26   5.219   0.296  29.957
 308          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
 309          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
 310          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
 311          UI    5.56    5.56    5.56    5.56    5.56    5.56
              *

 312          KK   7TH-S
 313          KM  CP @ 7TH AND BELOAT
 314          KO       0       0     0.0       0      22
 315          HC       3
              *
 316          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    25        4TH
                .
                .
    39          .-------->  TO4THS
    37      TO6TH
                V
                V
    42      4TH6TH
                .
                .
    49          .         6TH
                .           .
```

```
 59          .          .
           6TH............
             .
             .
 65          .-------> TO7THS
 63       TO8TH
             V
             V
 68       6TH8TH
             .
             .
 75          .         8TH
             .           .
             .           .
 86         8TH............
             .
             .
 92          .-------> TOCEN1
 90       TO9TH
             V
             V
 95       8TH9TH
             .
             .
102          .        9THE
             .           .
             .           .
115          .           .        9THW
             .           .           .
             .           .           .
126         9TH.......................
             V
             V
130        PARK
             .
             .
139          .-------> TOCEN2
137        PIPE
             V
             V
142      DETDRN
             .
             .
148          .           .<-------  TOCEN1
146          .      FRM8TH
             .           V
             .           V
149          .      8THCEN
             .           .
             .           .
158          .           .           .<-------  TOCEN2
156          .           .      FRM9TH
             .           .           V
             .           .           V
159          .           .      9THCEN
             .           .           .
             .           .           .
166          .           .           .      CENTRE
             .           .           .           .
             .           .           .           .
177          .      CENTRE........................
             .           .
             .           .
183          .           .-------> TO DRN
181          .      TOBELO
             .           V
             .           V
186          .      CENBEL
             .           .
             .           .
193          .           .      BELOAT
             .           .           .
             .           .           .
204          .      BELOAT............
             .           V
             .           V
208          .      BELDRN
             .           .
             .           .
217          .           .           .<-------  TO DRN
215          .           .      FRMCEN
             .           .           V
             .           .           V
218          .           .      CENDRN
             .           .           .
             .           .           .
225          .           .           .       DRAIN
             .           .           .           .
             .           .           .           .
237          .           .           .           .      BAYLIS
             .           .           .           .           V
             .           .           .           .           V
246          .           .           .           .      BAYDRN
             .           .           .           .           .
             .           .           .           .           .
253        DRAIN.............................................
             .
             .
```

```
 259          .          .<-------  TO4THS
 257          .      FRM4TH
              .          V
              .          V
 260          .       4TH4S
              .          .
              .          .
 267          .          .       4TH-S
              .          .           .
              .          .           .
 280          .       4TH-S...........
              .          V
              .          V
 284          .      4TH7TH
              .          .
              .          .
 293          .          .           .<-------  TO7THS
 291          .          .      FRM6TH
              .          .          V
              .          .          V
 294          .          .      6TH7TH
              .          .           .
              .          .           .
 301          .          .           .      7TH-S
              .          .           .           .
              .          .           .           .
 312          .       7TH-S......................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 | 4TH | 152. | 4.30 | 17. | 4. | 2. | .08 | | |
| + | DIVERSION TO | TO4THS | 76. | 4.30 | 9. | 2. | 1. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 76. | 4.30 | 9. | 2. | 1. | .08 | | |
| + | ROUTED TO | 4TH6TH | 72. | 4.37 | 9. | 2. | 1. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 138. | 4.17 | 13. | 3. | 1. | .06 | | |
| + | 2 COMBINED AT | 6TH | 193. | 4.23 | 22. | 6. | 2. | .14 | | |
| + | DIVERSION TO | TO7THS | 97. | 4.23 | 11. | 3. | 1. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 97. | 4.23 | 11. | 3. | 1. | .14 | | |
| + | ROUTED TO | 6TH8TH | 91. | 4.30 | 11. | 3. | 1. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 164. | 4.27 | 18. | 5. | 2. | .08 | | |
| + | 2 COMBINED AT | 8TH | 254. | 4.30 | 29. | 7. | 3. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 127. | 4.30 | 15. | 4. | 1. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 127. | 4.30 | 15. | 4. | 1. | .22 | | |
| + | ROUTED TO | 8TH9TH | 123. | 4.33 | 15. | 4. | 1. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 174. | 4.37 | 22. | 6. | 2. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 175. | 4.23 | 19. | 5. | 2. | .08 | | |
| + | 3 COMBINED AT | 9TH | 458. | 4.30 | 56. | 14. | 5. | .40 | | |
| + | ROUTED TO | PARK | 458. | 4.33 | 53. | 14. | 5. | .40 | | |
| + | DIVERSION TO | TOCEN2 | 356. | 4.33 | 23. | 6. | 2. | .40 | | |
| + | HYDROGRAPH AT | PIPE | 102. | 4.17 | 29. | 8. | 3. | .40 | | |
| | ROUTED TO | | | | | | | | | |

```
+                    DETDRN   102.  4.23    29.    8.    3.   .40

        HYDROGRAPH AT
+                    FRM8TH   127.  4.30    15.    4.    1.   .22

        ROUTED TO
+                    8THCEN   120.  4.40    15.    4.    1.   .22

        HYDROGRAPH AT
+                    FRM9TH   356.  4.33    23.    6.    2.   .40

        ROUTED TO
+                    9THCEN   326.  4.40    23.    6.    2.   .40

        HYDROGRAPH AT
+                    CENTRE   156.  4.17    15.    4.    1.   .07

        3 COMBINED AT
+                    CENTRE   530.  4.37    53.   13.    5.   .07

        DIVERSION TO
+                    TO DRN   265.  4.37    27.    7.    2.   .07

        HYDROGRAPH AT
+                    TOBELO   265.  4.37    27.    7.    2.   .07

        ROUTED TO
+                    CENBEL   227.  4.53    27.    7.    2.   .07

        HYDROGRAPH AT
+                    BELOAT   112.  4.20    11.    3.    1.   .05

        2 COMBINED AT
+                    BELOAT   264.  4.47    38.   10.    3.   .12

        ROUTED TO
+                    BELDRN   240.  4.60    38.   10.    3.   .12

        HYDROGRAPH AT
+                    FRMCEN   265.  4.37    27.    7.    2.   .07

        ROUTED TO
+                    CENDRN   150.  4.77    26.    7.    2.   .07

        HYDROGRAPH AT
+                     DRAIN   250.  4.23    23.    6.    2.   .12

        HYDROGRAPH AT
+                    BAYLIS    50.  4.07     4.    1.    0.   .02

        ROUTED TO
+                    BAYDRN    43.  4.17     4.    1.    0.   .02

        5 COMBINED AT
+                     DRAIN   557.  4.30   119.   31.   11.   .65

        HYDROGRAPH AT
+                    FRM4TH    76.  4.30     9.    2.    1.   .08

        ROUTED TO
+                     4TH4S    74.  4.37     9.    2.    1.   .08

        HYDROGRAPH AT
+                     4TH-S   247.  4.37    31.    8.    3.   .15

        2 COMBINED AT
+                     4TH-S   321.  4.37    40.   10.    4.   .15

        ROUTED TO
+                    4TH7TH   288.  4.47    40.   10.    4.   .15

        HYDROGRAPH AT
+                    FRM6TH    97.  4.23    11.    3.    1.   .14

        ROUTED TO
+                    6TH7TH    84.  4.37    11.    3.    1.   .14

        HYDROGRAPH AT
+                     7TH-S   231.  4.30    25.    6.    2.   .13

        3 COMBINED AT
+                     7TH-S   560.  4.37    75.   19.    7.   .27
1

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

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN  1998               *
 *           VERSION 4.1                *
 *                                      *
 *  RUN DATE   13MAY04  TIME  09:11:10  *
 *                                      *
 ****************************************
```

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

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

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

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

```
1                                          HEC-1 INPUT                                                    PAGE  1

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

  1           ID  BUCKEYE CAR
  2           ID  100 YEAR, 6 HOUR EXISTING CONDITIONS MODEL WITH PARK DETENTION AND 48" OUTLET
  3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
  4           ID  NO OVERFLOW FROM NORTH OF BID CANAL INPUT
  5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
  6           ID  RAINFALL LOSSES - GREEN AND AMPT
  7           ID  CHANNEL ROUTING - NORMAL DEPTH
  8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON
  9           ID  FIELD VISIT 01/29/04
              *DIAGRAM
 10           IT       2 01JAN04    1200    2000
 11           IO       3
 12           IN      15
 13           JD     3.3    0.01
              * 6-hour distribution, pattern 1.0
 14           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
 15           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
 16           PC   0.962   0.972   0.983   0.991     1.0
 17           JD    3.28     0.5
 18           JD   3.257     1.0
 19           JD   3.168     5.0
 20           JD   3.102    10.0
 21           JD   3.003    20.0
 22           JD   2.937    30.0
 23           JD   2.871    40.0
 24           JD    2.64   100.0
              *

 25           KK     4TH
 26           KM  SUB BASIN 4TH
 27           KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
 28           KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
 29           KO       0       0     0.0       1      22
 30           BA   0.082
 31           IN      15 01JAN04       0
 32           LG   0.282   0.264    5.16   0.322  43.403
 33           UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
 34           UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
 35           UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
 36           UI    3.56    3.56    3.56    3.56    3.56    3.56       0
              *

 37           KK   TO6TH
 38           KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 39           DT  TO4THS
 40           DI       0     100    1000    2000
 41           DQ       0      50     500    1000
              *

 42           KK  4TH6TH
 43           KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
 44           KO       0       0     0.0       0      22
 45           RS       1    FLOW     0.0     0.0
 46           RC    0.05   0.015    0.05  871.82   0.002     2.0
 47           RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
1                                          HEC-1 INPUT                                                    PAGE  2

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

 48           RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
```

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*

KK     6TH
KM  SUB BASIN 6TH
KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
KO       0       0     0.0       1      22
BA  0.0565
LG   0.325   0.152   7.592   0.121   41.38
UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
UI    3.51    3.51    3.51    3.51    3.51    3.51
*

KK     6TH
KM  CP @ 6TH AND MONROE
KO       0       0     0.0       0      22
HC       2
*

KK   TO8TH
KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
DT  TO7THS
DI       0     100    1000    2000
DQ       0      50     500    1000
*

KK  6TH8TH
KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
KO       0       0     0.0       0      22
RS       2    FLOW     0.0     0.0
RC    0.05   0.015    0.05 1116.33   0.002     2.0
RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
*

KK     8TH
KM  SUB BASIN 8TH
KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
KO       0       0     0.0       1      22
BA  0.0792
LG    0.31   0.145   8.765   0.075  32.587
UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
UI    3.52    3.52    3.52    3.52    3.52       0
*
```

1 HEC-1 INPUT PAGE 3

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

KK     8TH
KM  CP @ 8TH AND MONROE
KO       0       0     0.0       0      22
HC       2
*

KK   TO9TH
KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
DT  TOCEN1
DI       0     100    1000    2000
DQ       0      50     500    1000
*

KK  8TH9TH
KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
KO       0       0     0.0       0      22
RS       1    FLOW     0.0     0.0
RC    0.05   0.015    0.05  680.42   0.002     2.0
RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
*

KK    9THE
KM  SUB BASIN 9THE
KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
KO       0       0     0.0       1      22
BA   0.096
IN      15 01JAN04       0
LG   0.385   0.113   8.599   0.087  33.259
UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
UI    3.37    3.37    3.37    3.37       0
*

KK    9THW
KM  SUB BASIN 9THW
KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
KO       0       0     0.0       1      22
BA  0.0814
LG   0.309     0.1    8.39   0.099  35.997
UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
```

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 123          UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
 124          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
 125          UI    3.87    3.87    3.87
              *
1                                          HEC-1 INPUT                                          PAGE  4

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


 126          KK     9TH
 127          KM  CP @ 9TH AND MONROE
 128          KO       0       0     0.0       0      22
 129          HC       3
              *

 130          KK    PARK
 131          KM  FLOW AT CP 9TH ROUTED THROUGH MAX POSSIBLE DETENTION AT PARK
 132          RS       1    STOR       0
 133          SA    1.99    2.17    2.35    2.54    2.58
 134          SE     863     864     865     866   866.2
 135          SQ       0       8      32      66     530
 136          KO                                     22
              *

 137          KK    PIPE
 138          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 139          DT  TOCEN2
 140          DI       0     102     103     500    1000    2000
 141          DQ       0       0       1     398     898    1898
              *

 142          KK  DETDRN
 143          KM  48" DETENTION OUTLET TO DRAIN
 144          RK    3685   0.006   0.013             CIRC       4
 145          KO                                     22
              *

 146          KK  FRM8TH
 147          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
 148          DR  TOCEN1
              *

 149          KK  8THCEN
 150          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
 151          KO       0       0     0.0       0      22
 152          RS       2    FLOW     0.0     0.0
 153          RC    0.05   0.015    0.05    1967   0.007     2.0
 154          RX     0.0   100.0   100.0  111.99     112     124     124     224
 155          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 156          KK  FRM9TH
 157          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
 158          DR  TOCEN2
              *

 159          KK  9THCEN
 160          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
 161          KO       0       0     0.0       0      22
 162          RS       1    FLOW     0.0     0.0
 163          RC    0.05   0.015    0.05    1300   0.008     2.0
 164          RX     0.0   100.0   100.0  111.99     112     124     124     224
 165          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *
1                                          HEC-1 INPUT                                          PAGE  5

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


 166          KK  CENTRE
 167          KM  SUB BASIN CENTRE
 168          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 169          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
 170          KO       0       0     0.0       1      22
 171          BA   0.067
 172          IN      15 01JAN04       0
 173          LG   0.248   0.159   6.909   0.151  32.636
 174          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
 175          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
 176          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
              *

 177          KK  CENTRE
 178          KM  CP @ CENTRE AND 9TH
 179          KO       0       0     0.0       0      22
 180          HC       3
              *

 181          KK  TOBELO
 182          KM  FLOW SPLIT AT CENTRE AND 9TH
 183          DT  TO DRN
 184          DI       0     100    1000    2000
 185          DQ       0      50     500    1000
              *

 186          KK  CENBEL
 187          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
 188          KO       0       0     0.0       0      22
```

```
189          RS      2    FLOW     0.0     0.0
190          RC   0.05   0.015    0.05    2542   0.005     2.0
191          RX    0.0   100.0   100.0  111.99     112     124     124     224
192          RY    2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

193          KK  BELOAT
194          KM  SUB BASIN BELOAT
195          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
196          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
197          KO      0       0     0.0       1      22
198          BA   0.049
199          IN     15 01JAN04       0
200          LG   0.25   0.151   9.213   0.065  29.636
201          UI    0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
202          UI  105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
203          UI  10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
             *

204          KK  BELOAT
205          KM  CP @ BELOAT AND 9TH
206          KO      0       0     0.0       0      22
207          HC      2
             *
1                                        HEC-1 INPUT                                          PAGE  6

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

208          KK  BELDRN
209          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
210          KO      0       0     0.0       0      22
211          RS      1    FLOW     0.0     0.0
212          RC  0.035   0.015   0.035    1343  0.0011       4
213          RX    0.0     108     120  131.99     132     144     156     264
214          RY      8       0       3    3.24    3.24       3       0       8
             *

215          KK  FRMCEN
216          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
217          DR  TO DRN
             *

218          KK  CENDRN
219          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
220          KO      0       0     0.0       0      22
221          RS      2    FLOW     0.0     0.0
222          RC   0.05    0.05    0.05    1888   0.005       4
223          RX    0.0     300     600     900    1200    1500    1800    2100
224          RY      1    0.67    0.33       0       0    0.33    0.67       1
             *

225          KK   DRAIN
226          KM  SUB BASIN DRAIN
227          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
228          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
229          KO      0       0     0.0       1      22
230          BA   0.118
231          IN     15 01JAN04       0
232          LG   0.447   0.155   9.461   0.074   8.034
233          UI    0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
234          UI 246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
235          UI  32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
236          UI   5.98
             *

237          KK  BAYLIS
238          KM  SUB BASIN BAYLIS
239          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
240          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
241          KO      0       0     0.0       1      22
242          BA   0.016
243          LG   0.223   0.022     9.7    0.07   4.895
244          UI    0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
245          UI   7.39     3.9    1.75    1.75    1.75
             *

246          KK  BAYDRN
247          KM  FLOW ROUTED FROM BAYLISS TO CP DRAIN
248          KO      0       0     0.0       0      22
249          RS      2    FLOW     0.0     0.0
250          RC   0.05    0.03    0.05    2657  0.0065       9
251          RX    0.0      50     100     108     110     118     168     218
1                                        HEC-1 INPUT                                          PAGE  7

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

252          RY      9     8.5       8       0       0       8     8.5       9
             *

253          KK   DRAIN
254          KM  CP @ BELOAT AND APACHE
255          KO      0       0     0.0       0      22
256          HC      5
             *

257          KK  FRM4TH
258          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
```

```
259          DR  TO4THS
             *

260          KK   4TH4S
261          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
262          KO       0       0     0.0       0      22
263          RS       2    FLOW     0.0     0.0
264          RC    0.05   0.015    0.05    2629   0.015     2.0
265          RX     0.0   100.0   100.0  111.99     112     124     124     224
266          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

267          KK   4TH-S
268          KM  SUB BASIN 4TH-S
269          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
270          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
271          KO       0       0     0.0       1      22
272          BA   0.146
273          IN      15 01JAN04       0
274          LG   0.215   0.166   6.501    0.19  28.927
275          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
276          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
277          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
278          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
279          UI       5       5       5       5       5       0
             *

280          KK   4TH-S
281          KM  CP @ 4TH AND BELOAT
282          KO       0       0     0.0       0      22
283          HC       2
             *

284          KK  4TH7TH
285          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
286          KO       0       0     0.0       0      22
287          RS       1    FLOW     0.0     0.0
288          RC    0.05   0.015    0.05    1339  0.0028     2.0
289          RX     0.0   100.0   100.0  111.99     112     124     124     224
290          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *
1                                        HEC-1 INPUT                                                    PAGE  8

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

291          KK  FRM6TH
292          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
293          DR  TO7THS
             *

294          KK  6TH7TH
295          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
296          KO       0       0     0.0       0      22
297          RS       2    FLOW     0.0     0.0
298          RC    0.05   0.015    0.05    3061  0.0059     2.0
299          RX     0.0   100.0   100.0  111.99     112     124     124     224
300          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

301          KK   7TH-S
302          KM  SUB BASIN 7TH-S
303          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
304          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
305          KO       0       0     0.0       1      22
306          BA   0.128
307          LG   0.243    0.26   5.219   0.296  29.957
308          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
309          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
310          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
311          UI    5.56    5.56    5.56    5.56    5.56    5.56
             *

312          KK   7TH-S
313          KM  CP @ 7TH AND BELOAT
314          KO       0       0     0.0       0      22
315          HC       3
             *
316          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK

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

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

   25        4TH
             .
             .
   39        .-------> TO4THS
   37      TO6TH
             V
             V
   42      4TH6TH
             .
             .
   49        .         6TH
             .           .
```

```
                .          .
 59           6TH............
                .
                .
 65             .-------> TO7THS
 63         TO8TH
                V
                V
 68        6TH8TH
                .
                .
 75             .         8TH
                .           .
                .           .
 86           8TH............
                .
                .
 92             .-------> TOCEN1
 90         TO9TH
                V
                V
 95        8TH9TH
                .
                .
102             .        9THE
                .           .
                .           .
115             .           .        9THW
                .           .          .
                .           .          .
126           9TH........................
                V
                V
130          PARK
                .
                .
139             .-------> TOCEN2
137          PIPE
                V
                V
142        DETDRN
                .
                .
148             .           .<-------  TOCEN1
146             .      FRM8TH
                .           V
                .           V
149             .      8THCEN
                .           .
                .           .
158             .           .           .<-------  TOCEN2
156             .           .      FRM9TH
                .           .           V
                .           .           V
159             .           .      9THCEN
                .           .           .
                .           .           .
166             .           .           .      CENTRE
                .           .           .          .
                .           .           .          .
177             .      CENTRE........................
                .           .
                .           .
183             .           .-------> TO DRN
181             .      TOBELO
                .           V
                .           V
186             .      CENBEL
                .           .
                .           .
193             .           .      BELOAT
                .           .           .
                .           .           .
204             .      BELOAT............
                .           V
                .           V
208             .      BELDRN
                .           .
                .           .
217             .           .           .<-------  TO DRN
215             .           .      FRMCEN
                .           .           V
                .           .           V
218             .           .      CENDRN
                .           .           .
                .           .           .
225             .           .           .      DRAIN
                .           .           .          .
                .           .           .          .
237             .           .           .          .      BAYLIS
                .           .           .          .           V
                .           .           .          .           V
246             .           .           .          .      BAYDRN
                .           .           .          .           .
                .           .           .          .           .
253          DRAIN.............................................
                .
                .
```

```
259          .          .<-------  TO4THS
257          .      FRM4TH
             .          V
             .          V
260          .       4TH4S
             .          .
             .          .
267          .          .       4TH-S
             .          .           .
             .          .           .
280          .       4TH-S............
             .          V
             .          V
284          .      4TH7TH
             .          .
             .          .
293          .          .           .<-------  TO7THS
291          .          .      FRM6TH
             .          .           V
             .          .           V
294          .          .      6TH7TH
             .          .           .
             .          .           .
301          .          .           .       7TH-S
             .          .           .           .
             .          .           .           .
312          .       7TH-S........................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 | 4TH | 178. | 4.27 | 20. | 5. | 2. | .08 | | |
| + | DIVERSION TO | TO4THS | 89. | 4.27 | 10. | 3. | 1. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 89. | 4.27 | 10. | 3. | 1. | .08 | | |
| + | ROUTED TO | 4TH6TH | 84. | 4.37 | 10. | 3. | 1. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 159. | 4.17 | 16. | 4. | 1. | .06 | | |
| + | 2 COMBINED AT | 6TH | 225. | 4.23 | 26. | 6. | 2. | .14 | | |
| + | DIVERSION TO | TO7THS | 112. | 4.23 | 13. | 3. | 1. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 112. | 4.23 | 13. | 3. | 1. | .14 | | |
| + | ROUTED TO | 6TH8TH | 107. | 4.30 | 13. | 3. | 1. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 189. | 4.27 | 22. | 5. | 2. | .08 | | |
| + | 2 COMBINED AT | 8TH | 294. | 4.30 | 34. | 9. | 3. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 147. | 4.30 | 17. | 4. | 2. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 147. | 4.30 | 17. | 4. | 2. | .22 | | |
| + | ROUTED TO | 8TH9TH | 142. | 4.33 | 17. | 4. | 2. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 201. | 4.37 | 26. | 6. | 2. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 201. | 4.23 | 22. | 6. | 2. | .08 | | |
| + | 3 COMBINED AT | 9TH | 530. | 4.30 | 65. | 16. | 6. | .40 | | |
| + | ROUTED TO | PARK | 529. | 4.33 | 62. | 16. | 6. | .40 | | |
| + | DIVERSION TO | TOCEN2 | 427. | 4.33 | 31. | 8. | 3. | .40 | | |
| + | HYDROGRAPH AT | PIPE | 102. | 4.10 | 31. | 9. | 3. | .40 | | |
| | ROUTED TO | | | | | | | | | |

```
+                    DETDRN   102.  4.17    31.    9.    3.   .40
        HYDROGRAPH AT
+                    FRM8TH   147.  4.30    17.    4.    2.   .22
        ROUTED TO
+                    8THCEN   138.  4.40    17.    4.    2.   .22
        HYDROGRAPH AT
+                    FRM9TH   427.  4.33    31.    8.    3.   .40
        ROUTED TO
+                    9THCEN   398.  4.40    31.    8.    3.   .40
        HYDROGRAPH AT
+                    CENTRE   180.  4.17    18.    4.    2.   .07
        3 COMBINED AT
+                    CENTRE   638.  4.33    66.   17.    6.   .07
        DIVERSION TO
+                    TO DRN   319.  4.33    33.    8.    3.   .07
        HYDROGRAPH AT
+                    TOBELO   319.  4.33    33.    8.    3.   .07
        ROUTED TO
+                    CENBEL   278.  4.53    33.    8.    3.   .07
        HYDROGRAPH AT
+                    BELOAT   129.  4.20    13.    3.    1.   .05
        2 COMBINED AT
+                    BELOAT   324.  4.47    46.   12.    4.   .12
        ROUTED TO
+                    BELDRN   296.  4.60    46.   12.    4.   .12
        HYDROGRAPH AT
+                    FRMCEN   319.  4.33    33.    8.    3.   .07
        ROUTED TO
+                    CENDRN   191.  4.73    33.    8.    3.   .07
        HYDROGRAPH AT
+                     DRAIN   291.  4.23    27.    7.    2.   .12
        HYDROGRAPH AT
+                    BAYLIS    57.  4.07     4.    1.    0.   .02
        ROUTED TO
+                    BAYDRN    50.  4.17     4.    1.    0.   .02
        5 COMBINED AT
+                     DRAIN   650.  4.33   140.   36.   13.   .65
        HYDROGRAPH AT
+                    FRM4TH    89.  4.27    10.    3.    1.   .08
        ROUTED TO
+                     4TH4S    86.  4.37    10.    3.    1.   .08
        HYDROGRAPH AT
+                     4TH-S   288.  4.37    37.    9.    3.   .15
        2 COMBINED AT
+                     4TH-S   374.  4.37    47.   12.    4.   .15
        ROUTED TO
+                    4TH7TH   338.  4.47    47.   12.    4.   .15
        HYDROGRAPH AT
+                    FRM6TH   112.  4.23    13.    3.    1.   .14
        ROUTED TO
+                    6TH7TH    97.  4.37    13.    3.    1.   .14
        HYDROGRAPH AT
+                     7TH-S   272.  4.27    29.    7.    3.   .13
        3 COMBINED AT
+                     7TH-S   658.  4.37    89.   22.    8.   .27
1

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

# Alt 4 – Storm Drain from 4th/MC 85 to 6th/Beloat and from 7th/MC 85 to Apache Road Models

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN  1998               *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   13MAY04  TIME  09:44:23  *
*                                      *
****************************************
```

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

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

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

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

```
1                                    HEC-1 INPUT                                    PAGE  1

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

    1           ID  BUCKEYE CAR
    2           ID  10 YEAR, 6 HOUR ALTERNATIVE 4 MODEL-STORM DRAIN ALONG MC 85 AND 6TH ST
    3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
    4           ID  NO OVERFLOW FROM NORTH OVER BID CANAL
    5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
    6           ID  RAINFALL LOSSES - GREEN AND AMPT
    7           ID  CHANNEL ROUTING - NORMAL DEPTH
    8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON FIE
                *DIAGRAM
    9           IT       2 01JAN04    1200    2000
   10           IO       5
   11           IN      15
   12           JD     2.1    0.01
                * 6-hour distribution, pattern 1.0
   13           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
   14           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
   15           PC   0.962   0.972   0.983   0.991     1.0
   16           JD    2.09     0.5
   17           JD    2.07     1.0
   18           JD    2.02     5.0
   19           JD    1.97    10.0
   20           JD    1.91    20.0
   21           JD    1.87    30.0
   22           JD    1.83    40.0
   23           JD    1.68   100.0
                *

   24           KK     4TH
   25           KM  SUB BASIN 4TH
   26           KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
   27           KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
   28           KO       0       0     0.0       1      22
   29           BA   0.082
   30           IN      15 01JAN04       0
   31           LG   0.282   0.264    5.16   0.322  43.403
   32           UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
   33           UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
   34           UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
   35           UI    3.56    3.56    3.56    3.56    3.56    3.56       0
                *

   36           KK   TO6TH
   37           KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
   38           DT  TO4THS
   39           DI       0     100    1000    2000
   40           DQ       0       0       0       0
                *

   41           KK  4TH6TH
   42           KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
   43           KO       0       0     0.0       0      22
   44           RS       1    FLOW     0.0     0.0
   45           RC    0.05   0.015    0.05  871.82   0.002     2.0
   46           RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
   47           RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                *
1                                    HEC-1 INPUT                                    PAGE  2

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
 48          KK     6TH
 49          KM  SUB BASIN 6TH
 50          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 51          KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
 52          KO       0       0     0.0       1      22
 53          BA  0.0565
 54          LG   0.325   0.152   7.592   0.121   41.38
 55          UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
 56          UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
 57          UI    3.51    3.51    3.51    3.51    3.51    3.51
             *

 58          KK     6TH
 59          KM  CP @ 6TH AND MONROE
 60          KO       0       0     0.0       0      22
 61          HC       2
             *

 62          KK   TO8TH
 63          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 64          DT  TO7THS
 65          DI       0     100    1000    2000
 66          DQ       0     100    1000    2000
             *

 67          KK  6TH8TH
 68          KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
 69          KO       0       0     0.0       0      22
 70          RS       2    FLOW     0.0     0.0
 71          RC    0.05   0.015    0.05 1116.33   0.002     2.0
 72          RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
 73          RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
             *

 74          KK     8TH
 75          KM  SUB BASIN 8TH
 76          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 77          KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
 78          KO       0       0     0.0       1      22
 79          BA  0.0792
 80          LG    0.31   0.145   8.765   0.075  32.587
 81          UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
 82          UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
 83          UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
 84          UI    3.52    3.52    3.52    3.52    3.52       0
             *

 85          KK     8TH
 86          KM  CP @ 8TH AND MONROE
 87          KO       0       0     0.0       0      22
 88          HC       2
             *
1                                    HEC-1 INPUT                                          PAGE  3

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

 89          KK   TO9TH
 90          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 91          DT  TOCEN1
 92          DI       0     100    1000    2000
 93          DQ       0       0       0       0
             *

 94          KK  8TH9TH
 95          KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
 96          KO       0       0     0.0       0      22
 97          RS       1    FLOW     0.0     0.0
 98          RC    0.05   0.015    0.05  680.42   0.002     2.0
 99          RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
100          RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
             *

101          KK    9THE
102          KM  SUB BASIN 9THE
103          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
104          KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
105          KO       0       0     0.0       1      22
106          BA   0.096
107          IN      15 01JAN04       0
108          LG   0.385   0.113   8.599   0.087  33.259
109          UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
110          UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
111          UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
112          UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
113          UI    3.37    3.37    3.37    3.37       0
             *

114          KK    9THW
115          KM  SUB BASIN 9THW
116          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
117          KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
118          KO       0       0     0.0       1      22
119          BA  0.0814
120          LG   0.309     0.1    8.39   0.099  35.997
121          UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
122          UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
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 123          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
 124          UI    3.87    3.87    3.87
              *

 125          KK     9TH
 126          KM  CP @ 9TH AND MONROE
 127          KO       0       0     0.0       0      22
 128          HC       3
              *
1                                          HEC-1 INPUT                                          PAGE  4

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

 129          KK  TO DET
 130          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 131          DT  TOCEN2
 132          DI       0     100    1000    2000
 133          DQ       0       0       0       0
              *

 134          KK  BAYLIS
 135          KM  SUB BASIN BAYLIS
 136          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 137          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
 138          KO       0       0     0.0       1      22
 139          BA   0.016
 140          LG   0.223   0.022     9.7    0.07   4.895
 141          UI     0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
 142          UI    7.39     3.9    1.75    1.75    1.75
              *

 143          KK     DET
 144          KM  CP @ BAYLISS PROPERTY SOUTH OF MONROE
 145          KO       0       0     0.0       0      22
 146          HC       2
              *
              * KKDETBAS
              * KMPROPOSEDDETENTION BASIN ANALYSI       S
              * RS     1    STOR       0
              * SA   3.2     3.5     3.7       4     4.3     4.6     4.9     5.3     5.7
              * SA   6.3
              * SE    56      57      58      59      60      61      62      63      64
              * SE    66
              * SQ     0       0      34      66     100     140     182     228     274     3
              * SQ   364
              * KO                                    22
              *

 147          KK  DETDRN
 148          KM  FLOW ROUTED FROM CP DET TO CP DRAIN
 149          KO       0       0     0.0       0      22
 150          RS       2    FLOW     0.0     0.0
 151          RC    0.05    0.03    0.05    2657  0.0065       9
 152          RX     0.0      50     100     108     110     118     168     218
 153          RY       9     8.5       8       0       0       8     8.5       9
              *

 154          KK  FRM8TH
 155          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
 156          DR  TOCEN1
              *
1                                          HEC-1 INPUT                                          PAGE  5

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

 157          KK  8THCEN
 158          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
 159          KO       0       0     0.0       0      22
 160          RS       2    FLOW     0.0     0.0
 161          RC    0.05   0.015    0.05    1967   0.007     2.0
 162          RX     0.0   100.0   100.0  111.99     112     124     124     224
 163          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 164          KK  FRM9TH
 165          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
 166          DR  TOCEN2
              *

 167          KK  9THCEN
 168          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
 169          KO       0       0     0.0       0      22
 170          RS       1    FLOW     0.0     0.0
 171          RC    0.05   0.015    0.05    1300   0.008     2.0
 172          RX     0.0   100.0   100.0  111.99     112     124     124     224
 173          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 174          KK  CENTRE
 175          KM  SUB BASIN CENTRE
 176          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 177          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
 178          KO       0       0     0.0       1      22
 179          BA   0.067
 180          IN      15 01JAN04       0
 181          LG   0.248   0.159   6.909   0.151  32.636
```

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182          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
183          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
184          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
             *

185          KK  CENTRE
186          KM  CP @ CENTRE AND 9TH
187          KO       0       0     0.0       0      22
188          HC       3
             *

189          KK  TOBELO
190          KM  FLOW SPLIT AT CENTRE AND 9TH
191          DT  TO DRN
192          DI       0     100    1000    2000
193          DQ       0      50     500    1000
             *
1                                          HEC-1 INPUT                                                    PAGE   6

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

194          KK  CENBEL
195          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
196          KO       0       0     0.0       0      22
197          RS       2    FLOW     0.0     0.0
198          RC    0.05   0.015    0.05    2542   0.005     2.0
199          RX     0.0   100.0   100.0  111.99     112     124     124     224
200          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

201          KK  BELOAT
202          KM  SUB BASIN BELOAT
203          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
204          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
205          KO       0       0     0.0       1      22
206          BA   0.049
207          IN      15 01JAN04       0
208          LG    0.25   0.151   9.213   0.065  29.636
209          UI     0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
210          UI   105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
211          UI   10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
             *

212          KK  BELOAT
213          KM  CP @ BELOAT AND 9TH
214          KO       0       0     0.0       0      22
215          HC       2
             *

216          KK  BELDRN
217          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
218          KO       0       0     0.0       0      22
219          RS       1    FLOW     0.0     0.0
220          RC   0.035   0.015   0.035    1343  0.0011       4
221          RX     0.0     108     120  131.99     132     144     156     264
222          RY       8       0       3    3.24    3.24       3       0       8
             *

223          KK  FRMCEN
224          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
225          DR  TO DRN
             *

226          KK  CENDRN
227          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
228          KO       0       0     0.0       0      22
229          RS       2    FLOW     0.0     0.0
230          RC    0.05    0.05    0.05    1888   0.005       4
231          RX     0.0     300     600     900    1200    1500    1800    2100
232          RY       1    0.67    0.33       0       0    0.33    0.67       1
             *
1                                          HEC-1 INPUT                                                    PAGE   7

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

233          KK   DRAIN
234          KM  SUB BASIN DRAIN
235          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
236          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
237          KO       0       0     0.0       1      22
238          BA   0.118
239          IN      15 01JAN04       0
240          LG   0.447   0.155   9.461   0.074   8.034
241          UI     0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
242          UI  246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
243          UI   32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
244          UI    5.98
             *

245          KK   DRAIN
246          KM  CP @ BELOAT AND APACHE
247          KO       0       0     0.0       0      22
248          HC       4
             *

249          KK  FRM4TH
```

```
250          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
251          DR  TO4THS
             *

252          KK   4TH4S
253          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
254          KO       0       0     0.0       0      22
255          RS       2    FLOW     0.0     0.0
256          RC    0.05   0.015    0.05    2629   0.015     2.0
257          RX     0.0   100.0   100.0  111.99     112     124     124     224
258          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

259          KK   4TH-S
260          KM  SUB BASIN 4TH-S
261          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
262          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
263          KO       0       0     0.0       1      22
264          BA   0.146
265          IN      15 01JAN04       0
266          LG   0.215   0.166   6.501    0.19  28.927
267          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
268          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
269          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
270          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
271          UI       5       5       5       5       5       0
             *
1                                          HEC-1 INPUT                                          PAGE  8

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

272          KK   4TH-S
273          KM  CP @ 4TH AND BELOAT
274          KO       0       0     0.0       0      22
275          HC       2
             *

276          KK  4TH7TH
277          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
278          KO       0       0     0.0       0      22
279          RS       1    FLOW     0.0     0.0
280          RC    0.05   0.015    0.05    1339  0.0028     2.0
281          RX     0.0   100.0   100.0  111.99     112     124     124     224
282          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

283          KK  FRM6TH
284          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
285          DR  TO7THS
             *

286          KK  6TH7TH
287          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
288          KO       0       0     0.0       0      22
289          RS       2    FLOW     0.0     0.0
290          RC    0.05   0.015    0.05    3061  0.0059     2.0
291          RX     0.0   100.0   100.0  111.99     112     124     124     224
292          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

293          KK   7TH-S
294          KM  SUB BASIN 7TH-S
295          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
296          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
297          KO       0       0     0.0       1      22
298          BA   0.128
299          LG   0.243    0.26   5.219   0.296  29.957
300          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
301          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
302          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
303          UI    5.56    5.56    5.56    5.56    5.56    5.56
             *

304          KK   7TH-S
305          KM  CP @ 7TH AND BELOAT
306          KO       0       0     0.0       0      22
307          HC       3
             *
308          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   24        4TH
               .
               .
   38          .-------> TO4THS
   36      TO6TH
               V
               V
   41      4TH6TH
               .
               .
   48          .         6TH
```

```
                .          .
                .          .
 58           6TH............
                .
                .
 64             .-------> TO7THS
 62         TO8TH
                V
                V
 67        6TH8TH
                .
                .
 74             .         8TH
                .          .
                .          .
 85           8TH............
                .
                .
 91             .-------> TOCEN1
 89         TO9TH
                V
                V
 94        8TH9TH
                .
                .
101             .        9THE
                .          .
                .          .
114             .          .        9THW
                .          .          .
                .          .          .
125           9TH........................
                .
                .
131             .-------> TOCEN2
129        TO DET
                .
                .
134             .      BAYLIS
                .          .
                .          .
143           DET............
                V
                V
147        DETDRN
                .
                .
156             .          .<-------  TOCEN1
154             .      FRM8TH
                .          V
                .          V
157             .      8THCEN
                .          .
                .          .
166             .          .          .<-------  TOCEN2
164             .          .      FRM9TH
                .          .          V
                .          .          V
167             .          .      9THCEN
                .          .          .
                .          .          .
174             .          .          .      CENTRE
                .          .          .          .
                .          .          .          .
185             .      CENTRE........................
                .          .
                .          .
191             .          .-------> TO DRN
189             .      TOBELO
                .          V
                .          V
194             .      CENBEL
                .          .
                .          .
201             .          .      BELOAT
                .          .          .
                .          .          .
212             .      BELOAT............
                .          V
                .          V
216             .      BELDRN
                .          .
                .          .
225             .          .          .<-------  TO DRN
223             .          .      FRMCEN
                .          .          V
                .          .          V
226             .          .      CENDRN
                .          .          .
                .          .          .
233             .          .          .      DRAIN
                .          .          .          .
                .          .          .          .
245          DRAIN....................................
                .
                .
251             .          .<-------  TO4THS
249             .      FRM4TH
```

```
                .          V
                .          V
  252           .       4TH4S
                .          .
                .          .
  259           .          .       4TH-S
                .          .          .
                .          .          .
  272           .       4TH-S............
                .          V
                .          V
  276           .      4TH7TH
                .          .
                .          .
  285           .          .          .<-------  TO7THS
  283           .          .      FRM6TH
                .          .          V
                .          .          V
  286           .          .      6TH7TH
                .          .          .
                .          .          .
  293           .          .          .       7TH-S
                .          .          .          .
                .          .          .          .
  304           .       7TH-S........................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 | 4TH | 101. | 4.30 | 11. | 3. | 1. | .08 | | |
| + | DIVERSION TO | TO4THS | 0. | .00 | 0. | 0. | 0. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 101. | 4.30 | 11. | 3. | 1. | .08 | | |
| + | ROUTED TO | 4TH6TH | 95. | 4.37 | 11. | 3. | 1. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 96. | 4.17 | 9. | 2. | 1. | .06 | | |
| + | *2 COMBINED* AT | 6TH | 172. | 4.23 | 20. | 5. | 2. | .14 | | |
| + | DIVERSION TO | TO7THS | 172. | 4.23 | 20. | 5. | 2. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 0. | .00 | 0. | 0. | 0. | .14 | | |
| + | ROUTED TO | 6TH8TH | 0. | .00 | 0. | 0. | 0. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 113. | 4.27 | 12. | 3. | 1. | .08 | | |
| + | 2 COMBINED AT | 8TH | 113. | 4.27 | 12. | 3. | 1. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 0. | .00 | 0. | 0. | 0. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 113. | 4.27 | 12. | 3. | 1. | .22 | | |
| + | ROUTED TO | 8TH9TH | 110. | 4.33 | 12. | 3. | 1. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 119. | 4.37 | 15. | 4. | 1. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 122. | 4.23 | 13. | 3. | 1. | .08 | | |
| + | 3 COMBINED AT | 9TH | 341. | 4.30 | 40. | 10. | 4. | .40 | | |
| + | DIVERSION TO | TOCEN2 | 0. | .00 | 0. | 0. | 0. | .40 | | |
| + | HYDROGRAPH AT | TO DET | 341. | 4.30 | 40. | 10. | 4. | .40 | | |
| + | HYDROGRAPH AT | BAYLIS | 36. | 4.07 | 3. | 1. | 0. | .02 | | |
| + | 2 COMBINED AT | DET | 349. | 4.30 | 43. | 11. | 4. | .41 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | ROUTED TO | DETDRN | 341. | 4.37 | 43. | 11. | 4. | .41 |
| + | HYDROGRAPH AT | FRM8TH | 0. | .00 | 0. | 0. | 0. | .22 |
| + | ROUTED TO | 8THCEN | 0. | .00 | 0. | 0. | 0. | .22 |
| + | HYDROGRAPH AT | FRM9TH | 0. | .00 | 0. | 0. | 0. | .40 |
| + | ROUTED TO | 9THCEN | 0. | .00 | 0. | 0. | 0. | .40 |
| + | HYDROGRAPH AT | CENTRE | 107. | 4.17 | 10. | 2. | 1. | .07 |
| + | 3 COMBINED AT | CENTRE | 107. | 4.17 | 10. | 2. | 1. | .07 |
| + | DIVERSION TO | TO DRN | 54. | 4.17 | 5. | 1. | 0. | .07 |
| + | HYDROGRAPH AT | TOBELO | 54. | 4.17 | 5. | 1. | 0. | .07 |
| + | ROUTED TO | CENBEL | 48. | 4.30 | 5. | 1. | 0. | .07 |
| + | HYDROGRAPH AT | BELOAT | 78. | 4.20 | 8. | 2. | 1. | .05 |
| + | 2 COMBINED AT | BELOAT | 123. | 4.27 | 13. | 3. | 1. | .12 |
| + | ROUTED TO | BELDRN | 92. | 4.40 | 13. | 3. | 1. | .12 |
| + | HYDROGRAPH AT | FRMCEN | 54. | 4.17 | 5. | 1. | 0. | .07 |
| + | ROUTED TO | CENDRN | 20. | 4.70 | 5. | 1. | 0. | .07 |
| + | HYDROGRAPH AT | DRAIN | 167. | 4.23 | 14. | 4. | 1. | .12 |
| + | 4 COMBINED AT | DRAIN | 583. | 4.33 | 73. | 18. | 7. | .65 |
| + | HYDROGRAPH AT | FRM4TH | 0. | .00 | 0. | 0. | 0. | .08 |
| + | ROUTED TO | 4TH4S | 0. | .00 | 0. | 0. | 0. | .08 |
| + | HYDROGRAPH AT | 4TH-S | 165. | 4.40 | 20. | 5. | 2. | .15 |
| + | 2 COMBINED AT | 4TH-S | 165. | 4.40 | 20. | 5. | 2. | .15 |
| + | ROUTED TO | 4TH7TH | 149. | 4.50 | 20. | 5. | 2. | .15 |
| + | HYDROGRAPH AT | FRM6TH | 172. | 4.23 | 20. | 5. | 2. | .14 |
| + | ROUTED TO | 6TH7TH | 145. | 4.43 | 20. | 5. | 2. | .14 |
| + | HYDROGRAPH AT | 7TH-S | 150. | 4.30 | 16. | 4. | 1. | .13 |
| + | 3 COMBINED AT | 7TH-S | 416. | 4.37 | 56. | 14. | 5. | .27 |

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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN  1998                *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   13MAY04  TIME  09:46:26  *
*                                      *
****************************************
```

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

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

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

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

```
1                                   HEC-1 INPUT                                                    PAGE  1

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

  1           ID  BUCKEYE CAR
  2           ID  50 YEAR, 6 HOUR ALTERNATIVE 4 MODEL- STORM DRAIN ALONG MC 85 AND 6TH ST
  3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
  4           ID  NO OVERFLOW FROM NORTH OVER BID CANAL
  5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
  6           ID  RAINFALL LOSSES - GREEN AND AMPT
  7           ID  CHANNEL ROUTING - NORMAL DEPTH
  8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON FIE
              *DIAGRAM
  9           IT       2 01JAN04    1200    2000
 10           IO       5
 11           IN      15
 12           JD     2.9    0.01
              * 6-hour distribution, pattern 1.0
 13           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
 14           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
 15           PC   0.962   0.972   0.983   0.991     1.0
 16           JD    2.88     0.5
 17           JD    2.86     1.0
 18           JD    2.78     5.0
 19           JD    2.73    10.0
 20           JD    2.64    20.0
 21           JD    2.58    30.0
 22           JD    2.52    40.0
 23           JD    2.32   100.0
              *

 24           KK     4TH
 25           KM  SUB BASIN 4TH
 26           KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
 27           KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
 28           KO       0       0     0.0       1      22
 29           BA   0.082
 30           IN      15 01JAN04       0
 31           LG   0.282   0.264    5.16   0.322  43.403
 32           UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
 33           UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
 34           UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
 35           UI    3.56    3.56    3.56    3.56    3.56    3.56       0
              *

 36           KK   TO6TH
 37           KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 38           DT  TO4THS
 39           DI       0     100    1000    2000
 40           DQ       0       0       0       0
              *

 41           KK  4TH6TH
 42           KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
 43           KO       0       0     0.0       0      22
 44           RS       1    FLOW     0.0     0.0
 45           RC    0.05   0.015    0.05  871.82   0.002     2.0
 46           RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
 47           RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
              *
1                                   HEC-1 INPUT                                                    PAGE  2

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

```
KK     6TH
KM  SUB BASIN 6TH
KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
KO       0       0     0.0       1      22
BA  0.0565
LG   0.325   0.152   7.592   0.121   41.38
UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
UI    3.51    3.51    3.51    3.51    3.51    3.51
*

KK     6TH
KM  CP @ 6TH AND MONROE
KO       0       0     0.0       0      22
HC       2
*

KK   TO8TH
KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
DT  TO7THS
DI       0     100    1000    2000
DQ       0     100    1000    2000
*

KK  6TH8TH
KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
KO       0       0     0.0       0      22
RS       2    FLOW     0.0     0.0
RC    0.05   0.015    0.05 1116.33   0.002     2.0
RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
*

KK     8TH
KM  SUB BASIN 8TH
KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
KO       0       0     0.0       1      22
BA  0.0792
LG    0.31   0.145   8.765   0.075  32.587
UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
UI    3.52    3.52    3.52    3.52    3.52       0
*

KK     8TH
KM  CP @ 8TH AND MONROE
KO       0       0     0.0       0      22
HC       2
*
```



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

KK   TO9TH
KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
DT  TOCEN1
DI       0     100    1000    2000
DQ       0       0       0       0
*

KK  8TH9TH
KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
KO       0       0     0.0       0      22
RS       1    FLOW     0.0     0.0
RC    0.05   0.015    0.05  680.42   0.002     2.0
RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
*

KK    9THE
KM  SUB BASIN 9THE
KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
KO       0       0     0.0       1      22
BA   0.096
IN      15 01JAN04       0
LG   0.385   0.113   8.599   0.087  33.259
UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
UI    3.37    3.37    3.37    3.37       0
*

KK    9THW
KM  SUB BASIN 9THW
KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
KO       0       0     0.0       1      22
BA  0.0814
LG   0.309     0.1    8.39   0.099  35.997
UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
```

```
 123          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
 124          UI    3.87    3.87    3.87
              *

 125          KK     9TH
 126          KM  CP @ 9TH AND MONROE
 127          KO       0       0     0.0       0      22
 128          HC       3
              *
1                                          HEC-1 INPUT                                          PAGE  4

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

 129          KK  TO DET
 130          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 131          DT  TOCEN2
 132          DI       0     100    1000    2000
 133          DQ       0       0       0       0
              *

 134          KK  BAYLIS
 135          KM  SUB BASIN BAYLIS
 136          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 137          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
 138          KO       0       0     0.0       1      22
 139          BA   0.016
 140          LG   0.223   0.022     9.7    0.07   4.895
 141          UI     0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
 142          UI    7.39     3.9    1.75    1.75    1.75
              *

 143          KK     DET
 144          KM  CP @ BAYLISS PROPERTY SOUTH OF MONROE
 145          KO       0       0     0.0       0      22
 146          HC       2
              *
              * KKDETBAS
              * KMPROPOSEDDETENTION BASIN ANALYSI       S
              * RS     1    STOR       0
              * SA   3.2     3.5     3.7       4     4.3     4.6     4.9     5.3     5.7
              * SA   6.3
              * SE    56      57      58      59      60      61      62      63      64
              * SE    66
              * SQ     0       0      34      66     100     140     182     228     274     3
              * SQ   364
              * KO                                     22
              *

 147          KK  DETDRN
 148          KM  FLOW ROUTED FROM CP DET TO CP DRAIN
 149          KO       0       0     0.0       0      22
 150          RS       2    FLOW     0.0     0.0
 151          RC    0.05    0.03    0.05    2657  0.0065       9
 152          RX     0.0      50     100     108     110     118     168     218
 153          RY       9     8.5       8       0       0       8     8.5       9
              *

 154          KK  FRM8TH
 155          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
 156          DR  TOCEN1
              *
1                                          HEC-1 INPUT                                          PAGE  5

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

 157          KK  8THCEN
 158          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
 159          KO       0       0     0.0       0      22
 160          RS       2    FLOW     0.0     0.0
 161          RC    0.05   0.015    0.05    1967   0.007     2.0
 162          RX     0.0   100.0   100.0  111.99     112     124     124     224
 163          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 164          KK  FRM9TH
 165          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
 166          DR  TOCEN2
              *

 167          KK  9THCEN
 168          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
 169          KO       0       0     0.0       0      22
 170          RS       1    FLOW     0.0     0.0
 171          RC    0.05   0.015    0.05    1300   0.008     2.0
 172          RX     0.0   100.0   100.0  111.99     112     124     124     224
 173          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 174          KK  CENTRE
 175          KM  SUB BASIN CENTRE
 176          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 177          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
 178          KO       0       0     0.0       1      22
 179          BA   0.067
 180          IN      15 01JAN04       0
 181          LG   0.248   0.159   6.909   0.151  32.636
```

```
182          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
183          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
184          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
             *

185          KK  CENTRE
186          KM  CP @ CENTRE AND 9TH
187          KO       0       0     0.0       0      22
188          HC       3
             *

189          KK  TOBELO
190          KM  FLOW SPLIT AT CENTRE AND 9TH
191          DT  TO DRN
192          DI       0     100    1000    2000
193          DQ       0      50     500    1000
             *
1                                        HEC-1 INPUT                                                PAGE  6

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

194          KK  CENBEL
195          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
196          KO       0       0     0.0       0      22
197          RS       2    FLOW     0.0     0.0
198          RC    0.05   0.015    0.05    2542   0.005     2.0
199          RX     0.0   100.0   100.0  111.99     112     124     124     224
200          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

201          KK  BELOAT
202          KM  SUB BASIN BELOAT
203          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
204          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
205          KO       0       0     0.0       1      22
206          BA   0.049
207          IN      15 01JAN04       0
208          LG    0.25   0.151   9.213   0.065  29.636
209          UI     0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
210          UI   105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
211          UI   10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
             *

212          KK  BELOAT
213          KM  CP @ BELOAT AND 9TH
214          KO       0       0     0.0       0      22
215          HC       2
             *

216          KK  BELDRN
217          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
218          KO       0       0     0.0       0      22
219          RS       1    FLOW     0.0     0.0
220          RC   0.035   0.015   0.035    1343  0.0011       4
221          RX     0.0     108     120  131.99     132     144     156     264
222          RY       8       0       3    3.24    3.24       3       0       8
             *

223          KK  FRMCEN
224          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
225          DR  TO DRN
             *

226          KK  CENDRN
227          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
228          KO       0       0     0.0       0      22
229          RS       2    FLOW     0.0     0.0
230          RC    0.05    0.05    0.05    1888   0.005       4
231          RX     0.0     300     600     900    1200    1500    1800    2100
232          RY       1    0.67    0.33       0       0    0.33    0.67       1
             *
1                                        HEC-1 INPUT                                                PAGE  7

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

233          KK   DRAIN
234          KM  SUB BASIN DRAIN
235          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
236          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
237          KO       0       0     0.0       1      22
238          BA   0.118
239          IN      15 01JAN04       0
240          LG   0.447   0.155   9.461   0.074   8.034
241          UI     0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
242          UI  246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
243          UI   32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
244          UI    5.98
             *

245          KK   DRAIN
246          KM  CP @ BELOAT AND APACHE
247          KO       0       0     0.0       0      22
248          HC       4
             *

249          KK  FRM4TH
```

```
250          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
251          DR  TO4THS
             *

252          KK   4TH4S
253          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
254          KO       0       0     0.0       0      22
255          RS       2    FLOW     0.0     0.0
256          RC    0.05   0.015    0.05    2629   0.015     2.0
257          RX     0.0   100.0   100.0  111.99     112     124     124     224
258          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

259          KK   4TH-S
260          KM  SUB BASIN 4TH-S
261          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
262          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
263          KO       0       0     0.0       1      22
264          BA   0.146
265          IN      15 01JAN04       0
266          LG   0.215   0.166   6.501    0.19  28.927
267          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
268          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
269          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
270          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
271          UI       5       5       5       5       5       0
             *
1                                          HEC-1 INPUT                                          PAGE  8

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

272          KK   4TH-S
273          KM  CP @ 4TH AND BELOAT
274          KO       0       0     0.0       0      22
275          HC       2
             *

276          KK  4TH7TH
277          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
278          KO       0       0     0.0       0      22
279          RS       1    FLOW     0.0     0.0
280          RC    0.05   0.015    0.05    1339  0.0028     2.0
281          RX     0.0   100.0   100.0  111.99     112     124     124     224
282          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

283          KK  FRM6TH
284          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
285          DR  TO7THS
             *

286          KK  6TH7TH
287          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
288          KO       0       0     0.0       0      22
289          RS       2    FLOW     0.0     0.0
290          RC    0.05   0.015    0.05    3061  0.0059     2.0
291          RX     0.0   100.0   100.0  111.99     112     124     124     224
292          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

293          KK   7TH-S
294          KM  SUB BASIN 7TH-S
295          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
296          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
297          KO       0       0     0.0       1      22
298          BA   0.128
299          LG   0.243    0.26   5.219   0.296  29.957
300          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
301          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
302          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
303          UI    5.56    5.56    5.56    5.56    5.56    5.56
             *

304          KK   7TH-S
305          KM  CP @ 7TH AND BELOAT
306          KO       0       0     0.0       0      22
307          HC       3
             *
308          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   24        4TH
               .
               .
   38          .-------> TO4THS
   36      TO6TH
               V
               V
   41      4TH6TH
               .
               .
   48          .         6TH
```

```
                .          .
                .          .
 58           6TH...........
                .
                .
 64             .-------> TO7THS
 62         TO8TH
                V
                V
 67        6TH8TH
                .
                .
 74             .         8TH
                .          .
                .          .
 85           8TH...........
                .
                .
 91             .-------> TOCEN1
 89         TO9TH
                V
                V
 94        8TH9TH
                .
                .
101             .        9THE
                .          .
                .          .
114             .          .        9THW
                .          .          .
                .          .          .
125           9TH........................
                .
                .
131             .-------> TOCEN2
129        TO DET
                .
                .
134             .      BAYLIS
                .          .
                .          .
143           DET...........
                V
                V
147        DETDRN
                .
                .
156             .          .<-------  TOCEN1
154             .      FRM8TH
                .          V
                .          V
157             .      8THCEN
                .          .
                .          .
166             .          .          .<-------  TOCEN2
164             .          .      FRM9TH
                .          .          V
                .          .          V
167             .          .      9THCEN
                .          .          .
                .          .          .
174             .          .          .      CENTRE
                .          .          .          .
                .          .          .          .
185             .      CENTRE........................
                .          .
                .          .
191             .          .-------> TO DRN
189             .      TOBELO
                .          V
                .          V
194             .      CENBEL
                .          .
                .          .
201             .          .      BELOAT
                .          .          .
                .          .          .
212             .      BELOAT...........
                .          V
                .          V
216             .      BELDRN
                .          .
                .          .
225             .          .          .<-------  TO DRN
223             .          .      FRMCEN
                .          .          V
                .          .          V
226             .          .      CENDRN
                .          .          .
                .          .          .
233             .          .          .       DRAIN
                .          .          .           .
                .          .          .           .
245         DRAIN....................................
                .
                .
251             .          .<-------  TO4THS
249             .      FRM4TH
```

```
                .          V
                .          V
  252           .       4TH4S
                .          .
                .          .
  259           .          .       4TH-S
                .          .          .
                .          .          .
  272           .       4TH-S...........
                .          V
                .          V
  276           .      4TH7TH
                .          .
                .          .
  285           .          .          .<-------  TO7THS
  283           .          .      FRM6TH
                .          .          V
                .          .          V
  286           .          .      6TH7TH
                .          .          .
                .          .          .
  293           .          .          .       7TH-S
                .          .          .          .
                .          .          .          .
  304           .       7TH-S......................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 | 4TH | 152. | 4.30 | 17. | 4. | 2. | .08 | | |
| + | DIVERSION TO | TO4THS | 0. | .00 | 0. | 0. | 0. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 152. | 4.30 | 17. | 4. | 2. | .08 | | |
| + | ROUTED TO | 4TH6TH | 144. | 4.37 | 17. | 4. | 2. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 138. | 4.17 | 13. | 3. | 1. | .06 | | |
| + | 2 COMBINED AT | 6TH | 257. | 4.23 | 31. | 8. | 3. | .14 | | |
| + | DIVERSION TO | TO7THS | 257. | 4.23 | 31. | 8. | 3. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 0. | .00 | 0. | 0. | 0. | .14 | | |
| + | ROUTED TO | 6TH8TH | 0. | .00 | 0. | 0. | 0. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 164. | 4.27 | 18. | 5. | 2. | .08 | | |
| + | 2 COMBINED AT | 8TH | 164. | 4.27 | 18. | 5. | 2. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 0. | .00 | 0. | 0. | 0. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 164. | 4.27 | 18. | 5. | 2. | .22 | | |
| + | ROUTED TO | 8TH9TH | 159. | 4.33 | 18. | 5. | 2. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 174. | 4.37 | 22. | 6. | 2. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 175. | 4.23 | 19. | 5. | 2. | .08 | | |
| + | 3 COMBINED AT | 9TH | 495. | 4.30 | 60. | 15. | 5. | .40 | | |
| + | DIVERSION TO | TOCEN2 | 0. | .00 | 0. | 0. | 0. | .40 | | |
| + | HYDROGRAPH AT | TO DET | 495. | 4.30 | 60. | 15. | 5. | .40 | | |
| + | HYDROGRAPH AT | BAYLIS | 50. | 4.07 | 4. | 1. | 0. | .02 | | |
| + | 2 COMBINED AT | DET | 507. | 4.30 | 63. | 16. | 6. | .41 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | ROUTED TO | DETDRN | 499. | 4.37 | 63. | 16. | 6. | .41 |
| + | HYDROGRAPH AT | FRM8TH | 0. | .00 | 0. | 0. | 0. | .22 |
| + | ROUTED TO | 8THCEN | 0. | .00 | 0. | 0. | 0. | .22 |
| + | HYDROGRAPH AT | FRM9TH | 0. | .00 | 0. | 0. | 0. | .40 |
| + | ROUTED TO | 9THCEN | 0. | .00 | 0. | 0. | 0. | .40 |
| + | HYDROGRAPH AT | CENTRE | 156. | 4.17 | 15. | 4. | 1. | .07 |
| + | 3 COMBINED AT | CENTRE | 156. | 4.17 | 15. | 4. | 1. | .07 |
| + | DIVERSION TO | TO DRN | 78. | 4.17 | 7. | 2. | 1. | .07 |
| + | HYDROGRAPH AT | TOBELO | 78. | 4.17 | 7. | 2. | 1. | .07 |
| + | ROUTED TO | CENBEL | 69. | 4.33 | 7. | 2. | 1. | .07 |
| + | HYDROGRAPH AT | BELOAT | 112. | 4.20 | 11. | 3. | 1. | .05 |
| + | 2 COMBINED AT | BELOAT | 175. | 4.27 | 19. | 5. | 2. | .12 |
| + | ROUTED TO | BELDRN | 139. | 4.37 | 19. | 5. | 2. | .12 |
| + | HYDROGRAPH AT | FRMCEN | 78. | 4.17 | 7. | 2. | 1. | .07 |
| + | ROUTED TO | CENDRN | 30. | 4.70 | 7. | 2. | 1. | .07 |
| + | HYDROGRAPH AT | DRAIN | 250. | 4.23 | 23. | 6. | 2. | .12 |
| + | 4 COMBINED AT | DRAIN | 868. | 4.33 | 111. | 28. | 10. | .65 |
| + | HYDROGRAPH AT | FRM4TH | 0. | .00 | 0. | 0. | 0. | .08 |
| + | ROUTED TO | 4TH4S | 0. | .00 | 0. | 0. | 0. | .08 |
| + | HYDROGRAPH AT | 4TH-S | 247. | 4.37 | 31. | 8. | 3. | .15 |
| + | 2 COMBINED AT | 4TH-S | 247. | 4.37 | 31. | 8. | 3. | .15 |
| + | ROUTED TO | 4TH7TH | 223. | 4.50 | 31. | 8. | 3. | .15 |
| + | HYDROGRAPH AT | FRM6TH | 257. | 4.23 | 31. | 8. | 3. | .14 |
| + | ROUTED TO | 6TH7TH | 217. | 4.43 | 31. | 8. | 3. | .14 |
| + | HYDROGRAPH AT | 7TH-S | 231. | 4.30 | 25. | 6. | 2. | .13 |
| + | 3 COMBINED AT | 7TH-S | 628. | 4.37 | 86. | 22. | 8. | .27 |

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

```
1****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              JUN  1998               *
*            VERSION 4.1               *
*                                      *
*  RUN DATE   13MAY04  TIME  09:47:24  *
*                                      *
****************************************
```

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

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

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

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

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1                                   HEC-1 INPUT                                                    PAGE  1

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

    1           ID  BUCKEYE CAR
    2           ID  100 YEAR, 6 HOUR ALTERNATIVE 4 MODEL - STORM DRAIN ALONG MC 85 AND 6TH ST
    3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
    4           ID  NO OVERFLOW FROM NORTH OVER BID CANAL
    5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
    6           ID  RAINFALL LOSSES - GREEN AND AMPT
    7           ID  CHANNEL ROUTING - NORMAL DEPTH
    8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON FIE
                *DIAGRAM
    9           IT       2 01JAN04    1200    2000
   10           IO       5
   11           IN      15
   12           JD     3.3    0.01
                * 6-hour distribution, pattern 1.0
   13           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
   14           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
   15           PC   0.962   0.972   0.983   0.991     1.0
   16           JD    3.28     0.5
   17           JD   3.257     1.0
   18           JD   3.168     5.0
   19           JD   3.102    10.0
   20           JD   3.003    20.0
   21           JD   2.937    30.0
   22           JD   2.871    40.0
   23           JD    2.64   100.0
                *

   24           KK     4TH
   25           KM  SUB BASIN 4TH
   26           KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
   27           KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
   28           KO       0       0     0.0       1      22
   29           BA   0.082
   30           IN      15 01JAN04       0
   31           LG   0.282   0.264    5.16   0.322  43.403
   32           UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
   33           UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
   34           UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
   35           UI    3.56    3.56    3.56    3.56    3.56    3.56       0
                *

   36           KK   TO6TH
   37           KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
   38           DT  TO4THS
   39           DI       0     100    1000    2000
   40           DQ       0       0       0       0
                *

   41           KK  4TH6TH
   42           KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
   43           KO       0       0     0.0       0      22
   44           RS       1    FLOW     0.0     0.0
   45           RC    0.05   0.015    0.05  871.82   0.002     2.0
   46           RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
   47           RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                *
1                                   HEC-1 INPUT                                                    PAGE  2

  LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
 48          KK     6TH
 49          KM  SUB BASIN 6TH
 50          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 51          KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
 52          KO       0       0     0.0       1      22
 53          BA  0.0565
 54          LG   0.325   0.152   7.592   0.121   41.38
 55          UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
 56          UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
 57          UI    3.51    3.51    3.51    3.51    3.51    3.51
             *

 58          KK     6TH
 59          KM  CP @ 6TH AND MONROE
 60          KO       0       0     0.0       0      22
 61          HC       2
             *

 62          KK   TO8TH
 63          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 64          DT  TO7THS
 65          DI       0     100    1000    2000
 66          DQ       0     100    1000    2000
             *

 67          KK  6TH8TH
 68          KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
 69          KO       0       0     0.0       0      22
 70          RS       2    FLOW     0.0     0.0
 71          RC    0.05   0.015    0.05 1116.33   0.002     2.0
 72          RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
 73          RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
             *

 74          KK     8TH
 75          KM  SUB BASIN 8TH
 76          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 77          KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
 78          KO       0       0     0.0       1      22
 79          BA  0.0792
 80          LG    0.31   0.145   8.765   0.075  32.587
 81          UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
 82          UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
 83          UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
 84          UI    3.52    3.52    3.52    3.52    3.52       0
             *

 85          KK     8TH
 86          KM  CP @ 8TH AND MONROE
 87          KO       0       0     0.0       0      22
 88          HC       2
             *
1                                    HEC-1 INPUT                                          PAGE  3

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

 89          KK   TO9TH
 90          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 91          DT  TOCEN1
 92          DI       0     100    1000    2000
 93          DQ       0       0       0       0
             *

 94          KK  8TH9TH
 95          KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
 96          KO       0       0     0.0       0      22
 97          RS       1    FLOW     0.0     0.0
 98          RC    0.05   0.015    0.05  680.42   0.002     2.0
 99          RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
100          RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
             *

101          KK    9THE
102          KM  SUB BASIN 9THE
103          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
104          KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
105          KO       0       0     0.0       1      22
106          BA   0.096
107          IN      15 01JAN04       0
108          LG   0.385   0.113   8.599   0.087  33.259
109          UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
110          UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
111          UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
112          UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
113          UI    3.37    3.37    3.37    3.37       0
             *

114          KK    9THW
115          KM  SUB BASIN 9THW
116          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
117          KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
118          KO       0       0     0.0       1      22
119          BA  0.0814
120          LG   0.309     0.1    8.39   0.099  35.997
121          UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
122          UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
```

```
 123          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
 124          UI    3.87    3.87    3.87
              *

 125          KK     9TH
 126          KM  CP @ 9TH AND MONROE
 127          KO       0       0     0.0       0      22
 128          HC       3
              *
1                                          HEC-1 INPUT                                          PAGE  4

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

 129          KK  TO DET
 130          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 131          DT  TOCEN2
 132          DI       0     100    1000    2000
 133          DQ       0       0       0       0
              *

 134          KK  BAYLIS
 135          KM  SUB BASIN BAYLIS
 136          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 137          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
 138          KO       0       0     0.0       1      22
 139          BA   0.016
 140          LG   0.223   0.022     9.7    0.07   4.895
 141          UI     0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
 142          UI    7.39     3.9    1.75    1.75    1.75
              *

 143          KK     DET
 144          KM  CP @ BAYLISS PROPERTY SOUTH OF MONROE
 145          KO       0       0     0.0       0      22
 146          HC       2
              *
              * KKDETBAS
              * KMPROPOSEDDETENTION BASIN ANALYSI       S
              * RS     1    STOR       0
              * SA   3.2     3.5     3.7       4     4.3     4.6     4.9     5.3     5.7
              * SA   6.3
              * SE    56      57      58      59      60      61      62      63      64
              * SE    66
              * SQ     0       0      34      66     100     140     182     228     274     3
              * SQ   364
              * KO                                     22
              *

 147          KK  DETDRN
 148          KM  FLOW ROUTED FROM CP DET TO CP DRAIN
 149          KO       0       0     0.0       0      22
 150          RS       2    FLOW     0.0     0.0
 151          RC    0.05    0.03    0.05    2657  0.0065       9
 152          RX     0.0      50     100     108     110     118     168     218
 153          RY       9     8.5       8       0       0       8     8.5       9
              *

 154          KK  FRM8TH
 155          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
 156          DR  TOCEN1
              *
1                                          HEC-1 INPUT                                          PAGE  5

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

 157          KK  8THCEN
 158          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
 159          KO       0       0     0.0       0      22
 160          RS       2    FLOW     0.0     0.0
 161          RC    0.05   0.015    0.05    1967   0.007     2.0
 162          RX     0.0   100.0   100.0  111.99     112     124     124     224
 163          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 164          KK  FRM9TH
 165          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
 166          DR  TOCEN2
              *

 167          KK  9THCEN
 168          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
 169          KO       0       0     0.0       0      22
 170          RS       1    FLOW     0.0     0.0
 171          RC    0.05   0.015    0.05    1300   0.008     2.0
 172          RX     0.0   100.0   100.0  111.99     112     124     124     224
 173          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 174          KK  CENTRE
 175          KM  SUB BASIN CENTRE
 176          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 177          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
 178          KO       0       0     0.0       1      22
 179          BA   0.067
 180          IN      15 01JAN04       0
 181          LG   0.248   0.159   6.909   0.151  32.636
```

```
 182          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
 183          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
 184          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
              *

 185          KK  CENTRE
 186          KM  CP @ CENTRE AND 9TH
 187          KO       0       0     0.0       0      22
 188          HC       3
              *

 189          KK  TOBELO
 190          KM  FLOW SPLIT AT CENTRE AND 9TH
 191          DT  TO DRN
 192          DI       0     100    1000    2000
 193          DQ       0      50     500    1000
              *
1                                        HEC-1 INPUT                                          PAGE  6

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

 194          KK  CENBEL
 195          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
 196          KO       0       0     0.0       0      22
 197          RS       2    FLOW     0.0     0.0
 198          RC    0.05   0.015    0.05    2542   0.005     2.0
 199          RX     0.0   100.0   100.0  111.99     112     124     124     224
 200          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 201          KK  BELOAT
 202          KM  SUB BASIN BELOAT
 203          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 204          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
 205          KO       0       0     0.0       1      22
 206          BA   0.049
 207          IN      15 01JAN04       0
 208          LG    0.25   0.151   9.213   0.065  29.636
 209          UI     0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
 210          UI   105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
 211          UI   10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
              *

 212          KK  BELOAT
 213          KM  CP @ BELOAT AND 9TH
 214          KO       0       0     0.0       0      22
 215          HC       2
              *

 216          KK  BELDRN
 217          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
 218          KO       0       0     0.0       0      22
 219          RS       1    FLOW     0.0     0.0
 220          RC   0.035   0.015   0.035    1343  0.0011       4
 221          RX     0.0     108     120  131.99     132     144     156     264
 222          RY       8       0       3    3.24    3.24       3       0       8
              *

 223          KK  FRMCEN
 224          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
 225          DR  TO DRN
              *

 226          KK  CENDRN
 227          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
 228          KO       0       0     0.0       0      22
 229          RS       2    FLOW     0.0     0.0
 230          RC    0.05    0.05    0.05    1888   0.005       4
 231          RX     0.0     300     600     900    1200    1500    1800    2100
 232          RY       1    0.67    0.33       0       0    0.33    0.67       1
              *
1                                        HEC-1 INPUT                                          PAGE  7

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

 233          KK   DRAIN
 234          KM  SUB BASIN DRAIN
 235          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 236          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
 237          KO       0       0     0.0       1      22
 238          BA   0.118
 239          IN      15 01JAN04       0
 240          LG   0.447   0.155   9.461   0.074   8.034
 241          UI     0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
 242          UI  246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
 243          UI   32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
 244          UI    5.98
              *

 245          KK   DRAIN
 246          KM  CP @ BELOAT AND APACHE
 247          KO       0       0     0.0       0      22
 248          HC       4
              *

 249          KK  FRM4TH
```

```
 250          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
 251          DR  TO4THS
              *

 252          KK   4TH4S
 253          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
 254          KO       0       0     0.0       0      22
 255          RS       2    FLOW     0.0     0.0
 256          RC    0.05   0.015    0.05    2629   0.015     2.0
 257          RX     0.0   100.0   100.0  111.99     112     124     124     224
 258          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 259          KK   4TH-S
 260          KM  SUB BASIN 4TH-S
 261          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 262          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
 263          KO       0       0     0.0       1      22
 264          BA   0.146
 265          IN      15 01JAN04       0
 266          LG   0.215   0.166   6.501    0.19  28.927
 267          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
 268          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
 269          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
 270          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
 271          UI       5       5       5       5       5       0
              *
1                                          HEC-1 INPUT                                          PAGE  8

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

 272          KK   4TH-S
 273          KM  CP @ 4TH AND BELOAT
 274          KO       0       0     0.0       0      22
 275          HC       2
              *

 276          KK  4TH7TH
 277          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
 278          KO       0       0     0.0       0      22
 279          RS       1    FLOW     0.0     0.0
 280          RC    0.05   0.015    0.05    1339  0.0028     2.0
 281          RX     0.0   100.0   100.0  111.99     112     124     124     224
 282          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 283          KK  FRM6TH
 284          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
 285          DR  TO7THS
              *

 286          KK  6TH7TH
 287          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
 288          KO       0       0     0.0       0      22
 289          RS       2    FLOW     0.0     0.0
 290          RC    0.05   0.015    0.05    3061  0.0059     2.0
 291          RX     0.0   100.0   100.0  111.99     112     124     124     224
 292          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 293          KK   7TH-S
 294          KM  SUB BASIN 7TH-S
 295          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 296          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
 297          KO       0       0     0.0       1      22
 298          BA   0.128
 299          LG   0.243    0.26   5.219   0.296  29.957
 300          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
 301          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
 302          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
 303          UI    5.56    5.56    5.56    5.56    5.56    5.56
              *

 304          KK   7TH-S
 305          KM  CP @ 7TH AND BELOAT
 306          KO       0       0     0.0       0      22
 307          HC       3
              *
 308          ZZ
1
            SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   24         4TH
              .
              .
   38         .-------> TO4THS
   36       TO6TH
              V
              V
   41       4TH6TH
              .
              .
   48         .         6TH
```

```
                .          .
                .          .
 58           6TH............
                .
                .
 64             .-------> TO7THS
 62         TO8TH
                V
                V
 67        6TH8TH
                .
                .
 74             .        8TH
                .          .
                .          .
 85           8TH............
                .
                .
 91             .-------> TOCEN1
 89         TO9TH
                V
                V
 94        8TH9TH
                .
                .
101             .       9THE
                .          .
                .          .
114             .          .       9THW
                .          .          .
                .          .          .
125           9TH........................
                .
                .
131             .-------> TOCEN2
129        TO DET
                .
                .
134             .     BAYLIS
                .          .
                .          .
143           DET............
                V
                V
147        DETDRN
                .
                .
156             .          .<-------  TOCEN1
154             .     FRM8TH
                .          V
                .          V
157             .     8THCEN
                .          .
                .          .
166             .          .          .<-------  TOCEN2
164             .          .     FRM9TH
                .          .          V
                .          .          V
167             .          .     9THCEN
                .          .          .
                .          .          .
174             .          .          .     CENTRE
                .          .          .          .
                .          .          .          .
185             .     CENTRE........................
                .          .
                .          .
191             .          .-------> TO DRN
189             .     TOBELO
                .          V
                .          V
194             .     CENBEL
                .          .
                .          .
201             .          .     BELOAT
                .          .          .
                .          .          .
212             .     BELOAT............
                .          V
                .          V
216             .     BELDRN
                .          .
                .          .
225             .          .          .<-------  TO DRN
223             .          .     FRMCEN
                .          .          V
                .          .          V
226             .          .     CENDRN
                .          .          .
                .          .          .
233             .          .          .      DRAIN
                .          .          .          .
                .          .          .          .
245         DRAIN....................................
                .
                .
251             .          .<-------  TO4THS
249             .     FRM4TH
```

```
                .          V
                .          V
  252           .       4TH4S
                .          .
                .          .
  259           .          .       4TH-S
                .          .          .
                .          .          .
  272           .       4TH-S............
                .          V
                .          V
  276           .      4TH7TH
                .          .
                .          .
  285           .          .          .<-------  TO7THS
  283           .          .      FRM6TH
                .          .          V
                .          .          V
  286           .          .      6TH7TH
                .          .          .
                .          .          .
  293           .          .          .       7TH-S
                .          .          .          .
                .          .          .          .
  304           .       7TH-S......................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 | 4TH | 178. | 4.27 | 20. | 5. | 2. | .08 | | |
| + | DIVERSION TO | TO4THS | 0. | .00 | 0. | 0. | 0. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 178. | 4.27 | 20. | 5. | 2. | .08 | | |
| + | ROUTED TO | 4TH6TH | 169. | 4.37 | 20. | 5. | 2. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 159. | 4.17 | 16. | 4. | 1. | .06 | | |
| + | 2 COMBINED AT | 6TH | 300. | 4.23 | 36. | 9. | 3. | .14 | | |
| + | DIVERSION TO | TO7THS | 300. | 4.23 | 36. | 9. | 3. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 0. | .00 | 0. | 0. | 0. | .14 | | |
| + | ROUTED TO | 6TH8TH | 0. | .00 | 0. | 0. | 0. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 189. | 4.27 | 22. | 5. | 2. | .08 | | |
| + | 2 COMBINED AT | 8TH | 189. | 4.27 | 21. | 5. | 2. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 0. | .00 | 0. | 0. | 0. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 189. | 4.27 | 21. | 5. | 2. | .22 | | |
| + | ROUTED TO | 8TH9TH | 183. | 4.33 | 21. | 5. | 2. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 201. | 4.37 | 26. | 6. | 2. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 201. | 4.23 | 22. | 6. | 2. | .08 | | |
| + | 3 COMBINED AT | 9TH | 572. | 4.30 | 70. | 17. | 6. | .40 | | |
| + | DIVERSION TO | TOCEN2 | 0. | .00 | 0. | 0. | 0. | .40 | | |
| + | HYDROGRAPH AT | TO DET | 572. | 4.30 | 70. | 17. | 6. | .40 | | |
| + | HYDROGRAPH AT | BAYLIS | 57. | 4.07 | 4. | 1. | 0. | .02 | | |
| + | 2 COMBINED AT | DET | 585. | 4.30 | 74. | 19. | 7. | .41 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | ROUTED TO | DETDRN | 576. | 4.37 | 74. | 19. | 7. | .41 |
| + | HYDROGRAPH AT | FRM8TH | 0. | .00 | 0. | 0. | 0. | .22 |
| + | ROUTED TO | 8THCEN | 0. | .00 | 0. | 0. | 0. | .22 |
| + | HYDROGRAPH AT | FRM9TH | 0. | .00 | 0. | 0. | 0. | .40 |
| + | ROUTED TO | 9THCEN | 0. | .00 | 0. | 0. | 0. | .40 |
| + | HYDROGRAPH AT | CENTRE | 180. | 4.17 | 18. | 4. | 2. | .07 |
| + | 3 COMBINED AT | CENTRE | 180. | 4.17 | 18. | 4. | 2. | .07 |
| + | DIVERSION TO | TO DRN | 90. | 4.17 | 9. | 2. | 1. | .07 |
| + | HYDROGRAPH AT | TOBELO | 90. | 4.17 | 9. | 2. | 1. | .07 |
| + | ROUTED TO | CENBEL | 79. | 4.33 | 9. | 2. | 1. | .07 |
| + | HYDROGRAPH AT | BELOAT | 129. | 4.20 | 13. | 3. | 1. | .05 |
| + | 2 COMBINED AT | BELOAT | 201. | 4.27 | 22. | 6. | 2. | .12 |
| + | ROUTED TO | BELDRN | 163. | 4.37 | 22. | 6. | 2. | .12 |
| + | HYDROGRAPH AT | FRMCEN | 90. | 4.17 | 9. | 2. | 1. | .07 |
| + | ROUTED TO | CENDRN | 35. | 4.70 | 9. | 2. | 1. | .07 |
| + | HYDROGRAPH AT | DRAIN | 291. | 4.23 | 27. | 7. | 2. | .12 |
| + | 4 COMBINED AT | DRAIN | 1010. | 4.30 | 131. | 33. | 12. | .65 |
| + | HYDROGRAPH AT | FRM4TH | 0. | .00 | 0. | 0. | 0. | .08 |
| + | ROUTED TO | 4TH4S | 0. | .00 | 0. | 0. | 0. | .08 |
| + | HYDROGRAPH AT | 4TH-S | 288. | 4.37 | 37. | 9. | 3. | .15 |
| + | 2 COMBINED AT | 4TH-S | 288. | 4.37 | 37. | 9. | 3. | .15 |
| + | ROUTED TO | 4TH7TH | 261. | 4.50 | 36. | 9. | 3. | .15 |
| + | HYDROGRAPH AT | FRM6TH | 300. | 4.23 | 36. | 9. | 3. | .14 |
| + | ROUTED TO | 6TH7TH | 254. | 4.43 | 36. | 9. | 3. | .14 |
| + | HYDROGRAPH AT | 7TH-S | 272. | 4.27 | 29. | 7. | 3. | .13 |
| + | 3 COMBINED AT | 7TH-S | 737. | 4.37 | 102. | 26. | 9. | .27 |

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

## Alt 5, 6 – Storm Drain from 4th/MC 85 to Apache Road Models

```
1****************************************                                    ****************************************
*                                      *                                    *                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                    *   U.S. ARMY CORPS OF ENGINEERS       *
*              JUN  1998               *                                    *   HYDROLOGIC ENGINEERING CENTER      *
*           VERSION 4.1                *                                    *         609 SECOND STREET            *
*                                      *                                    *      DAVIS, CALIFORNIA 95616         *
*  RUN DATE   13MAY04  TIME  10:00:20  *                                    *          (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  BUCKEYE CAR
        2           ID  10 YEAR, 6 HOUR ALTERNATIVE 5 MODEL - STORM DRAIN ALONG MC 85
        3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
        4           ID  NO OVERFLOW FROM NORTH OVER BID CANAL
        5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
        6           ID  RAINFALL LOSSES - GREEN AND AMPT
        7           ID  CHANNEL ROUTING - NORMAL DEPTH
        8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON FIE
                    *DIAGRAM
        9           IT       2 01JAN04    1200    2000
       10           IO       5
       11           IN      15
       12           JD     2.1    0.01
                    * 6-hour distribution, pattern 1.0
       13           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
       14           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
       15           PC   0.962   0.972   0.983   0.991     1.0
       16           JD    2.09     0.5
       17           JD    2.07     1.0
       18           JD    2.02     5.0
       19           JD    1.97    10.0
       20           JD    1.91    20.0
       21           JD    1.87    30.0
       22           JD    1.83    40.0
       23           JD    1.68   100.0
                    *

       24           KK     4TH
       25           KM  SUB BASIN 4TH
       26           KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
       27           KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
       28           KO       0       0     0.0       1      22
       29           BA   0.082
       30           IN      15 01JAN04       0
       31           LG   0.282   0.264    5.16   0.322  43.403
       32           UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
       33           UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
       34           UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
       35           UI    3.56    3.56    3.56    3.56    3.56    3.56       0
                    *

       36           KK   TO6TH
       37           KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
       38           DT  TO4THS
       39           DI       0     100    1000    2000
       40           DQ       0       0       0       0
                    *

       41           KK  4TH6TH
       42           KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
       43           KO       0       0     0.0       0      22
       44           RS       1    FLOW     0.0     0.0
       45           RC    0.05   0.015    0.05  871.82   0.002     2.0
       46           RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
       47           RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                    *
1                                                HEC-1 INPUT                                                    PAGE  2

      LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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```
 48          KK     6TH
 49          KM  SUB BASIN 6TH
 50          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 51          KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
 52          KO       0       0     0.0       1      22
 53          BA  0.0565
 54          LG   0.325   0.152   7.592   0.121   41.38
 55          UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
 56          UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
 57          UI    3.51    3.51    3.51    3.51    3.51    3.51
             *

 58          KK     6TH
 59          KM  CP @ 6TH AND MONROE
 60          KO       0       0     0.0       0      22
 61          HC       2
             *

 62          KK   TO8TH
 63          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 64          DT  TO7THS
 65          DI       0     100    1000    2000
 66          DQ       0       0       0       0
             *

 67          KK  6TH8TH
 68          KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
 69          KO       0       0     0.0       0      22
 70          RS       2    FLOW     0.0     0.0
 71          RC    0.05   0.015    0.05 1116.33   0.002     2.0
 72          RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
 73          RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
             *

 74          KK     8TH
 75          KM  SUB BASIN 8TH
 76          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 77          KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
 78          KO       0       0     0.0       1      22
 79          BA  0.0792
 80          LG    0.31   0.145   8.765   0.075  32.587
 81          UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
 82          UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
 83          UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
 84          UI    3.52    3.52    3.52    3.52    3.52       0
             *

 85          KK     8TH
 86          KM  CP @ 8TH AND MONROE
 87          KO       0       0     0.0       0      22
 88          HC       2
             *
1                                        HEC-1 INPUT                                          PAGE  3

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

 89          KK   TO9TH
 90          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 91          DT  TOCEN1
 92          DI       0     100    1000    2000
 93          DQ       0       0       0       0
             *

 94          KK  8TH9TH
 95          KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
 96          KO       0       0     0.0       0      22
 97          RS       1    FLOW     0.0     0.0
 98          RC    0.05   0.015    0.05  680.42   0.002     2.0
 99          RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
100          RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
             *

101          KK    9THE
102          KM  SUB BASIN 9THE
103          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
104          KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
105          KO       0       0     0.0       1      22
106          BA   0.096
107          IN      15 01JAN04       0
108          LG   0.385   0.113   8.599   0.087  33.259
109          UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
110          UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
111          UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
112          UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
113          UI    3.37    3.37    3.37    3.37       0
             *

114          KK    9THW
115          KM  SUB BASIN 9THW
116          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
117          KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
118          KO       0       0     0.0       1      22
119          BA  0.0814
120          LG   0.309     0.1    8.39   0.099  35.997
121          UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
122          UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
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 123          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
 124          UI    3.87    3.87    3.87
              *

 125          KK     9TH
 126          KM  CP @ 9TH AND MONROE
 127          KO       0       0     0.0       0      22
 128          HC       3
              *
1                                          HEC-1 INPUT                                          PAGE  4

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

 129          KK  TO DET
 130          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 131          DT  TOCEN2
 132          DI       0     100    1000    2000
 133          DQ       0       0       0       0
              *

 134          KK  BAYLIS
 135          KM  SUB BASIN BAYLIS
 136          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 137          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
 138          KO       0       0     0.0       1      22
 139          BA   0.016
 140          LG   0.223   0.022     9.7    0.07   4.895
 141          UI     0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
 142          UI    7.39     3.9    1.75    1.75    1.75
              *

 143          KK     DET
 144          KM  CP @ BAYLISS PROPERTY SOUTH OF MONROE
 145          KO       0       0     0.0       0      22
 146          HC       2
              *
              * KKDETBAS
              * KMPROPOSEDDETENTION BASIN ANALYSI       S
              * RS      1    STOR       0
              * SA   3.2     3.5     3.7       4     4.3     4.6     4.9     5.3     5.7
              * SA   6.3
              * SE    56      57      58      59      60      61      62      63      64
              * SE    66
              * SQ     0       0      34      66     100     140     182     228     274     3
              * SQ   364
              * KO                                     22
              *

 147          KK  DETDRN
 148          KM  FLOW ROUTED FROM CP DET TO CP DRAIN
 149          KO       0       0     0.0       0      22
 150          RS       2    FLOW     0.0     0.0
 151          RC    0.05    0.03    0.05    2657  0.0065       9
 152          RX     0.0      50     100     108     110     118     168     218
 153          RY       9     8.5       8       0       0       8     8.5       9
              *

 154          KK  FRM8TH
 155          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
 156          DR  TOCEN1
              *
1                                          HEC-1 INPUT                                          PAGE  5

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

 157          KK  8THCEN
 158          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
 159          KO       0       0     0.0       0      22
 160          RS       2    FLOW     0.0     0.0
 161          RC    0.05   0.015    0.05    1967   0.007     2.0
 162          RX     0.0   100.0   100.0  111.99     112     124     124     224
 163          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 164          KK  FRM9TH
 165          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
 166          DR  TOCEN2
              *

 167          KK  9THCEN
 168          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
 169          KO       0       0     0.0       0      22
 170          RS       1    FLOW     0.0     0.0
 171          RC    0.05   0.015    0.05    1300   0.008     2.0
 172          RX     0.0   100.0   100.0  111.99     112     124     124     224
 173          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 174          KK  CENTRE
 175          KM  SUB BASIN CENTRE
 176          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 177          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
 178          KO       0       0     0.0       1      22
 179          BA   0.067
 180          IN      15 01JAN04       0
 181          LG   0.248   0.159   6.909   0.151  32.636
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182          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
183          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
184          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
             *

185          KK  CENTRE
186          KM  CP @ CENTRE AND 9TH
187          KO       0       0     0.0       0      22
188          HC       3
             *

189          KK  TOBELO
190          KM  FLOW SPLIT AT CENTRE AND 9TH
191          DT  TO DRN
192          DI       0     100    1000    2000
193          DQ       0      50     500    1000
             *
1                                        HEC-1 INPUT                                          PAGE  6

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

194          KK  CENBEL
195          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
196          KO       0       0     0.0       0      22
197          RS       2    FLOW     0.0     0.0
198          RC    0.05   0.015    0.05    2542   0.005     2.0
199          RX     0.0   100.0   100.0  111.99     112     124     124     224
200          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

201          KK  BELOAT
202          KM  SUB BASIN BELOAT
203          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
204          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
205          KO       0       0     0.0       1      22
206          BA   0.049
207          IN      15 01JAN04       0
208          LG    0.25   0.151   9.213   0.065  29.636
209          UI     0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
210          UI   105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
211          UI   10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
             *

212          KK  BELOAT
213          KM  CP @ BELOAT AND 9TH
214          KO       0       0     0.0       0      22
215          HC       2
             *

216          KK  BELDRN
217          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
218          KO       0       0     0.0       0      22
219          RS       1    FLOW     0.0     0.0
220          RC   0.035   0.015   0.035    1343  0.0011       4
221          RX     0.0     108     120  131.99     132     144     156     264
222          RY       8       0       3    3.24    3.24       3       0       8
             *

223          KK  FRMCEN
224          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
225          DR  TO DRN
             *

226          KK  CENDRN
227          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
228          KO       0       0     0.0       0      22
229          RS       2    FLOW     0.0     0.0
230          RC    0.05    0.05    0.05    1888   0.005       4
231          RX     0.0     300     600     900    1200    1500    1800    2100
232          RY       1    0.67    0.33       0       0    0.33    0.67       1
             *
1                                        HEC-1 INPUT                                          PAGE  7

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

233          KK   DRAIN
234          KM  SUB BASIN DRAIN
235          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
236          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
237          KO       0       0     0.0       1      22
238          BA   0.118
239          IN      15 01JAN04       0
240          LG   0.447   0.155   9.461   0.074   8.034
241          UI     0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
242          UI  246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
243          UI   32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
244          UI    5.98
             *

245          KK   DRAIN
246          KM  CP @ BELOAT AND APACHE
247          KO       0       0     0.0       0      22
248          HC       4
             *

249          KK  FRM4TH
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 250          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
 251          DR  TO4THS
              *

 252          KK   4TH4S
 253          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
 254          KO       0       0     0.0       0      22
 255          RS       2    FLOW     0.0     0.0
 256          RC    0.05   0.015    0.05    2629   0.015     2.0
 257          RX     0.0   100.0   100.0  111.99     112     124     124     224
 258          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 259          KK   4TH-S
 260          KM  SUB BASIN 4TH-S
 261          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 262          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
 263          KO       0       0     0.0       1      22
 264          BA   0.146
 265          IN      15 01JAN04       0
 266          LG   0.215   0.166   6.501    0.19  28.927
 267          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
 268          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
 269          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
 270          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
 271          UI       5       5       5       5       5       0
              *
1                                          HEC-1 INPUT                                          PAGE  8

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

 272          KK   4TH-S
 273          KM  CP @ 4TH AND BELOAT
 274          KO       0       0     0.0       0      22
 275          HC       2
              *

 276          KK  4TH7TH
 277          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
 278          KO       0       0     0.0       0      22
 279          RS       1    FLOW     0.0     0.0
 280          RC    0.05   0.015    0.05    1339  0.0028     2.0
 281          RX     0.0   100.0   100.0  111.99     112     124     124     224
 282          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 283          KK  FRM6TH
 284          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
 285          DR  TO7THS
              *

 286          KK  6TH7TH
 287          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
 288          KO       0       0     0.0       0      22
 289          RS       2    FLOW     0.0     0.0
 290          RC    0.05   0.015    0.05    3061  0.0059     2.0
 291          RX     0.0   100.0   100.0  111.99     112     124     124     224
 292          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 293          KK   7TH-S
 294          KM  SUB BASIN 7TH-S
 295          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 296          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
 297          KO       0       0     0.0       1      22
 298          BA   0.128
 299          LG   0.243    0.26   5.219   0.296  29.957
 300          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
 301          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
 302          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
 303          UI    5.56    5.56    5.56    5.56    5.56    5.56
              *

 304          KK   7TH-S
 305          KM  CP @ 7TH AND BELOAT
 306          KO       0       0     0.0       0      22
 307          HC       3
              *
 308          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  24        4TH
              .
              .
  38          .-------> TO4THS
  36      TO6TH
              V
              V
  41      4TH6TH
              .
              .
  48          .         6TH
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                .          .
                .          .
 58           6TH............
                .
                .
 64             .-------> TO7THS
 62         TO8TH
                V
                V
 67        6TH8TH
                .
                .
 74             .        8TH
                .          .
                .          .
 85           8TH............
                .
                .
 91             .-------> TOCEN1
 89         TO9TH
                V
                V
 94        8TH9TH
                .
                .
101             .       9THE
                .          .
                .          .
114             .          .       9THW
                .          .          .
                .          .          .
125           9TH........................
                .
                .
131             .-------> TOCEN2
129        TO DET
                .
                .
134             .     BAYLIS
                .          .
                .          .
143           DET............
                V
                V
147        DETDRN
                .
                .
156             .          .<-------  TOCEN1
154             .     FRM8TH
                .          V
                .          V
157             .     8THCEN
                .          .
                .          .
166             .          .          .<-------  TOCEN2
164             .          .     FRM9TH
                .          .          V
                .          .          V
167             .          .     9THCEN
                .          .          .
                .          .          .
174             .          .          .      CENTRE
                .          .          .           .
                .          .          .           .
185             .     CENTRE........................
                .          .
                .          .
191             .          .-------> TO DRN
189             .     TOBELO
                .          V
                .          V
194             .     CENBEL
                .          .
                .          .
201             .          .     BELOAT
                .          .          .
                .          .          .
212             .     BELOAT............
                .          V
                .          V
216             .     BELDRN
                .          .
                .          .
225             .          .          .<-------  TO DRN
223             .          .     FRMCEN
                .          .          V
                .          .          V
226             .          .     CENDRN
                .          .          .
                .          .          .
233             .          .          .       DRAIN
                .          .          .           .
                .          .          .           .
245        DRAIN...................................
                .
                .
251             .          .<-------  TO4THS
249             .     FRM4TH
```

```
                .          V
                .          V
  252           .       4TH4S
                .          .
                .          .
  259           .          .       4TH-S
                .          .          .
                .          .          .
  272           .       4TH-S............
                .          V
                .          V
  276           .      4TH7TH
                .          .
                .          .
  285           .          .          .<-------  TO7THS
  283           .          .      FRM6TH
                .          .          V
                .          .          V
  286           .          .      6TH7TH
                .          .          .
                .          .          .
  293           .          .          .       7TH-S
                .          .          .          .
                .          .          .          .
  304           .       7TH-S........................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 | 4TH | 101. | 4.30 | 11. | 3. | 1. | .08 | | |
| + | DIVERSION TO | TO4THS | 0. | .00 | 0. | 0. | 0. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 101. | 4.30 | 11. | 3. | 1. | .08 | | |
| + | ROUTED TO | 4TH6TH | 95. | 4.37 | 11. | 3. | 1. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 96. | 4.17 | 9. | 2. | 1. | .06 | | |
| + | 2 COMBINED AT | 6TH | 172. | 4.23 | 20. | 5. | 2. | .14 | | |
| + | DIVERSION TO | TO7THS | 0. | .00 | 0. | 0. | 0. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 172. | 4.23 | 20. | 5. | 2. | .14 | | |
| + | ROUTED TO | 6TH8TH | 163. | 4.33 | 20. | 5. | 2. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 113. | 4.27 | 12. | 3. | 1. | .08 | | |
| + | 2 COMBINED AT | 8TH | 273. | 4.30 | 33. | 8. | 3. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 0. | .00 | 0. | 0. | 0. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 273. | 4.30 | 33. | 8. | 3. | .22 | | |
| + | ROUTED TO | 8TH9TH | 265. | 4.37 | 33. | 8. | 3. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 119. | 4.37 | 15. | 4. | 1. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 122. | 4.23 | 13. | 3. | 1. | .08 | | |
| + | 3 COMBINED AT | 9TH | 492. | 4.33 | 60. | 15. | 5. | .40 | | |
| + | DIVERSION TO | TOCEN2 | 0. | .00 | 0. | 0. | 0. | .40 | | |
| + | HYDROGRAPH AT | TO DET | 492. | 4.33 | 60. | 15. | 5. | .40 | | |
| + | HYDROGRAPH AT | BAYLIS | 36. | 4.07 | 3. | 1. | 0. | .02 | | |
| + | 2 COMBINED AT | DET | 498. | 4.33 | 63. | 16. | 6. | .41 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | ROUTED TO | DETDRN | 487. | 4.40 | 63. | 16. | 6. | .41 |
| + | HYDROGRAPH AT | FRM8TH | 0. | .00 | 0. | 0. | 0. | .22 |
| + | ROUTED TO | 8THCEN | 0. | .00 | 0. | 0. | 0. | .22 |
| + | HYDROGRAPH AT | FRM9TH | 0. | .00 | 0. | 0. | 0. | .40 |
| + | ROUTED TO | 9THCEN | 0. | .00 | 0. | 0. | 0. | .40 |
| + | HYDROGRAPH AT | CENTRE | 107. | 4.17 | 10. | 2. | 1. | .07 |
| + | 3 COMBINED AT | CENTRE | 107. | 4.17 | 10. | 2. | 1. | .07 |
| + | DIVERSION TO | TO DRN | 54. | 4.17 | 5. | 1. | 0. | .07 |
| + | HYDROGRAPH AT | TOBELO | 54. | 4.17 | 5. | 1. | 0. | .07 |
| + | ROUTED TO | CENBEL | 48. | 4.30 | 5. | 1. | 0. | .07 |
| + | HYDROGRAPH AT | BELOAT | 78. | 4.20 | 8. | 2. | 1. | .05 |
| + | 2 COMBINED AT | BELOAT | 123. | 4.27 | 13. | 3. | 1. | .12 |
| + | ROUTED TO | BELDRN | 92. | 4.40 | 13. | 3. | 1. | .12 |
| + | HYDROGRAPH AT | FRMCEN | 54. | 4.17 | 5. | 1. | 0. | .07 |
| + | ROUTED TO | CENDRN | 20. | 4.70 | 5. | 1. | 0. | .07 |
| + | HYDROGRAPH AT | DRAIN | 167. | 4.23 | 14. | 4. | 1. | .12 |
| + | 4 COMBINED AT | DRAIN | 715. | 4.33 | 94. | 24. | 8. | .65 |
| + | HYDROGRAPH AT | FRM4TH | 0. | .00 | 0. | 0. | 0. | .08 |
| + | ROUTED TO | 4TH4S | 0. | .00 | 0. | 0. | 0. | .08 |
| + | HYDROGRAPH AT | 4TH-S | 165. | 4.40 | 20. | 5. | 2. | .15 |
| + | 2 COMBINED AT | 4TH-S | 165. | 4.40 | 20. | 5. | 2. | .15 |
| + | ROUTED TO | 4TH7TH | 149. | 4.50 | 20. | 5. | 2. | .15 |
| + | HYDROGRAPH AT | FRM6TH | 0. | .00 | 0. | 0. | 0. | .14 |
| + | ROUTED TO | 6TH7TH | 0. | .00 | 0. | 0. | 0. | .14 |
| + | HYDROGRAPH AT | 7TH-S | 150. | 4.30 | 16. | 4. | 1. | .13 |
| + | 3 COMBINED AT | 7TH-S | 274. | 4.37 | 36. | 9. | 3. | .27 |

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

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN  1998               *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   13MAY04  TIME  10:01:13  *
 *                                      *
 ****************************************
```

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

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

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

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

```
1                                    HEC-1 INPUT                                                    PAGE  1

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

    1           ID  BUCKEYE CAR
    2           ID  50 YEAR, 6 HOUR ALTERNATIVE 5 MODEL - STORM DRAIN ALONG MC 85
    3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
    4           ID  NO OVERFLOW FROM NORTH OVER BID CANAL
    5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
    6           ID  RAINFALL LOSSES - GREEN AND AMPT
    7           ID  CHANNEL ROUTING - NORMAL DEPTH
    8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON FIE
                *DIAGRAM
    9           IT       2 01JAN04    1200    2000
   10           IO       5
   11           IN      15
   12           JD     2.9    0.01
                * 6-hour distribution, pattern 1.0
   13           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
   14           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
   15           PC   0.962   0.972   0.983   0.991     1.0
   16           JD    2.88     0.5
   17           JD    2.86     1.0
   18           JD    2.78     5.0
   19           JD    2.73    10.0
   20           JD    2.64    20.0
   21           JD    2.58    30.0
   22           JD    2.52    40.0
   23           JD    2.32   100.0
                *

   24           KK     4TH
   25           KM  SUB BASIN 4TH
   26           KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
   27           KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
   28           KO       0       0     0.0       1      22
   29           BA   0.082
   30           IN      15 01JAN04       0
   31           LG   0.282   0.264    5.16   0.322  43.403
   32           UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
   33           UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
   34           UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
   35           UI    3.56    3.56    3.56    3.56    3.56    3.56       0
                *

   36           KK   TO6TH
   37           KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
   38           DT  TO4THS
   39           DI       0     100    1000    2000
   40           DQ       0       0       0       0
                *

   41           KK  4TH6TH
   42           KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
   43           KO       0       0     0.0       0      22
   44           RS       1    FLOW     0.0     0.0
   45           RC    0.05   0.015    0.05  871.82   0.002     2.0
   46           RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
   47           RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                *
1                                    HEC-1 INPUT                                                    PAGE  2

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

```
KK     6TH
KM  SUB BASIN 6TH
KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
KO       0       0     0.0       1      22
BA  0.0565
LG   0.325   0.152   7.592   0.121   41.38
UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
UI    3.51    3.51    3.51    3.51    3.51    3.51
*

KK     6TH
KM  CP @ 6TH AND MONROE
KO       0       0     0.0       0      22
HC       2
*

KK   TO8TH
KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
DT  TO7THS
DI       0     100    1000    2000
DQ       0       0       0       0
*

KK  6TH8TH
KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
KO       0       0     0.0       0      22
RS       2    FLOW     0.0     0.0
RC    0.05   0.015    0.05 1116.33   0.002     2.0
RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
*

KK     8TH
KM  SUB BASIN 8TH
KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
KO       0       0     0.0       1      22
BA  0.0792
LG    0.31   0.145   8.765   0.075  32.587
UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
UI    3.52    3.52    3.52    3.52    3.52       0
*

KK     8TH
KM  CP @ 8TH AND MONROE
KO       0       0     0.0       0      22
HC       2
*
```

1 HEC-1 INPUT PAGE 3

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

KK   TO9TH
KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
DT  TOCEN1
DI       0     100    1000    2000
DQ       0       0       0       0
*

KK  8TH9TH
KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
KO       0       0     0.0       0      22
RS       1    FLOW     0.0     0.0
RC    0.05   0.015    0.05  680.42   0.002     2.0
RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
*

KK    9THE
KM  SUB BASIN 9THE
KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
KO       0       0     0.0       1      22
BA   0.096
IN      15 01JAN04       0
LG   0.385   0.113   8.599   0.087  33.259
UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
UI    3.37    3.37    3.37    3.37       0
*

KK    9THW
KM  SUB BASIN 9THW
KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
KO       0       0     0.0       1      22
BA  0.0814
LG   0.309     0.1    8.39   0.099  35.997
UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
```

```
 123          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
 124          UI    3.87    3.87    3.87
              *

 125          KK     9TH
 126          KM  CP @ 9TH AND MONROE
 127          KO       0       0     0.0       0      22
 128          HC       3
              *
1                                          HEC-1 INPUT                                          PAGE  4

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

 129          KK  TO DET
 130          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 131          DT  TOCEN2
 132          DI       0     100    1000    2000
 133          DQ       0       0       0       0
              *

 134          KK  BAYLIS
 135          KM  SUB BASIN BAYLIS
 136          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 137          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
 138          KO       0       0     0.0       1      22
 139          BA   0.016
 140          LG   0.223   0.022     9.7    0.07   4.895
 141          UI     0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
 142          UI    7.39     3.9    1.75    1.75    1.75
              *

 143          KK     DET
 144          KM  CP @ BAYLISS PROPERTY SOUTH OF MONROE
 145          KO       0       0     0.0       0      22
 146          HC       2
              *
              * KKDETBAS
              * KMPROPOSEDDETENTION BASIN ANALYSI       S
              * RS      1    STOR       0
              * SA    3.2     3.5     3.7       4     4.3     4.6     4.9     5.3     5.7
              * SA    6.3
              * SE     56      57      58      59      60      61      62      63      64
              * SE     66
              * SQ      0       0      34      66     100     140     182     228     274     3
              * SQ    364
              * KO                                     22
              *

 147          KK  DETDRN
 148          KM  FLOW ROUTED FROM CP DET TO CP DRAIN
 149          KO       0       0     0.0       0      22
 150          RS       2    FLOW     0.0     0.0
 151          RC    0.05    0.03    0.05    2657  0.0065       9
 152          RX     0.0      50     100     108     110     118     168     218
 153          RY       9     8.5       8       0       0       8     8.5       9
              *

 154          KK  FRM8TH
 155          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
 156          DR  TOCEN1
              *
1                                          HEC-1 INPUT                                          PAGE  5

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

 157          KK  8THCEN
 158          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
 159          KO       0       0     0.0       0      22
 160          RS       2    FLOW     0.0     0.0
 161          RC    0.05   0.015    0.05    1967   0.007     2.0
 162          RX     0.0   100.0   100.0  111.99     112     124     124     224
 163          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 164          KK  FRM9TH
 165          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
 166          DR  TOCEN2
              *

 167          KK  9THCEN
 168          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
 169          KO       0       0     0.0       0      22
 170          RS       1    FLOW     0.0     0.0
 171          RC    0.05   0.015    0.05    1300   0.008     2.0
 172          RX     0.0   100.0   100.0  111.99     112     124     124     224
 173          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 174          KK  CENTRE
 175          KM  SUB BASIN CENTRE
 176          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 177          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
 178          KO       0       0     0.0       1      22
 179          BA   0.067
 180          IN      15 01JAN04       0
 181          LG   0.248   0.159   6.909   0.151  32.636
```

```
182          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
183          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
184          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
             *

185          KK  CENTRE
186          KM  CP @ CENTRE AND 9TH
187          KO       0       0     0.0       0      22
188          HC       3
             *

189          KK  TOBELO
190          KM  FLOW SPLIT AT CENTRE AND 9TH
191          DT  TO DRN
192          DI       0     100    1000    2000
193          DQ       0      50     500    1000
             *
1                                          HEC-1 INPUT                                                    PAGE  6

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

194          KK  CENBEL
195          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
196          KO       0       0     0.0       0      22
197          RS       2    FLOW     0.0     0.0
198          RC    0.05   0.015    0.05    2542   0.005     2.0
199          RX     0.0   100.0   100.0  111.99     112     124     124     224
200          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

201          KK  BELOAT
202          KM  SUB BASIN BELOAT
203          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
204          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
205          KO       0       0     0.0       1      22
206          BA   0.049
207          IN      15 01JAN04       0
208          LG    0.25   0.151   9.213   0.065  29.636
209          UI     0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
210          UI   105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
211          UI   10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
             *

212          KK  BELOAT
213          KM  CP @ BELOAT AND 9TH
214          KO       0       0     0.0       0      22
215          HC       2
             *

216          KK  BELDRN
217          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
218          KO       0       0     0.0       0      22
219          RS       1    FLOW     0.0     0.0
220          RC   0.035   0.015   0.035    1343  0.0011       4
221          RX     0.0     108     120  131.99     132     144     156     264
222          RY       8       0       3    3.24    3.24       3       0       8
             *

223          KK  FRMCEN
224          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
225          DR  TO DRN
             *

226          KK  CENDRN
227          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
228          KO       0       0     0.0       0      22
229          RS       2    FLOW     0.0     0.0
230          RC    0.05    0.05    0.05    1888   0.005       4
231          RX     0.0     300     600     900    1200    1500    1800    2100
232          RY       1    0.67    0.33       0       0    0.33    0.67       1
             *
1                                          HEC-1 INPUT                                                    PAGE  7

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

233          KK   DRAIN
234          KM  SUB BASIN DRAIN
235          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
236          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
237          KO       0       0     0.0       1      22
238          BA   0.118
239          IN      15 01JAN04       0
240          LG   0.447   0.155   9.461   0.074   8.034
241          UI     0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
242          UI  246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
243          UI   32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
244          UI    5.98
             *

245          KK   DRAIN
246          KM  CP @ BELOAT AND APACHE
247          KO       0       0     0.0       0      22
248          HC       4
             *

249          KK  FRM4TH
```

```
 250          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
 251          DR  TO4THS
              *

 252          KK   4TH4S
 253          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
 254          KO       0       0     0.0       0      22
 255          RS       2    FLOW     0.0     0.0
 256          RC    0.05   0.015    0.05    2629   0.015     2.0
 257          RX     0.0   100.0   100.0  111.99     112     124     124     224
 258          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 259          KK   4TH-S
 260          KM  SUB BASIN 4TH-S
 261          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 262          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
 263          KO       0       0     0.0       1      22
 264          BA   0.146
 265          IN      15 01JAN04       0
 266          LG   0.215   0.166   6.501    0.19  28.927
 267          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
 268          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
 269          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
 270          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
 271          UI       5       5       5       5       5       0
              *
1                                          HEC-1 INPUT                                          PAGE  8

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

 272          KK   4TH-S
 273          KM  CP @ 4TH AND BELOAT
 274          KO       0       0     0.0       0      22
 275          HC       2
              *

 276          KK  4TH7TH
 277          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
 278          KO       0       0     0.0       0      22
 279          RS       1    FLOW     0.0     0.0
 280          RC    0.05   0.015    0.05    1339  0.0028     2.0
 281          RX     0.0   100.0   100.0  111.99     112     124     124     224
 282          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 283          KK  FRM6TH
 284          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
 285          DR  TO7THS
              *

 286          KK  6TH7TH
 287          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
 288          KO       0       0     0.0       0      22
 289          RS       2    FLOW     0.0     0.0
 290          RC    0.05   0.015    0.05    3061  0.0059     2.0
 291          RX     0.0   100.0   100.0  111.99     112     124     124     224
 292          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 293          KK   7TH-S
 294          KM  SUB BASIN 7TH-S
 295          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 296          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
 297          KO       0       0     0.0       1      22
 298          BA   0.128
 299          LG   0.243    0.26   5.219   0.296  29.957
 300          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
 301          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
 302          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
 303          UI    5.56    5.56    5.56    5.56    5.56    5.56
              *

 304          KK   7TH-S
 305          KM  CP @ 7TH AND BELOAT
 306          KO       0       0     0.0       0      22
 307          HC       3
              *
 308          ZZ
1
          SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  24        4TH
              .
              .
  38          .-------> TO4THS
  36      TO6TH
              V
              V
  41      4TH6TH
              .
              .
  48          .         6TH
```

```
                .          .
                .          .
 58           6TH............
                .
                .
 64             .-------> TO7THS
 62         TO8TH
                V
                V
 67        6TH8TH
                .
                .
 74             .         8TH
                .          .
                .          .
 85           8TH............
                .
                .
 91             .-------> TOCEN1
 89         TO9TH
                V
                V
 94        8TH9TH
                .
                .
101             .        9THE
                .          .
                .          .
114             .          .        9THW
                .          .          .
                .          .          .
125           9TH........................
                .
                .
131             .-------> TOCEN2
129       TO DET
                .
                .
134             .      BAYLIS
                .          .
                .          .
143          DET............
                V
                V
147       DETDRN
                .
                .
156             .          .<-------  TOCEN1
154             .      FRM8TH
                .          V
                .          V
157             .      8THCEN
                .          .
                .          .
166             .          .          .<-------  TOCEN2
164             .          .      FRM9TH
                .          .          V
                .          .          V
167             .          .      9THCEN
                .          .          .
                .          .          .
174             .          .          .      CENTRE
                .          .          .          .
                .          .          .          .
185             .      CENTRE........................
                .          .
                .          .
191             .          .-------> TO DRN
189             .      TOBELO
                .          V
                .          V
194             .      CENBEL
                .          .
                .          .
201             .          .      BELOAT
                .          .          .
                .          .          .
212             .      BELOAT............
                .          V
                .          V
216             .      BELDRN
                .          .
                .          .
225             .          .          .<-------  TO DRN
223             .          .      FRMCEN
                .          .          V
                .          .          V
226             .          .      CENDRN
                .          .          .
                .          .          .
233             .          .          .      DRAIN
                .          .          .          .
                .          .          .          .
245       DRAIN....................................
                .
                .
251             .          .<-------  TO4THS
249             .      FRM4TH
```

```
                .          V
                .          V
  252           .       4TH4S
                .          .
                .          .
  259           .          .       4TH-S
                .          .          .
                .          .          .
  272           .       4TH-S............
                .          V
                .          V
  276           .      4TH7TH
                .          .
                .          .
  285           .          .          .<-------  TO7THS
  283           .          .      FRM6TH
                .          .          V
                .          .          V
  286           .          .      6TH7TH
                .          .          .
                .          .          .
  293           .          .          .       7TH-S
                .          .          .          .
                .          .          .          .
  304           .       7TH-S........................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 | 4TH | 152. | 4.30 | 17. | 4. | 2. | .08 | | |
| + | DIVERSION TO | TO4THS | 0. | .00 | 0. | 0. | 0. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 152. | 4.30 | 17. | 4. | 2. | .08 | | |
| + | ROUTED TO | 4TH6TH | 144. | 4.37 | 17. | 4. | 2. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 138. | 4.17 | 13. | 3. | 1. | .06 | | |
| + | 2 COMBINED AT | 6TH | 257. | 4.23 | 31. | 8. | 3. | .14 | | |
| + | DIVERSION TO | TO7THS | 0. | .00 | 0. | 0. | 0. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 257. | 4.23 | 31. | 8. | 3. | .14 | | |
| + | ROUTED TO | 6TH8TH | 244. | 4.33 | 31. | 8. | 3. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 164. | 4.27 | 18. | 5. | 2. | .08 | | |
| + | 2 COMBINED AT | 8TH | 404. | 4.30 | 49. | 12. | 4. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 0. | .00 | 0. | 0. | 0. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 404. | 4.30 | 49. | 12. | 4. | .22 | | |
| + | ROUTED TO | 8TH9TH | 393. | 4.37 | 49. | 12. | 4. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 174. | 4.37 | 22. | 6. | 2. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 175. | 4.23 | 19. | 5. | 2. | .08 | | |
| + | 3 COMBINED AT | 9TH | 723. | 4.33 | 90. | 23. | 8. | .40 | | |
| + | DIVERSION TO | TOCEN2 | 0. | .00 | 0. | 0. | 0. | .40 | | |
| + | HYDROGRAPH AT | TO DET | 723. | 4.33 | 90. | 23. | 8. | .40 | | |
| + | HYDROGRAPH AT | BAYLIS | 50. | 4.07 | 4. | 1. | 0. | .02 | | |
| + | 2 COMBINED AT | DET | 733. | 4.33 | 94. | 24. | 8. | .41 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | ROUTED TO | DETDRN | 717. | 4.40 | 94. | 24. | 8. | .41 |
| + | HYDROGRAPH AT | FRM8TH | 0. | .00 | 0. | 0. | 0. | .22 |
| + | ROUTED TO | 8THCEN | 0. | .00 | 0. | 0. | 0. | .22 |
| + | HYDROGRAPH AT | FRM9TH | 0. | .00 | 0. | 0. | 0. | .40 |
| + | ROUTED TO | 9THCEN | 0. | .00 | 0. | 0. | 0. | .40 |
| + | HYDROGRAPH AT | CENTRE | 156. | 4.17 | 15. | 4. | 1. | .07 |
| + | 3 COMBINED AT | CENTRE | 156. | 4.17 | 15. | 4. | 1. | .07 |
| + | DIVERSION TO | TO DRN | 78. | 4.17 | 7. | 2. | 1. | .07 |
| + | HYDROGRAPH AT | TOBELO | 78. | 4.17 | 7. | 2. | 1. | .07 |
| + | ROUTED TO | CENBEL | 69. | 4.33 | 7. | 2. | 1. | .07 |
| + | HYDROGRAPH AT | BELOAT | 112. | 4.20 | 11. | 3. | 1. | .05 |
| + | 2 COMBINED AT | BELOAT | 175. | 4.27 | 19. | 5. | 2. | .12 |
| + | ROUTED TO | BELDRN | 139. | 4.37 | 19. | 5. | 2. | .12 |
| + | HYDROGRAPH AT | FRMCEN | 78. | 4.17 | 7. | 2. | 1. | .07 |
| + | ROUTED TO | CENDRN | 30. | 4.70 | 7. | 2. | 1. | .07 |
| + | HYDROGRAPH AT | DRAIN | 250. | 4.23 | 23. | 6. | 2. | .12 |
| + | 4 COMBINED AT | DRAIN | 1073. | 4.33 | 142. | 36. | 13. | .65 |
| + | HYDROGRAPH AT | FRM4TH | 0. | .00 | 0. | 0. | 0. | .08 |
| + | ROUTED TO | 4TH4S | 0. | .00 | 0. | 0. | 0. | .08 |
| + | HYDROGRAPH AT | 4TH-S | 247. | 4.37 | 31. | 8. | 3. | .15 |
| + | 2 COMBINED AT | 4TH-S | 247. | 4.37 | 31. | 8. | 3. | .15 |
| + | ROUTED TO | 4TH7TH | 223. | 4.50 | 31. | 8. | 3. | .15 |
| + | HYDROGRAPH AT | FRM6TH | 0. | .00 | 0. | 0. | 0. | .14 |
| + | ROUTED TO | 6TH7TH | 0. | .00 | 0. | 0. | 0. | .14 |
| + | HYDROGRAPH AT | 7TH-S | 231. | 4.30 | 25. | 6. | 2. | .13 |
| + | 3 COMBINED AT | 7TH-S | 417. | 4.37 | 56. | 14. | 5. | .27 |

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

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN  1998               *                    *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1               *                    *         609 SECOND STREET            *
 *                                      *                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   13MAY04  TIME  10:02:49  *                    *          (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  BUCKEYE CAR
        2           ID  100 YEAR, 6 HOUR ALTERNATIVE 5 MODEL - STORM DRAIN ALONG MC85
        3           ID  PROJECT ENGINEERING CONSULTANTS - G. BROWNELL
        4           ID  NO OVERFLOW FROM NORTH OVER BID CANAL
        5           ID  UNIT HYDROGRAPH - S-GRAPH, PHOENIX VALLEY WAS USED FOR ALL BASINS
        6           ID  RAINFALL LOSSES - GREEN AND AMPT
        7           ID  CHANNEL ROUTING - NORMAL DEPTH
        8           ID  FLOW SPLITS ALONG MONROE AND AT CENTRE/9TH WERE ASSUMED TO BE 50% BASED ON FIE
                    *DIAGRAM
        9           IT       2 01JAN04    1200    2000
       10           IO       5
       11           IN      15
       12           JD     3.3    0.01
                    * 6-hour distribution, pattern 1.0
       13           PC     0.0   0.008   0.016   0.025   0.033   0.041    0.05   0.058   0.066   0.074
       14           PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931    0.95
       15           PC   0.962   0.972   0.983   0.991     1.0
       16           JD    3.28     0.5
       17           JD   3.257     1.0
       18           JD   3.168     5.0
       19           JD   3.102    10.0
       20           JD   3.003    20.0
       21           JD   2.937    30.0
       22           JD   2.871    40.0
       23           JD    2.64   100.0
                    *

       24           KK     4TH
       25           KM  SUB BASIN 4TH
       26           KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS BASIN
       27           KM  L = 0.515   Lca = 0.397   S = 29.04   LAG = 23.8
       28           KO       0       0     0.0       1      22
       29           BA   0.082
       30           IN      15 01JAN04       0
       31           LG   0.282   0.264    5.16   0.322  43.403
       32           UI     0.0    11.6    11.6   18.57   40.85   51.24   59.88   67.31   75.93   87.02
       33           UI  102.37  132.16  148.51  122.18  104.93   93.47   81.97   71.15   61.92   54.65
       34           UI   41.21   28.98   20.52   19.36    18.1    11.6    11.6    8.46    3.56    3.56
       35           UI    3.56    3.56    3.56    3.56    3.56    3.56       0
                    *

       36           KK   TO6TH
       37           KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
       38           DT  TO4THS
       39           DI       0     100    1000    2000
       40           DQ       0       0       0       0
                    *

       41           KK  4TH6TH
       42           KM  FLOW ROUTED FROM CP 4TH TO CP 6TH
       43           KO       0       0     0.0       0      22
       44           RS       1    FLOW     0.0     0.0
       45           RC    0.05   0.015    0.05  871.82   0.002     2.0
       46           RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
       47           RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
                    *
1                                                   HEC-1 INPUT                                                    PAGE  2

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

```
 48          KK     6TH
 49          KM  SUB BASIN 6TH
 50          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 51          KM  L = 0.455   Lca = 0.174   S = 26.4   LAG = 16.75
 52          KO       0       0     0.0       1      22
 53          BA  0.0565
 54          LG   0.325   0.152   7.592   0.121   41.38
 55          UI     0.0   11.46   13.41   40.72   55.41   65.81   78.49   96.51  136.05  131.55
 56          UI  103.92   87.68   71.86   59.09   45.64   27.06   19.73   17.32   11.46    9.25
 57          UI    3.51    3.51    3.51    3.51    3.51    3.51
             *

 58          KK     6TH
 59          KM  CP @ 6TH AND MONROE
 60          KO       0       0     0.0       0      22
 61          HC       2
             *

 62          KK   TO8TH
 63          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 64          DT  TO7THS
 65          DI       0     100    1000    2000
 66          DQ       0       0       0       0
             *

 67          KK  6TH8TH
 68          KM  FLOW ROUTED FROM CP 6TH TP CP 8TH
 69          KO       0       0     0.0       0      22
 70          RS       2    FLOW     0.0     0.0
 71          RC    0.05   0.015    0.05 1116.33   0.002     2.0
 72          RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
 73          RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
             *

 74          KK     8TH
 75          KM  SUB BASIN 8TH
 76          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 77          KM  L = 0.603   Lca = 0.309   S = 27.46   LAG = 23.18
 78          KO       0       0     0.0       1      22
 79          BA  0.0792
 80          LG    0.31   0.145   8.765   0.075  32.587
 81          UI     0.0   11.47   11.47   20.23   40.98   52.09   60.43   67.79   77.11    88.3
 82          UI  107.81  140.64   139.2  114.23   99.29   88.36   76.22   66.56   57.31   48.38
 83          UI   35.13   21.85   19.76   18.85   13.33   11.47   10.82    3.52    3.52    3.52
 84          UI    3.52    3.52    3.52    3.52    3.52       0
             *

 85          KK     8TH
 86          KM  CP @ 8TH AND MONROE
 87          KO       0       0     0.0       0      22
 88          HC       2
             *
1                                    HEC-1 INPUT                                          PAGE  3

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

 89          KK   TO9TH
 90          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 91          DT  TOCEN1
 92          DI       0     100    1000    2000
 93          DQ       0       0       0       0
             *

 94          KK  8TH9TH
 95          KM  FLOW ROUTED FROM CP 8TH TO CP 9TH
 96          KO       0       0     0.0       0      22
 97          RS       1    FLOW     0.0     0.0
 98          RC    0.05   0.015    0.05  680.42   0.002     2.0
 99          RX     0.0   100.0   100.0  127.49  127.51   155.0   155.0   255.0
100          RY     2.0     0.5     0.0    0.55    0.55     0.0     0.5     2.0
             *

101          KK    9THE
102          KM  SUB BASIN 9THE
103          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
104          KM  L = 0.773   Lca = 0.388   S = 21.12   LAG = 29.4
105          KO       0       0     0.0       1      22
106          BA   0.096
107          IN      15 01JAN04       0
108          LG   0.385   0.113   8.599   0.087  33.259
109          UI     0.0   10.99   10.99   10.99   26.54   39.67    48.1   55.11   60.81   66.49
110          UI   73.78   82.59   92.67  115.66   137.1  135.48  114.58  101.26   91.72   83.82
111          UI   74.18   66.78   59.71   53.06   46.05   35.25   25.79   19.45   18.66   18.06
112          UI   14.47   10.99   10.99   10.02    3.37    3.37    3.37    3.37    3.37    3.37
113          UI    3.37    3.37    3.37    3.37       0
             *

114          KK    9THW
115          KM  SUB BASIN 9THW
116          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
117          KM  L = 0.541   Lca = 0.317   S = 33.26   LAG = 21.63
118          KO       0       0     0.0       1      22
119          BA  0.0814
120          LG   0.309     0.1    8.39   0.099  35.997
121          UI     0.0   12.61   12.61   27.36   47.66   60.41   69.91   78.72   91.74  107.66
122          UI  142.08  159.87  129.45  110.39   97.49   83.22   71.93   61.57   49.82   33.15
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```
 123          UI    22.3      21   18.27   12.61   12.61     5.5    3.87    3.87    3.87    3.87
 124          UI    3.87    3.87    3.87
              *

 125          KK     9TH
 126          KM  CP @ 9TH AND MONROE
 127          KO       0       0     0.0       0      22
 128          HC       3
              *
1                                          HEC-1 INPUT                                          PAGE  4

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

 129          KK  TO DET
 130          KM  FLOW SPLIT TO SOUTH AT INTERSECTIONS
 131          DT  TOCEN2
 132          DI       0     100    1000    2000
 133          DQ       0       0       0       0
              *

 134          KK  BAYLIS
 135          KM  SUB BASIN BAYLIS
 136          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 137          KM  L = 0.298   Lca = 0.079   S = 43.82   LAG = 9.43
 138          KO       0       0     0.0       1      22
 139          BA   0.016
 140          LG   0.223   0.022     9.7    0.07   4.895
 141          UI     0.0    5.71   20.94   32.52   45.72   67.88   49.77   35.65   23.75   11.13
 142          UI    7.39     3.9    1.75    1.75    1.75
              *

 143          KK     DET
 144          KM  CP @ BAYLISS PROPERTY SOUTH OF MONROE
 145          KO       0       0     0.0       0      22
 146          HC       2
              *
              * KKDETBAS
              * KMPROPOSEDDETENTION BASIN ANALYSI       S
              * RS     1    STOR       0
              * SA   3.2     3.5     3.7       4     4.3     4.6     4.9     5.3     5.7
              * SA   6.3
              * SE    56      57      58      59      60      61      62      63      64
              * SE    66
              * SQ     0       0      34      66     100     140     182     228     274     3
              * SQ   364
              * KO                                     22
              *

 147          KK  DETDRN
 148          KM  FLOW ROUTED FROM CP DET TO CP DRAIN
 149          KO       0       0     0.0       0      22
 150          RS       2    FLOW     0.0     0.0
 151          RC    0.05    0.03    0.05    2657  0.0065       9
 152          RX     0.0      50     100     108     110     118     168     218
 153          RY       9     8.5       8       0       0       8     8.5       9
              *

 154          KK  FRM8TH
 155          KM  RETRIEVE DIVERSION FROM 8TH AND MONROE
 156          DR  TOCEN1
              *
1                                          HEC-1 INPUT                                          PAGE  5

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

 157          KK  8THCEN
 158          KM  FLOW ROUTED FROM CP 8TH TO CP CENTRE
 159          KO       0       0     0.0       0      22
 160          RS       2    FLOW     0.0     0.0
 161          RC    0.05   0.015    0.05    1967   0.007     2.0
 162          RX     0.0   100.0   100.0  111.99     112     124     124     224
 163          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 164          KK  FRM9TH
 165          KM  RETRIEVE DIVERSION FROM 9TH AND MONROE
 166          DR  TOCEN2
              *

 167          KK  9THCEN
 168          KM  FLOW ROUTED FROM CP 9TH TO CP CENTRE
 169          KO       0       0     0.0       0      22
 170          RS       1    FLOW     0.0     0.0
 171          RC    0.05   0.015    0.05    1300   0.008     2.0
 172          RX     0.0   100.0   100.0  111.99     112     124     124     224
 173          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 174          KK  CENTRE
 175          KM  SUB BASIN CENTRE
 176          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 177          KM  L = 0.4   Lca = 0.233   S = 28.51   LAG = 17.57
 178          KO       0       0     0.0       1      22
 179          BA   0.067
 180          IN      15 01JAN04       0
 181          LG   0.248   0.159   6.909   0.151  32.636
```

```
 182          UI     0.0   12.84   12.84   44.18   58.99   71.58    83.5  100.44  134.36  161.66
 183          UI  127.44  106.63   89.62   74.42   61.96   43.78   26.22   21.73   17.94   12.84
 184          UI    9.61    3.94    3.94    3.94    3.94    3.94    3.94
              *

 185          KK  CENTRE
 186          KM  CP @ CENTRE AND 9TH
 187          KO       0       0     0.0       0      22
 188          HC       3
              *

 189          KK  TOBELO
 190          KM  FLOW SPLIT AT CENTRE AND 9TH
 191          DT  TO DRN
 192          DI       0     100    1000    2000
 193          DQ       0      50     500    1000
              *
1                                        HEC-1 INPUT                                                PAGE  6

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

 194          KK  CENBEL
 195          KM  FLOW ROUTED FROM CP CENTRE TO CP BELOAT
 196          KO       0       0     0.0       0      22
 197          RS       2    FLOW     0.0     0.0
 198          RC    0.05   0.015    0.05    2542   0.005     2.0
 199          RX     0.0   100.0   100.0  111.99     112     124     124     224
 200          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
              *

 201          KK  BELOAT
 202          KM  SUB BASIN BELOAT
 203          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 204          KM  L = 0.435   Lca = 0.248   S = 23.23   LAG = 19.38
 205          KO       0       0     0.0       1      22
 206          BA   0.049
 207          IN      15 01JAN04       0
 208          LG    0.25   0.151   9.213   0.065  29.636
 209          UI     0.0    8.52    8.52   23.98   36.06   44.24   50.73   59.81   70.83   95.81
 210          UI   105.9   84.14   71.42   61.52   51.76   43.52   35.65    23.1   15.07   14.07
 211          UI   10.88    8.52    6.51    2.61    2.61    2.61    2.61    2.61    2.61       0
              *

 212          KK  BELOAT
 213          KM  CP @ BELOAT AND 9TH
 214          KO       0       0     0.0       0      22
 215          HC       2
              *

 216          KK  BELDRN
 217          KM  FLOW ROUTED FROM CP BELOAT TO CP DRAIN
 218          KO       0       0     0.0       0      22
 219          RS       1    FLOW     0.0     0.0
 220          RC   0.035   0.015   0.035    1343  0.0011       4
 221          RX     0.0     108     120  131.99     132     144     156     264
 222          RY       8       0       3    3.24    3.24       3       0       8
              *

 223          KK  FRMCEN
 224          KM  RETRIEVE DIVERSION FROM 9TH AND CENTRE
 225          DR  TO DRN
              *

 226          KK  CENDRN
 227          KM  FLOW ROUTED FROM CP CENTRE TO CP DRAIN
 228          KO       0       0     0.0       0      22
 229          RS       2    FLOW     0.0     0.0
 230          RC    0.05    0.05    0.05    1888   0.005       4
 231          RX     0.0     300     600     900    1200    1500    1800    2100
 232          RY       1    0.67    0.33       0       0    0.33    0.67       1
              *
1                                        HEC-1 INPUT                                                PAGE  7

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

 233          KK   DRAIN
 234          KM  SUB BASIN DRAIN
 235          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
 236          KM  L = 0.591   Lca = 0.263   S = 36.96   LAG = 20.38
 237          KO       0       0     0.0       1      22
 238          BA   0.118
 239          IN      15 01JAN04       0
 240          LG   0.447   0.155   9.461   0.074   8.034
 241          UI     0.0   19.49   19.49   48.71   79.05    97.4  112.13  129.01  151.21  194.02
 242          UI  246.49   214.7  178.16  155.74  132.06  113.04   95.79    76.4   49.42   34.48
 243          UI   32.07   25.06   19.49   16.64    5.98    5.98    5.98    5.98    5.98    5.98
 244          UI    5.98
              *

 245          KK   DRAIN
 246          KM  CP @ BELOAT AND APACHE
 247          KO       0       0     0.0       0      22
 248          HC       4
              *

 249          KK  FRM4TH
```

```
250          KM  RETRIEVE DIVERSION FROM 4TH AND MONROE
251          DR  TO4THS
             *

252          KK   4TH4S
253          KM  FLOW ROUTED FROM CP 4TH TO CP 4TH-S
254          KO       0       0     0.0       0      22
255          RS       2    FLOW     0.0     0.0
256          RC    0.05   0.015    0.05    2629   0.015     2.0
257          RX     0.0   100.0   100.0  111.99     112     124     124     224
258          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

259          KK   4TH-S
260          KM  SUB BASIN 4TH-S
261          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
262          KM  L = 0.736   Lca = 0.501   S = 27.98   LAG = 30.14
263          KO       0       0     0.0       1      22
264          BA   0.146
265          IN      15 01JAN04       0
266          LG   0.215   0.166   6.501    0.19  28.927
267          UI     0.0   16.31   16.31   16.31   36.23   57.87   69.72   79.81   89.23   96.83
268          UI   106.6   119.5   131.4  157.55   193.7   212.3  180.09  157.22   141.7  129.83
269          UI  116.79  104.11   94.74   83.02   76.45   62.43   46.89   31.73   28.86   27.04
270          UI    26.8    18.7   16.31   16.31   12.85       5       5       5       5       5
271          UI       5       5       5       5       5       0
             *
1                                          HEC-1 INPUT                                          PAGE  8

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

272          KK   4TH-S
273          KM  CP @ 4TH AND BELOAT
274          KO       0       0     0.0       0      22
275          HC       2
             *

276          KK  4TH7TH
277          KM  FLOW ROUTED FROM CP 4TH-S TO CP 7TH-S
278          KO       0       0     0.0       0      22
279          RS       1    FLOW     0.0     0.0
280          RC    0.05   0.015    0.05    1339  0.0028     2.0
281          RX     0.0   100.0   100.0  111.99     112     124     124     224
282          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

283          KK  FRM6TH
284          KM  RETRIEVE DIVERSION FROM 7TH AND MONROE
285          DR  TO7THS
             *

286          KK  6TH7TH
287          KM  FLOW ROUTED FROM CP 6TH TO CP 7TH-S
288          KO       0       0     0.0       0      22
289          RS       2    FLOW     0.0     0.0
290          RC    0.05   0.015    0.05    3061  0.0059     2.0
291          RX     0.0   100.0   100.0  111.99     112     124     124     224
292          RY     2.0     0.5     0.0    0.24    0.24     0.0     0.5     2.0
             *

293          KK   7TH-S
294          KM  SUB BASIN 7TH-S
295          KM  THE FOLLOWING PARAMETERS WERE CALCULATED FOR THIS SUB BASIN
296          KM  L = 0.657   Lca = 0.333   S = 33.26   LAG = 23.78
297          KO       0       0     0.0       1      22
298          BA   0.128
299          LG   0.243    0.26   5.219   0.296  29.957
300          UI     0.0   18.13   18.13   29.13   63.86   80.16   93.64  105.25  118.75  136.12
301          UI  160.31  207.03  231.77  190.48   163.7  145.83  127.72  110.99   96.48   85.04
302          UI   64.05   44.86   32.07    30.2   28.01   18.13   18.13   12.88    5.56    5.56
303          UI    5.56    5.56    5.56    5.56    5.56    5.56
             *

304          KK   7TH-S
305          KM  CP @ 7TH AND BELOAT
306          KO       0       0     0.0       0      22
307          HC       3
             *
308          ZZ
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   24        4TH
               .
               .
   38          .-------->  TO4THS
   36      TO6TH
               V
               V
   41      4TH6TH
               .
               .
   48          .         6TH
```

```
                .          .
                .          .
 58          6TH............
                .
                .
 64             .-------> TO7THS
 62        TO8TH
               V
               V
 67       6TH8TH
                .
                .
 74             .         8TH
                .          .
                .          .
 85          8TH............
                .
                .
 91             .-------> TOCEN1
 89        TO9TH
               V
               V
 94       8TH9TH
                .
                .
101             .        9THE
                .          .
                .          .
114             .          .        9THW
                .          .          .
                .          .          .
125          9TH........................
                .
                .
131             .-------> TOCEN2
129       TO DET
                .
                .
134             .      BAYLIS
                .          .
                .          .
143          DET............
               V
               V
147       DETDRN
                .
                .
156             .          .<-------  TOCEN1
154             .      FRM8TH
                .          V
                .          V
157             .      8THCEN
                .          .
                .          .
166             .          .          .<-------  TOCEN2
164             .          .      FRM9TH
                .          .          V
                .          .          V
167             .          .      9THCEN
                .          .          .
                .          .          .
174             .          .          .      CENTRE
                .          .          .          .
                .          .          .          .
185             .      CENTRE........................
                .          .
                .          .
191             .          .-------> TO DRN
189             .      TOBELO
                .          V
                .          V
194             .      CENBEL
                .          .
                .          .
201             .          .      BELOAT
                .          .          .
                .          .          .
212             .      BELOAT............
                .          V
                .          V
216             .      BELDRN
                .          .
                .          .
225             .          .          .<-------  TO DRN
223             .          .      FRMCEN
                .          .          V
                .          .          V
226             .          .      CENDRN
                .          .          .
                .          .          .
233             .          .          .       DRAIN
                .          .          .           .
                .          .          .           .
245        DRAIN....................................
                .
                .
251             .          .<-------  TO4THS
249             .      FRM4TH
```

```
                .          V
                .          V
  252           .       4TH4S
                .          .
                .          .
  259           .          .       4TH-S
                .          .          .
                .          .          .
  272           .       4TH-S............
                .          V
                .          V
  276           .      4TH7TH
                .          .
                .          .
  285           .          .          .<-------  TO7THS
  283           .          .      FRM6TH
                .          .          V
                .          .          V
  286           .          .      6TH7TH
                .          .          .
                .          .          .
  293           .          .          .       7TH-S
                .          .          .          .
                .          .          .          .
  304           .       7TH-S........................
```

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

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 | 4TH | 178. | 4.27 | 20. | 5. | 2. | .08 | | |
| + | DIVERSION TO | TO4THS | 0. | .00 | 0. | 0. | 0. | .08 | | |
| + | HYDROGRAPH AT | TO6TH | 178. | 4.27 | 20. | 5. | 2. | .08 | | |
| + | ROUTED TO | 4TH6TH | 169. | 4.37 | 20. | 5. | 2. | .08 | | |
| + | HYDROGRAPH AT | 6TH | 159. | 4.17 | 16. | 4. | 1. | .06 | | |
| + | 2 COMBINED AT | 6TH | 300. | 4.23 | 36. | 9. | 3. | .14 | | |
| + | DIVERSION TO | TO7THS | 0. | .00 | 0. | 0. | 0. | .14 | | |
| + | HYDROGRAPH AT | TO8TH | 300. | 4.23 | 36. | 9. | 3. | .14 | | |
| + | ROUTED TO | 6TH8TH | 286. | 4.33 | 36. | 9. | 3. | .14 | | |
| + | HYDROGRAPH AT | 8TH | 189. | 4.27 | 22. | 5. | 2. | .08 | | |
| + | 2 COMBINED AT | 8TH | 470. | 4.30 | 57. | 14. | 5. | .22 | | |
| + | DIVERSION TO | TOCEN1 | 0. | .00 | 0. | 0. | 0. | .22 | | |
| + | HYDROGRAPH AT | TO9TH | 470. | 4.30 | 57. | 14. | 5. | .22 | | |
| + | ROUTED TO | 8TH9TH | 457. | 4.37 | 57. | 14. | 5. | .22 | | |
| + | HYDROGRAPH AT | 9THE | 201. | 4.37 | 26. | 6. | 2. | .10 | | |
| + | HYDROGRAPH AT | 9THW | 201. | 4.23 | 22. | 6. | 2. | .08 | | |
| + | 3 COMBINED AT | 9TH | 839. | 4.33 | 105. | 26. | 10. | .40 | | |
| + | DIVERSION TO | TOCEN2 | 0. | .00 | 0. | 0. | 0. | .40 | | |
| + | HYDROGRAPH AT | TO DET | 839. | 4.33 | 105. | 26. | 10. | .40 | | |
| + | HYDROGRAPH AT | BAYLIS | 57. | 4.07 | 4. | 1. | 0. | .02 | | |
| + | 2 COMBINED AT | DET | 851. | 4.33 | 110. | 28. | 10. | .41 | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| + | ROUTED TO | DETDRN | 797. | 4.43 | 110. | 28. | 10. | .41 |
| + | HYDROGRAPH AT | FRM8TH | 0. | .00 | 0. | 0. | 0. | .22 |
| + | ROUTED TO | 8THCEN | 0. | .00 | 0. | 0. | 0. | .22 |
| + | HYDROGRAPH AT | FRM9TH | 0. | .00 | 0. | 0. | 0. | .40 |
| + | ROUTED TO | 9THCEN | 0. | .00 | 0. | 0. | 0. | .40 |
| + | HYDROGRAPH AT | CENTRE | 180. | 4.17 | 18. | 4. | 2. | .07 |
| + | 3 COMBINED AT | CENTRE | 180. | 4.17 | 18. | 4. | 2. | .07 |
| + | DIVERSION TO | TO DRN | 90. | 4.17 | 9. | 2. | 1. | .07 |
| + | HYDROGRAPH AT | TOBELO | 90. | 4.17 | 9. | 2. | 1. | .07 |
| + | ROUTED TO | CENBEL | 79. | 4.33 | 9. | 2. | 1. | .07 |
| + | HYDROGRAPH AT | BELOAT | 129. | 4.20 | 13. | 3. | 1. | .05 |
| + | 2 COMBINED AT | BELOAT | 201. | 4.27 | 22. | 6. | 2. | .12 |
| + | ROUTED TO | BELDRN | 163. | 4.37 | 22. | 6. | 2. | .12 |
| + | HYDROGRAPH AT | FRMCEN | 90. | 4.17 | 9. | 2. | 1. | .07 |
| + | ROUTED TO | CENDRN | 35. | 4.70 | 9. | 2. | 1. | .07 |
| + | HYDROGRAPH AT | DRAIN | 291. | 4.23 | 27. | 7. | 2. | .12 |
| + | 4 COMBINED AT | DRAIN | 1193. | 4.33 | 167. | 42. | 15. | .65 |
| + | HYDROGRAPH AT | FRM4TH | 0. | .00 | 0. | 0. | 0. | .08 |
| + | ROUTED TO | 4TH4S | 0. | .00 | 0. | 0. | 0. | .08 |
| + | HYDROGRAPH AT | 4TH-S | 288. | 4.37 | 37. | 9. | 3. | .15 |
| + | 2 COMBINED AT | 4TH-S | 288. | 4.37 | 37. | 9. | 3. | .15 |
| + | ROUTED TO | 4TH7TH | 261. | 4.50 | 36. | 9. | 3. | .15 |
| + | HYDROGRAPH AT | FRM6TH | 0. | .00 | 0. | 0. | 0. | .14 |
| + | ROUTED TO | 6TH7TH | 0. | .00 | 0. | 0. | 0. | .14 |
| + | HYDROGRAPH AT | 7TH-S | 272. | 4.27 | 29. | 7. | 3. | .13 |
| + | 3 COMBINED AT | 7TH-S | 490. | 4.37 | 66. | 17. | 6. | .27 |

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

# Model Input Parameters

| Land ID | Land Name | IA (in) | RTIMP (%) | % Vegetation | Moisture Condition |
|---|---|---|---|---|---|
| 0 | Industrial 1 | 0.15 | 55 | 60 | Normal |
| 1 | Canal | 10.00 | 0 | 0 | Dry |
| 2 | School | 0.25 | 30 | 80 | Normal |
| 3 | Medium Density Reidential | 0.25 | 30 | 50 | Normal |
| 4 | Commercial 2 | 0.10 | 80 | 75 | Normal |
| 5 | Industrial 2 | 0.20 | 30 | 20 | Dry |
| 6 | School 2 | 0.10 | 80 | 75 | Normal |
| 7 | Active Open Space | 0.20 | 5 | 80 | Saturated |
| 8 | Institutional | 0.20 | 25 | 60 | Normal |
| 9 | Agricultural | 0.50 | 0 | 85 | Normal |
| 10 | Multi Family Residential | 0.25 | 45 | 50 | Normal |
| 11 | Vacant | 0.25 | 0 | 0 | Dry |
| 12 | Very Low Density Residential | 0.30 | 5 | 30 | Dry |
| 13 | Undeveloped Desert | 0.35 | 0 | 80 | Dry |

```
Input Coverage Name -> General
Input Coverage Attribute -> Basin Name

Overlay Coverage Name -> Land Use
Overlay Coverage Attribute -> Land Use

Overlay Areas and Percentages

Basin 4TH - Land Use 0 - 0.00 sq mi. - 0.40%
Basin 4TH - Land Use 1 - 0.00 sq mi. - 0.81%
Basin 4TH - Land Use 2 - 0.01 sq mi. - 7.01%
Basin 4TH - Land Use 3 - 0.04 sq mi. - 53.77%
Basin 4TH - Land Use 4 - 0.02 sq mi. - 27.09%
Basin 4TH - Land Use 5 - 0.01 sq mi. - 10.92%
Basin 4TH-S - Land Use 0 - 0.00 sq mi. - 0.62%
Basin 4TH-S - Land Use 10 - 0.01 sq mi. - 5.11%
Basin 4TH-S - Land Use 3 - 0.06 sq mi. - 45.00%
Basin 4TH-S - Land Use 4 - 0.01 sq mi. - 9.76%
Basin 4TH-S - Land Use 5 - 0.02 sq mi. - 12.01%
Basin 4TH-S - Land Use 7 - 0.04 sq mi. - 27.50%
Basin 6TH - Land Use 1 - 0.00 sq mi. - 1.13%
Basin 6TH - Land Use 3 - 0.04 sq mi. - 75.43%
Basin 6TH - Land Use 4 - 0.01 sq mi. - 23.44%
Basin 7TH-S - Land Use 11 - 0.01 sq mi. - 8.25%
Basin 7TH-S - Land Use 3 - 0.11 sq mi. - 86.89%
Basin 7TH-S - Land Use 4 - 0.01 sq mi. - 4.86%
Basin 8TH - Land Use 1 - 0.00 sq mi. - 0.73%
Basin 8TH - Land Use 10 - 0.00 sq mi. - 5.10%
Basin 8TH - Land Use 3 - 0.06 sq mi. - 83.97%
Basin 8TH - Land Use 4 - 0.00 sq mi. - 6.12%
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Basin 8TH - Land Use 7 - 0.00 sq mi. - 4.08%
Basin 9THE - Land Use 0 - 0.00 sq mi. - 4.77%
Basin 9THE - Land Use 1 - 0.00 sq mi. - 1.88%
Basin 9THE - Land Use 10 - 0.02 sq mi. - 17.63%
Basin 9THE - Land Use 11 - 0.01 sq mi. - 5.65%
Basin 9THE - Land Use 3 - 0.02 sq mi. - 19.96%
Basin 9THE - Land Use 4 - 0.02 sq mi. - 18.85%
Basin 9THE - Land Use 6 - 0.00 sq mi. - 0.11%
Basin 9THE - Land Use 7 - 0.03 sq mi. - 31.04%
Basin 9THE - Land Use 9 - 0.00 sq mi. - 0.11%
Basin 9THW - Land Use 1 - 0.00 sq mi. - 1.25%
Basin 9THW - Land Use 3 - 0.03 sq mi. - 34.49%
Basin 9THW - Land Use 4 - 0.00 sq mi. - 0.69%
Basin 9THW - Land Use 6 - 0.02 sq mi. - 29.22%
Basin 9THW - Land Use 7 - 0.03 sq mi. - 34.35%
Basin BAYLIS - Land Use 11 - 0.00 sq mi. - 3.50%
Basin BAYLIS - Land Use 7 - 0.01 sq mi. - 87.41%
Basin BAYLIS - Land Use 8 - 0.00 sq mi. - 2.10%
Basin BAYLIS - Land Use 9 - 0.00 sq mi. - 6.99%
Basin BELOAT - Land Use 11 - 0.00 sq mi. - 1.21%
Basin BELOAT - Land Use 3 - 0.04 sq mi. - 98.79%
Basin CENTRE - Land Use 10 - 0.01 sq mi. - 13.18%
Basin CENTRE - Land Use 3 - 0.05 sq mi. - 85.50%
Basin CENTRE - Land Use 4 - 0.00 sq mi. - 1.32%
Basin DRAIN - Land Use 10 - 0.02 sq mi. - 15.27%
Basin DRAIN - Land Use 12 - 0.01 sq mi. - 4.96%
Basin DRAIN - Land Use 4 - 0.00 sq mi. - 1.15%
Basin DRAIN - Land Use 9 - 0.09 sq mi. - 78.63%
```

| Soil ID | Soil Name | XKSAT | RTIMP |
|---|---|---|---|
| 0 | "Ao" | 0.04 | 0 |
| 1 | "Ld" | 0.25 | 0 |
| 2 | "Gga" | 0.25 | 0 |
| 3 | "Lca" | 0.25 | 0 |
| 5 | "Aba" | 0.38 | 0 |
| 6 | "Le" | 0.04 | 0 |
| 7 | "Cn" | 0.01 | 0 |
| 8 | "Gs" | 0.23 | 0 |
| 9 | "Gh" | 0.24 | 0 |
| 10 | "An" | 0.05 | 0 |
| 11 | "Aa" | 0.26 | 0 |
| 12 | "Ap" | 0.04 | 0 |

```
Input Coverage Name -> General
Input Coverage Attribute -> Basin Name

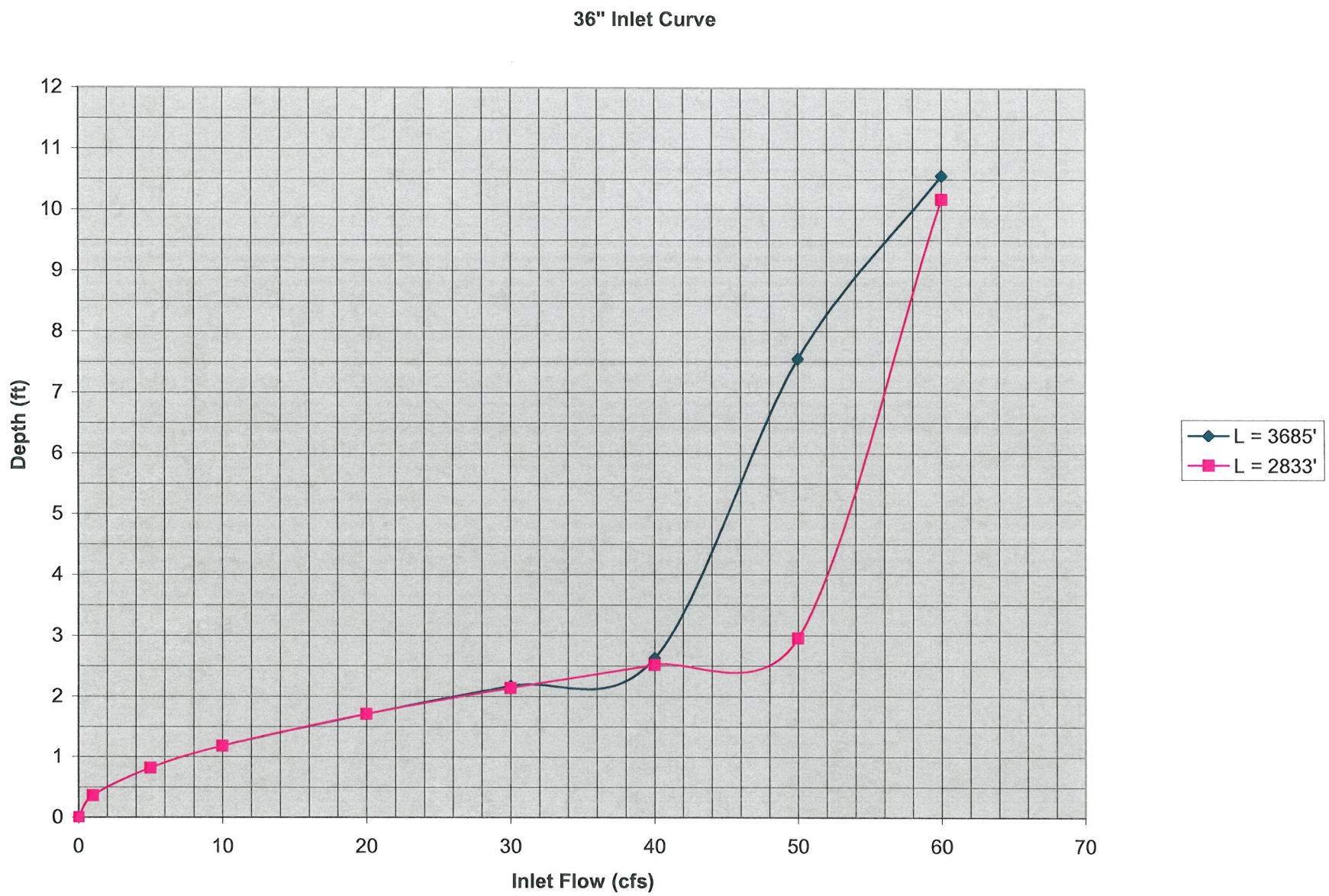
Overlay Coverage Name -> Soils
Overlay Coverage Attribute -> SCS Soil
```

Overlay Areas and Percentages

Basin 4TH - SCS Soil 0 - 0.01 sq mi. - 8.49%
Basin 4TH - SCS Soil 1 - 0.00 sq mi. - 0.13%
Basin 4TH - SCS Soil 2 - 0.07 sq mi. - 85.98%
Basin 4TH - SCS Soil 3 - 0.00 sq mi. - 5.39%
Basin 4TH-S - SCS Soil 0 - 0.04 sq mi. - 27.11%
Basin 4TH-S - SCS Soil 1 - 0.02 sq mi. - 18.13%
Basin 4TH-S - SCS Soil 10 - 0.01 sq mi. - 10.53%
Basin 4TH-S - SCS Soil 11 - 0.00 sq mi. - 0.39%
Basin 4TH-S - SCS Soil 12 - 0.00 sq mi. - 1.47%
Basin 4TH-S - SCS Soil 2 - 0.06 sq mi. - 41.13%
Basin 4TH-S - SCS Soil 9 - 0.00 sq mi. - 1.24%
Basin 6TH - SCS Soil 0 - 0.03 sq mi. - 58.41%
Basin 6TH - SCS Soil 2 - 0.00 sq mi. - 8.70%
Basin 6TH - SCS Soil 3 - 0.02 sq mi. - 29.30%
Basin 6TH - SCS Soil 6 - 0.00 sq mi. - 3.59%
Basin 7TH-S - SCS Soil 0 - 0.01 sq mi. - 8.94%
Basin 7TH-S - SCS Soil 1 - 0.01 sq mi. - 4.69%
Basin 7TH-S - SCS Soil 10 - 0.00 sq mi. - 0.26%
Basin 7TH-S - SCS Soil 11 - 0.02 sq mi. - 13.11%
Basin 7TH-S - SCS Soil 12 - 0.00 sq mi. - 0.35%
Basin 7TH-S - SCS Soil 2 - 0.05 sq mi. - 37.67%
Basin 7TH-S - SCS Soil 9 - 0.04 sq mi. - 34.98%
Basin 8TH - SCS Soil 0 - 0.02 sq mi. - 25.22%
Basin 8TH - SCS Soil 2 - 0.01 sq mi. - 7.00%
Basin 8TH - SCS Soil 3 - 0.00 sq mi. - 6.12%
Basin 8TH - SCS Soil 6 - 0.04 sq mi. - 61.66%
Basin 9THE - SCS Soil 0 - 0.07 sq mi. - 71.40%
Basin 9THE - SCS Soil 2 - 0.02 sq mi. - 17.41%
Basin 9THE - SCS Soil 6 - 0.01 sq mi. - 11.20%
Basin 9THW - SCS Soil 0 - 0.04 sq mi. - 57.06%
Basin 9THW - SCS Soil 2 - 0.01 sq mi. - 13.30%
Basin 9THW - SCS Soil 3 - 0.00 sq mi. - 4.29%
Basin 9THW - SCS Soil 5 - 0.00 sq mi. - 3.88%
Basin 9THW - SCS Soil 6 - 0.02 sq mi. - 21.47%
Basin BAYLIS - SCS Soil 0 - 0.02 sq mi. - 100.00%
Basin BELOAT - SCS Soil 0 - 0.04 sq mi. - 93.20%
Basin BELOAT - SCS Soil 11 - 0.00 sq mi. - 6.31%
Basin BELOAT - SCS Soil 9 - 0.00 sq mi. - 0.49%
Basin CENTRE - SCS Soil 0 - 0.03 sq mi. - 39.87%
Basin CENTRE - SCS Soil 11 - 0.00 sq mi. - 4.94%
Basin CENTRE - SCS Soil 2 - 0.03 sq mi. - 50.74%
Basin CENTRE - SCS Soil 7 - 0.00 sq mi. - 4.45%
Basin DRAIN - SCS Soil 0 - 0.09 sq mi. - 85.88%
Basin DRAIN - SCS Soil 2 - 0.01 sq mi. - 6.39%
Basin DRAIN - SCS Soil 7 - 0.01 sq mi. - 6.01%
Basin DRAIN - SCS Soil 8 - 0.00 sq mi. - 0.86%
Basin DRAIN - SCS Soil 9 - 0.00 sq mi. - 0.86%

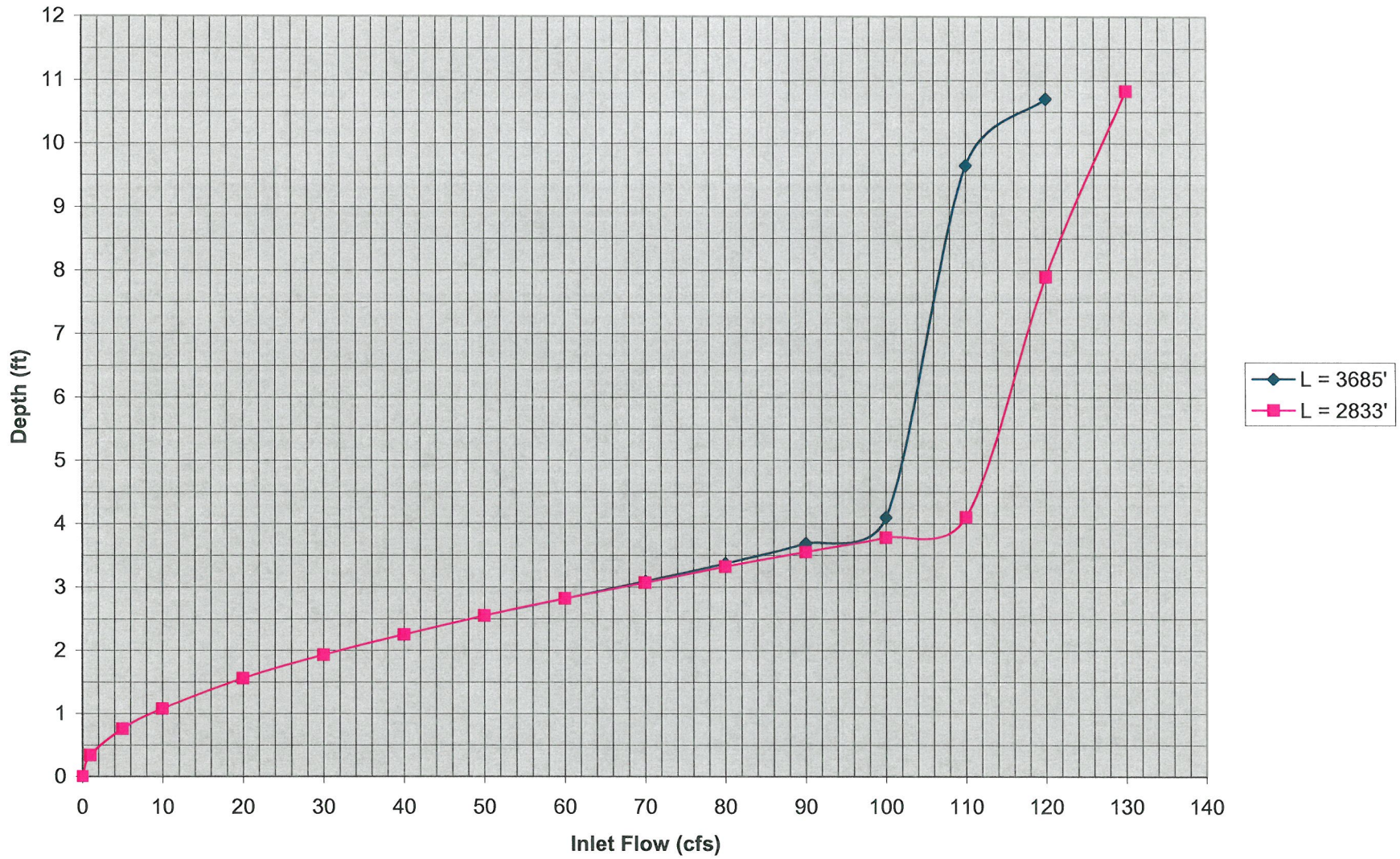
# APPENDIX D

**Hydraulic Calculations**




S:\2002 Projects\2013.03 Buckeye Basin\Hydraulics\Inlet Curves.xls Note: ke=0.5, slope=0.00565, tailwater calculated using normal depth. 5/5/2004

## 48" Inlet Curves




S:\2002 Projects\2013.03 Buckeye Basin\Hydraulics\Inlet Curves.xls Note: ke=0.50, slope=0.00565, tailwater calculated using normal depth. 5/5/2004

PROJECT ENGINEERING
CONSULTANTS, LTD.
2310 W. Mission Lane, Suite 4
Phoenix, AZ 85021

| | |
|---|---|
| Sht.: | Unit Cost Sheet |
| Job No.: | 2013.03 |
| By: | Project Engineering |
| Date: | 5/5/2004 |
| Chkd.: | LSM |
| Rev.: | MDH |

Comments: Park detention volume calculations

| Elevation | Area ($ft^2$) | Depth | Volume ($ft^3$) | Cumulative Volume ($ft^3$) | Cumulative Volume (ac-ft) |
|---|---|---|---|---|---|
| 863 | 86716 | | | | |
| | | 1 | 90639 | 90639 | 2.08 |
| 864 | 94562 | | | | |
| | | 1 | 98541 | 189179 | 4.34 |
| 865 | 102520 | | | | |
| | | 1 | 106555 | 295735 | 6.79 |
| 866 | 110591 | | | | |
| | | 1 | 114682 | 410417 | 9.42 |
| 867 | 118773 | | | | |
| | | 1 | 122921 | 533338 | 12.24 |
| 868 | 127068 | | | | |
| | | | **Total Volume** | **533338** | **12.24** |

Design Criteria: 4:1 side slopes, 3' ponding depth, 2' surcharge for large storm events

# Worksheet
## Worksheet for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | 7TH-S |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Discharge |

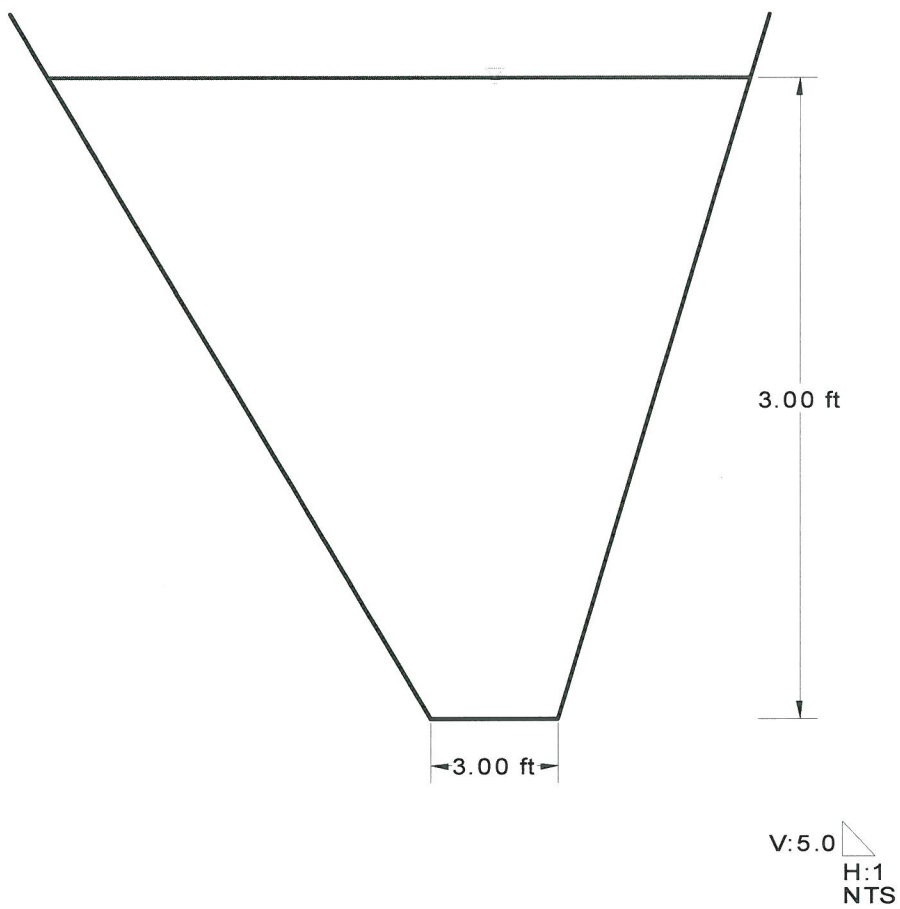
| Input Data | | |
|---|---|---|
| Mannings Coefficient | 0.030 | |
| Channel Slope | 0.006000 | ft/ft |
| Depth | 3.00 | ft |
| Left Side Slope | 3.00 | H : V |
| Right Side Slope | 1.50 | H : V |
| Bottom Width | 3.00 | ft |

| Results | | |
|---|---|---|
| Discharge | 155.72 | cfs |
| Flow Area | 29.3 | ft² |
| Wetted Perimeter | 17.90 | ft |
| Top Width | 16.50 | ft |
| Critical Depth | 2.54 | ft |
| Critical Slope | 0.012627 | ft/ft |
| Velocity | 5.32 | ft/s |
| Velocity Head | 0.44 | ft |
| Specific Energy | 3.44 | ft |
| Froude Number | 0.70 | |
| Flow Type | Subcritical | |

# Surface Drain Capacity @ CP 7TH-S
## Cross Section for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | 7TH-S |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Discharge |

| Section Data | | |
|---|---|---|
| Mannings Coefficient | 0.030 | |
| Channel Slope | 0.006000 | ft/ft |
| Depth | 3.00 | ft |
| Left Side Slope | 3.00 | H : V |
| Right Side Slope | 1.50 | H : V |
| Bottom Width | 3.00 | ft |
| Discharge | 155.72 | cfs |



# Worksheet
## Worksheet for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | DRAIN |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Discharge |

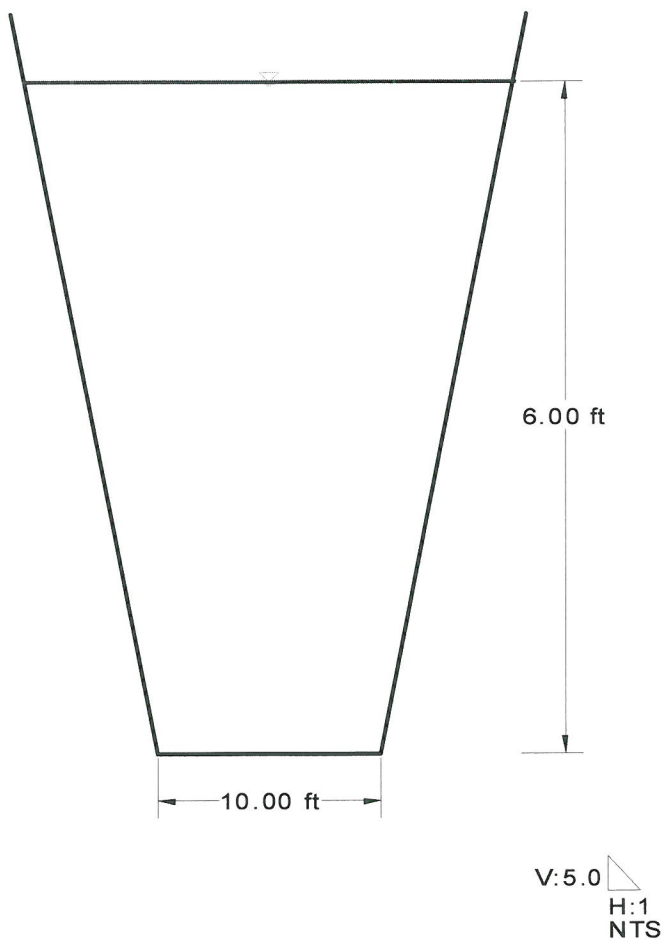
| Input Data | | |
|---|---|---|
| Mannings Coefficient | 0.030 | |
| Channel Slope | 0.000740 | ft/ft |
| Depth | 6.00 | ft |
| Left Side Slope | 1.00 | H : V |
| Right Side Slope | 1.00 | H : V |
| Bottom Width | 10.00 | ft |

| Results | | |
|---|---|---|
| Discharge | 301.54 | cfs |
| Flow Area | 96.0 | ft² |
| Wetted Perimeter | 26.97 | ft |
| Top Width | 22.00 | ft |
| Critical Depth | 2.76 | ft |
| Critical Slope | 0.011987 | ft/ft |
| Velocity | 3.14 | ft/s |
| Velocity Head | 0.15 | ft |
| Specific Energy | 6.15 | ft |
| Froude Number | 0.27 | |
| Flow Type | Subcritical | |

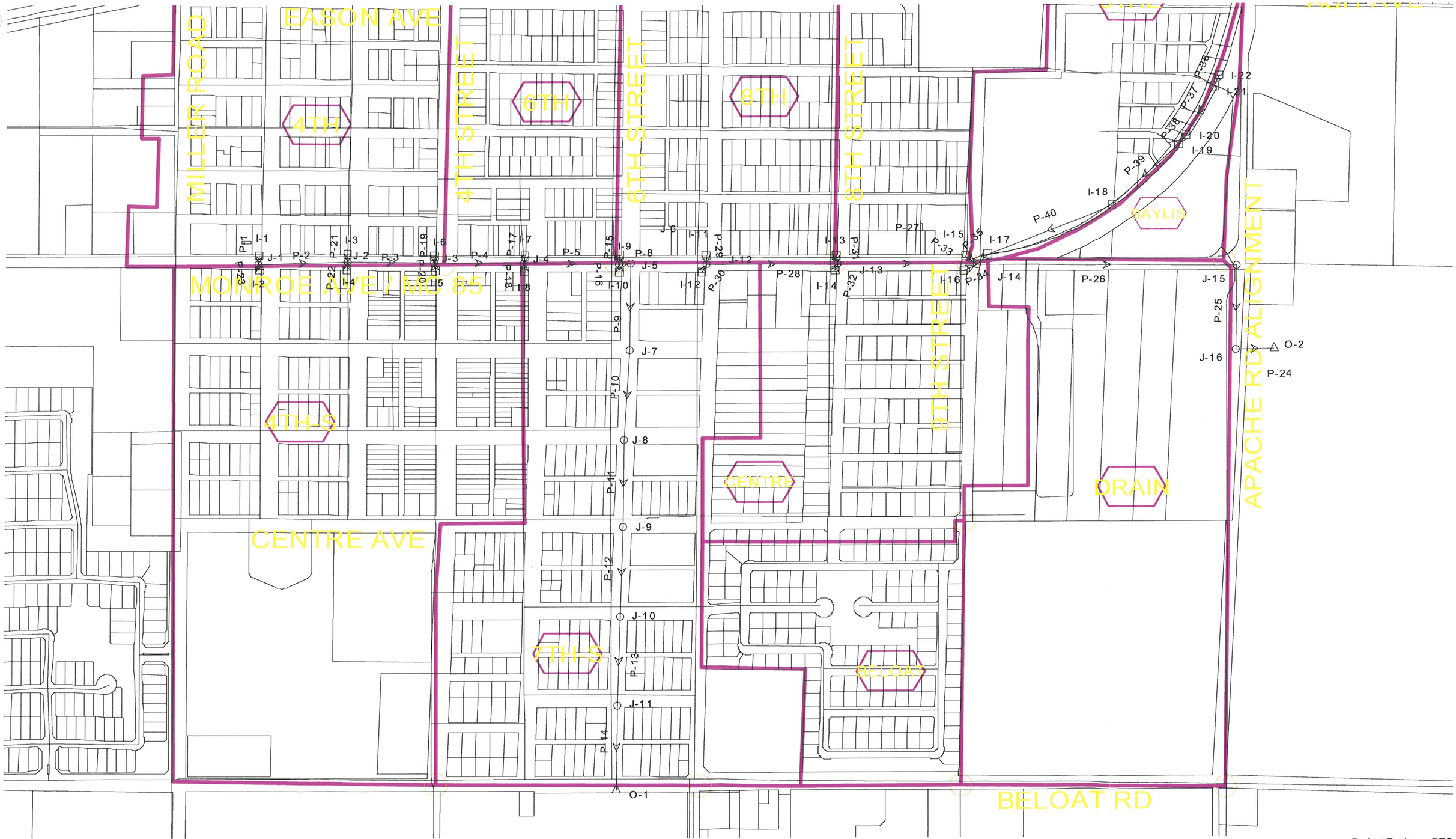
# Surface Drain capacity @ CP DRAIN
## Cross Section for Trapezoidal Channel

| Project Description | |
|---|---|
| Worksheet | DRAIN |
| Flow Element | Trapezoidal Channel |
| Method | Manning's Formula |
| Solve For | Discharge |

| Section Data | | |
|---|---|---|
| Mannings Coefficient | 0.030 | |
| Channel Slope | 0.000740 | ft/ft |
| Depth | 6.00 | ft |
| Left Side Slope | 1.00 | H : V |
| Right Side Slope | 1.00 | H : V |
| Bottom Width | 10.00 | ft |
| Discharge | 301.54 | cfs |



## Scenario: Alternative 4




Title: Buckeye CAR
s:\...\data\hydraulics\monroe.stm
06/04/04 11:10:00 AM

Project Engineering Consultants Ltd
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: PEC
StormCAD v5.5 [5.5003]
Page 1 of 1

## Scenario: Alternative 4

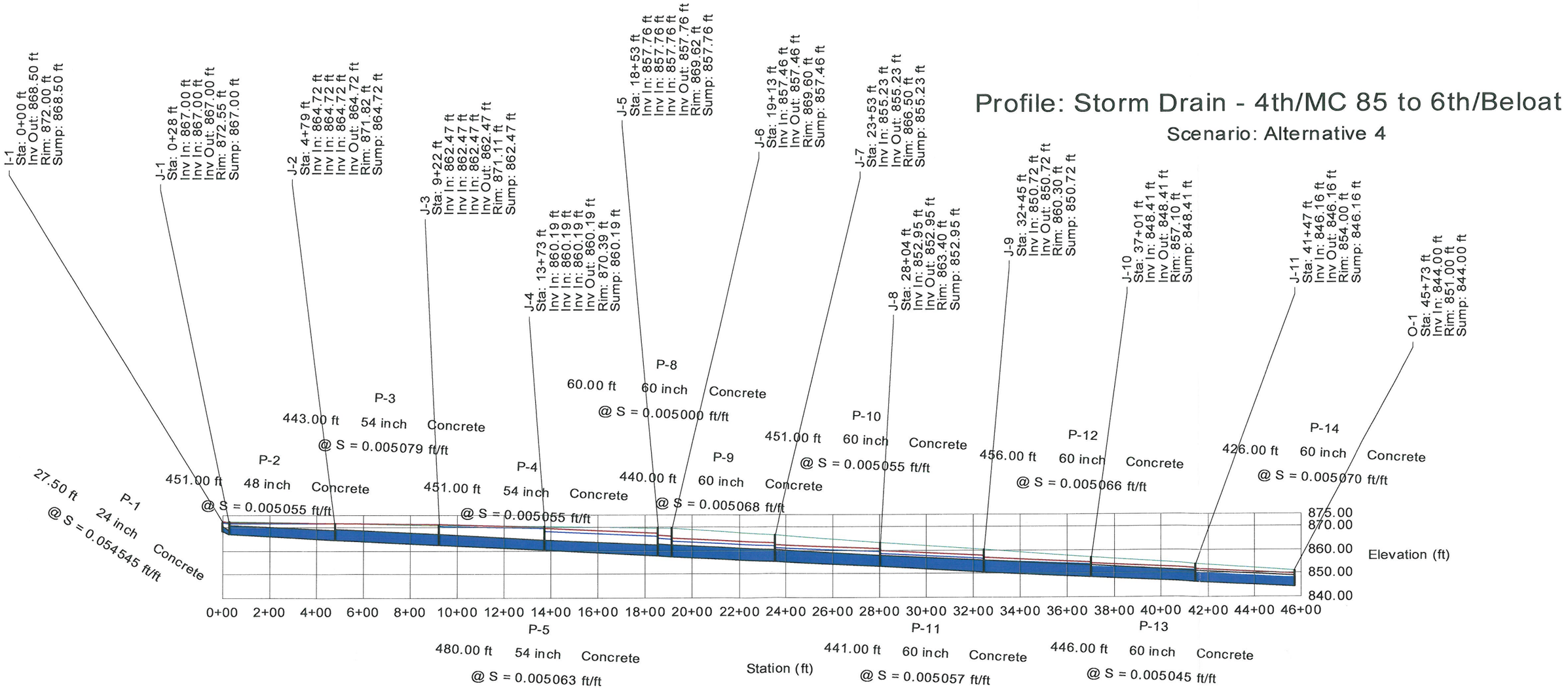
## Storm Drain-Along MC 85 and 6th

| Label | Element Type | Ground Elevation (ft) | Sump Elevation (ft) | Section Size | Length (ft) | Structure Diameter (ft) | Upstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Invert Elevation (ft) | Downstream Ground Elevation (ft) | Constructed Slope (ft/ft) | Minimum Cover (ft) | Upstream Node | Downstream Node | Hydraulic Grade Line In (ft) | Hydraulic Grade Line Out (ft) | Energy Grade Line In (ft) | Energy Grade Line Out (ft) | Headloss Coefficient | Headloss Method | Total Flow (cfs) | Average Velocity (ft/s) | Tailwater Elevation (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| O-1 | Outlet | 851.00 | 844.00 | | | | | | | | | | | | 844.00 | 844.00 | 844.00 | 844.00 | | | 171.98 | | |
| J-11 | Junction | 854.00 | 846.16 | | | 4.00 | | | | | | | | | 851.22 | 849.97 | 853.00 | 851.75 | 0.70 | Standard | 171.98 | | |
| J-10 | Junction | 857.10 | 848.41 | | | 4.00 | | | | | | | | | 853.80 | 852.86 | 855.15 | 854.21 | 0.70 | Standard | 171.98 | | |
| J-9 | Junction | 860.30 | 850.72 | | | 4.00 | | | | | | | | | 856.63 | 855.79 | 857.82 | 856.98 | 0.70 | Standard | 171.98 | | |
| J-8 | Junction | 863.40 | 852.95 | | | 4.00 | | | | | | | | | 859.38 | 858.55 | 860.58 | 859.74 | 0.70 | Standard | 171.98 | | |
| J-7 | Junction | 866.50 | 855.23 | | | 4.00 | | | | | | | | | 862.18 | 861.35 | 863.38 | 862.54 | 0.70 | Standard | 171.98 | | |
| J-6 | Junction | 869.60 | 857.46 | | | 4.00 | | | | | | | | | 865.06 | 864.10 | 866.25 | 865.30 | 0.80 | Standard | 171.98 | | |
| J-5 | Junction | 869.62 | 857.76 | | | 4.00 | | | | | | | | | 866.27 | 865.32 | 867.46 | 866.51 | 0.80 | Standard | 171.98 | | |
| J-4 | Junction | 870.39 | 860.19 | | | 4.00 | | | | | | | | | 869.50 | 868.58 | 870.64 | 869.73 | 0.80 | Standard | 136.48 | | |
| J-3 | Junction | 871.11 | 862.47 | | | 4.00 | | | | | | | | | 871.19 | 870.69 | 871.82 | 871.32 | 0.80 | Standard | 100.98 | | |
| J-2 | Junction | 871.82 | 864.72 | | | 4.00 | | | | | | | | | 871.71 | 871.71 | 871.99 | 871.99 | | Absolute | 67.32 | | |
| J-1 | Junction | 872.55 | 867.00 | | | 4.00 | | | | | | | | | 871.96 | 871.96 | 872.07 | 872.07 | | Absolute | 33.66 | | |
| I-1 | Inlet | 872.00 | 868.50 | | | | | | | | | | | | 872.36 | 872.00 | 872.80 | 872.45 | 0.80 | Standard | 16.83 | | |
| I-9 | Inlet | 869.07 | 865.57 | | | | | | | | | | | | 867.69 | 867.09 | 868.43 | 867.84 | 0.80 | Standard | 17.75 | | |
| I-10 | Inlet | 869.07 | 865.57 | | | | | | | | | | | | 867.69 | 867.09 | 868.43 | 867.84 | 0.80 | Standard | 17.75 | | |
| I-7 | Inlet | 869.84 | 866.34 | | | | | | | | | | | | 870.07 | 869.67 | 870.56 | 870.17 | 0.80 | Standard | 17.75 | | |
| I-8 | Inlet | 869.84 | 866.34 | | | | | | | | | | | | 870.07 | 869.67 | 870.56 | 870.17 | 0.80 | Standard | 17.75 | | |
| I-6 | Inlet | 871.66 | 868.16 | | | | | | | | | | | | 871.70 | 871.34 | 872.15 | 871.79 | 0.80 | Standard | 16.83 | | |
| I-5 | Inlet | 871.66 | 868.16 | | | | | | | | | | | | 871.70 | 871.34 | 872.15 | 871.79 | 0.80 | Standard | 16.83 | | |
| I-3 | Inlet | 871.27 | 867.78 | | | | | | | | | | | | 871.63 | 871.27 | 872.07 | 871.72 | 0.80 | Standard | 16.83 | | |
| I-4 | Inlet | 871.28 | 867.78 | | | | | | | | | | | | 871.64 | 871.28 | 872.08 | 871.73 | 0.80 | Standard | 16.83 | | |
| I-2 | Inlet | 872.00 | 868.50 | | | | | | | | | | | | 872.36 | 872.00 | 872.80 | 872.45 | 0.80 | Standard | 16.83 | | |
| I-16 | Inlet | 866.25 | 862.75 | | | | | | | | | | | | 867.74 | 865.92 | 870.34 | 868.52 | 0.70 | Standard | 40.67 | | |
| I-14 | Inlet | 867.39 | 863.89 | | | | | | | | | | | | 868.08 | 867.20 | 869.34 | 868.46 | 0.70 | Standard | 28.25 | | |
| I-12 | Inlet | 868.45 | 864.95 | | | | | | | | | | | | 869.33 | 868.45 | 870.59 | 869.71 | 0.70 | Standard | 28.25 | | |
| J-12 | Junction | 869.00 | 864.00 | | | 4.00 | | | | | | | | | 868.04 | 867.78 | 868.37 | 868.11 | 0.80 | Standard | 56.50 | | |
| J-13 | Junction | 867.94 | 861.21 | | | 4.00 | | | | | | | | | 866.78 | 866.36 | 867.29 | 866.88 | 0.80 | Standard | 113.00 | | |
| J-14 | Junction | 866.80 | 858.23 | | | 4.00 | | | | | | | | | 865.03 | 863.21 | 867.30 | 865.48 | 0.80 | Standard | 354.01 | | |
| J-15 | Junction | 864.00 | 852.69 | | | 4.00 | | | | | | | | | 859.88 | 858.57 | 861.51 | 860.20 | 0.80 | Standard | 354.01 | | |
| J-16 | Junction | 860.00 | 850.91 | | | 4.00 | | | | | | | | | 857.70 | 855.87 | 859.99 | 858.16 | 0.80 | Standard | 354.01 | | |
| O-2 | Outlet | 860.00 | 850.00 | | | | | | | | | | | | 855.00 | 855.00 | 855.00 | 855.00 | | | 354.01 | | 855.00 |
| I-11 | Inlet | 868.45 | 864.95 | | | | | | | | | | | | 869.33 | 868.45 | 870.59 | 869.71 | 0.70 | Standard | 28.25 | | |
| I-13 | Inlet | 867.39 | 863.89 | | | | | | | | | | | | 868.08 | 867.20 | 869.34 | 868.46 | 0.70 | Standard | 28.25 | | |
| I-15 | Inlet | 866.25 | 862.75 | | | | | | | | | | | | 867.74 | 865.92 | 870.34 | 868.52 | 0.70 | Standard | 40.67 | | |
| I-17 | Inlet | 866.00 | 859.00 | | | | | | | | | | | | 866.61 | 865.51 | 868.18 | 867.08 | 0.70 | Standard | 159.67 | | |
| I-18 | Inlet | 868.75 | 863.23 | | | | | | | | | | | | 869.18 | 868.48 | 870.05 | 869.35 | 0.80 | Standard | 119.00 | | |
| I-19 | Inlet | 870.68 | 866.06 | | | | | | | | | | | | 871.39 | 870.68 | 872.29 | 871.57 | 0.80 | Standard | 95.20 | | |
| I-20 | Inlet | 870.82 | 866.27 | | | | | | | | | | | | 871.16 | 870.76 | 871.66 | 871.26 | 0.80 | Standard | 71.40 | | |
| I-21 | Inlet | 872.00 | 867.80 | | | | | | | | | | | | 872.49 | 872.00 | 873.20 | 872.70 | 0.70 | Standard | 47.60 | | |
| I-22 | Inlet | 872.00 | 868.00 | | | | | | | | | | | | 872.12 | 872.00 | 872.30 | 872.18 | 0.70 | Standard | 23.80 | | |
| P-1 | Pipe | | | 24 inch | 27.50 | | 868.50 | 872.00 | 867.00 | 872.55 | 0.054545 | 3.00 | I-1 | J-1 | 872.11 | 871.96 | 872.56 | 872.40 | | | 16.83 | 5.36 | |
| P-2 | Pipe | | | 48 inch | 451.00 | | 867.00 | 872.55 | 864.72 | 871.82 | 0.005055 | 3.00 | J-1 | J-2 | 871.96 | 871.71 | 872.07 | 871.82 | | | 33.66 | 2.68 | |
| P-3 | Pipe | | | 54 inch | 443.00 | | 864.72 | 871.82 | 862.47 | 871.11 | 0.005079 | 3.00 | J-2 | J-3 | 871.71 | 871.19 | 871.99 | 871.47 | | | 67.32 | 4.23 | |
| P-4 | Pipe | | | 54 inch | 451.00 | | 862.47 | 871.11 | 860.19 | 870.39 | 0.005055 | 3.00 | J-3 | J-4 | 870.69 | 869.50 | 871.32 | 870.13 | | | 100.98 | 6.35 | |
| P-5 | Pipe | | | 54 inch | 480.00 | | 860.19 | 870.39 | 857.76 | 869.62 | 0.005063 | 3.00 | J-4 | J-5 | 868.58 | 866.27 | 869.73 | 867.42 | | | 136.48 | 8.58 | |
| P-15 | Pipe | | | 24 inch | 27.50 | | 865.57 | 869.07 | 857.76 | 869.62 | 0.284000 | 3.00 | I-9 | J-5 | 867.09 | 866.27 | 867.84 | 866.77 | | | 17.75 | 27.45 | |
| P-16 | Pipe | | | 24 inch | 27.50 | | 865.57 | 869.07 | 857.76 | 869.62 | 0.284000 | 3.00 | I-10 | J-5 | 867.09 | 866.27 | 867.84 | 866.77 | | | 17.75 | 27.45 | |
| P-17 | Pipe | | | 24 inch | 27.50 | | 866.34 | 869.84 | 860.19 | 870.39 | 0.223636 | 3.00 | I-7 | J-4 | 869.67 | 869.50 | 870.17 | 870.00 | | | 17.75 | 5.65 | |
| P-18 | Pipe | | | 24 inch | 27.50 | | 866.34 | 869.84 | 860.19 | 870.39 | 0.223636 | 3.00 | I-8 | J-4 | 869.67 | 869.50 | 870.17 | 870.00 | | | 17.75 | 5.65 | |
| P-19 | Pipe | | | 24 inch | 27.50 | | 868.16 | 871.66 | 862.47 | 871.11 | 0.206909 | 3.00 | I-6 | J-3 | 871.34 | 871.19 | 871.79 | 871.64 | | | 16.83 | 5.36 | |
| P-20 | Pipe | | | 24 inch | 27.50 | | 868.16 | 871.66 | 862.47 | 871.11 | 0.206909 | 3.00 | I-5 | J-3 | 871.34 | 871.19 | 871.79 | 871.64 | | | 16.83 | 5.36 | |

## Scenario: Alternative 4

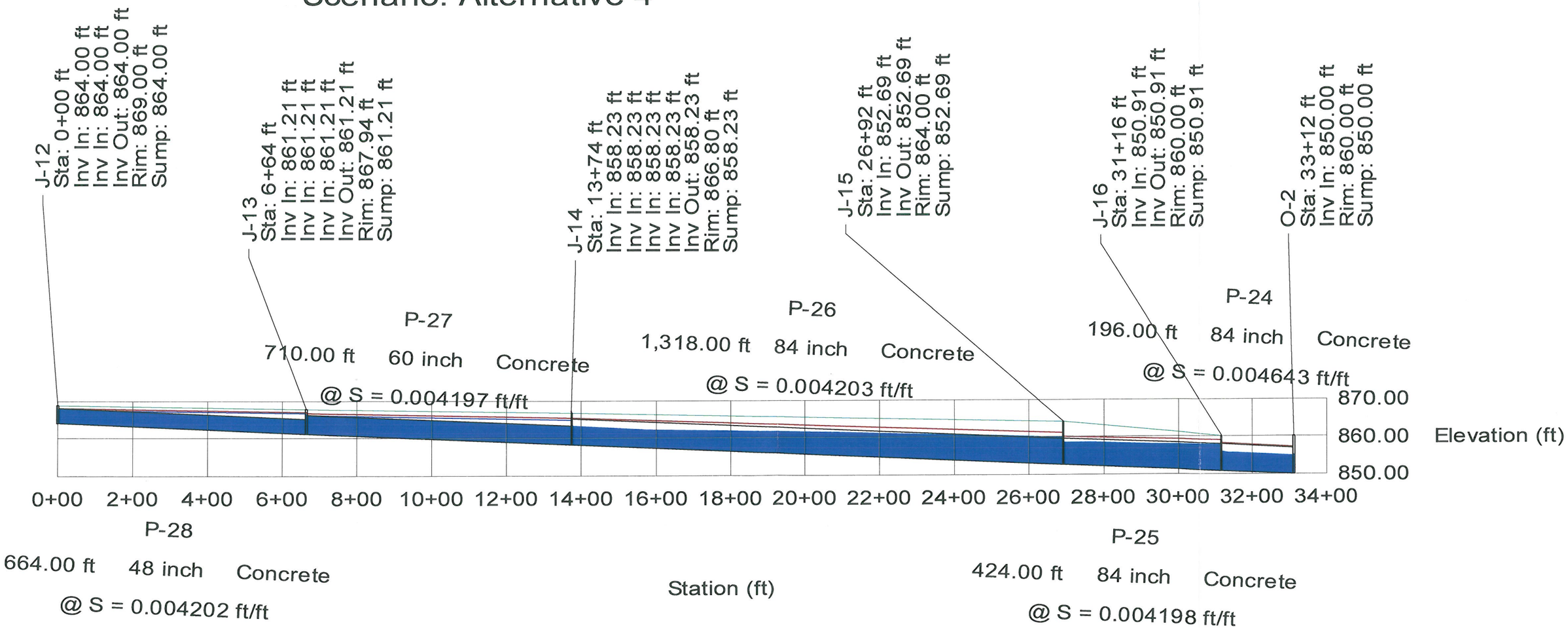
## Storm Drain-Along MC 85 and 6th

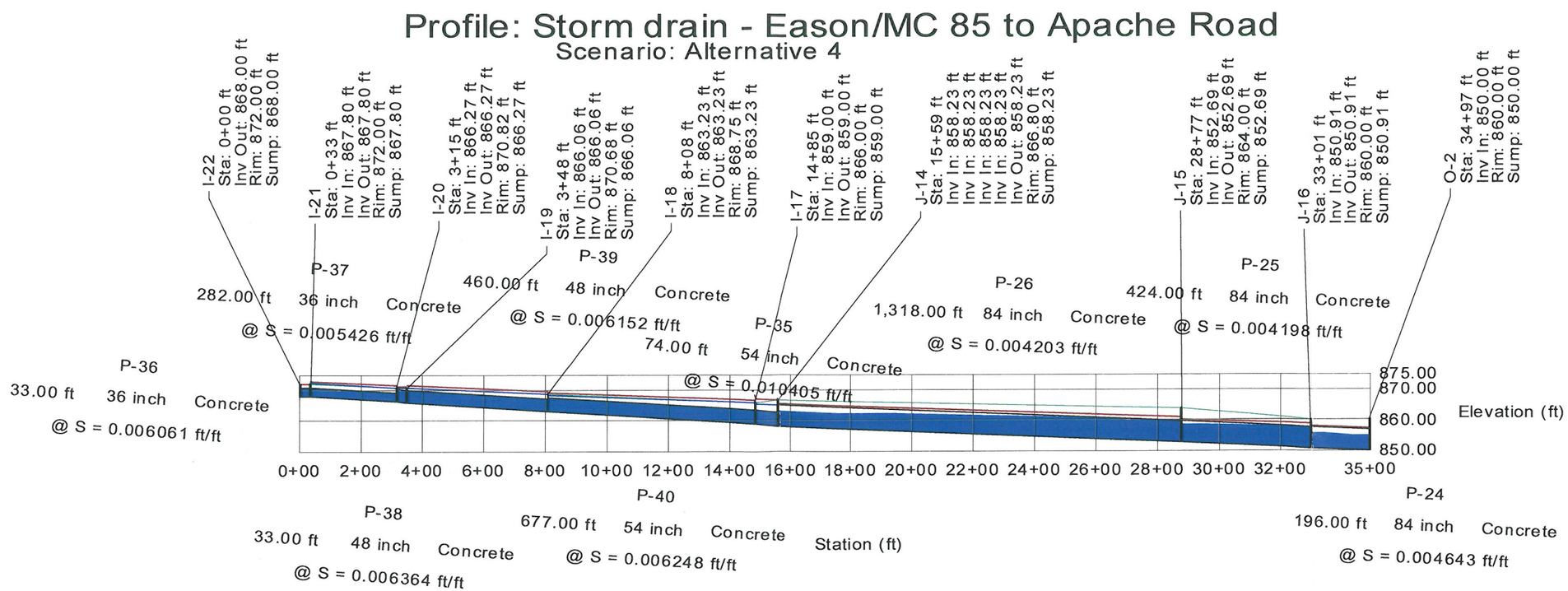
| Label | Element Type | Ground Elevation (ft) | Sump Elevation (ft) | Section Size | Length (ft) | Structure Diameter (ft) | Upstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Invert Elevation (ft) | Downstream Ground Elevation (ft) | Constructed Slope (ft/ft) | Minimum Cover (ft) | Upstream Node | Downstream Node | Hydraulic Grade Line In (ft) | Hydraulic Grade Line Out (ft) | Energy Grade Line In (ft) | Energy Grade Line Out (ft) | Headloss Coefficient | Headloss Method | Total Flow (cfs) | Average Velocity (ft/s) | Tailwater Elevation (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-21 | Pipe | | | 24 inch | 27.50 | | 867.78 | 871.27 | 864.72 | 871.82 | 0.111273 | 3.00 | I-3 | J-2 | 871.86 | 871.71 | 872.31 | 872.16 | | | 16.83 | 5.36 | |
| P-22 | Pipe | | | 24 inch | 27.50 | | 867.78 | 871.28 | 864.72 | 871.82 | 0.111273 | 3.00 | I-4 | J-2 | 871.86 | 871.71 | 872.31 | 872.16 | | | 16.83 | 5.36 | |
| P-23 | Pipe | | | 24 inch | 27.50 | | 868.50 | 872.00 | 867.00 | 872.55 | 0.054545 | 3.00 | I-2 | J-1 | 872.11 | 871.96 | 872.56 | 872.40 | | | 16.83 | 5.36 | |
| P-8 | Pipe | | | 60 inch | 60.00 | | 857.76 | 869.62 | 857.46 | 869.60 | 0.005000 | 3.00 | J-5 | J-6 | 865.32 | 865.06 | 866.51 | 866.25 | | | 171.98 | 8.76 | |
| P-9 | Pipe | | | 60 inch | 440.00 | | 857.46 | 869.60 | 855.23 | 866.50 | 0.005068 | 3.00 | J-6 | J-7 | 864.10 | 862.18 | 865.30 | 863.38 | | | 171.98 | 8.76 | |
| P-10 | Pipe | | | 60 inch | 451.00 | | 855.23 | 866.50 | 852.95 | 863.40 | 0.005055 | 3.00 | J-7 | J-8 | 861.35 | 859.38 | 862.54 | 860.58 | | | 171.98 | 8.76 | |
| P-11 | Pipe | | | 60 inch | 441.00 | | 852.95 | 863.40 | 850.72 | 860.30 | 0.005057 | 3.00 | J-8 | J-9 | 858.55 | 856.63 | 859.74 | 857.82 | | | 171.98 | 8.76 | |
| P-12 | Pipe | | | 60 inch | 456.00 | | 850.72 | 860.30 | 848.41 | 857.10 | 0.005066 | 3.00 | J-9 | J-10 | 855.79 | 853.80 | 856.98 | 854.99 | | | 171.98 | 8.76 | |
| P-13 | Pipe | | | 60 inch | 446.00 | | 848.41 | 857.10 | 846.16 | 854.00 | 0.005045 | 3.00 | J-10 | J-11 | 852.86 | 851.22 | 854.21 | 852.41 | | | 171.98 | 10.70 | |
| P-14 | Pipe | | | 60 inch | 426.00 | | 846.16 | 854.00 | 844.00 | 851.00 | 0.005070 | 3.00 | J-11 | O-1 | 849.97 | 847.76 | 851.75 | 849.59 | | | 171.98 | 10.72 | |
| P-24 | Pipe | | | 84 inch | 196.00 | | 850.91 | 860.00 | 850.00 | 860.00 | 0.004643 | 3.00 | J-16 | O-2 | 855.87 | 855.00 | 858.16 | 857.25 | | | 354.01 | 12.60 | |
| P-25 | Pipe | | | 84 inch | 424.00 | | 852.69 | 864.00 | 850.91 | 860.00 | 0.004198 | 3.00 | J-15 | J-16 | 858.57 | 857.70 | 860.20 | 859.04 | | | 354.01 | 12.08 | |
| P-26 | Pipe | | | 84 inch | 318.00 | | 858.23 | 866.80 | 852.69 | 864.00 | 0.004203 | 3.00 | J-14 | J-15 | 863.21 | 859.88 | 865.48 | 861.19 | | | 354.01 | 12.09 | |
| P-27 | Pipe | | | 60 inch | 710.00 | | 861.21 | 867.94 | 858.23 | 866.80 | 0.004197 | 3.00 | J-13 | J-14 | 866.36 | 865.03 | 866.88 | 865.54 | | | 113.00 | 5.76 | |
| P-28 | Pipe | | | 48 inch | 664.00 | | 864.00 | 869.00 | 861.21 | 867.94 | 0.004202 | 3.00 | J-12 | J-13 | 867.78 | 866.78 | 868.11 | 867.09 | | | 56.50 | 7.76 | |
| P-29 | Pipe | | | 24 inch | 27.50 | | 864.95 | 868.45 | 864.00 | 869.00 | 0.034545 | 3.00 | I-11 | J-12 | 868.47 | 868.04 | 869.73 | 869.30 | | | 28.25 | 8.99 | |
| P-30 | Pipe | | | 24 inch | 27.50 | | 864.95 | 868.45 | 864.00 | 869.00 | 0.034545 | 3.00 | I-12 | J-12 | 868.47 | 868.04 | 869.73 | 869.30 | | | 28.25 | 8.99 | |
| P-31 | Pipe | | | 24 inch | 27.50 | | 863.89 | 867.39 | 861.21 | 867.94 | 0.097455 | 3.00 | I-13 | J-13 | 867.20 | 866.78 | 868.46 | 868.03 | | | 28.25 | 8.99 | |
| P-32 | Pipe | | | 24 inch | 27.50 | | 863.89 | 867.39 | 861.21 | 867.94 | 0.097455 | 3.00 | I-14 | J-13 | 867.20 | 866.78 | 868.46 | 868.03 | | | 28.25 | 8.99 | |
| P-33 | Pipe | | | 24 inch | 27.50 | | 862.75 | 866.25 | 858.23 | 866.80 | 0.164364 | 3.00 | I-15 | J-14 | 865.92 | 865.03 | 868.52 | 867.63 | | | 40.67 | 12.95 | |
| P-34 | Pipe | | | 24 inch | 27.50 | | 862.75 | 866.25 | 858.23 | 866.80 | 0.164364 | 3.00 | I-16 | J-14 | 865.92 | 865.03 | 868.52 | 867.63 | | | 40.67 | 12.95 | |
| P-35 | Pipe | | | 54 inch | 74.00 | | 859.00 | 866.00 | 858.23 | 866.80 | 0.010405 | 3.00 | I-17 | J-14 | 865.51 | 865.03 | 867.08 | 866.59 | | | 159.67 | 10.04 | |
| P-36 | Pipe | | | 36 inch | 33.00 | | 868.00 | 872.00 | 867.80 | 872.00 | 0.006061 | 3.00 | I-22 | I-21 | 872.04 | 872.00 | 872.22 | 872.18 | | | 23.80 | 3.37 | |
| P-37 | Pipe | | | 36 inch | 282.00 | | 867.80 | 872.00 | 866.27 | 870.82 | 0.005426 | 3.00 | I-21 | I-20 | 872.26 | 870.82 | 872.96 | 871.52 | | | 47.60 | 6.73 | |
| P-38 | Pipe | | | 48 inch | 33.00 | | 866.27 | 870.82 | 866.06 | 870.68 | 0.006364 | 3.00 | I-20 | I-19 | 870.76 | 870.68 | 871.26 | 871.18 | | | 71.40 | 5.68 | |
| P-39 | Pipe | | | 48 inch | 460.00 | | 866.06 | 870.68 | 863.23 | 868.75 | 0.006152 | 3.00 | I-19 | I-18 | 870.77 | 868.75 | 871.66 | 869.64 | | | 95.20 | 7.58 | |
| P-40 | Pipe | | | 54 inch | 677.00 | | 863.23 | 868.75 | 859.00 | 866.00 | 0.006248 | 3.00 | I-18 | I-17 | 868.48 | 866.00 | 869.35 | 866.87 | | | 119.00 | 7.48 | |


Profile: Storm Drain - 4th/MC 85 to 6th/Beloat
Scenario: Alternative 4
I-1
Sta: 0+00 ft
Inv Out: 868.50 ft
Rim: 872.00 ft
Sump: 868.50 ft
J-1
Sta: 0+28 ft
Inv In: 867.00 ft
Inv In: 867.00 ft
Inv Out: 867.00 ft
Rim: 872.55 ft
Sump: 867.00 ft
J-2
Sta: 4+79 ft
Inv In: 864.72 ft
Inv In: 864.72 ft
Inv In: 864.72 ft
Inv Out: 864.72 ft
Rim: 871.82 ft
Sump: 864.72 ft
J-3
Sta: 9+22 ft
Inv In: 862.47 ft
Inv In: 862.47 ft
Inv In: 862.47 ft
Inv Out: 862.47 ft
Rim: 871.11 ft
Sump: 862.47 ft
J-4
Sta: 13+73 ft
Inv In: 860.19 ft
Inv In: 860.19 ft
Inv In: 860.19 ft
Inv Out: 860.19 ft
Rim: 870.39 ft
Sump: 860.19 ft
J-5
Sta: 18+53 ft
Inv In: 857.76 ft
Inv In: 857.76 ft
Inv In: 857.76 ft
Inv Out: 857.76 ft
Rim: 869.62 ft
Sump: 857.76 ft
J-6
Sta: 19+13 ft
Inv In: 857.46 ft
Inv Out: 857.46 ft
Rim: 869.60 ft
Sump: 857.46 ft
J-7
Sta: 23+53 ft
Inv In: 855.23 ft
Inv Out: 855.23 ft
Rim: 866.50 ft
Sump: 855.23 ft
J-8
Sta: 28+04 ft
Inv In: 852.95 ft
Inv Out: 852.95 ft
Rim: 863.40 ft
Sump: 852.95 ft
J-9
Sta: 32+45 ft
Inv In: 850.72 ft
Inv Out: 850.72 ft
Rim: 860.30 ft
Sump: 850.72 ft
J-10
Sta: 37+01 ft
Inv In: 848.41 ft
Inv Out: 848.41 ft
Rim: 857.10 ft
Sump: 848.41 ft
J-11
Sta: 41+47 ft
Inv In: 846.16 ft
Inv Out: 846.16 ft
Rim: 854.00 ft
Sump: 846.16 ft
O-1
Sta: 45+73 ft
Inv In: 844.00 ft
Rim: 851.00 ft
Sump: 844.00 ft
P-1
27.50 ft
24 inch
Concrete
@ S = 0.054545 ft/ft
P-2
451.00 ft
48 inch
Concrete
@ S = 0.005055 ft/ft
P-3
443.00 ft
54 inch
Concrete
@ S = 0.005079 ft/ft
P-4
451.00 ft
54 inch
Concrete
@ S = 0.005055 ft/ft
P-5
480.00 ft
54 inch
Concrete
@ S = 0.005063 ft/ft
P-8
60.00 ft
60 inch
Concrete
@ S = 0.005000 ft/ft
P-9
440.00 ft
60 inch
Concrete
@ S = 0.005068 ft/ft
P-10
451.00 ft
60 inch
Concrete
@ S = 0.005055 ft/ft
P-11
441.00 ft
60 inch
Concrete
@ S = 0.005057 ft/ft
P-12
456.00 ft
60 inch
Concrete
@ S = 0.005066 ft/ft
P-13
446.00 ft
60 inch
Concrete
@ S = 0.005045 ft/ft
P-14
426.00 ft
60 inch
Concrete
@ S = 0.005070 ft/ft
875.00
870.00
860.00
850.00
840.00
Elevation (ft)
0+00 2+00 4+00 6+00 8+00 10+00 12+00 14+00 16+00 18+00 20+00 22+00 24+00 26+00 28+00 30+00 32+00 34+00 36+00 38+00 40+00 42+00 44+00 46+00
Station (ft)

# Profile: Storm Drain - 7th/MC 85 to Apache Road

## Scenario: Alternative 4




Profile: Storm drain - Eason/MC 85 to Apache Road
Scenario: Alternative 4
I-22
Sta: 0+00 ft
Inv Out: 868.00 ft
Rim: 872.00 ft
Sump: 868.00 ft
I-21
Sta: 0+33 ft
Inv In: 867.80 ft
Inv Out: 867.80 ft
Rim: 872.00 ft
Sump: 867.80 ft
I-20
Sta: 3+15 ft
Inv In: 866.27 ft
Inv Out: 866.27 ft
Rim: 870.82 ft
Sump: 866.27 ft
I-19
Sta: 3+48 ft
Inv In: 866.06 ft
Inv Out: 866.06 ft
Rim: 870.68 ft
Sump: 866.06 ft
I-18
Sta: 8+08 ft
Inv In: 863.23 ft
Inv Out: 863.23 ft
Rim: 868.75 ft
Sump: 863.23 ft
I-17
Sta: 14+85 ft
Inv In: 859.00 ft
Inv Out: 859.00 ft
Rim: 866.00 ft
Sump: 859.00 ft
J-14
Sta: 15+59 ft
Inv In: 858.23 ft
Inv In: 858.23 ft
Inv In: 858.23 ft
Inv In: 858.23 ft
Inv Out: 858.23 ft
Rim: 866.80 ft
Sump: 858.23 ft
J-15
Sta: 28+77 ft
Inv In: 852.69 ft
Inv Out: 852.69 ft
Rim: 864.00 ft
Sump: 852.69 ft
J-16
Sta: 33+01 ft
Inv In: 850.91 ft
Inv Out: 850.91 ft
Rim: 860.00 ft
Sump: 850.91 ft
O-2
Sta: 34+97 ft
Inv In: 850.00 ft
Rim: 860.00 ft
Sump: 850.00 ft
P-36
33.00 ft 36 inch Concrete
@ S = 0.006061 ft/ft
P-37
282.00 ft 36 inch Concrete
@ S = 0.005426 ft/ft
P-38
33.00 ft 48 inch Concrete
@ S = 0.006364 ft/ft
P-39
460.00 ft 48 inch Concrete
@ S = 0.006152 ft/ft
P-40
677.00 ft 54 inch Concrete
@ S = 0.006248 ft/ft
P-35
74.00 ft 54 inch Concrete
@ S = 0.010405 ft/ft
P-26
1,318.00 ft 84 inch Concrete
@ S = 0.004203 ft/ft
P-25
424.00 ft 84 inch Concrete
@ S = 0.004198 ft/ft
P-24
196.00 ft 84 inch Concrete
@ S = 0.004643 ft/ft
875.00
870.00
860.00
850.00
Elevation (ft)
0+00 2+00 4+00 6+00 8+00 10+00 12+00 14+00 16+00 18+00 20+00 22+00 24+00 26+00 28+00 30+00 32+00 35+00
Station (ft)

# Scenario: Alternative 5

Title: Buckeye CAR
s:\...\data\hydraulics\monroe2.stm
06/04/04 11:01:51 AM

**Project Engineering Consultants Ltd**
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: PEC
StormCAD v5.5 [5.5003]

## Scenario: Alternative 5

## Storm Drain Along MC 85 to Apache Road

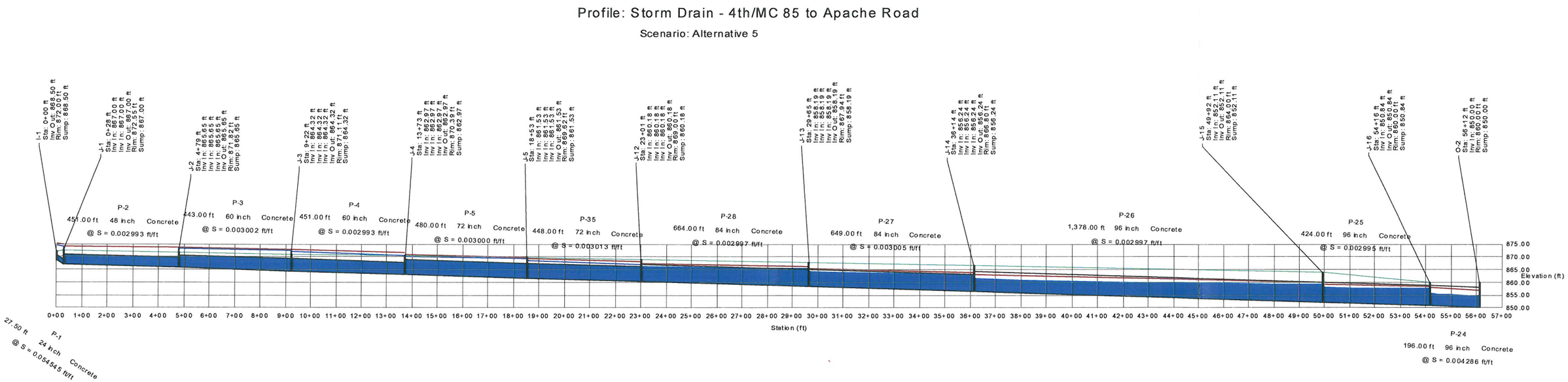
| Label | Element Type | Ground Elevation (ft) | Sump Elevation (ft) | Section Size | Length (ft) | Structure Diameter (ft) | Upstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Invert Elevation (ft) | Downstream Ground Elevation (ft) | Constructed Slope (ft/ft) | Minimum Cover (ft) | Upstream Node | Downstream Node | Hydraulic Grade Line In (ft) | Hydraulic Grade Line Out (ft) | Energy Grade Line In (ft) | Energy Grade Line Out (ft) | Headloss Coefficient | Headloss Method | Total Flow (cfs) | Average Velocity (ft/s) | Tailwater Elevation (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I-16 | Inlet | 866.25 | 862.75 | | | | | | | | | | | | 865.18 | 864.47 | 866.21 | 865.49 | 0.70 | Standard | 23.30 | | |
| I-14 | Inlet | 867.39 | 863.89 | | | | | | | | | | | | 866.32 | 865.61 | 867.35 | 866.63 | 0.70 | Standard | 23.30 | | |
| I-12 | Inlet | 868.45 | 864.95 | | | | | | | | | | | | 867.96 | 867.36 | 868.81 | 868.21 | 0.70 | Standard | 23.30 | | |
| J-12 | Junction | 869.00 | 860.18 | | | 4.00 | | | | | | | | | 867.07 | 866.30 | 868.02 | 867.26 | 0.80 | Standard | 279.60 | | |
| J-13 | Junction | 867.94 | 858.19 | | | 4.00 | | | | | | | | | 865.26 | 864.19 | 866.60 | 865.53 | 0.80 | Standard | 326.20 | | |
| J-14 | Junction | 866.80 | 856.24 | | | 4.00 | | | | | | | | | 862.87 | 861.39 | 864.71 | 863.24 | 0.80 | Standard | 372.80 | | |
| J-15 | Junction | 864.00 | 852.11 | | | 4.00 | | | | | | | | | 859.03 | 857.89 | 860.46 | 859.32 | 0.80 | Standard | 372.80 | | |
| J-16 | Junction | 860.00 | 850.84 | | | 4.00 | | | | | | | | | 857.40 | 855.74 | 859.47 | 857.81 | 0.80 | Standard | 372.80 | | |
| O-2 | Outlet | 860.00 | 850.00 | | | | | | | | | | | | 855.00 | 855.00 | 855.00 | 855.00 | | | 372.80 | | 855.00 |
| I-11 | Inlet | 868.45 | 864.95 | | | | | | | | | | | | 867.96 | 867.36 | 868.81 | 868.21 | 0.70 | Standard | 23.30 | | |
| I-13 | Inlet | 867.39 | 863.89 | | | | | | | | | | | | 866.32 | 865.61 | 867.35 | 866.63 | 0.70 | Standard | 23.30 | | |
| I-15 | Inlet | 866.25 | 862.75 | | | | | | | | | | | | 865.18 | 864.47 | 866.21 | 865.49 | 0.70 | Standard | 23.30 | | |
| J-5 | Junction | 869.62 | 861.53 | | | 4.00 | | | | | | | | | 869.27 | 868.42 | 870.32 | 869.48 | 0.80 | Standard | 233.00 | | |
| J-4 | Junction | 870.39 | 862.97 | | | 4.00 | | | | | | | | | 870.74 | 870.20 | 871.41 | 870.87 | 0.80 | Standard | 186.40 | | |
| J-3 | Junction | 871.11 | 864.32 | | | 4.00 | | | | | | | | | 872.67 | 872.04 | 873.45 | 872.82 | 0.80 | Standard | 139.80 | | |
| J-2 | Junction | 871.82 | 865.65 | | | 4.00 | | | | | | | | | 873.51 | 873.23 | 873.86 | 873.58 | 0.80 | Standard | 93.20 | | |
| J-1 | Junction | 872.55 | 867.00 | | | 4.00 | | | | | | | | | 874.16 | 873.99 | 874.37 | 874.20 | 0.80 | Standard | 46.60 | | |
| I-1 | Inlet | 872.00 | 868.50 | | | | | | | | | | | | 872.60 | 872.00 | 873.45 | 872.85 | 0.70 | Standard | 23.30 | | |
| I-9 | Inlet | 869.07 | 865.57 | | | | | | | | | | | | 869.67 | 869.07 | 870.52 | 869.92 | 0.70 | Standard | 23.30 | | |
| I-10 | Inlet | 869.07 | 865.57 | | | | | | | | | | | | 869.67 | 869.07 | 870.52 | 869.92 | 0.70 | Standard | 23.30 | | |
| I-7 | Inlet | 869.84 | 866.34 | | | | | | | | | | | | 870.44 | 869.84 | 871.29 | 870.69 | 0.70 | Standard | 23.30 | | |
| I-8 | Inlet | 869.84 | 866.34 | | | | | | | | | | | | 870.44 | 869.84 | 871.29 | 870.69 | 0.70 | Standard | 23.30 | | |
| I-6 | Inlet | 871.66 | 868.16 | | | | | | | | | | | | 872.26 | 871.66 | 873.11 | 872.51 | 0.70 | Standard | 23.30 | | |
| I-5 | Inlet | 871.66 | 868.16 | | | | | | | | | | | | 872.26 | 871.66 | 873.11 | 872.51 | 0.70 | Standard | 23.30 | | |
| I-3 | Inlet | 871.27 | 867.78 | | | | | | | | | | | | 871.87 | 871.27 | 872.72 | 872.12 | 0.70 | Standard | 23.30 | | |
| I-4 | Inlet | 871.28 | 867.78 | | | | | | | | | | | | 871.88 | 871.28 | 872.73 | 872.13 | 0.70 | Standard | 23.30 | | |
| I-2 | Inlet | 872.00 | 868.50 | | | | | | | | | | | | 872.60 | 872.00 | 873.45 | 872.85 | 0.70 | Standard | 23.30 | | |
| P-24 | Pipe | | | 96 inch | 196.00 | | 850.84 | 860.00 | 850.00 | 860.00 | 0.004286 | 3.00 | J-16 | O-2 | 855.74 | 855.00 | 857.81 | 856.98 | | | 372.80 | 12.53 | |
| P-25 | Pipe | | | 96 inch | 424.00 | | 852.11 | 864.00 | 850.84 | 860.00 | 0.002995 | 3.00 | J-15 | J-16 | 857.89 | 857.40 | 859.32 | 858.51 | | | 372.80 | 10.89 | |
| P-26 | Pipe | | | 96 inch | 378.00 | | 856.24 | 866.80 | 852.11 | 864.00 | 0.002997 | 3.00 | J-14 | J-15 | 861.39 | 859.03 | 863.24 | 860.04 | | | 372.80 | 10.89 | |
| P-27 | Pipe | | | 84 inch | 649.00 | | 858.19 | 867.94 | 856.24 | 866.80 | 0.003005 | 3.00 | J-13 | J-14 | 864.19 | 862.87 | 865.53 | 864.03 | | | 326.20 | 10.34 | |
| P-28 | Pipe | | | 84 inch | 664.00 | | 860.18 | 869.00 | 858.19 | 867.94 | 0.002997 | 3.00 | J-12 | J-13 | 866.30 | 865.26 | 867.26 | 866.08 | | | 279.60 | 10.09 | |
| P-29 | Pipe | | | 24 inch | 27.50 | | 864.95 | 868.45 | 860.18 | 869.00 | 0.173455 | 3.00 | I-11 | J-12 | 867.36 | 867.07 | 868.21 | 867.92 | | | 23.30 | 7.42 | |
| P-30 | Pipe | | | 24 inch | 27.50 | | 864.95 | 868.45 | 860.18 | 869.00 | 0.173455 | 3.00 | I-12 | J-12 | 867.36 | 867.07 | 868.21 | 867.92 | | | 23.30 | 7.42 | |
| P-31 | Pipe | | | 24 inch | 27.50 | | 863.89 | 867.39 | 858.19 | 867.94 | 0.207273 | 3.00 | I-13 | J-13 | 865.61 | 865.26 | 866.63 | 866.12 | | | 23.30 | 26.50 | |
| P-32 | Pipe | | | 24 inch | 27.50 | | 863.89 | 867.39 | 858.19 | 867.94 | 0.207273 | 3.00 | I-14 | J-13 | 865.61 | 865.26 | 866.63 | 866.12 | | | 23.30 | 26.50 | |
| P-33 | Pipe | | | 24 inch | 27.50 | | 862.75 | 866.25 | 856.24 | 866.80 | 0.236727 | 3.00 | I-15 | J-14 | 864.47 | 862.87 | 865.49 | 863.72 | | | 23.30 | 27.80 | |
| P-34 | Pipe | | | 24 inch | 27.50 | | 862.75 | 866.25 | 856.24 | 866.80 | 0.236727 | 3.00 | I-16 | J-14 | 864.47 | 862.87 | 865.49 | 863.72 | | | 23.30 | 27.80 | |
| P-1 | Pipe | | | 24 inch | 27.50 | | 868.50 | 872.00 | 867.00 | 872.55 | 0.054545 | 3.00 | I-1 | J-1 | 874.45 | 874.16 | 875.31 | 875.01 | | | 23.30 | 7.42 | |
| P-2 | Pipe | | | 48 inch | 451.00 | | 867.00 | 872.55 | 865.65 | 871.82 | 0.002993 | 3.00 | J-1 | J-2 | 873.99 | 873.51 | 874.20 | 873.73 | | | 46.60 | 3.71 | |
| P-3 | Pipe | | | 60 inch | 443.00 | | 865.65 | 871.82 | 864.32 | 871.11 | 0.003002 | 3.00 | J-2 | J-3 | 873.23 | 872.67 | 873.58 | 873.02 | | | 93.20 | 4.75 | |
| P-4 | Pipe | | | 60 inch | 451.00 | | 864.32 | 871.11 | 862.97 | 870.39 | 0.002993 | 3.00 | J-3 | J-4 | 872.04 | 870.74 | 872.82 | 871.52 | | | 139.80 | 7.12 | |
| P-5 | Pipe | | | 72 inch | 480.00 | | 862.97 | 870.39 | 861.53 | 869.62 | 0.003000 | 3.00 | J-4 | J-5 | 870.20 | 869.27 | 870.87 | 869.94 | | | 186.40 | 6.59 | |
| P-15 | Pipe | | | 24 inch | 27.50 | | 865.57 | 869.07 | 861.53 | 869.62 | 0.146909 | 3.00 | I-9 | J-5 | 869.56 | 869.27 | 870.41 | 870.12 | | | 23.30 | 7.42 | |
| P-16 | Pipe | | | 24 inch | 27.50 | | 865.57 | 869.07 | 861.53 | 869.62 | 0.146909 | 3.00 | I-10 | J-5 | 869.56 | 869.27 | 870.41 | 870.12 | | | 23.30 | 7.42 | |
| P-17 | Pipe | | | 24 inch | 27.50 | | 866.34 | 869.84 | 862.97 | 870.39 | 0.122545 | 3.00 | I-7 | J-4 | 871.03 | 870.74 | 871.88 | 871.59 | | | 23.30 | 7.42 | |
| P-18 | Pipe | | | 24 inch | 27.50 | | 866.34 | 869.84 | 862.97 | 870.39 | 0.122545 | 3.00 | I-8 | J-4 | 871.03 | 870.74 | 871.88 | 871.59 | | | 23.30 | 7.42 | |
| P-19 | Pipe | | | 24 inch | 27.50 | | 868.16 | 871.66 | 864.32 | 871.11 | 0.139636 | 3.00 | I-6 | J-3 | 872.96 | 872.67 | 873.81 | 873.52 | | | 23.30 | 7.42 | |
| P-20 | Pipe | | | 24 inch | 27.50 | | 868.16 | 871.66 | 864.32 | 871.11 | 0.139636 | 3.00 | I-5 | J-3 | 872.96 | 872.67 | 873.81 | 873.52 | | | 23.30 | 7.42 | |
| P-21 | Pipe | | | 24 inch | 27.50 | | 867.78 | 871.27 | 865.65 | 871.82 | 0.077455 | 3.00 | I-3 | J-2 | 873.81 | 873.51 | 874.66 | 874.37 | | | 23.30 | 7.42 | |
| P-22 | Pipe | | | 24 inch | 27.50 | | 867.78 | 871.28 | 865.65 | 871.82 | 0.077455 | 3.00 | I-4 | J-2 | 873.81 | 873.51 | 874.66 | 874.37 | | | 23.30 | 7.42 | |

## Scenario: Alternative 5

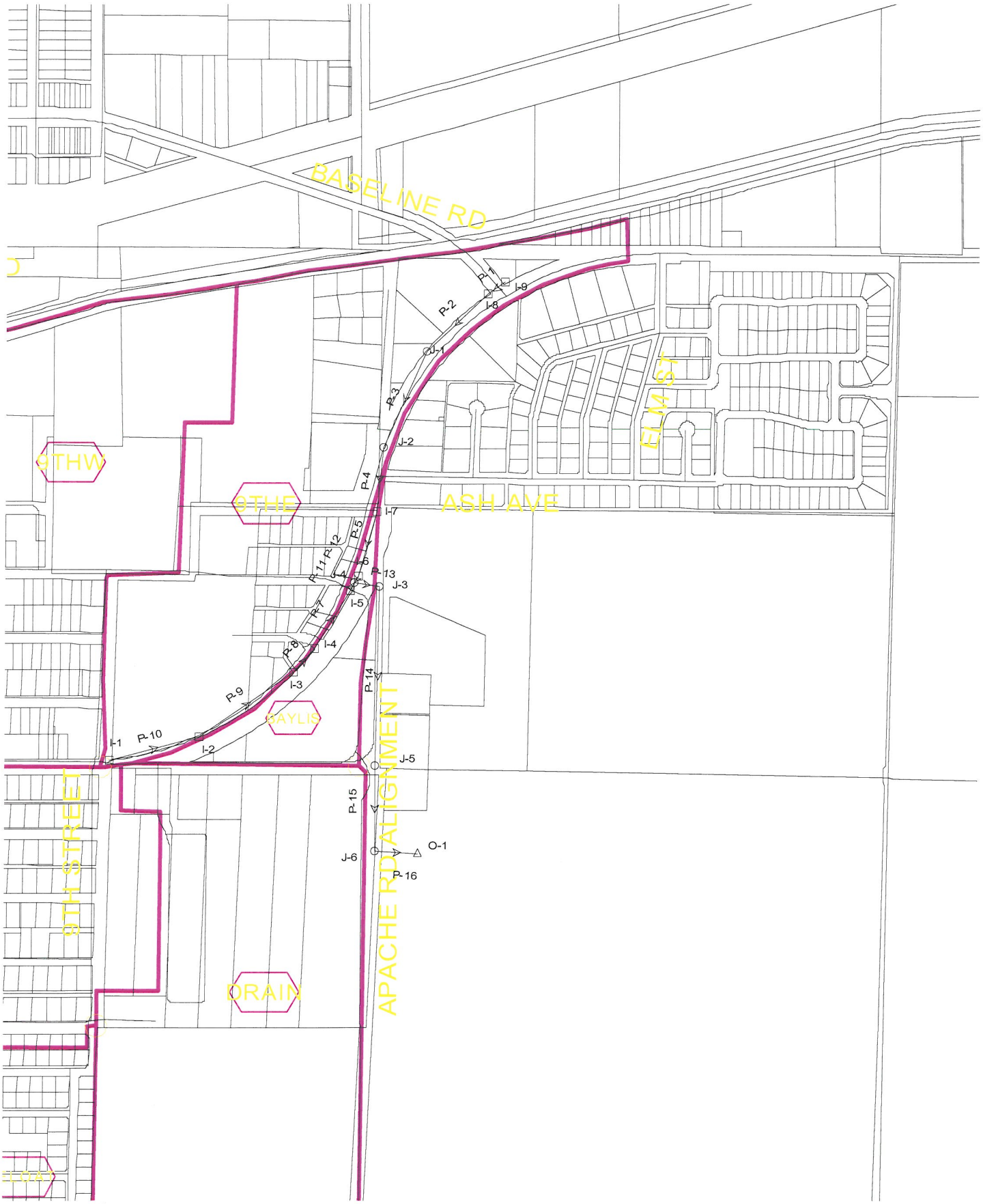
## Storm Drain Along MC 85 to Apache Road

| Label | Element Type | Ground Elevation (ft) | Sump Elevation (ft) | Section Size | Length (ft) | Structure Diameter (ft) | Upstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Invert Elevation (ft) | Downstream Ground Elevation (ft) | Constructed Slope (ft/ft) | Minimum Cover (ft) | Upstream Node | Downstream Node | Hydraulic Grade Line In (ft) | Hydraulic Grade Line Out (ft) | Energy Grade Line In (ft) | Energy Grade Line Out (ft) | Headloss Coefficient | Headloss Method | Total Flow (cfs) | Average Velocity (ft/s) | Tailwater Elevation (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-23 | Pipe | | | 24 inch | 27.50 | | 868.50 | 872.00 | 867.00 | 872.55 | 0.054545 | 3.00 | I-2 | J-1 | 874.45 | 874.16 | 875.31 | 875.01 | | | 23.30 | 7.42 | |
| P-35 | Pipe | | | 72 inch | 448.00 | | 861.53 | 869.62 | 860.18 | 869.00 | 0.003013 | 3.00 | J-5 | J-12 | 868.42 | 867.07 | 869.48 | 868.12 | | | 233.00 | 8.24 | |

# Profile
## Scenario: Alternative 5



# Scenario: Alternative 5




Title: Buckeye CAR
s:\...\data\hydraulics\9th.stm
06/04/04 11:23:37 AM © Haestad Methods, Inc.

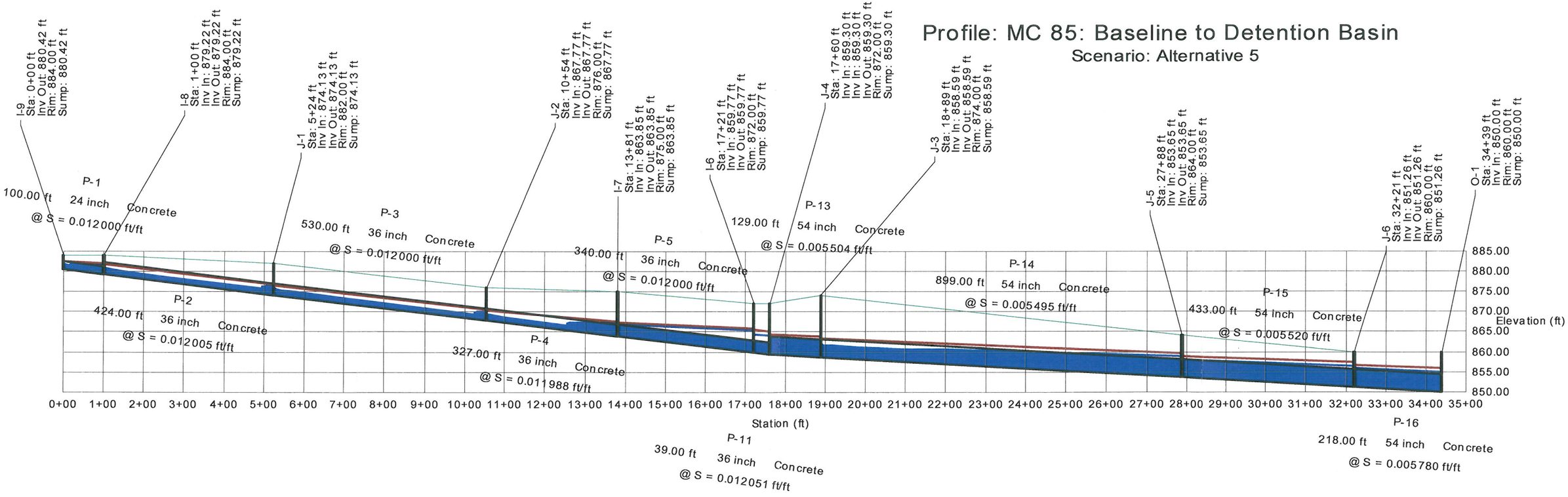
**Project Engineering Consultants Ltd**
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

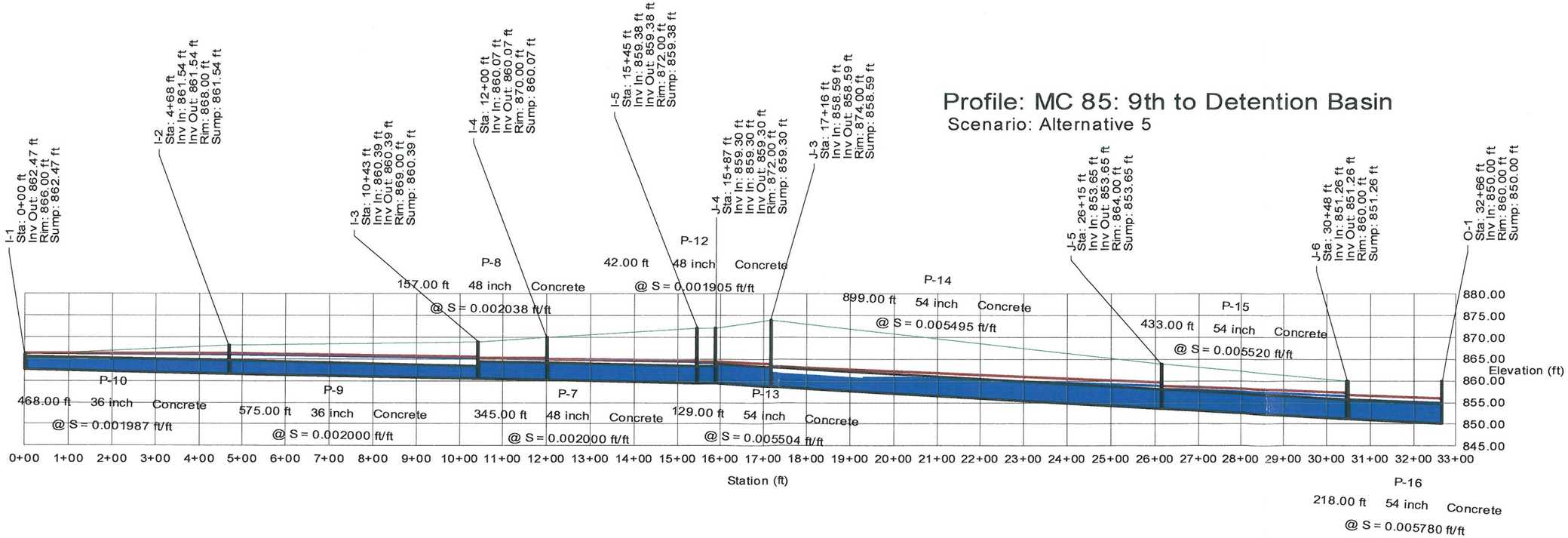
Project Engineer: PEC
StormCAD v5.5 [5.5003]
Page 1 of 1

## Scenario: Alternative 5

## Storm Drain-Along MC 85 to Detention

| Label | Element Type | Ground Elevation (ft) | Sump Elevation (ft) | Section Size | Length (ft) | Structure Diameter (ft) | Upstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Invert Elevation (ft) | Downstream Ground Elevation (ft) | Constructed Slope (ft/ft) | Minimum Cover (ft) | Upstream Node | Downstream Node | Hydraulic Grade Line In (ft) | Hydraulic Grade Line Out (ft) | Energy Grade Line In (ft) | Energy Grade Line Out (ft) | Headloss Coefficient | Headloss Method | Total Flow (cfs) | Average Velocity (ft/s) | Tailwater Elevation (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| O-1 | Outlet | 860.00 | 850.00 | | | | | | | | | | | | 855.00 | 855.00 | 855.00 | 855.00 | | | 119.00 | | 855.00 |
| J-6 | Junction | 860.00 | 851.26 | | | 4.00 | | | | | | | | | 856.49 | 855.80 | 857.36 | 856.67 | 0.80 | Standard | 119.00 | | |
| J-5 | Junction | 864.00 | 853.65 | | | 4.00 | | | | | | | | | 858.77 | 858.06 | 859.64 | 858.94 | 0.80 | Standard | 119.00 | | |
| J-3 | Junction | 874.00 | 858.59 | | | 4.00 | | | | | | | | | 863.00 | 861.80 | 864.49 | 863.29 | 0.80 | Standard | 119.00 | | |
| I-1 | Inlet | 866.00 | 862.47 | | | | | | | | | | | | 866.04 | 866.00 | 866.08 | 866.04 | 0.80 | Standard | 12.00 | | |
| I-2 | Inlet | 868.00 | 861.54 | | | | | | | | | | | | 866.10 | 865.96 | 866.28 | 866.13 | 0.80 | Standard | 24.00 | | |
| I-3 | Inlet | 869.00 | 860.39 | | | | | | | | | | | | 865.21 | 865.11 | 865.34 | 865.24 | 0.80 | Standard | 36.00 | | |
| I-4 | Inlet | 870.00 | 860.07 | | | | | | | | | | | | 865.01 | 864.83 | 865.24 | 865.06 | 0.80 | Standard | 48.00 | | |
| I-5 | Inlet | 872.00 | 859.38 | | | | | | | | | | | | 864.44 | 864.16 | 864.79 | 864.51 | 0.80 | Standard | 59.50 | | |
| J-4 | Junction | 872.00 | 859.30 | | | 4.00 | | | | | | | | | 864.09 | 863.31 | 865.08 | 864.29 | 0.80 | Standard | 119.00 | | |
| I-6 | Inlet | 872.00 | 859.77 | | | | | | | | | | | | 865.28 | 864.40 | 866.39 | 865.50 | 0.80 | Standard | 59.50 | | |
| I-7 | Inlet | 875.00 | 863.85 | | | | | | | | | | | | 867.29 | 866.79 | 867.91 | 867.41 | 0.80 | Standard | 44.50 | | |
| J-2 | Junction | 876.00 | 867.77 | | | 4.00 | | | | | | | | | 870.11 | 869.53 | 870.84 | 870.26 | 0.80 | Standard | 29.50 | | |
| J-1 | Junction | 882.00 | 874.13 | | | 4.00 | | | | | | | | | 876.47 | 875.89 | 877.20 | 876.62 | 0.80 | Standard | 29.50 | | |
| I-8 | Inlet | 884.00 | 879.22 | | | | | | | | | | | | 881.56 | 880.98 | 882.29 | 881.71 | 0.80 | Standard | 29.50 | | |
| I-9 | Inlet | 884.00 | 880.42 | | | | | | | | | | | | 882.29 | 881.79 | 882.91 | 882.41 | 0.80 | Standard | 14.50 | | |
| P-7 | Pipe | | | 48 inch | 345.00 | | 860.07 | 870.00 | 859.38 | 872.00 | 0.002000 | 3.00 | I-4 | I-5 | 864.83 | 864.44 | 865.06 | 864.67 | | | 48.00 | 3.82 | |
| P-8 | Pipe | | | 48 inch | 157.00 | | 860.39 | 869.00 | 860.07 | 870.00 | 0.002038 | 3.00 | I-3 | I-4 | 865.11 | 865.01 | 865.24 | 865.14 | | | 36.00 | 2.86 | |
| P-9 | Pipe | | | 36 inch | 575.00 | | 861.54 | 868.00 | 860.39 | 869.00 | 0.002000 | 3.00 | I-2 | I-3 | 865.96 | 865.21 | 866.13 | 865.39 | | | 24.00 | 3.40 | |
| P-10 | Pipe | | | 36 inch | 468.00 | | 862.47 | 866.00 | 861.54 | 868.00 | 0.001987 | 3.00 | I-1 | I-2 | 866.25 | 866.10 | 866.30 | 866.14 | | | 12.00 | 1.70 | |
| P-1 | Pipe | | | 24 inch | 100.00 | | 880.42 | 884.00 | 879.22 | 884.00 | 0.012000 | 3.00 | I-9 | I-8 | 881.79 | 881.56 | 882.41 | 881.89 | | | 14.50 | 8.20 | |
| P-2 | Pipe | | | 36 inch | 424.00 | | 879.22 | 884.00 | 874.13 | 882.00 | 0.012005 | 3.00 | I-8 | J-1 | 880.98 | 876.47 | 881.71 | 876.86 | | | 29.50 | 9.79 | |
| P-3 | Pipe | | | 36 inch | 530.00 | | 874.13 | 882.00 | 867.77 | 876.00 | 0.012000 | 3.00 | J-1 | J-2 | 875.89 | 870.11 | 876.62 | 870.50 | | | 29.50 | 9.78 | |
| P-4 | Pipe | | | 36 inch | 327.00 | | 867.77 | 876.00 | 863.85 | 875.00 | 0.011988 | 3.00 | J-2 | I-7 | 869.53 | 867.29 | 870.26 | 867.56 | | | 29.50 | 9.78 | |
| P-5 | Pipe | | | 36 inch | 340.00 | | 863.85 | 875.00 | 859.77 | 872.00 | 0.012000 | 3.00 | I-7 | I-6 | 866.79 | 865.28 | 867.41 | 865.90 | | | 44.50 | 10.84 | |
| P-11 | Pipe | | | 36 inch | 39.00 | | 859.77 | 872.00 | 859.30 | 872.00 | 0.012051 | 3.00 | I-6 | J-4 | 864.40 | 864.09 | 865.50 | 865.19 | | | 59.50 | 8.42 | |
| P-12 | Pipe | | | 48 inch | 42.00 | | 859.38 | 872.00 | 859.30 | 872.00 | 0.001905 | 3.00 | I-5 | J-4 | 864.16 | 864.09 | 864.51 | 864.44 | | | 59.50 | 4.73 | |
| P-13 | Pipe | | | 54 inch | 129.00 | | 859.30 | 872.00 | 858.59 | 874.00 | 0.005504 | 3.00 | J-4 | J-3 | 863.31 | 863.00 | 864.29 | 863.87 | | | 119.00 | 10.23 | |
| P-14 | Pipe | | | 54 inch | 899.00 | | 858.59 | 874.00 | 853.65 | 864.00 | 0.005495 | 3.00 | J-3 | J-5 | 861.80 | 858.77 | 863.29 | 859.64 | | | 119.00 | 10.22 | |
| P-15 | Pipe | | | 54 inch | 433.00 | | 853.65 | 864.00 | 851.26 | 860.00 | 0.005520 | 3.00 | J-5 | J-6 | 858.06 | 856.49 | 858.94 | 857.36 | | | 119.00 | 10.24 | |
| P-16 | Pipe | | | 54 inch | 218.00 | | 851.26 | 860.00 | 850.00 | 860.00 | 0.005780 | 3.00 | J-6 | O-1 | 855.80 | 855.00 | 856.67 | 855.87 | | | 119.00 | 7.48 | |


Profile: MC 85: Baseline to Detention Basin
Scenario: Alternative 5
I-9
Sta: 0+00 ft
Inv Out: 880.42 ft
Rim: 884.00 ft
Sump: 880.42 ft
I-8
Sta: 1+00 ft
Inv In: 879.22 ft
Inv Out: 879.22 ft
Rim: 884.00 ft
Sump: 879.22 ft
J-1
Sta: 5+24 ft
Inv In: 874.13 ft
Inv Out: 874.13 ft
Rim: 882.00 ft
Sump: 874.13 ft
J-2
Sta: 10+54 ft
Inv In: 867.77 ft
Inv Out: 867.77 ft
Rim: 876.00 ft
Sump: 867.77 ft
I-7
Sta: 13+81 ft
Inv In: 863.85 ft
Inv Out: 863.85 ft
Rim: 875.00 ft
Sump: 863.85 ft
I-6
Sta: 17+21 ft
Inv In: 859.77 ft
Inv Out: 859.77 ft
Rim: 872.00 ft
Sump: 859.77 ft
J-4
Sta: 17+60 ft
Inv In: 859.30 ft
Inv In: 859.30 ft
Inv Out: 859.30 ft
Rim: 872.00 ft
Sump: 859.30 ft
J-3
Sta: 18+89 ft
Inv In: 858.59 ft
Inv Out: 858.59 ft
Rim: 874.00 ft
Sump: 858.59 ft
J-5
Sta: 27+88 ft
Inv In: 853.65 ft
Inv Out: 853.65 ft
Rim: 864.00 ft
Sump: 853.65 ft
J-6
Sta: 32+21 ft
Inv In: 851.26 ft
Inv Out: 851.26 ft
Rim: 860.00 ft
Sump: 851.26 ft
O-1
Sta: 34+39 ft
Inv In: 850.00 ft
Rim: 860.00 ft
Sump: 850.00 ft
P-1
100.00 ft
24 inch
Concrete
@ S = 0.012000 ft/ft
P-2
424.00 ft
36 inch
Concrete
@ S = 0.012005 ft/ft
P-3
530.00 ft
36 inch
Concrete
@ S = 0.012000 ft/ft
P-4
327.00 ft
36 inch
Concrete
@ S = 0.011988 ft/ft
P-5
340.00 ft
36 inch
Concrete
@ S = 0.012000 ft/ft
P-11
39.00 ft
36 inch
Concrete
@ S = 0.012051 ft/ft
P-13
129.00 ft
54 inch
Concrete
@ S = 0.005504 ft/ft
P-14
899.00 ft
54 inch
Concrete
@ S = 0.005495 ft/ft
P-15
433.00 ft
54 inch
Concrete
@ S = 0.005520 ft/ft
P-16
218.00 ft
54 inch
Concrete
@ S = 0.005780 ft/ft
885.00
880.00
875.00
870.00
865.00
860.00
855.00
850.00
Elevation (ft)
0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00 34+00 35+00
Station (ft)


Profile: MC 85: 9th to Detention Basin
Scenario: Alternative 5
I-1
Sta: 0+00 ft
Inv Out: 862.47 ft
Rim: 866.00 ft
Sump: 862.47 ft
I-2
Sta: 4+68 ft
Inv In: 861.54 ft
Inv Out: 861.54 ft
Rim: 868.00 ft
Sump: 861.54 ft
I-3
Sta: 10+43 ft
Inv In: 860.39 ft
Inv Out: 860.39 ft
Rim: 869.00 ft
Sump: 860.39 ft
I-4
Sta: 12+00 ft
Inv In: 860.07 ft
Inv Out: 860.07 ft
Rim: 870.00 ft
Sump: 860.07 ft
I-5
Sta: 15+45 ft
Inv In: 859.38 ft
Inv Out: 859.38 ft
Rim: 872.00 ft
Sump: 859.38 ft
J-4
Sta: 15+87 ft
Inv In: 859.30 ft
Inv In: 859.30 ft
Inv Out: 859.30 ft
Rim: 872.00 ft
Sump: 859.30 ft
J-3
Sta: 17+16 ft
Inv In: 858.59 ft
Inv Out: 858.59 ft
Rim: 874.00 ft
Sump: 858.59 ft
J-5
Sta: 26+15 ft
Inv In: 853.65 ft
Inv Out: 853.65 ft
Rim: 864.00 ft
Sump: 853.65 ft
J-6
Sta: 30+48 ft
Inv In: 851.26 ft
Inv Out: 851.26 ft
Rim: 860.00 ft
Sump: 851.26 ft
O-1
Sta: 32+66 ft
Inv In: 850.00 ft
Rim: 860.00 ft
Sump: 850.00 ft
P-10
468.00 ft 36 inch Concrete
@ S = 0.001987 ft/ft
P-9
575.00 ft 36 inch Concrete
@ S = 0.002000 ft/ft
P-8
157.00 ft 48 inch Concrete
@ S = 0.002038 ft/ft
P-7
345.00 ft 48 inch Concrete
@ S = 0.002000 ft/ft
P-12
42.00 ft 48 inch Concrete
@ S = 0.001905 ft/ft
P-13
129.00 ft 54 inch Concrete
@ S = 0.005504 ft/ft
P-14
899.00 ft 54 inch Concrete
@ S = 0.005495 ft/ft
P-15
433.00 ft 54 inch Concrete
@ S = 0.005520 ft/ft
P-16
218.00 ft 54 inch Concrete
@ S = 0.005780 ft/ft
880.00
875.00
870.00
865.00
860.00
855.00
850.00
845.00
Elevation (ft)
0+00 1+00 2+00 3+00 4+00 5+00 6+00 7+00 8+00 9+00 10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00 33+00
Station (ft)

# APPENDIX E

**Alternative Cost Analysis**

## Alternative Summary

**Alternative #1** – Do nothing.

**Alternative #2** – Localized drainage conveyance improvements at points of flooding. This would include culvert and channel improvements at 7th Street and Beloat Road along with off-site stormwater conveyance through or around platted development southeast of 9th Street and Centre Street.

- Scupper inlet at Centre and 9th
- Approximately 500' of channel improvements along 7th to Beloat
  - Remove existing concrete (~5 sq. yd.)
  - Improve inlet (Scupper)
  - Excavate channel (~800 cu. yd.)
    - Assumptions: Existing channel dimensions – 2:1 side slopes, 4' depth v-channel. Improved channel dimensions – 2:1 side slopes, 5' bottom width, 5' depth.
- Approximately 1225' of channel improvements along Beloat
  - Remove existing concrete (~225 sq. yd.)
  - Excavate channel (~3400 cu. yd.)
    - Assumptions: Improved channel dimensions – 2:1 side slopes, 5' bottom width, 5' depth.
- Approximately 1360' of channel improvements of existing surface drain
  - Excavate channel (~1420 cu. yd.)
    - Assumptions: Existing channel dimensions – 3:1 left side slope, 1.5:1 right side slope, 3' bottom width, 3' depth. Improved channel dimensions – 1:1 side slopes, 6.5' bottom width, 5' depth.
- 7 headwalls
- 3 box culverts (4' x 8')
- 90' of 30" RCP
- 250' of 36" RCP
- Pavement replacement (~87 sq. yd.)
  - Assumptions: 2x width of pipe under pavement.
- Removal of Asphaltic Concrete (~87 sq. yd.)
  - Assumptions: 2x width of pipe under pavement.
- Removal of Pipe (~400 ft.)
- 6" Channel Lining (~2790 sq. yd.)
- Excavation Export (~5620 cu. yd.)

**Alternative #3** – Park detention with 10-year inlet and outlet.

- Approx. 20,000 $yd^3$ excavation and export
- 5 headwalls

- Approx. 4000' of 48" RCP
- 8 manholes
- 8 catch basins
- Scupper inlet
- Tree removal (~ 40)
- Removal of existing Asphaltic Concrete (~ 15 sq. yd.)
    - Assumptions: 2x width of pipe under pavement.
- Pavement Replacement (~15 sq. yd.)

**Alternative #4** – 10-year storm drain between 4th and 6th along Monroe, then south to 10-year basin. 10-year storm drain between 6th and 9th along Monroe, then east to 10-year basin.

- Scupper inlet at Centre and 9th
- Approximately 500' of channel improvements along 7th to Beloat
    - Remove existing concrete (~5 sq. yd.)
    - Improve inlet (Scupper)
    - Excavate channel (~800 cu. yd.)
        - Assumptions: Existing channel dimensions – 2:1 side slopes, 4' depth v-channel. Improved channel dimensions – 2:1 side slopes, 5' bottom width, 5' depth.
- Approximately 1225' of channel improvements along Beloat
    - Remove existing concrete (~225 sq. yd.)
    - Excavate channel (~3400 cu. yd.)
        - Assumptions: Improved channel dimensions – 2:1 side slopes, 5' bottom width, 5' depth.
- Approximately 1360' of channel improvements of existing surface drain
    - Excavate channel (~1420 cu. yd.)
        - Assumptions: Existing channel dimensions – 3:1 left side slope, 1.5:1 right side slope, 3' bottom width, 3' depth. Improved channel dimensions – 1:1 side slopes, 6.5' bottom width, 5' depth.
- 12 headwalls
- 3 box culverts (4' x 8')
- 440' of 24" RCP
- 90' of 30" RCP
- 565' of 36" RCP
- 4400' 0f 48" RCP
- 2125' of 54" RCP
- 3430' of 60" RCP
- 1940' of 84" RCP
- 77,500 $yd^3$ excavation
- 20 manholes
- 22 catch basins

- Pavement replacement (~3365 sq. yd.)
  - Assumptions: 2x width of pipe under pavement.
- Removal of Asphaltic Concrete (~3365 sq. yd.)
  - Assumptions: 2x width of pipe under pavement.
- Removal of Pipe (~3800 ft.)
- 6" Channel Lining (~2790 sq. yd.)
- Excavation Export (~83,120 cu. yd.)
- Land Acquisition (~5.5 ac)

**Alternative #4a** – 10-year storm drain between 4th and 6th along Monroe, then south to 100-year basin. 10-year storm drain between 6th and 9th along Monroe, then east to 100-year basin.

- Scupper inlet at Centre and 9th
- Approximately 500' of channel improvements along 7th to Beloat
  - Remove existing concrete (~5 sq. yd.)
  - Improve inlet (Scupper)
  - Excavate channel (~800 cu. yd.)
    - Assumptions: Existing channel dimensions – 2:1 side slopes, 4' depth v-channel. Improved channel dimensions – 2:1 side slopes, 5' bottom width, 5' depth.
- Approximately 1225' of channel improvements along Beloat
  - Remove existing concrete (~225 sq. yd.)
  - Excavate channel (~3400 cu. yd.)
    - Assumptions: Improved channel dimensions – 2:1 side slopes, 5' bottom width, 5' depth.
- Approximately 1360' of channel improvements of existing surface drain
  - Excavate channel (~1420 cu. yd.)
    - Assumptions: Existing channel dimensions – 3:1 left side slope, 1.5:1 right side slope, 3' bottom width, 3' depth. Improved channel dimensions – 1:1 side slopes, 6.5' bottom width, 5' depth.
- 12 headwalls
- 3 box culverts (4' x 8')
- 440' of 24" RCP
- 90' of 30" RCP
- 565' of 36" RCP
- 4400' 0f 48" RCP
- 2125' of 54" RCP
- 3430' of 60" RCP
- 1940' of 84" RCP
- 137,625 $yd^3$ excavation
- 20 manholes
- 22 catch basins

- Pavement replacement (~3365 sq. yd.)
    - Assumptions: 2x width of pipe under pavement.
- Removal of Asphaltic Concrete (~3365 sq. yd.)
    - Assumptions: 2x width of pipe under pavement.
- Removal of Pipe (~3800 ft.)
- 6" Channel Lining (~2790 sq. yd.)
- Excavation Export (~143,245 cu. yd.)
- Land Acquisition (~10.5 ac)

**Alternative #5** – 10-year storm drain from 4th to 9th, either along Monroe or Centre or both, then east to 10-year basin.

- 4 headwalls
- 540' of 24" RCP
- 2705' of 36" RCP
- 3830' 0f 48" RCP
- 1680' of 54" RCP
- 895' of 60" RCP
- 930' of 72" RCP
- 1315' of 84" RCP
- 2000' of 96" RCP
- 48,500 $yd^3$ excavation
- 22 manholes
- 25 catch basins
- Pavement replacement (~3410 sq. yd.)
    - Assumptions: 2x width of pipe under pavement.
- Removal of Asphaltic Concrete (~3410 sq. yd.)
    - Assumptions: 2x width of pipe under pavement.
- Removal of Pipe (~3800 ft.)
- Excavation Export (~48,500 cu. yd.)
- Land Acquisition (~4.0 ac)

**Alternative #5a** – 10-year storm drain from 4th to 9th, either along Monroe or Centre or both, then east to 100-year basin.

- 4 headwalls
- 540' of 24" RCP
- 2705' of 36" RCP
- 3830' 0f 48" RCP
- 1680' of 54" RCP
- 895' of 60" RCP

- 930' of 72" RCP
- 1315' of 84" RCP
- 2000' of 96" RCP
- 84,750 $yd^3$ excavation
- 22 manholes
- 25 catch basins
- Pavement replacement (~3410 sq. yd.)
    - Assumptions: 2x width of pipe under pavement.
- Removal of Asphaltic Concrete (~3410 sq. yd.)
    - Assumptions: 2x width of pipe under pavement.
- Removal of Pipe (~3800 ft.)
- Excavation Export (~84,750 cu. yd.)
- Land Acquisition (~6.5 ac)

**Alternative #6** – Combination of Alt. #5 and Alt. #2

- 540' of 24" RCP
- 90' of 30" RCP
- 2960' of 36" RCP
- 3830' 0f 48" RCP
- 1680' of 54" RCP
- 895' of 60" RCP
- 930' of 72" RCP
- 1315' of 84" RCP
- 2000' of 96" RCP
- 48,500 $yd^3$ excavation
- 22 manholes
- 25 catch basins
- Scupper inlet at Centre and 9th
- Approximately 500' of channel improvements along 7th to Beloat
    - Remove existing concrete (~5 sq. yd.)
    - Improve inlet (Scupper)
    - Excavate channel (~800 cu. yd.)
        - Assumptions: Existing channel dimensions – 2:1 side slopes, 4' depth v-channel. Improved channel dimensions – 2:1 side slopes, 5' bottom width, 5' depth.
- Approximately 1225' of channel improvements along Beloat
    - Remove existing concrete (~225 sq. yd.)
    - Excavate channel (~3400 cu. yd.)

        - Assumptions: Improved channel dimensions – 2:1 side slopes, 5' bottom width, 5' depth.
- Approximately 1360' of channel improvements of existing surface drain
    - Excavate channel (~1420 cu. yd.)
        - Assumptions: Existing channel dimensions – 3:1 left side slope, 1.5:1 right side slope, 3' bottom width, 3' depth. Improved channel dimensions – 1:1 side slopes, 6.5' bottom width, 5' depth.
- 11 headwalls
- 3 box culverts (4' x 8')
- Pavement replacement (~3497 sq. yd.)
    - Assumptions: 2x width of pipe under pavement.
- Removal of Asphaltic Concrete (~3497 sq. yd.)
    - Assumptions: 2x width of pipe under pavement.
- Removal of Pipe (~4200 ft.)
- 6" Channel Lining (~2790 sq. yd.)
- Excavation Export (~54120 cu. yd.)
- Land Acquisition (~4.0 ac)

**Alternative #6a** – Combination of Alt. #5a and Alt. #2

- 540' of 24" RCP
- 90' of 30" RCP
- 2960' of 36" RCP
- 3830' 0f 48" RCP
- 1680' of 54" RCP
- 895' of 60" RCP
- 930' of 72" RCP
- 1315' of 84" RCP
- 2000' of 96" RCP
- 84,750 $yd^3$ excavation
- 22 manholes
- 25 catch basins
- Scupper inlet at Centre and 9th
- Approximately 500' of channel improvements along 7th to Beloat
    - Remove existing concrete (~5 sq. yd.)
    - Improve inlet (Scupper)
    - Excavate channel (~800 cu. yd.)
        - Assumptions: Existing channel dimensions – 2:1 side slopes, 4' depth v-channel. Improved channel dimensions – 2:1 side slopes, 5' bottom width, 5' depth.
- Approximately 1225' of channel improvements along Beloat

  - Remove existing concrete (~225 sq. yd.)
  - Excavate channel (~3400 cu. yd.)
    - Assumptions: Improved channel dimensions – 2:1 side slopes, 5' bottom width, 5' depth.
- Approximately 1360' of channel improvements of existing surface drain
  - Excavate channel (~1420 cu. yd.)
    - Assumptions: Existing channel dimensions – 3:1 left side slope, 1.5:1 right side slope, 3' bottom width, 3' depth. Improved channel dimensions – 1:1 side slopes, 6.5' bottom width, 5' depth.
- 11 headwalls
- 3 box culverts (4' x 8')
- Pavement replacement (~3497 sq. yd.)
  - Assumptions: 2x width of pipe under pavement.
- Removal of Asphaltic Concrete (~3497 sq. yd.)
  - Assumptions: 2x width of pipe under pavement.
- Removal of Pipe (~4200 ft.)
- 6" Channel Lining (~2790 sq. yd.)
- Excavation Export (~90,370 cu. yd.)
- Land Acquisition (~6.5 ac)

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| | |
|---|---|
| Sht.: | Unit Cost Sheet |
| Job No.: | 2013.03 |
| By: | Project Engineering |
| Date: | 6/4/2004 |
| Chkd.: | LSM |
| Rev.: | MDH |

Comments:

Unit Price for Buckeye CAR Project - 2004

| Item | Unit Cost | Unit | Reference |
|---|---|---|---|
| Drainage Excavation | $8.00 | yd^3 | Ref: ADOT Contruction Cost 1999 |
| Concrete Headwall | $2,500.00 | ea. | Ref: City of Phoenix - Bid Item List - March, 2004 |
| Concrete Headwall | $2,397.00 | ea. | Ref: ADOT Contruction Cost 1999 |
| 24" Storm Sewer Pipe | $69.00 | ft. | Ref: City of Phoenix - Bid Item List - March, 2004 |
| 24" Storm Sewer Pipe | $61.67 | ft. | Ref: ADOT Contruction Cost 1999 |
| 30" Storm Sewer Pipe | $70.00 | ft. | Ref: ADOT Contruction Cost 1997 |
| 36" Storm Sewer Pipe | $86.00 | ft. | Ref: City of Phoenix - Bid Item List - March, 2004 |
| 36" Storm Sewer Pipe | $90.56 | ft. | Ref: ADOT Contruction Cost 1999 |
| 48" Storm Sewer Pipe | $124.00 | ft. | Ref: City of Phoenix - Bid Item List - March, 2004 |
| 54" Storm Sewer Pipe | $154.00 | ft. | Ref: City of Phoenix - Bid Item List - June, 1999 |
| 54" Storm Sewer Pipe | $153.00 | ft. | Ref: ADOT Contruction Cost 1999 |
| 60" Storm Sewer Pipe | $170.00 | ft. | Ref: ADOT Contruction Cost 1997 |
| 72" Storm Sewer Pipe | $210.00 | ft. | Ref: ADOT Contruction Cost 1997 |
| 84" Storm Sewer Pipe | $250.00 | ft. | Ref: ADOT Contruction Cost 1997 |
| 90" Storm Sewer Pipe | $315.00 | ft. | Ref: ADOT Contruction Cost 1997 |
| 24" CB Connector Pipe | $80.00 | ft. | Ref: City of Phoenix - Bid Item List - March, 2004 |
| Acreage | $70,000.00 | Acre | Estimated by FCDMC |
| Pavement Replacement | $45.00 | yd^2 | Dynamite Road Project - COP - 2001 |
| 6" Channel Lining | $40.00 | yd^2 | Ref: ADOT Contruction Cost 1999 |
| Earthwork | $3.50 | yd^3 | Ref: City of Phoenix - Bid Item List - July, 2002 |
| Export | $3.00 | yd^3 | Ref: City of Phoenix - Bid Item List - July, 2002 |
| Storm Sewer Manhole | $2,655.00 | each | Ref: City of Phoenix - Bid Item List - March, 2004 |
| Street curb | $10.00 | ft. | Ref: ADOT Contruction Cost 1999 |
| Removal of Concrete Pavement | $10.00 | yd^2 | Ref: ADOT Contruction Cost 1997 |
| Removal of Asphaltic Concrete | $2.00 | yd^2 | Ref: ADOT Contruction Cost 1997 |
| Removal of Tree | $1,000.00 | ea. | Ref: ADOT Contruction Cost 1997 |
| Removal of Pipe | $15.00 | ft. | Ref: ADOT Contruction Cost 1997 |
| Catch Basin - MAG 533-1 | $3,000.00 | ea. | Ref: ADOT Contruction Cost 1997 |
| Precast Concrete Box Culvert | $600.00 | ft. | Ref: ADOT Contruction Cost 1999 |
| Scupper | $2,000.00 | ea. | Ref: ADOT Contruction Cost 1997 |
| Shotcrete | $120.00 | yd^2 | Ref: ADOT Contruction Cost 1997 |

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|---|---|
| Sht.: | Alt 2 |
| Job No.: | 2013.03 |
| By: | Project Engineering |
| Date: | 6/4/2004 |
| Chkd.: | LSM |
| Rev.: | MDH |

Comments: **ALTERNATIVE 2 -Park detention and Outfall**

| Improvement | Size | Material | Quantity | | Unit Cost | Estimated Cost |
|---|---|---|---|---|---|---|
| Removal of Asphaltic Concrete | | | 15 | yd^2 | $12 | $180 |
| Tree Removal/Replacement | | | 40 | ea | $1,000 | $40,000 |
| Site Excavation | | | 20000 | yd^3 | $4 | $70,000 |
| Excavation Export | | | 20000 | yd^3 | $3 | $60,000 |
| Headwalls | | Reinforced Concrete | 5 | ea | $2,500 | $12,500 |
| Scupper | | Reinforced Concrete | 1 | ea | $2,000 | $2,000 |
| Storm Drain Pipe | 48" | RCP | 4000 | ft | $124 | $496,000 |
| Storm Drain Manhole | | | 8 | ea | $2,655 | $21,240 |
| Asphaltic Pavement Replacement | | | 15 | yd^2 | $45 | $675 |
| MAG 533-1 Catch Basin | | | 8 | ea | $3,000 | $24,000 |

Total Improvement Costs $726,595

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|---|---|
| Sht.: | Alt 3 |
| Job No.: | 2013.03 |
| By: | Project Engineering |
| Date: | 6/4/2004 |
| Chkd.: | LSM |
| Rev.: | MDH |

Comments: **ALTERNATIVE 3 - Localized Drainage Conveyance Improvements at Points of Flooding.**

| Improvement | Size | Material | Quantity | Unit Cost | Estimated Cost |
|---|---|---|---|---|---|
| Removal of Existing Concrete | | | 230 yd^2 | $10 | $2,300 |
| Removal of Asphaltic Concrete | | | 87 yd^2 | $2 | $174 |
| Removal of Existing Pipe | | | 400 ft | $15 | $6,000 |
| Channel Excavation | | | 5620 yd^3 | $8 | $44,960 |
| Excavation Export | | | 5620 yd^3 | $3 | $16,860 |
| 6" Channel Lining | | Reinforced Concrete | 2790 yd^2 | $40 | $111,600 |
| Headwalls | | Reinforced Concrete | 7 ea | $2,500 | $17,500 |
| Scupper | | Reinforced Concrete | 2 ea | $2,000 | $4,000 |
| Box Culvert | 4' x 8' | Precast Concrete | 195 ft | $600 | $117,000 |
| Storm Drain Pipe | 30" | RCP | 90 ft | $70 | $6,300 |
| Storm Drain Pipe | 36" | RCP | 250 ft | $91 | $22,750 |
| Asphaltic Pavement Replacement | | | 87 yd^2 | $45 | $3,915 |
| | | Total Improvement Costs | | | $353,359 |

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|---|---|
| Sht.: | Alt 4 |
| Job No.: | 2013.03 |
| By: | Project Engineering |
| Date: | 6/4/2004 |
| Chkd.: | LSM |
| Rev.: | MDH |

Comments: **ALTERNATIVE 4 - 10-year SD with 10-year Basins at 7th St/ Beloat Rd and Apache Rd between Monroe and Centre**

| Improvement | Size | Material | Quantity | Unit Cost | Estimated Cost |
|---|---|---|---|---|---|
| Removal of Existing Concrete | | | 230 yd^2 | $10 | $2,300 |
| Removal of Asphaltic Concrete | | | 3365 yd^2 | $2 | $6,730 |
| Removal of Existing Pipe | | | 3800 ft | $15 | $57,000 |
| Channel Excavation | | | 5620 yd^3 | $8 | $44,960 |
| Site Excavation | | | 77500 yd^3 | $4 | $271,250 |
| Excavation Export | | | 83120 yd^3 | $3 | $249,360 |
| 6" Channel Lining | | Reinforced Concrete | 2790 yd^2 | $40 | $111,600 |
| Headwalls | | Reinforced Concrete | 12 ea | $2,500 | $30,000 |
| Scupper | | Reinforced Concrete | 2 ea | $2,000 | $4,000 |
| Box Culvert | 4' x 8' | Precast Concrete | 195 ea | $600 | $117,000 |
| Storm Drain Manhole | | | 20 ea | $2,655 | $53,100 |
| MAG 533-1 Catch Basin | | | 22 ea | $3,000 | $66,000 |
| Storm Drain Pipe | 24" | RCP | 440 ft | $69 | $30,360 |
| Storm Drain Pipe | 30" | RCP | 90 ft | $70 | $6,300 |
| Storm Drain Pipe | 36" | RCP | 565 ft | $91 | $51,415 |
| Storm Drain Pipe | 48" | RCP | 4400 ft | $124 | $545,600 |
| Storm Drain Pipe | 54" | RCP | 2125 ft | $154 | $327,250 |
| Storm Drain Pipe | 60" | RCP | 3430 ft | $170 | $583,100 |
| Storm Drain Pipe | 84" | RCP | 1940 ft | $250 | $485,000 |
| Asphaltic Pavement Replacement | | | 3365 yd^2 | $45 | $151,425 |
| Land Acquisition | | | 5.5 ac | $70,000 | $385,000 |
| | | Total Improvement Costs | | | $3,578,750 |

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| | |
|---|---|
| Sht.: | Alt 5 |
| Job No.: | 2013.03 |
| By: | Project Engineering |
| Date: | 6/4/2004 |
| Chkd.: | LSM |
| Rev.: | MDH |

Comments: **ALTERNATIVE 5 - 10-year SD with 10-year Basin at Apache between Monroe and Centre**

| Improvement | Size | Material | Quantity | Unit Cost | Estimated Cost |
|---|---|---|---|---|---|
| Removal of Asphaltic Concrete | | | 3410 yd^2 | $2 | $6,820 |
| Removal of Existing Pipe | | | 3800 ft | $15 | $57,000 |
| Site Excavation | | | 48500 yd^3 | $4 | $169,750 |
| Excavation Export | | | 48500 yd^3 | $3 | $145,500 |
| Headwalls | | Reinforced Concrete | 4 ea | $2,500 | $10,000 |
| Storm Drain Manhole | | | 22 ea | $2,655 | $58,410 |
| MAG 533-1 Catch Basin | | | 25 ea | $3,000 | $75,000 |
| Storm Drain Pipe | 24" | RCP | 540 ft | $69 | $37,260 |
| Storm Drain Pipe | 36" | RCP | 2705 ft | $91 | $246,155 |
| Storm Drain Pipe | 48" | RCP | 3830 ft | $124 | $474,920 |
| Storm Drain Pipe | 54" | RCP | 1680 ft | $154 | $258,720 |
| Storm Drain Pipe | 60" | RCP | 895 ft | $170 | $152,150 |
| Storm Drain Pipe | 72" | RCP | 930 ft | $210 | $195,300 |
| Storm Drain Pipe | 84" | RCP | 1315 ft | $250 | $328,750 |
| Storm Drain Pipe | 96" | RCP | 2000 ft | $315 | $630,000 |
| Asphaltic Pavement Replacement | | | 3410 yd^2 | $45 | $153,450 |
| Land Acquisition | | | 4 ac | $70,000 | $280,000 |
| | | Total Improvement Costs | | | $3,279,185 |

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| | |
|---|---|
| Sht.: | Alt 6 |
| Job No.: | 2013.03 |
| By: | Project Engineering |
| Date: | 6/4/2004 |
| Chkd.: | LSM |
| Rev.: | MDH |

Comments: **ALTERNATIVE 6 - Combination of Alt 2 and Alt 5**

| Improvement | Size | Material | Quantity | Unit Cost | Estimated Cost |
|---|---|---|---|---|---|
| Removal of Existing Concrete | | | 230 yd^2 | $10 | $2,300 |
| Removal of Asphaltic Concrete | | | 3497 yd^2 | $2 | $6,994 |
| Removal of Existing Pipe | | | 4200 ft | $15 | $63,000 |
| Channel Excavation | | | 5620 yd^3 | $8 | $44,960 |
| Site Excavation | | | 48500 yd^3 | $4 | $169,750 |
| Excavation Export | | | 54120 yd^3 | $3 | $162,360 |
| 6" Channel Lining | | Reinforced Concrete | 2790 yd^2 | $40 | $111,600 |
| Headwalls | | Reinforced Concrete | 11 ea | $2,500 | $27,500 |
| Scupper | | Reinforced Concrete | 2 ea | $2,000 | $4,000 |
| Box Culvert | 4' x 8' | Precast Concrete | 195 ea | $600 | $117,000 |
| Storm Drain Manhole | | | 22 ea | $2,655 | $58,410 |
| MAG 533-1 Catch Basin | | | 25 ea | $3,000 | $75,000 |
| Storm Drain Pipe | 24" | RCP | 540 ft | $69 | $37,260 |
| Storm Drain Pipe | 30" | RCP | 90 ft | $70 | $6,300 |
| Storm Drain Pipe | 36" | RCP | 2960 ft | $91 | $269,360 |
| Storm Drain Pipe | 48" | RCP | 3830 ft | $124 | $474,920 |
| Storm Drain Pipe | 54" | RCP | 1680 ft | $154 | $258,720 |
| Storm Drain Pipe | 60" | RCP | 895 ft | $170 | $152,150 |
| Storm Drain Pipe | 72" | RCP | 930 ft | $210 | $195,300 |
| Storm Drain Pipe | 84" | RCP | 1940 ft | $250 | $485,000 |
| Storm Drain Pipe | 96" | RCP | 2000 ft | $315 | $630,000 |
| Asphaltic Pavement Replacement | | | 3497 yd^2 | $45 | $157,365 |
| Land Acquisition | | | 4 ac | $70,000 | $280,000 |
| | | Total Improvement Costs | | | $3,789,249 |

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Sht.: Cost Summary
Job No.: 2013.03
By: Project Engineering
Date: 6/4/2004
Chkd.: LSM
Rev.: MDH

Comments:

| Alternative (Description) | Cost | Cost Rank | Level of Protection Rank @ 7th and Beloat (x1.5) | Level of Protection Rank @ 9th and Centre | Level of Protection Rank @ 9th and Monroe | Total | Overall Rank |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| Alt 1 (Do Nothing) | $0 | 1 | 5 (7.5) | 5 | 3 | 16.5 | 5 |
| Alt 2 (Park Detention) | $726,595 | 3 | 5 (7.5) | 4 | 2 | 16.5 | 5 |
| Alt 3 ( Localized drainage improvements at points of flooding) | $353,359 | 2 | 3 (4.5) | 2 | 3 | 11.5 | 3 |
| Alt 4 (10-yr storm drain w/ 10-yr basins @ 7th/Beloat and Apache) | $3,578,750 | 5 | 2 (3) | 1 | 1 | 10 | 2 |
| Alt 5 (10-yr storm drain w/ 10-yr basin @ Apache) | $3,279,185 | 4 | 4 (6) | 3 | 1 | 14 | 4 |
| Alt 6 (Combination of Alt 2 and Alt 5) | $3,789,249 | 6 | 1 (1.5) | 1 | 1 | 9.5 | 1 |

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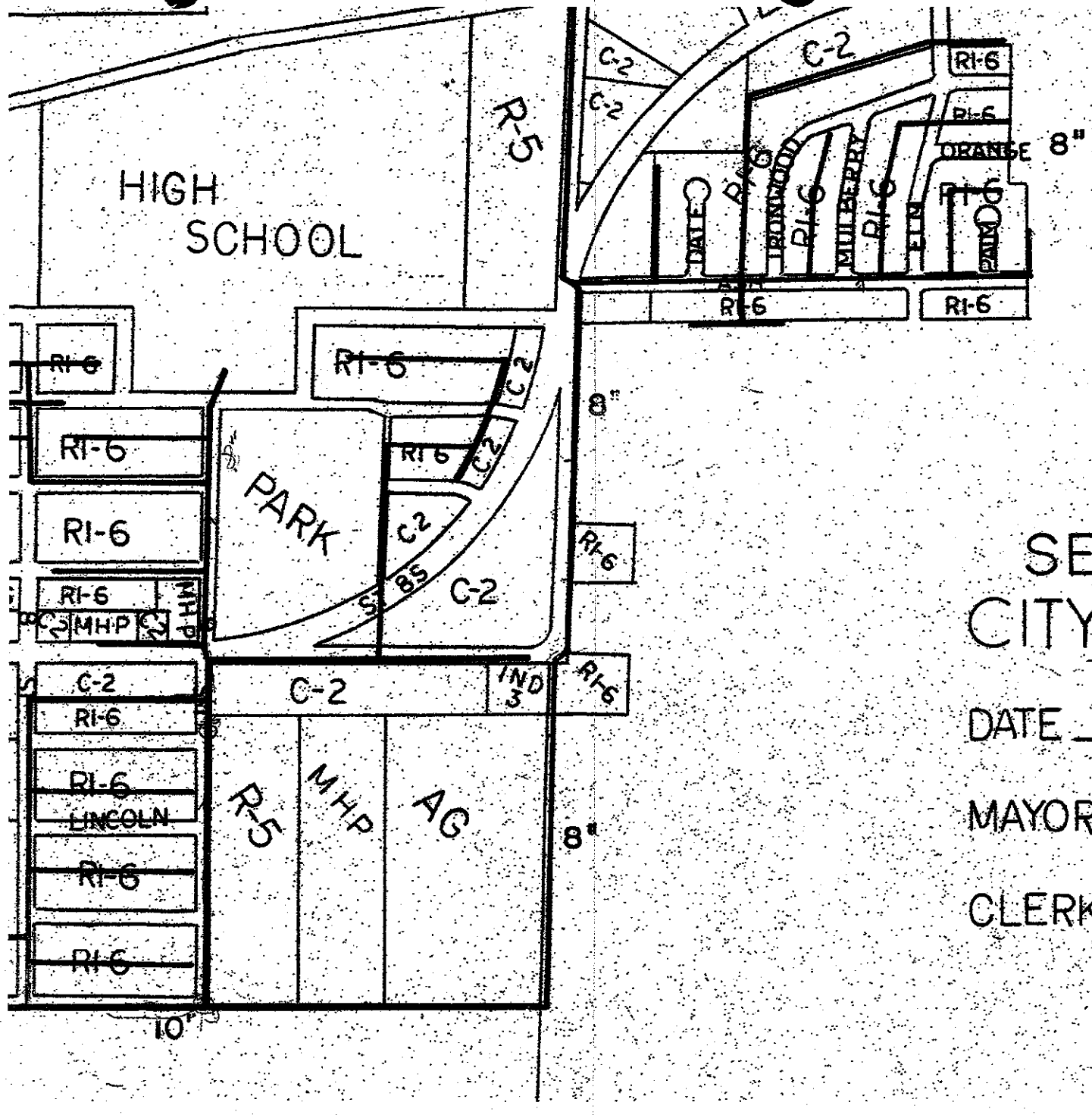
Sht.: Cost Summary
Job No.: 2013.03
By: Project Engineering
Date: 6/4/2004
Chkd.: LSM
Rev.: MDH

Comments:

| Alternative (Description) | Cost | Cost Rank (x2) | Level of Protection Rank @ 7th and Beloat (x1.5) | Level of Protection Rank @ 9th and Centre | Level of Protection Rank @ 9th and Monroe | Total | Overall Rank |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| Alt 1 (Do Nothing) | $0 | 1 (2) | 5 (7.5) | 5 | 3 | 17.5 | 4 |
| Alt 2 (Park Detention) | $726,595 | 3 (6) | 5 (7.5) | 4 | 2 | 19.5 | 6 |
| Alt 3 ( Localized drainage improvements at points of flooding) | $353,359 | 2 (4) | 3 (4.5) | 2 | 3 | 13.5 | 1 |
| Alt 4 (10-yr storm drain w/ 10-yr basins @ 7th/Beloat and Apache) | $3,578,750 | 5 (10) | 2 (3) | 1 | 1 | 15 | 2 |
| Alt 5 (10-yr storm drain w/ 10-yr basin @ Apache) | $3,279,185 | 4 (8) | 4 (6) | 3 | 1 | 18 | 5 |
| Alt 6 (Combination of Alt 2 and Alt 5) | $3,789,249 | 6 (12) | 1 (1.5) | 1 | 1 | 15.5 | 3 |

# APPENDIX F

**Utility Maps**

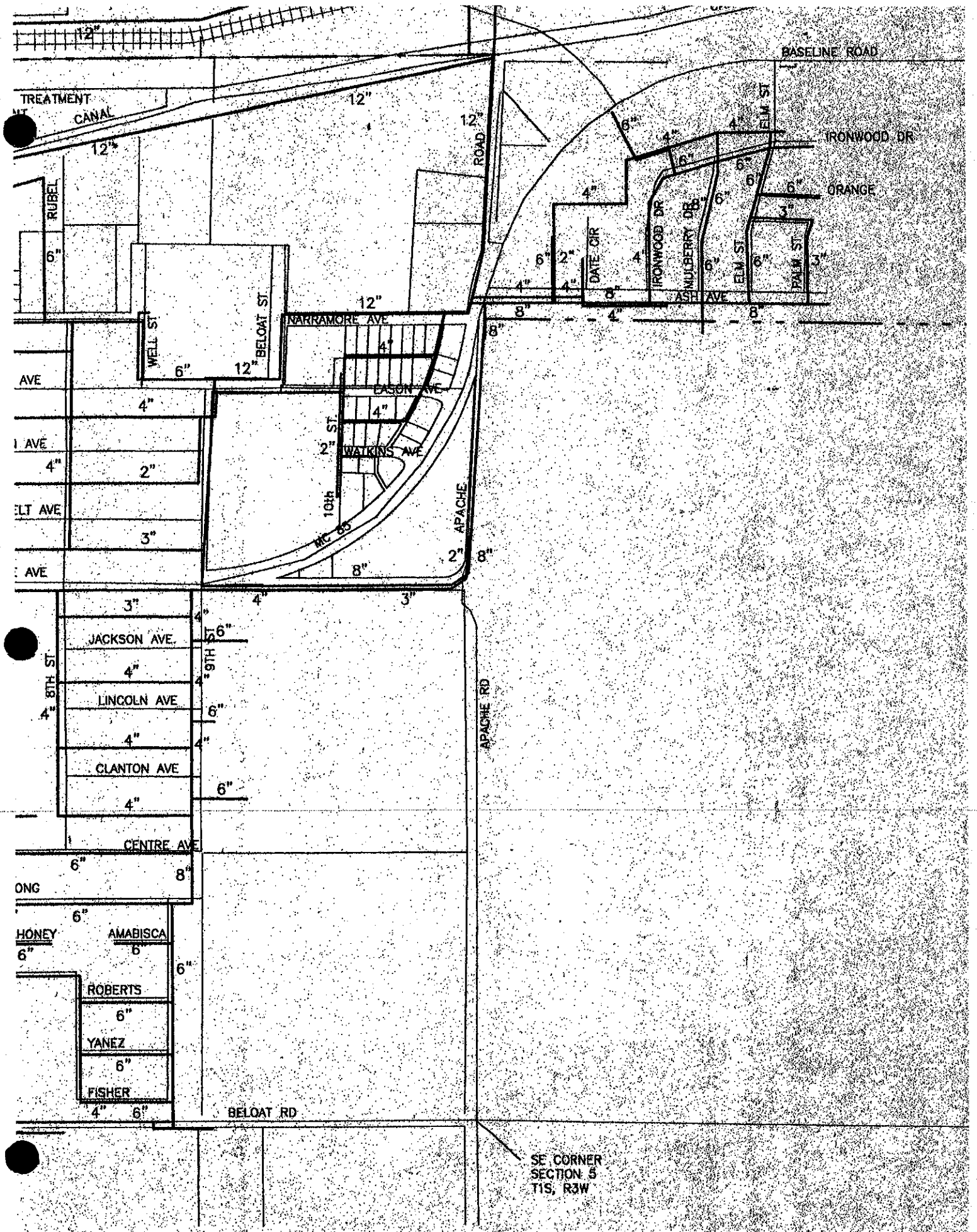



# SEWER MAP
# CITY OF BUCKEYE

DATE MARCH 21, 1985

MAYOR Robert H. Strander
ROBERT STRANDER

CLERK
FRED CARPENTER




# TOWN OF BUCKEYE

N1-W31

S1-W32

S1-W30

S1-W31

OLD DOC NUMBER

NE1/4 SEC 4 T1S - R3W

4010030042

USGS NUMBER

DATE: 05-15-03 TSW

SCALE: 1" = 100'

SOUTHWEST GAS CORPORATION

GAS DISTRIBUTION SYSTEM

PHOENIX, ARIZONA

NOTE:

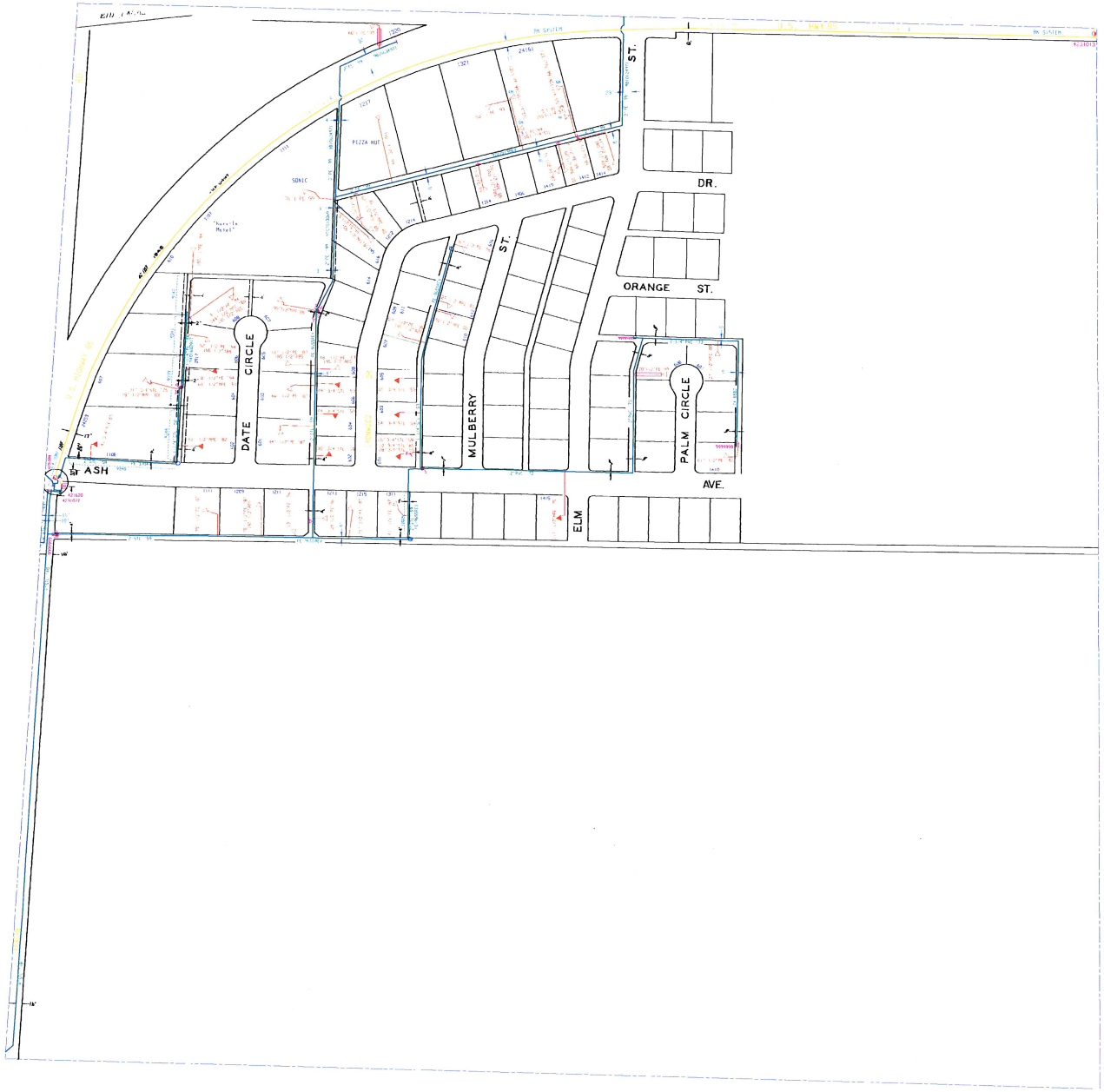
SOUTHWEST GAS CORPORATION DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OR ELEVATIONS OF THE UTILITIES AS SHOWN ON THIS MAP.

NO BORDER MAP

N1-W32

S1-W33

S1-W31




S1-W32

OLD DOC NUMBER

NW1/4 SEC 4 T1S - R3W

401003041

USGS NUMBER

DATE: 05-15-03 TSW

SCALE: 1" = 100'

SOUTHWEST GAS CORPORATION

GAS DISTRIBUTION SYSTEM

PHOENIX, ARIZONA

NOTE:

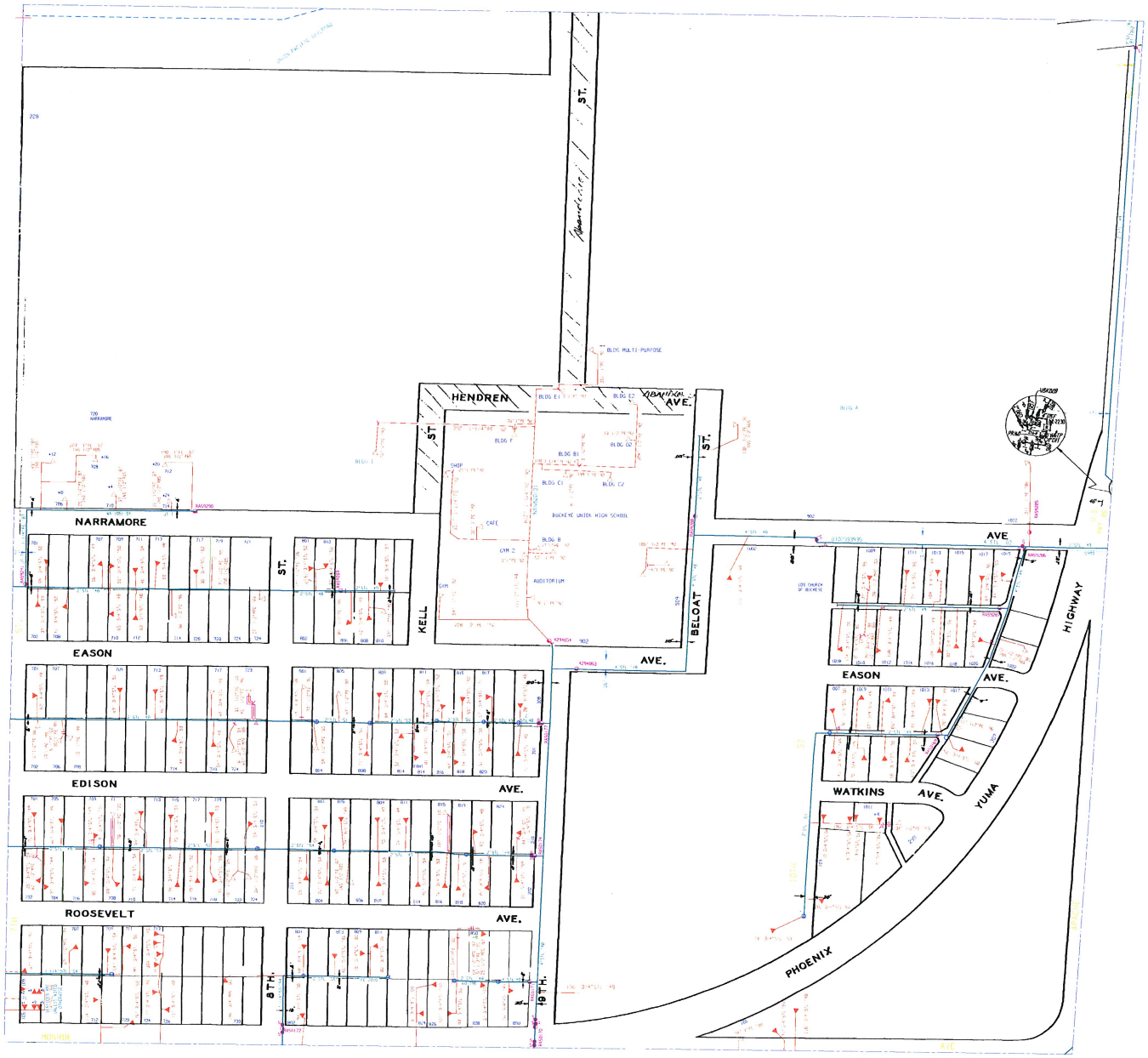
SOUTHWEST GAS CORPORATION DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OR ELEVATIONS OF THE UTILITIES AS SHOWN ON THIS MAP.

NO BORDER MAP

N1-W33

S1-W34

S1-W32




S1-W33

OLD DOC NUMBER

NE1/4 SEC 5 T1S - R3W

4010030052 USGS NUMBER

DATE: 10-15-03 JCD

SCALE: 1" = 100'

SOUTHWEST GAS CORPORATION

GAS DISTRIBUTION SYSTEM

PHOENIX, ARIZONA

NOTE:

SOUTHWEST GAS CORPORATION DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OR ELEVATIONS OF THE UTILITIES AS SHOWN ON THIS MAP.

S2-W33

N1-W34

S1-W35

S1-W33

S2-W34

S1-W34

OLD DOC NUMBER

NW1/4 SEC 5 T1S - R3W

4010030051

USGS NUMBER

DATE: 08-05-03 TSW

SCALE: 1" = 100'

SOUTHWEST GAS CORPORATION

GAS DISTRIBUTION SYSTEM

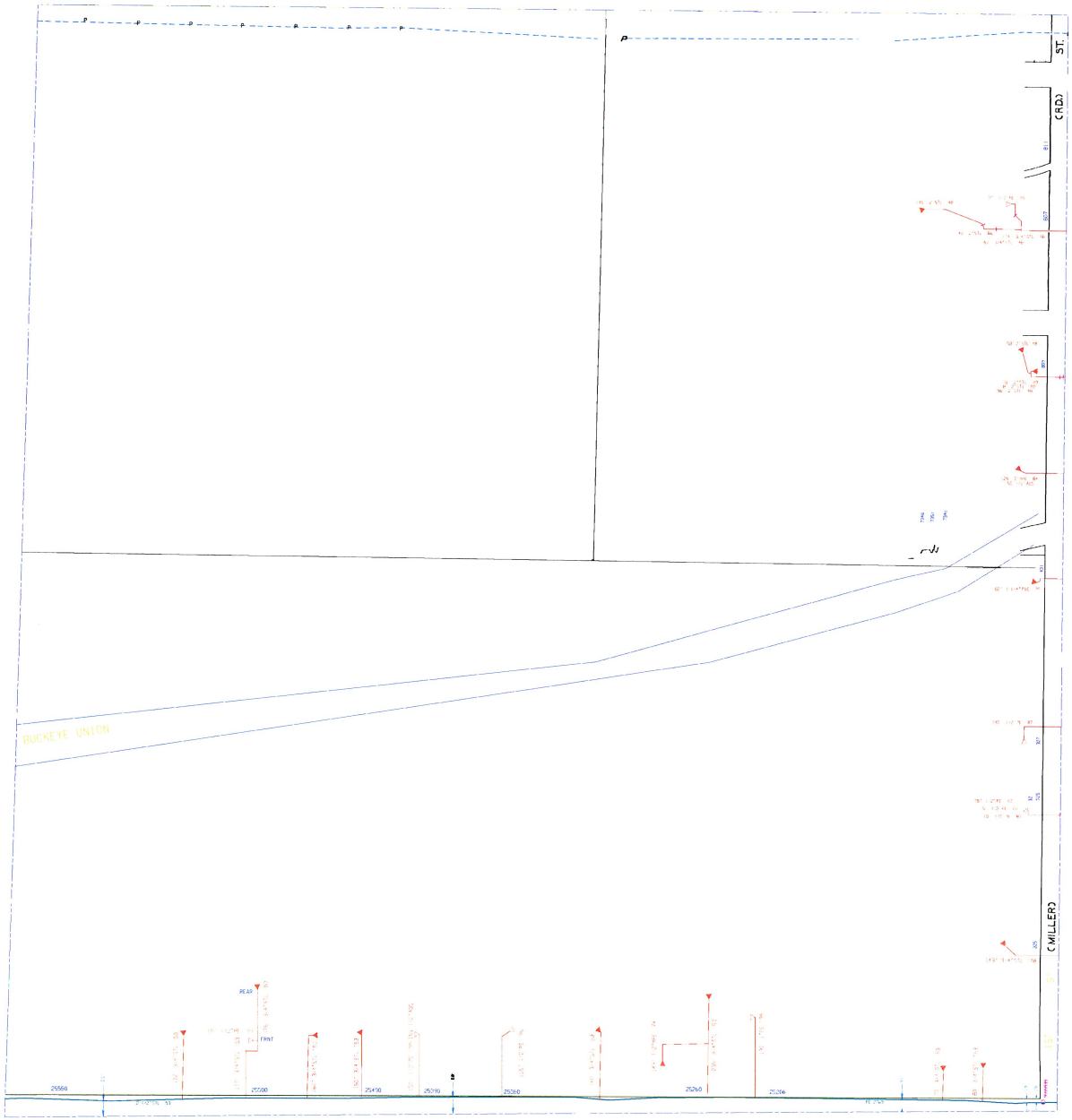
PHOENIX, ARIZONA

NOTE:

SOUTHWEST GAS CORPORATION DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OR ELEVATIONS OF THE UTILITIES AS SHOWN ON THIS MAP.

N1-W35

S1-W36




S1-W34

S2-W35

S1-W35

OLD DOC NUMBER

NE1/4 SEC 6 T1S - R3W

4010030062

UGGS NUMBER

DATE: 05-15-03 TSW

SCALE: 1" = 100'

SOUTHWEST GAS CORPORATION

GAS DISTRIBUTION SYSTEM

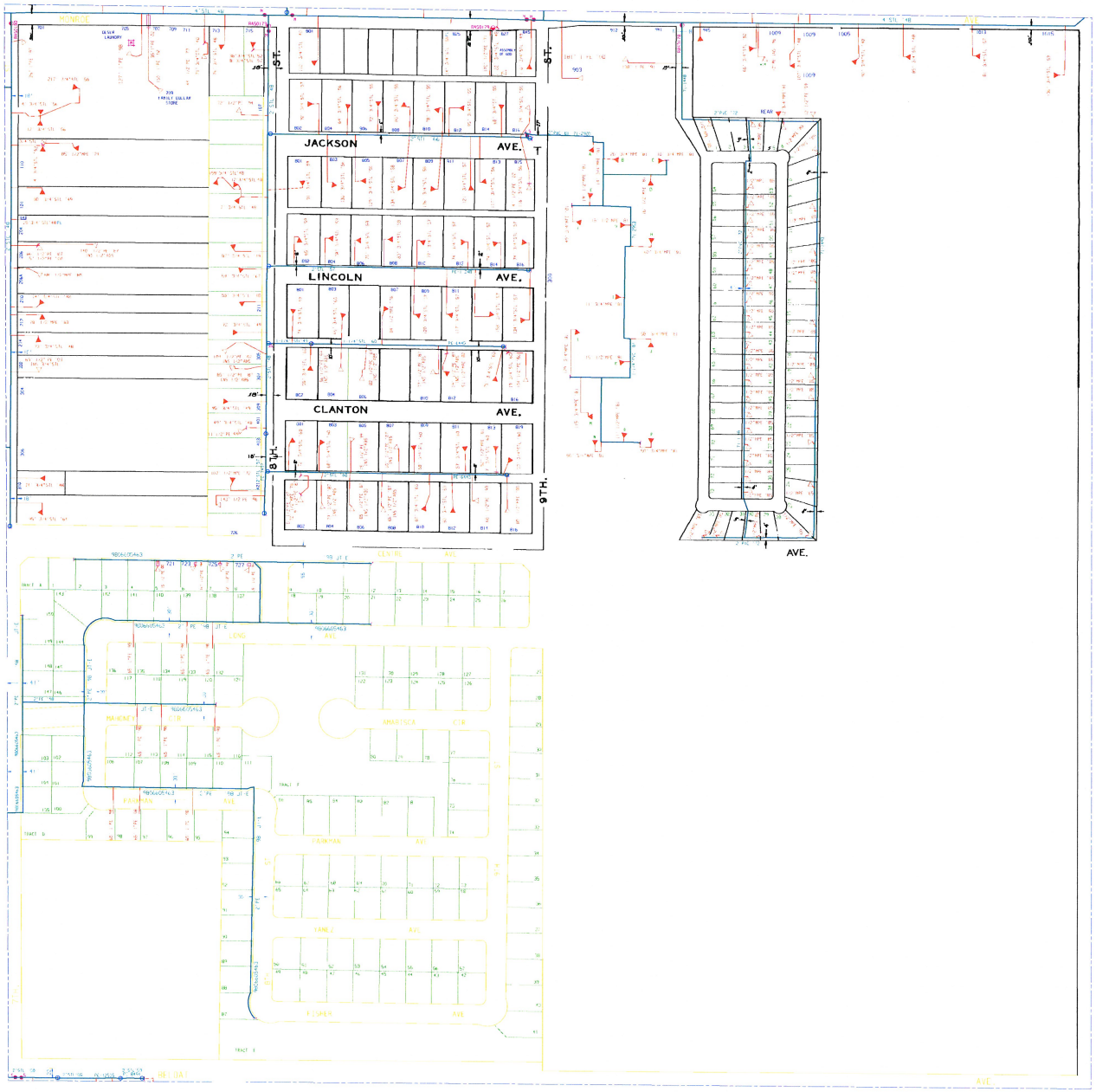
PHOENIX, ARIZONA

NOTE:

SOUTHWEST GAS CORPORATION DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OR ELEVATIONS OF THE UTILITIES AS SHOWN ON THIS MAP.

S1-W33

S2-W34




NO BORDER MAP

S2-W33

OLD DOC NUMBER

SE1/4 SEC 5 T1S - R3W

4010030053

USGS NUMBER

DATE: 12-4-03 CDW

SCALE: 1" = 100'

SOUTHWEST GAS CORPORATION

GAS DISTRIBUTION SYSTEM

PHOENIX, ARIZONA

NOTE:

SOUTHWEST GAS CORPORATION DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OR ELEVATIONS OF THE UTILITIES AS SHOWN ON THIS MAP.

S3-W33

S1-W34

S2-W35

S2-W33

S2-W34

OLD DOC NUMBER

SW1/4 SEC 5 T1S - R3W

4010030054

USGS NUMBER

DATE: 12-2-03 SRM

SCALE: 1" = 100'

SOUTHWEST GAS CORPORATION

GAS DISTRIBUTION SYSTEM

PHOENIX, ARIZONA

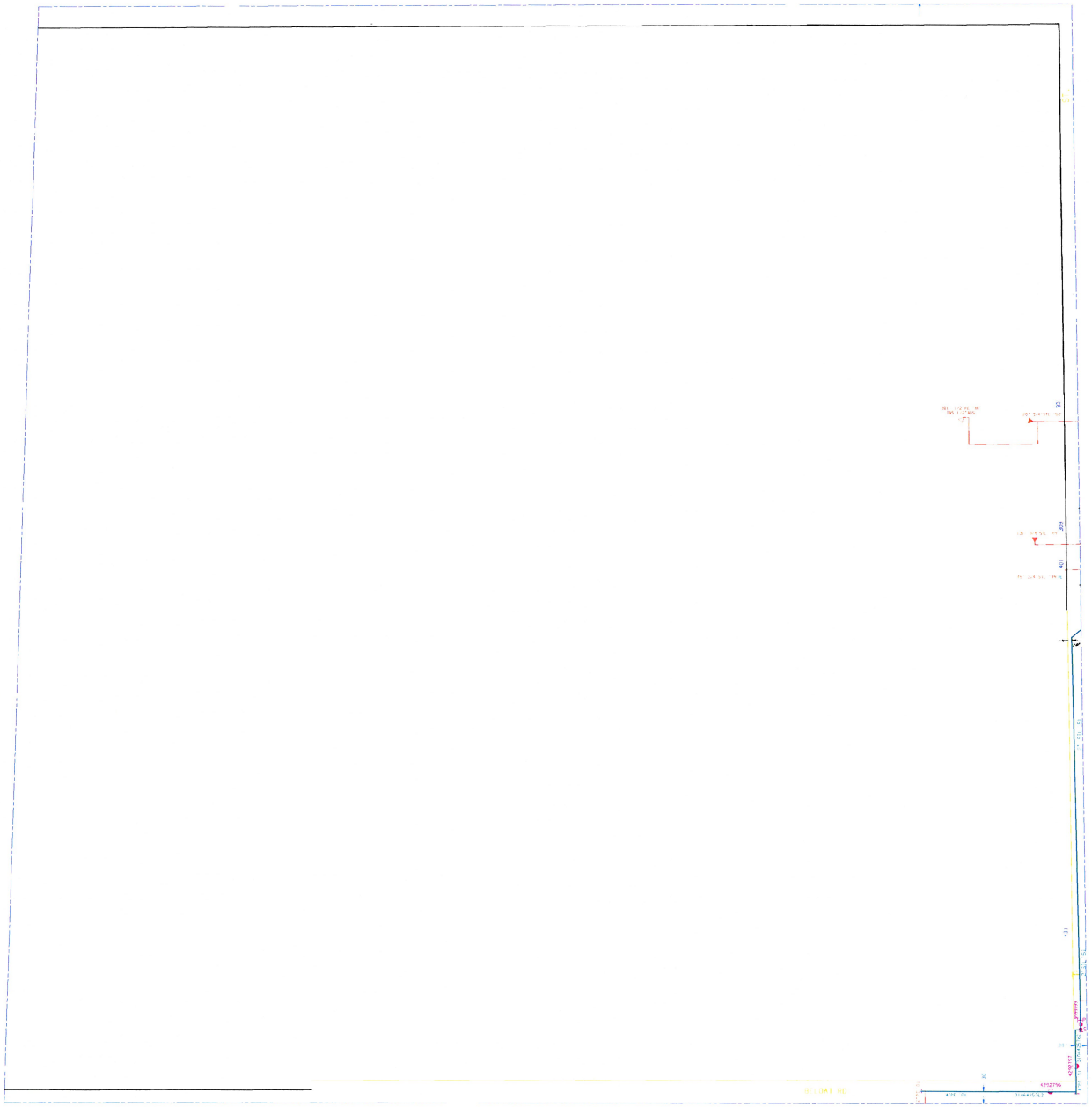
NOTE:

SOUTHWEST GAS CORPORATION DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OR ELEVATIONS OF THE UTILITIES AS SHOWN ON THIS MAP.

S3-W34

S1-W35

NO BORDER MAP



S2-W34

S3-W35

NOTE:

SOUTHWEST GAS CORPORATION DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OR ELEVATIONS OF THE UTILITIES AS SHOWN ON THIS MAP.

S2-W35

OLD DOC NUMBER

SE1/4 SEC 6 T1S - R3W

4010030063

USGS NUMBER

DATE: 05-16-03 TSW

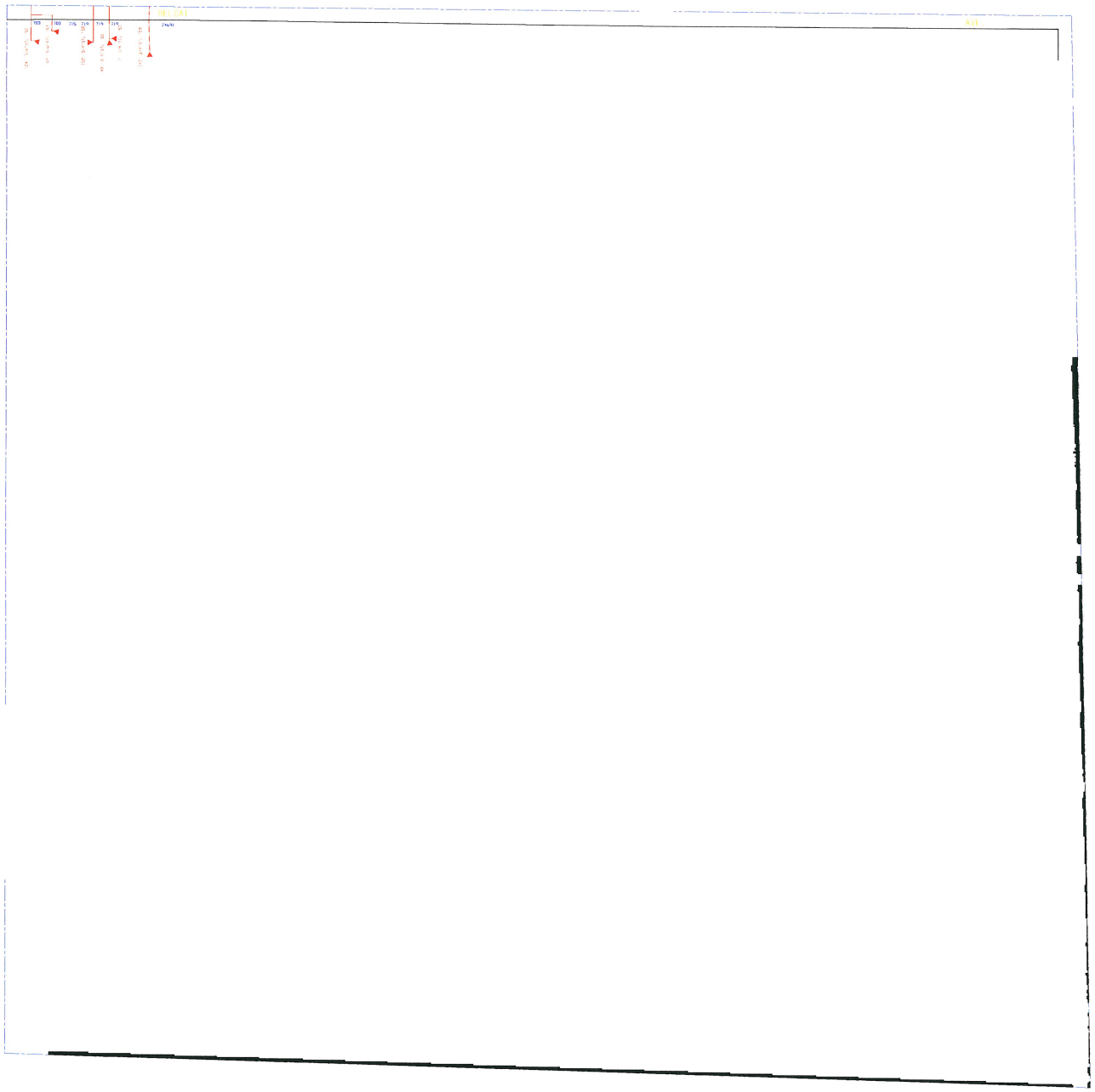
SCALE: 1" = 100'

SOUTHWEST GAS CORPORATION

GAS DISTRIBUTION SYSTEM

PHOENIX, ARIZONA

S2-W33



S3-W34

NO BORDER MAP

S3-W33

OLD DOC NUMBER

NE1/4 SEC 8 T1S - R3W

4010030082

USGS NUMBER

DATE: 05-18-03 TSW

SCALE: 1" = 100'

SOUTHWEST GAS CORPORATION

GAS DISTRIBUTION SYSTEM

PHOENIX, ARIZONA

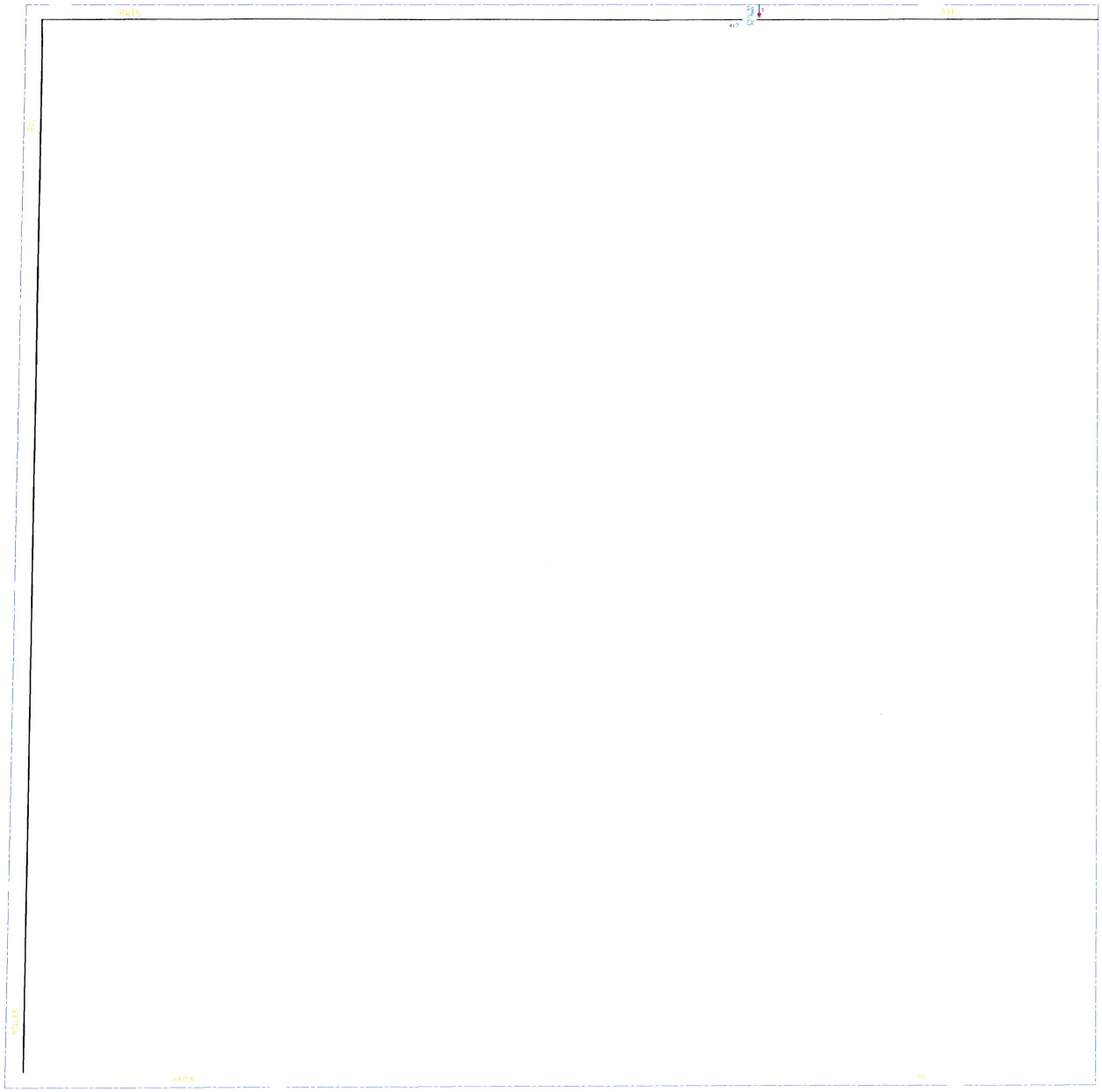
NOTE:

SOUTHWEST GAS CORPORATION DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OR ELEVATIONS OF THE UTILITIES AS SHOWN ON THIS MAP.

NO BORDER MAP

S2-W34

S3-W35




S3-W33

S4-W34

S3-W34

OLD DOC NUMBER

NW1/4 SEC 8 T1S - R3W

4010030081

USGS NUMBER

DATE: 05-18-03 TSW

SCALE: 1" = 100'

SOUTHWEST GAS CORPORATION

GAS DISTRIBUTION SYSTEM

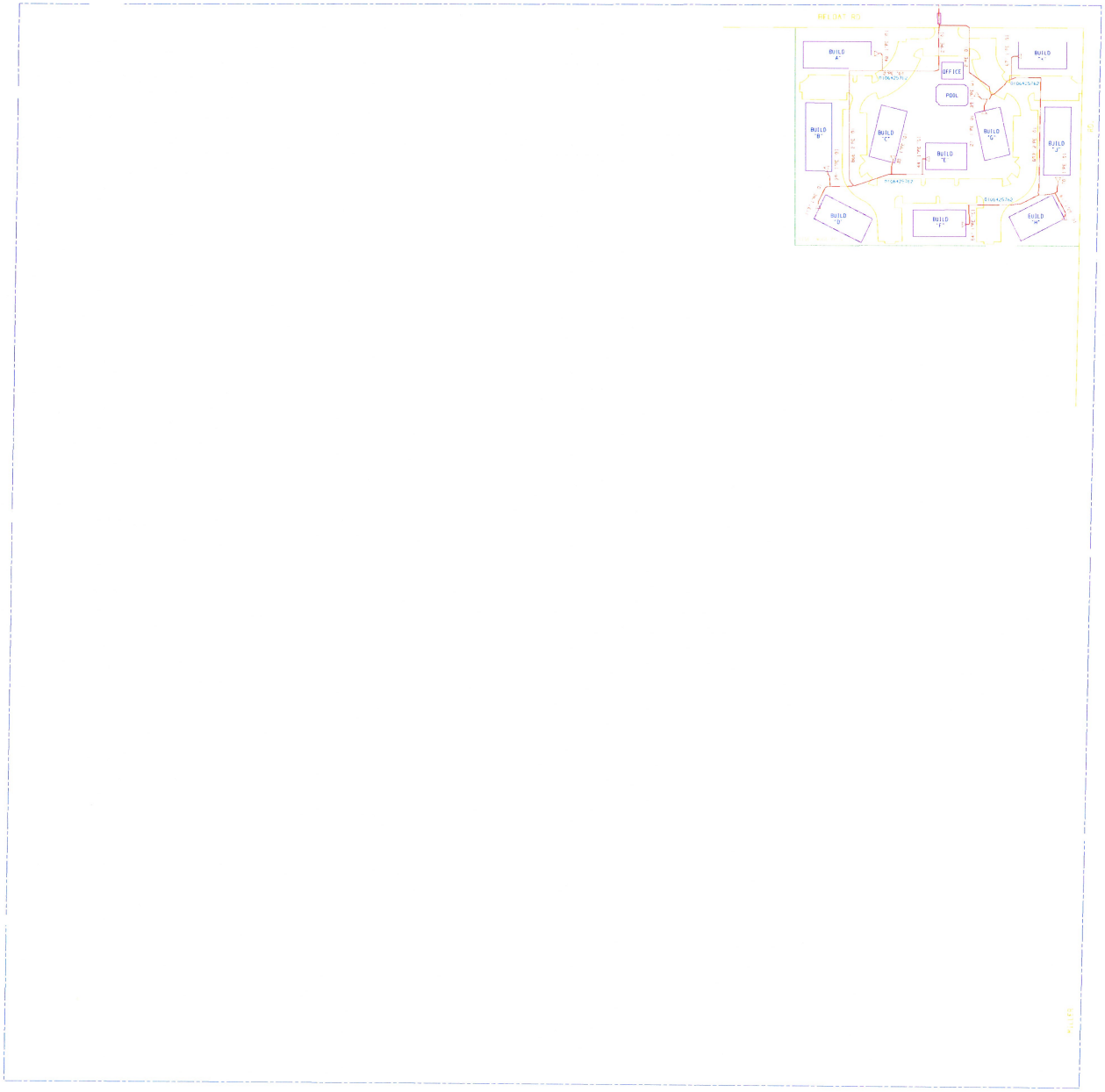
PHOENIX, ARIZONA

NOTE:

SOUTHWEST GAS CORPORATION DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OR ELEVATIONS OF THE UTILITIES AS SHOWN ON THIS MAP.

S2-W35

NO BORDER MAP




S3-W34

S3-W35

OLD DOC NUMBER

NE1/4 SEC 7 T1S - R3W

4010030072

USGS NUMBER

DATE: 05-18-03 TSW

SCALE: 1" = 100'

SOUTHWEST GAS CORPORATION

GAS DISTRIBUTION SYSTEM

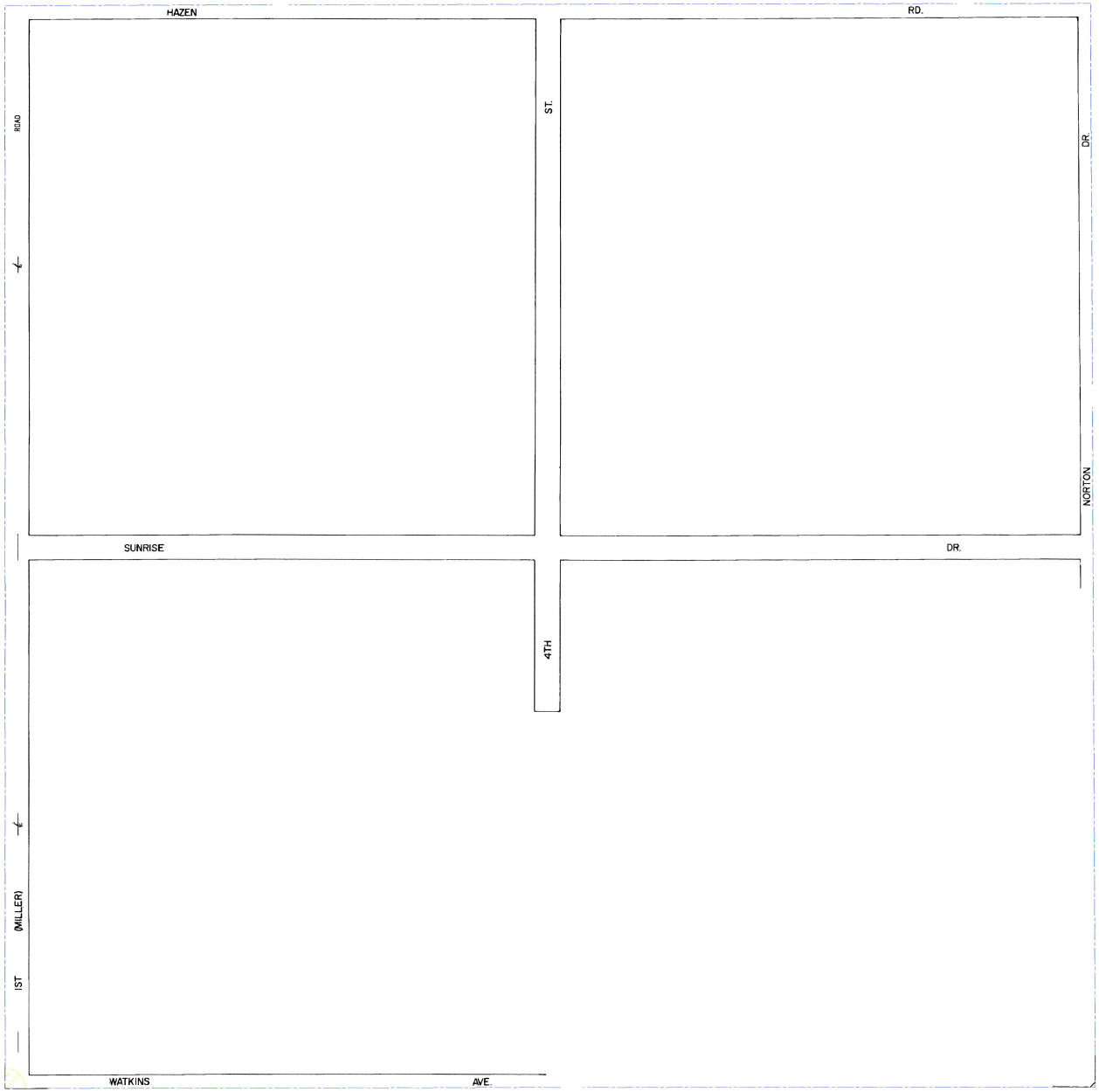
PHOENIX, ARIZONA

NOTE:

SOUTHWEST GAS CORPORATION DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OR ELEVATIONS OF THE UTILITIES AS SHOWN ON THIS MAP.

NO BORDER MAP

S3-W34




NO BORDER MAP

NO BORDER MAP

S4-W34

OLD DOC NUMBER

SW1/4 SEC 8 T1S - R3W

4010030084

USGS NUMBER

DATE: 05-18-03 TSW

SCALE: 1" = 100'

SOUTHWEST GAS CORPORATION

GAS DISTRIBUTION SYSTEM

PHOENIX, ARIZONA

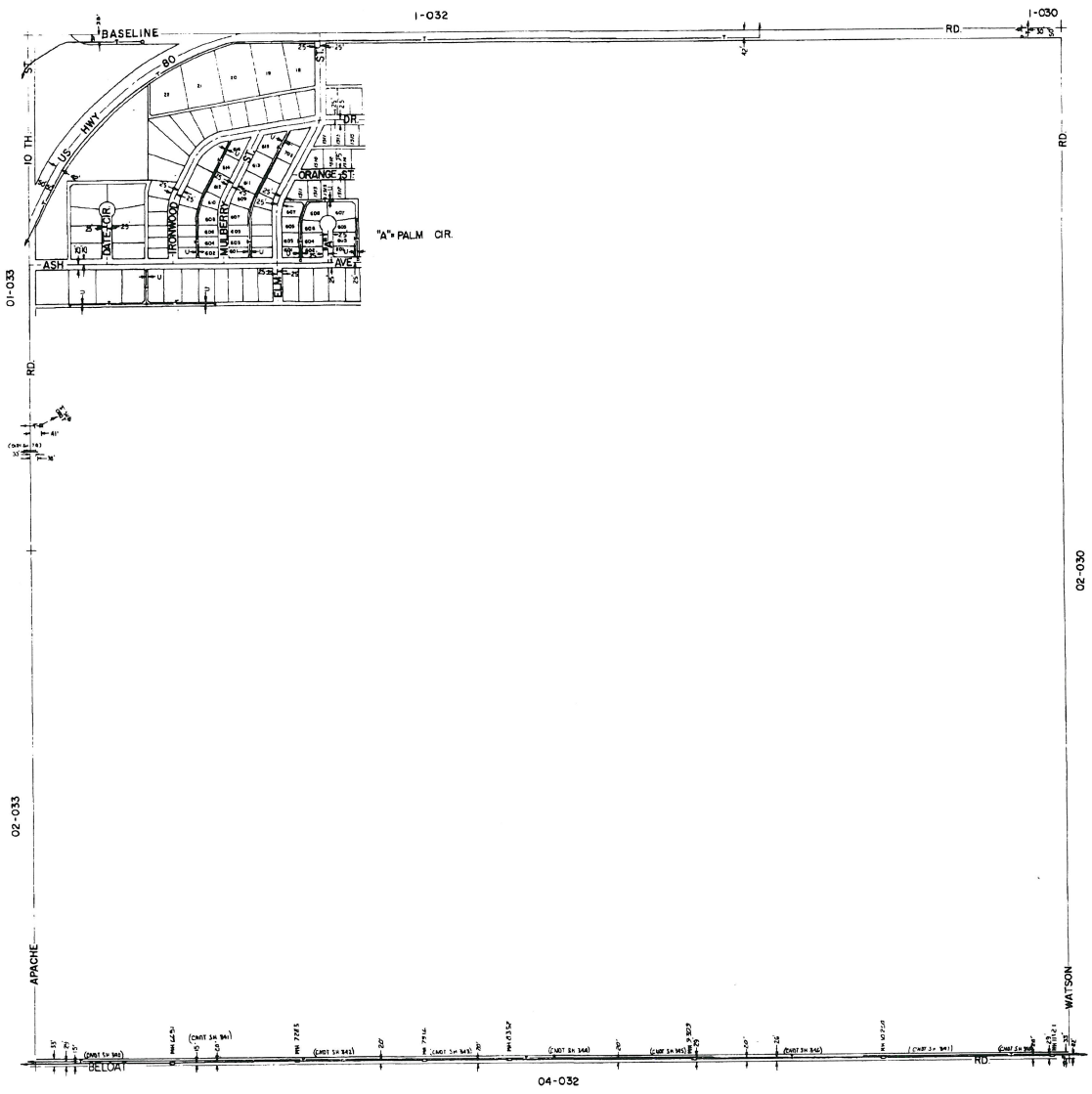
NOTE:

SOUTHWEST GAS CORPORATION DOES NOT GUARANTEE THE ACCURACY OF THE LOCATIONS OR ELEVATIONS OF THE UTILITIES AS SHOWN ON THIS MAP.

NO BORDER MAP

CHRIS LERTIQUE (MLERTIQ) 01/13/2004 08:33 CLLI:BCKYAZMA
RECORD NO: BURSH02-032 SHEET:1 REV:2

CONFIDENTIAL: DISCLOSE AND DISTRIBUTE SOLELY TO US WEST EMPLOYEES HAVING A NEED TO KNOW




MOUNTAIN BELL
SURVEY

CORRECTED

| | |
|---|---|
| SH DN | [illegible] |
| [illegible] | [illegible] |
| AZ 2-5-81 | [illegible] |
| [illegible] | [illegible] |
| AL 10-15-82 | [illegible] |
| 5-18-83 | [illegible] |
| 11-15-82 | ADV |
| 3-8-88 | ADV |
| 9-14-88 | HBP |
| 8-13-87 | MCV |
| 7-6-78 | NBP |
| 8-21-81 | MCC |
| 12-05-83 | HOP |
| 1-18-87 | PCP |
| 12-10-87 | CS |
| 1-30-91 | CS |

print 13
3000 108
109
24
18
C1107 16

N

LEGEND

| | |
|---|---|
| PROPOSED PLANT | |
| EXISTING PLANT | |
| ABANDONED PLANT | |
| CLOSURE | |
| MANHOLE | |
| BURIED SPLICE | |
| POLE | |
| UNKNOWN DISTANCE | |

SCALE 1" = 200'

MOUNTAIN BELL

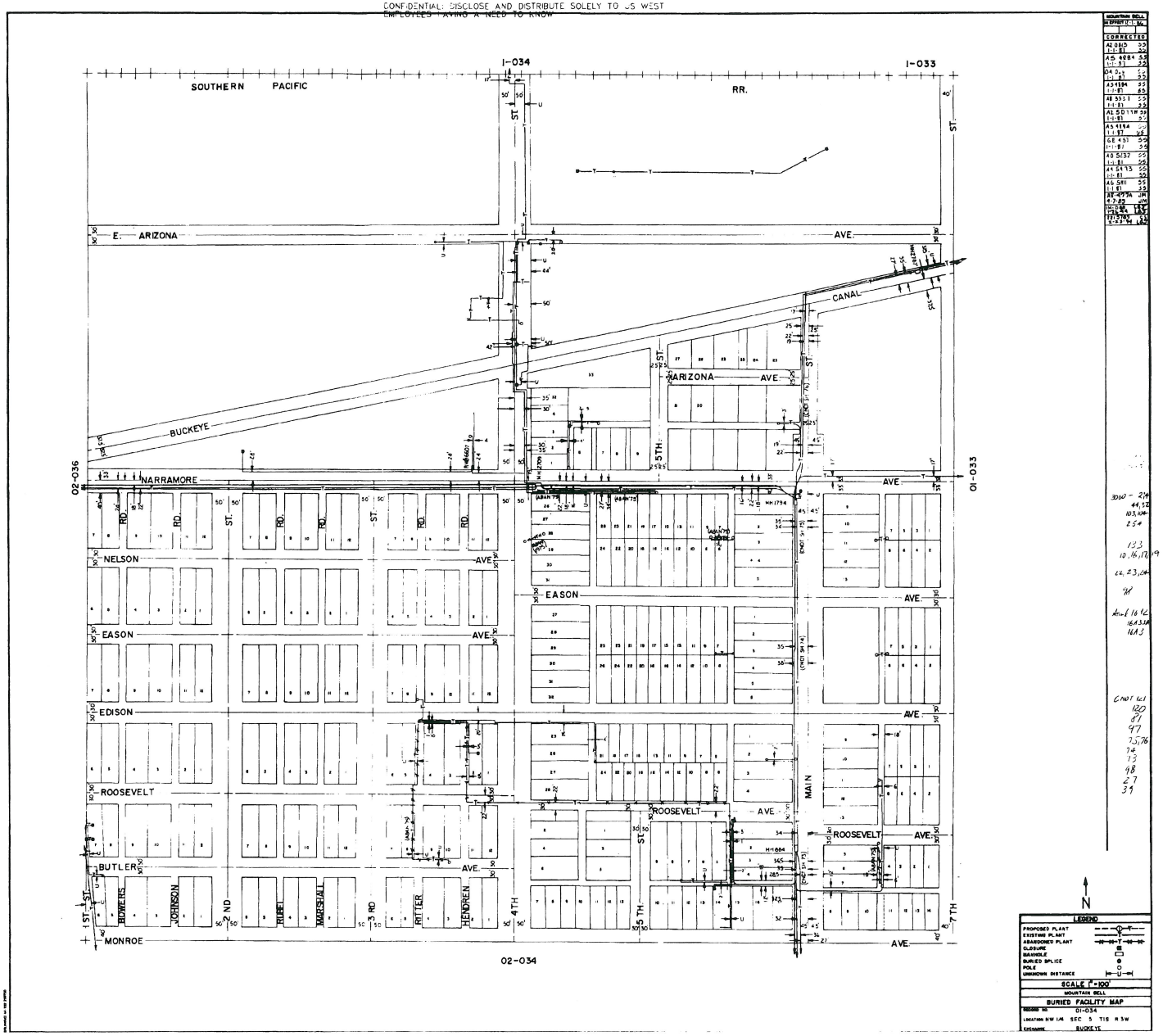
BURIED FACILITY MAP

MAPPING NO. 02-032
LOCATION SEC. 4 T15 R3W
EXCHANGE BUCKEYE

FACILITY OWNER IN ORDER TO ASSIST THE FACILITY OWNER IN LOCATING ITS FACILITIES. THIS MAP IS NOT INTENDED FOR USE AS A MANUFACTURING DOCUMENT. CALL ARIZONA STATE (602) 263-1100 BEFORE YOU DIG. MARICOPA COUNTY (602) 263-1100

CHRIS LERTIQUE (MLERTIQ) 01/13/2004 08:33 CLLI:BCKYAZMA
RECORD NO: BURSH01-034 SHEET:1 REV:2

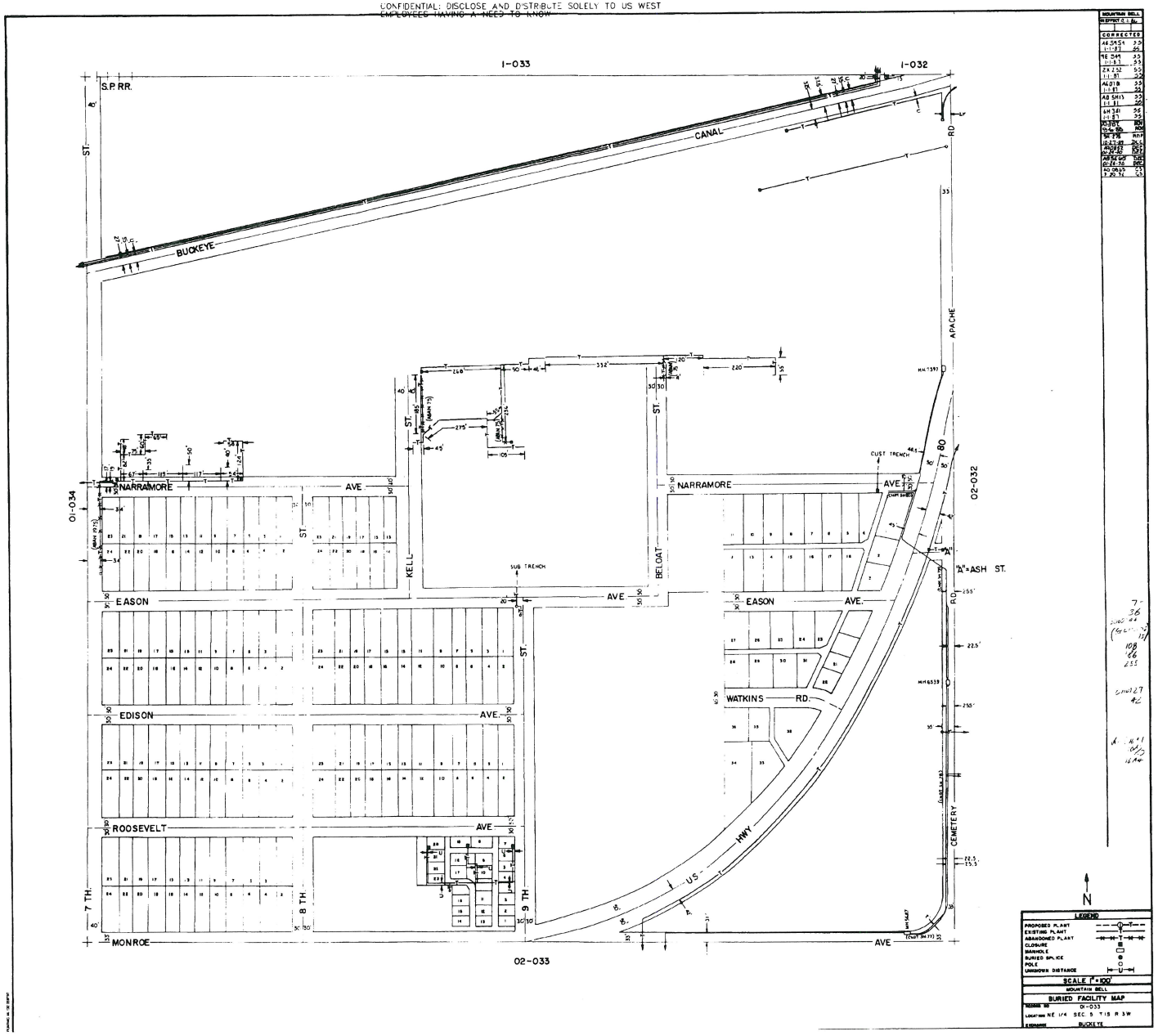
CONFIDENTIAL: DISCLOSE AND DISTRIBUTE SOLELY TO US WEST EMPLOYEES HAVING A NEED TO KNOW




INSTALLATION RECORDS ARE FOR THE ... THE FACILITY OWNER IN LOCATING ITS ... OTHER AND ARE NOT INTENDED ... MARICOPA COUNTY

CHRIS LERTIQUE (MLERTIQ) 01/13/2004 08:33 CLLI:BCKYAZMA
RECORD NO: BURSH01-033 SHEET:1 REV:2

CONFIDENTIAL: DISCLOSE AND DISTRIBUTE SOLELY TO US WEST EMPLOYEES HAVING A NEED TO KNOW

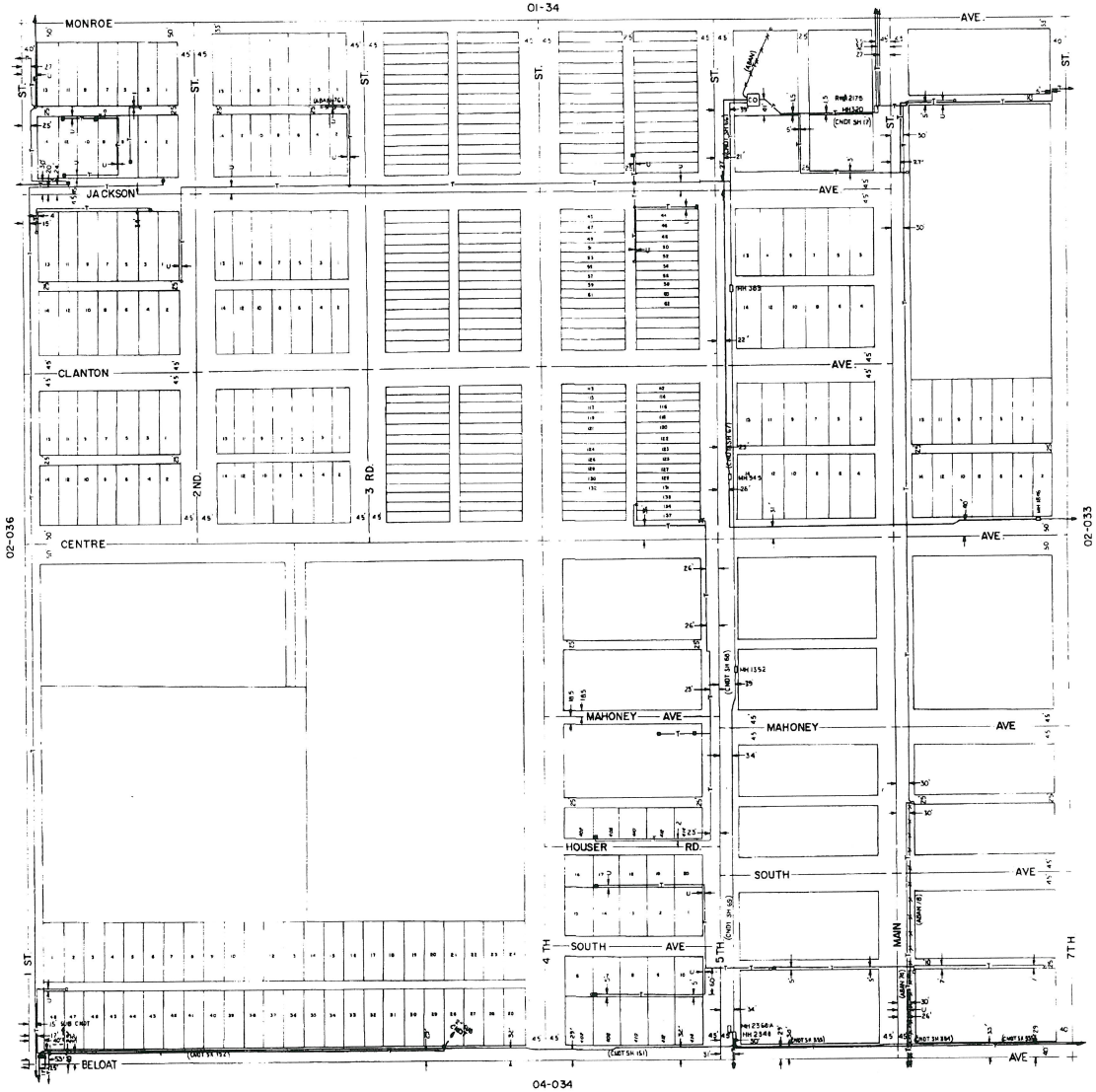



INSTALLATION RECORDS ARE FOR THE INTERNAL USE OF THE FACILITY OWNER IN LOCATING TO UNDERGROUND FACILITIES AND ARE NOT INTENDED TO BE USED FOR UNDERGROUND FACILITIES FOR ALL BLUE STAKE (602) 263-1100 IN MARICOPA COUNTY, CALL 1-800-STAKE IT OUTSIDE OF MARICOPA COUNTY.

CHRIS LERTIQUE (MLERTIQ) 01/13/2004 08:34 CLLI:BCKYAZMA
RECORD NO: BURSH02-034 SHEET:1 REV:2

CONFIDENTIAL: DISCLOSE AND DISTRIBUTE SOLELY TO US WEST EMPLOYEES HAVING A NEED TO KNOW

INSTALLATION RECORDS ARE FOR THE INTERNAL USE OF FACILITY OWNER IN MAINTAINING ITS UNDERGROUND FACILITIES




| MOUNTAIN BELL | |
|---|---|
| CORRECTED | |
| 10 SH NEW | SS |
| 1-94 | SS |
| 5 15 90 | SS |
| 1-12-94 | SS |
| 49 SF DM | SS |
| 1-12-94 | SS |
| 4P 1-12 | SS |
| 1-12-94 | SS |
| 49 SW 3 | SS |
| 1-12-94 | SS |
| AD 15 63 | SS |
| 1-12-94 | SS |
| 4 5 D 41 | SS |
| 1-12-94 | SS |
| AD 05 13 | SS |
| 1-12-94 | SS |
| 1E 5 4 5 | SS |
| 1-12-94 | SS |
| A 4 2 1 B 1 | SS |
| 1-12-94 | SS |
| AB-4 3 7U | MB |
| 10-06-87 | MB |
| BH 5 9 3 | MPH |
| 6-12-91 | SCL |
| AH 2 0 5 2 | JKC |
| 01-24-90 | DGC |
| AB 0 9 2 | MP |
| 5-17-90 | MPH |
| 1-4-91 | SSL |
| 2H 2 4 7 6 | VSM |
| 02-21-92 | TJC |
| AB 0 5 1 2 | MPH |
| 1-29-92 | PMH |
| 3 5 0 5 5 5 | TJC |
| 7-6-93 | CLC |

Now 16A 16D 16A.1

3700-12, 14, 19, 23, 25, 3, 5, 6, 9, 106, 112, 114

CHUT 16, 17, 33, 65, 67, 67A, 73, 113

LEGEND

| | |
|---|---|
| PROPOSED PLANT | |
| EXISTING PLANT | |
| ABANDONED PLANT | |
| CLOSURE | |
| MANHOLE | |
| BURIED SPLICE | |
| POLE | |
| UNKNOWN DISTANCE | |

SCALE 1" = 100'

MOUNTAIN BELL

BURIED FACILITY MAP

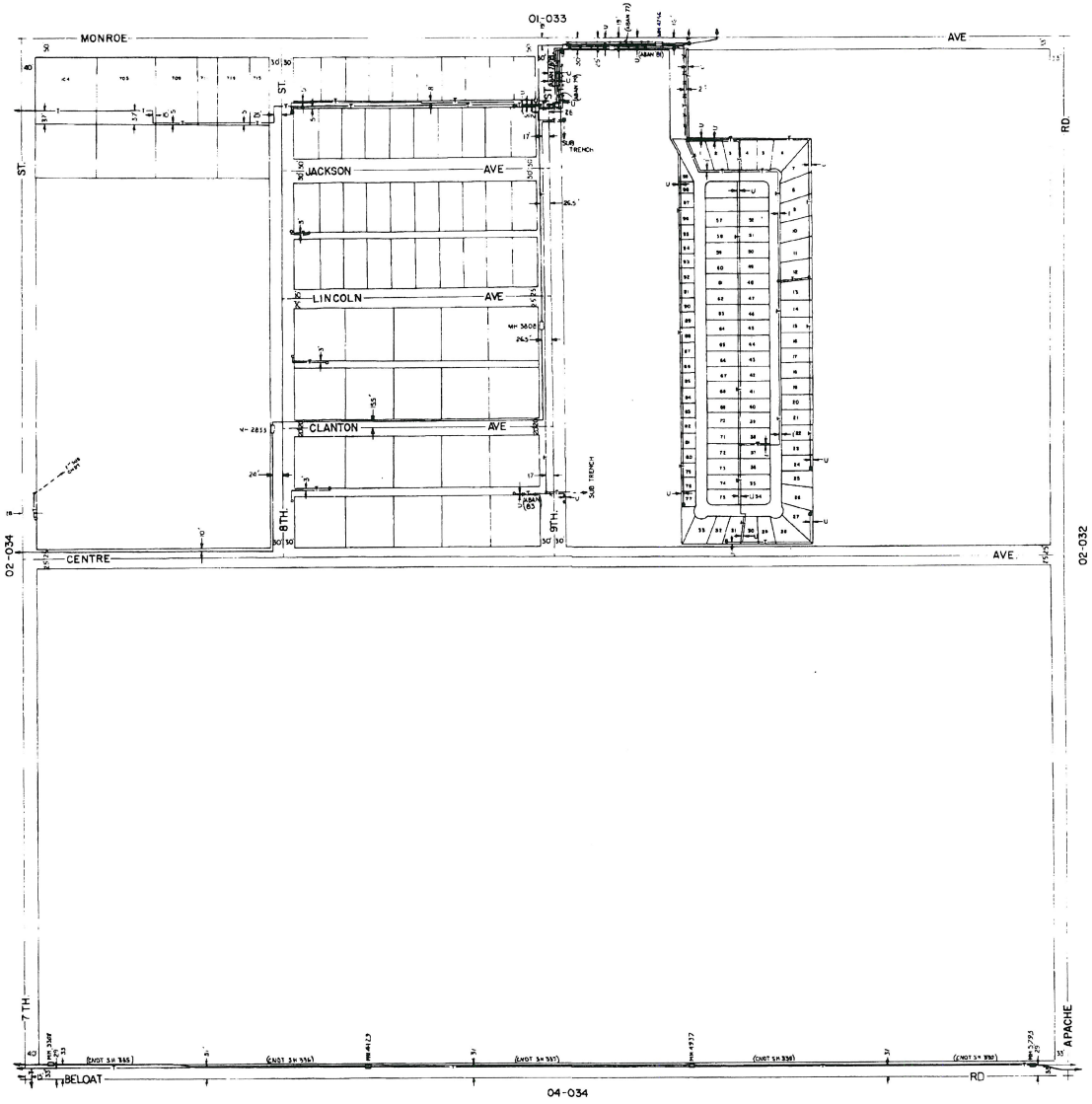
RECORD NO. 02-034

LOCATION SW 1/4 SEC 5 T15 R3W

EXCHANGE BUCKEYE

CHRIS LERTIQUE (MLERTIQ) 01/13/2004 08:34 CLLI:BCKYAZMA
RECORD NO: BURSH02-033 SHEET:1 REV:2

CONFIDENTIAL: DISCLOSE AND DISTRIBUTE SOLELY TO US WEST EMPLOYEES HAVING A NEED TO KNOW



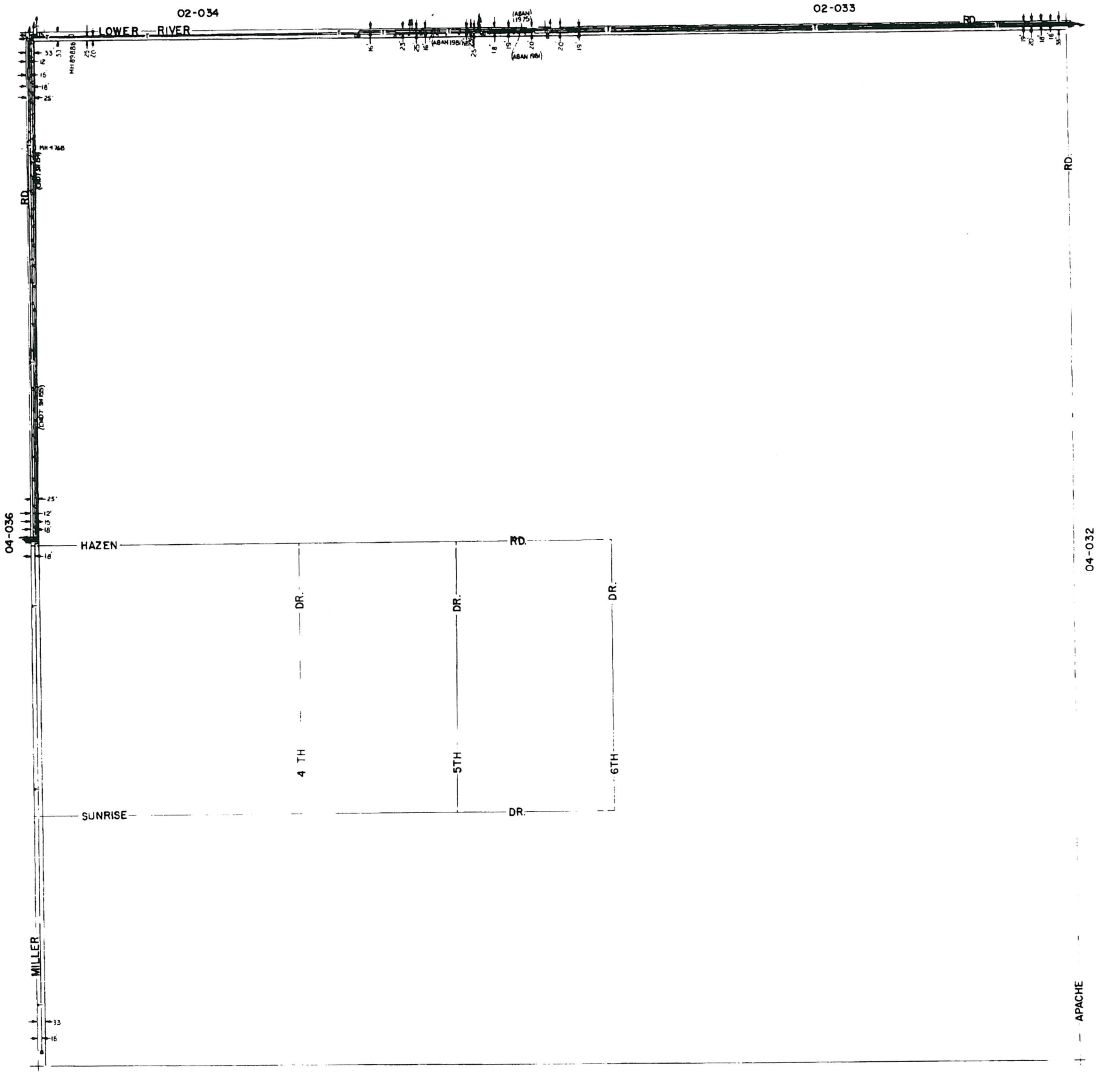

MOUNTAIN BELL
DATE 12-1-91
CORRECTED
01-24-90
01-13-91
1-28-92

LEGEND
PROPOSED PLANT
EXISTING PLANT
ABANDONED PLANT
CLOSURE
MANHOLE
BURIED SPLICE
POLE
UNKNOWN DISTANCE

SCALE 1" = 100'
MOUNTAIN BELL
BURIED FACILITY MAP
RECORD NO 01-033
LOCATION SE 1/4 SEC 3 T1S R3W
BUCKEYE

CHRIS LERTIQUE (MLERTIQ) 01/13/2004 08:34 CLLI:BCKYAZMA
RECORD NO: BURSH04-034 SHEET:1 REV:2

CONFIDENTIAL: DISCLOSE AND DISTRIBUTE SOLELY TO US WEST EMPLOYEES HAVING A NEED TO KNOW




MOUNTAIN BELL
DESIGN
CORRECTED
K.DILL SC
T.L.B. SC
S.S. CRUZ REF
3.20.92 REF
04-464 EDS
6.1.92 SS

N

LEGEND

| | |
|---|---|
| PROPOSED PLANT | |
| EXISTING PLANT | |
| ABANDONED PLANT | |
| CLOSURE | |
| MANHOLE | |
| BURIED SPLICE | |
| POLE | |
| UNKNOWN DISTANCE | |

SCALE 1" = 200'

MOUNTAIN BELL

BURIED FACILITY MAP

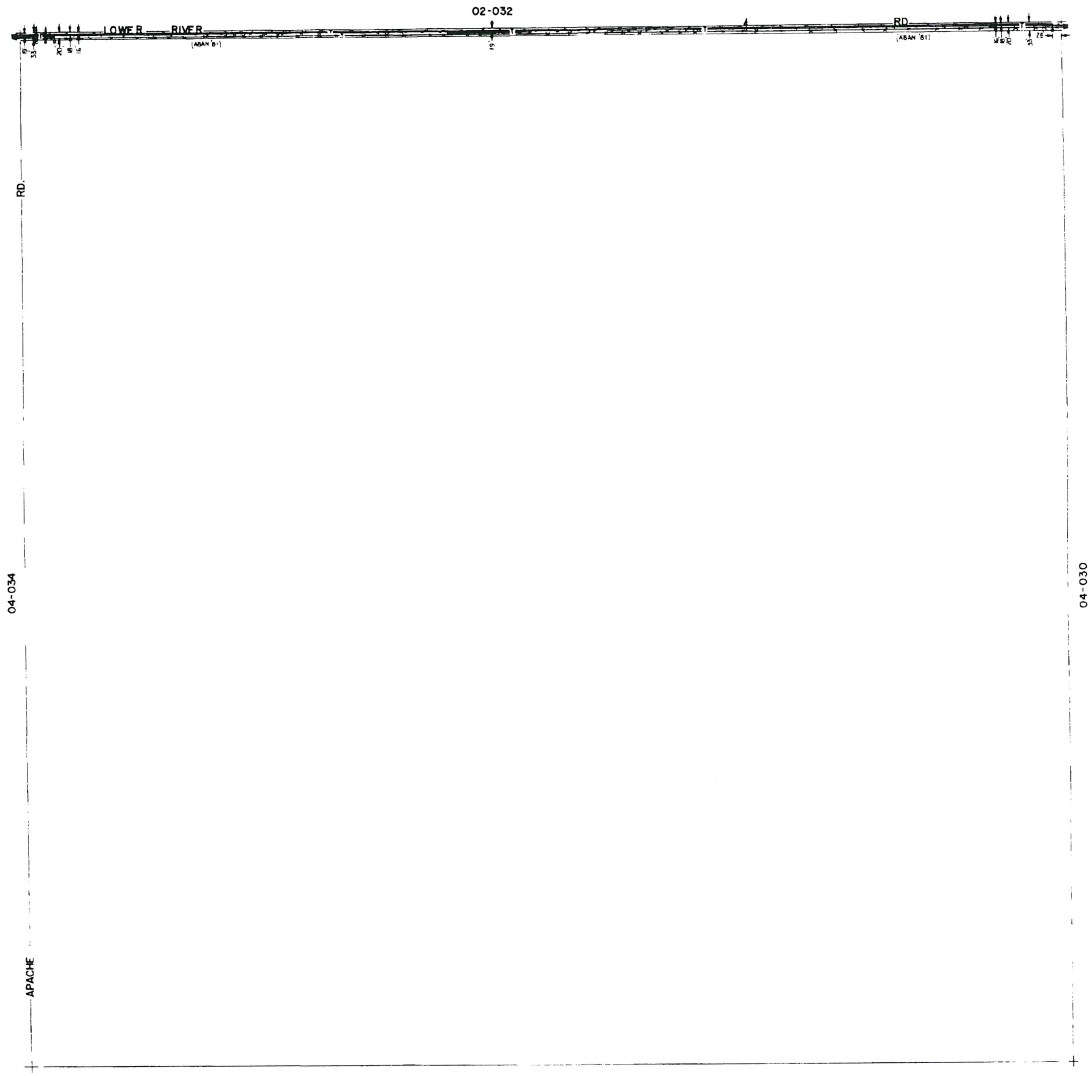
MAPPING DB 04-034

LOCATION S.E.C. 8 T1S R3W

EXCHANGE BUCKEYE

CHRIS LERTIQUE (MLERTIQ) 01/13/2004 08:34 CLLI:BCKYAZMA
RECORD NO: BURSH04-032 SHEET:1 REV:2

CONFIDENTIAL: DISCLOSE AND DISTRIBUTE SOLELY TO US WEST EMPLOYEES HAVING A NEED TO KNOW




MOUNTAIN BELL
SPEC: L M
CORRECTED

Mod 176
01/07/16

LEGEND

| | |
|---|---|
| PROPOSED PLANT | |
| EXISTING PLANT | |
| ABANDONED PLANT | |
| CLOSURE | |
| MANHOLE | |
| BURIED SPLICE | |
| POLE | |
| UNKNOWN DISTANCE | |

SCALE 1"=200'

MOUNTAIN BELL

BURIED FACILITY MAP

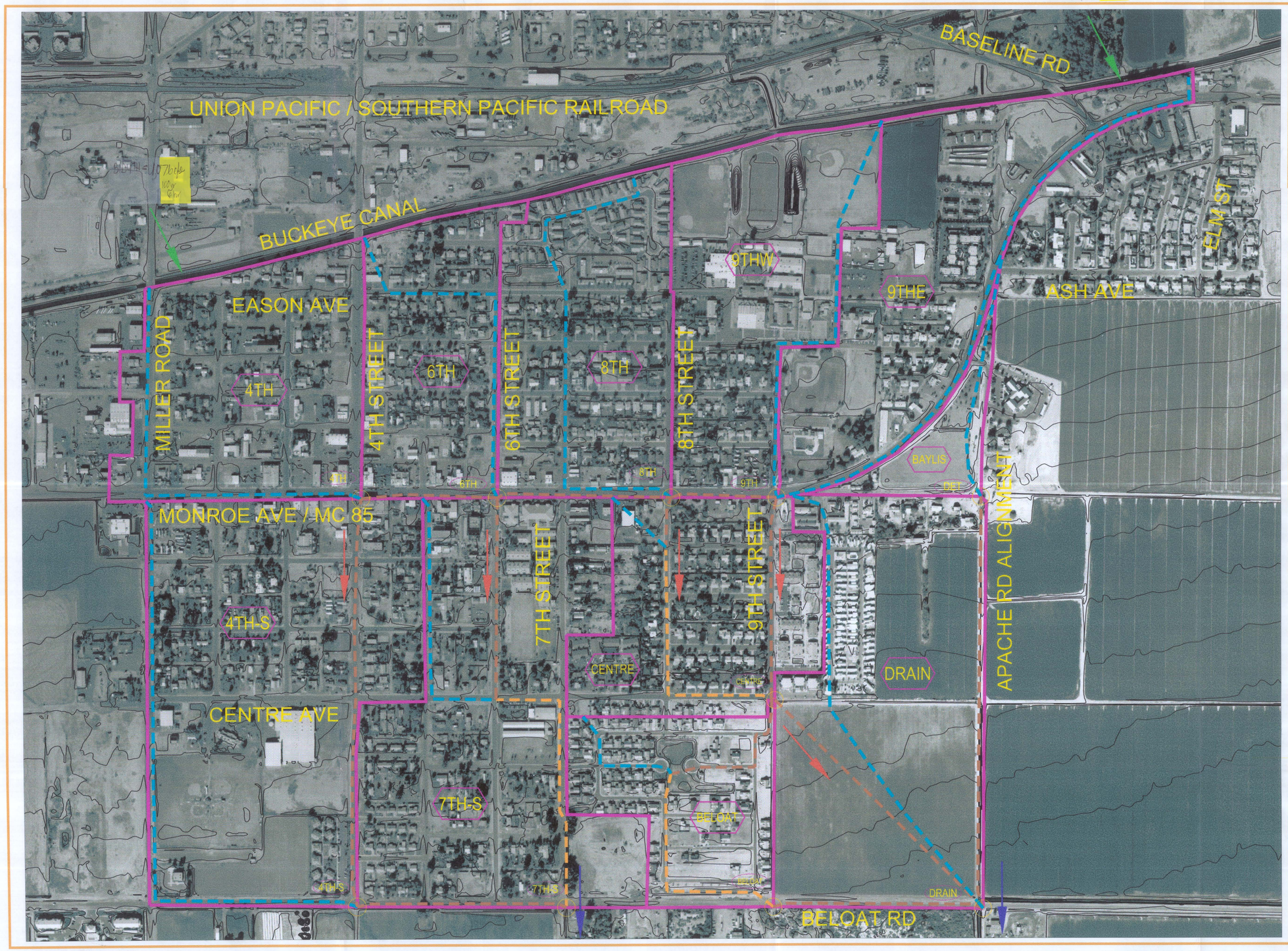
MAPNO 04-032

LOCATION SEC.9 T15 R3W

EXCHANGE BUCKEYE

# APPENDIX G

**Exhibits**




CONTOUR INTERVAL – 2 FT
FLIGHT DATE 03/27/02

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BUCKEYE
DETENTION BASIN
CANDIDATE ASSESSMENT
REPORT

LEGEND

- SUB BASIN BOUNDARY
- Tc FLOW PATH
- ROUTING REACH
- COMBINED Tc/ROUTE
- 9THW — SUB BASIN DESIGNATION
- CONCENTRATION POINT (CP)
- 8TH — CP DESIGNATION
- CANAL OVERFLOW (FIS)
- FLOW DIVERSION
- PROJECT AREA OUTFALL

SCALE 1"=300'
0 150 300 600

| DATE | REVISION | BY |
|---|---|---|
| | | |
| | | |
| | | |

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4
PHOENIX, ARIZONA 85021

## EXHIBIT A
## DRAINAGE AREA AND HYDROLOGIC MODEL MAP

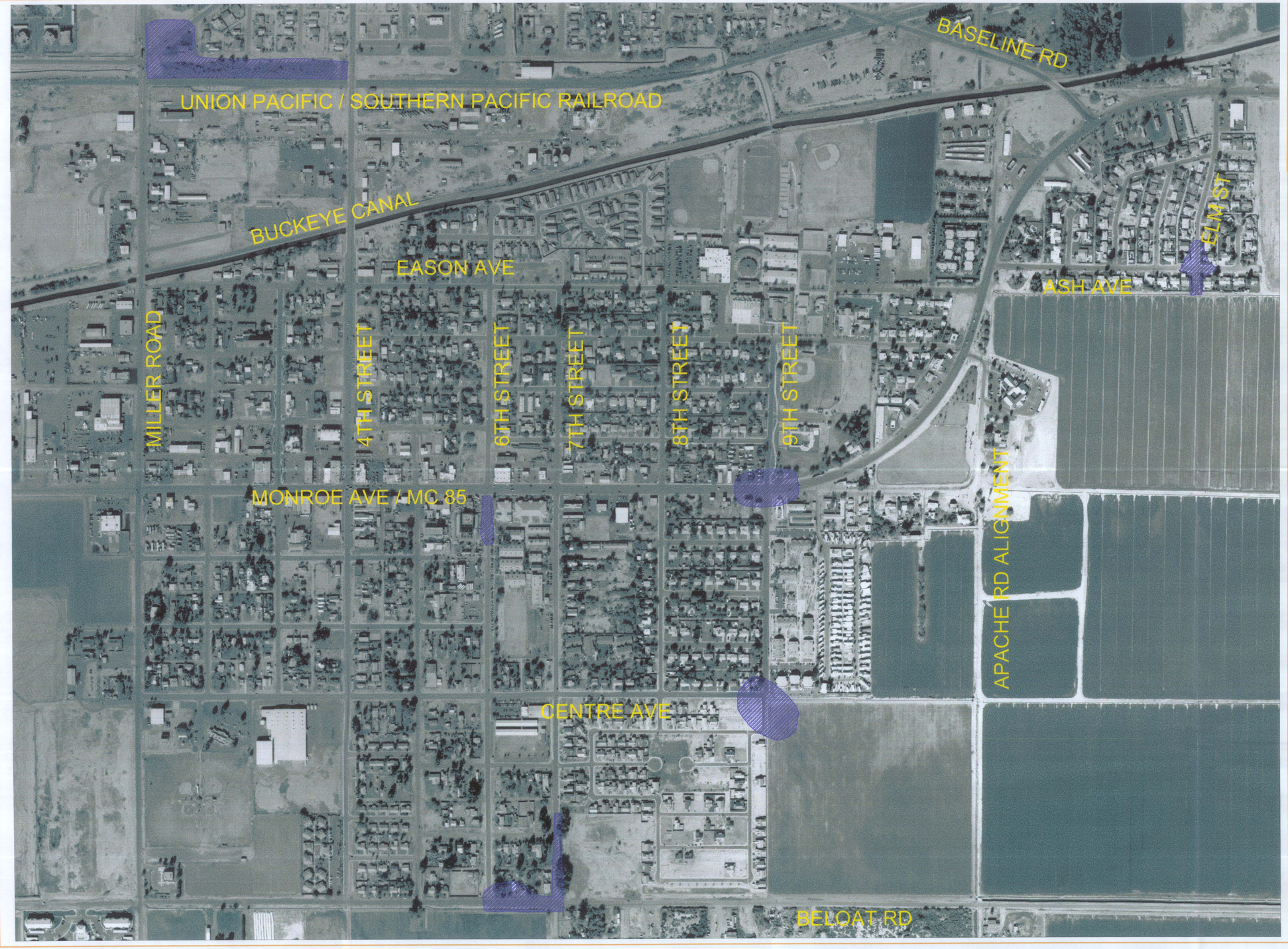
| | BY | DATE |
|---|---|---|
| DESIGN | GSB | 5/04 |
| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE
APPROVED BY: DATE
CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 1




# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BUCKEYE
DETENTION BASIN
CANDIDATE ASSESSMENT
REPORT

LEGEND

HISTORIC FLOODING LOCATIONS OR DRAINAGE PROBLEM AREAS

(SOURCE: TOWN OF BUCKEYE PUBLIC WORKS DIRECTOR AND STREETS SUPERINTENDENT)

SCALE 1"=300'

0 150 300 600

| DATE | REVISION | BY |
|---|---|---|
| | | |
| | | |
| | | |

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4
PHOENIX, ARIZONA 85021

## EXHIBIT B
## HISTORIC FLOODING

| | BY | DATE |
|---|---|---|
| DESIGN | GSB | 5/04 |
| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 1

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

BUCKEYE
DETENTION BASIN
CANDIDATE ASSESSMENT
REPORT

LEGEND

EXISTING FACILITIES

- RETENTION BASINS
- HEADWALLS
- 12" STORM DRAIN/CULVERTS
- 15" STORM DRAIN/CULVERTS
- 18" STORM DRAIN/CULVERTS
- 24" STORM DRAIN/CULVERTS
- 30" STORM DRAIN/CULVERTS
- SURFACE DRAIN/IRR. DITCH
- CATCH BASIN
- (SD) STORM DRAIN MANHOLE

SCALE 1"=300'

0 150 300 600

| DATE | REVISION | BY |
|---|---|---|
| | | |
| | | |
| | | |

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4
PHOENIX, ARIZONA 85021

## EXHIBIT C
## EXISTING FACILITIES

| | BY | DATE |
|---|---|---|
| DESIGN | GSB | 5/04 |
| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

SUBMITTED BY: DATE:

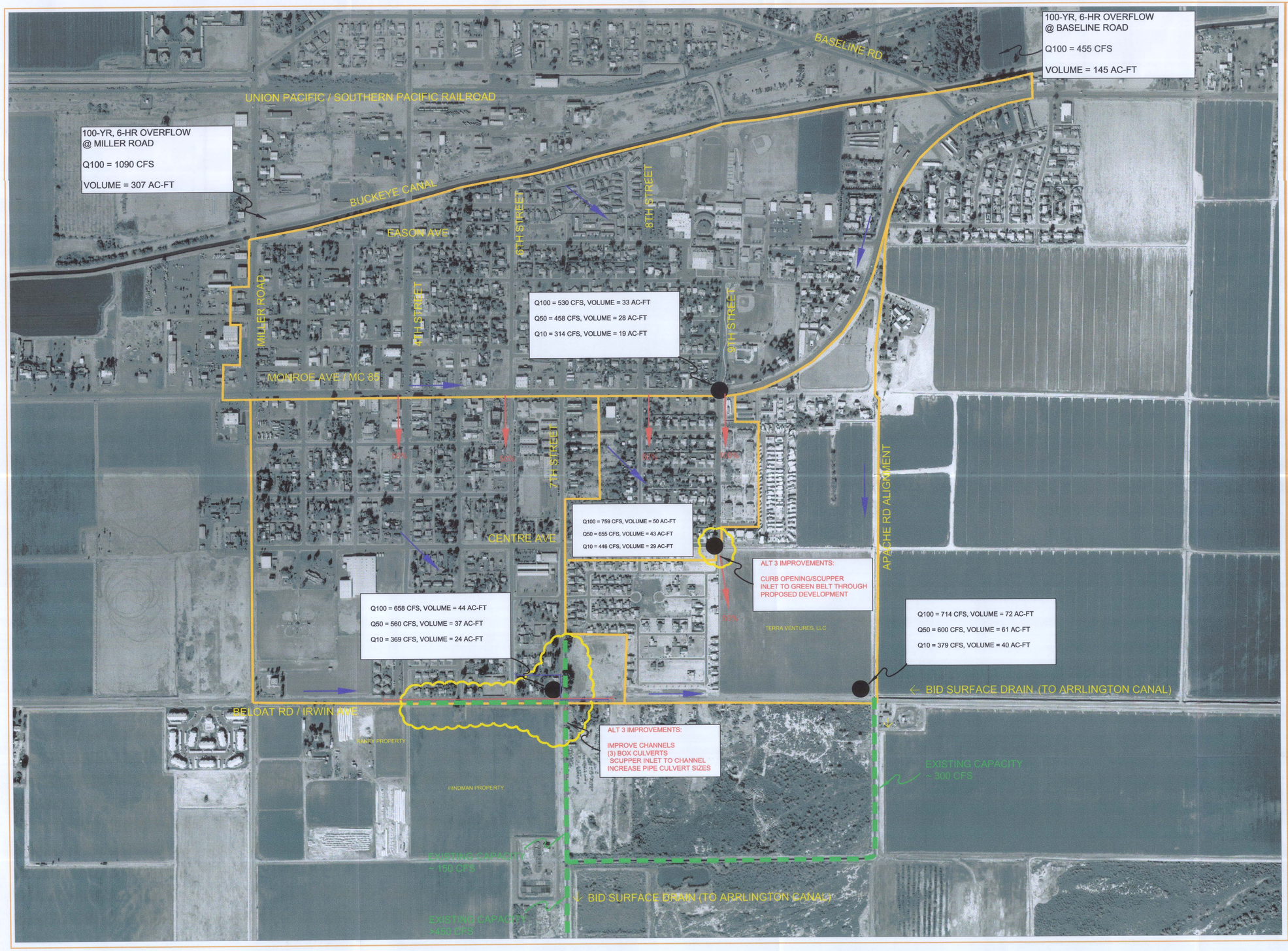
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 1




# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## BUCKEYE DETENTION BASIN CANDIDATE ASSESSMENT REPORT

LEGEND

- AREA OF PROPOSED IMPROVEMENTS
- CONCENTRATION POINTS
- POTENTIAL EXISTING OPEN CHANNEL OUTFALLS
- FLOW DIRECTION
- FLOW SPLITS (50%)
- CONTRIBUTING AREA BOUNDARIES
- SOUTHWEST GAS UNDERGROUND UTILITY
- QWEST COMMUNICATIONS UNDERGROUND UTILITY

SCALE 1"=400'

0 200 400 800

| DATE | REVISION | BY |
|---|---|---|
| | | |
| | | |

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4
PHOENIX, ARIZONA 85021

## EXHIBIT D
## PROPOSED ALTERNATIVES
## EXISTING CONDITIONS (ALT 1), ALT 3
## LOCALIZED DRAINAGE IMPROVEMENTS

| | BY | DATE |
|---|---|---|
| DESIGN | GSB | 5/04 |
| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 1

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## BUCKEYE DETENTION BASIN CANDIDATE ASSESSMENT REPORT

LEGEND

- AREA OF PROPOSED IMPROVEMENTS
- POTENTIAL DETENTION LOCATIONS
- CONCENTRATION POINTS
- POTENTIAL EXISTING OPEN CHANNEL OUTFALLS
- POTENTIAL PIPE OUTFALL ALIGNMENTS
- FLOW DIRECTION
- FLOW SPLITS (50%)
- CONTRIBUTING AREA BOUNDARIES
- TOWN OF BUCKEYE WATER
- TOWN OF BUCKEYE SEWER
- SOUTHWEST GAS UNDERGROUND UTILITY
- QWEST COMMUNICATIONS UNDERGROUND UTILITY

SCALE 1"=400'

0 200 400 800

| DATE | REVISION | BY |
|---|---|---|

PROJECT ENGINEERING CONSULTANTS, LTD.
2310 W. MISSION LANE, STE. 4
PHOENIX, ARIZONA 85021

EXHIBIT E
PROPOSED ALTERNATIVES
ALT 2–PARK DETENTION

| | BY | DATE |
|---|---|---|
| DESIGN | GSB | 5/04 |
| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 1

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## BUCKEYE DETENTION BASIN CANDIDATE ASSESSMENT REPORT

LEGEND

- AREA OF PROPOSED IMPROVEMENTS
- POTENTIAL DETENTION LOCATIONS
- CONCENTRATION POINTS
- POTENTIAL EXISTING OPEN CHANNEL OUTFALLS
- POTENTIAL PIPE OUTFALL ALIGNMENTS
- POTENTIAL STORM DRAIN ALIGNMENTS
- FLOW DIRECTION
- CONTRIBUTING AREA BOUNDARIES
- TOWN OF BUCKEYE WATER
- TOWN OF BUCKEYE SEWER
- SOUTHWEST GAS UNDERGROUND UTILITY
- QWEST COMMUNICATIONS UNDERGROUND UTILITY

SCALE 1"=400'

0 200 400 800

| DATE | REVISION | BY |
|---|---|---|
| | | |
| | | |

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PHOENIX, ARIZONA 85021

## EXHIBIT F
## PROPOSED ALTERNATIVES
## ALT 4– STORM DRAIN AND DETENTION

| | BY | DATE |
|---|---|---|
| DESIGN | GSB | 5/04 |
| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 1

# FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

## BUCKEYE DETENTION BASIN CANDIDATE ASSESSMENT REPORT

LEGEND

- AREA OF PROPOSED IMPROVEMENTS
- POTENTIAL DETENTION LOCATIONS
- CONCENTRATION POINTS
- POTENTIAL EXISTING OPEN CHANNEL OUTFALLS
- POTENTIAL PIPE OUTFALL ALIGNMENTS
- POTENTIAL STORM DRAIN ALIGNMENTS
- FLOW DIRECTION
- CONTRIBUTING AREA BOUNDARIES
- TOWN OF BUCKEYE WATER
- TOWN OF BUCKEYE SEWER
- SOUTHWEST GAS UNDERGROUND UTILITY
- QWEST COMMUNICATIONS UNDERGROUND UTILITY

SCALE 1"=400'

0 200 400 800

| DATE | REVISION | BY |
|---|---|---|
| | | |
| | | |

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PHOENIX, ARIZONA 85021

## EXHIBIT G
## PROPOSED ALTERNATIVES
## ALT 5, 6
## STORM DRAIN AND DETENTION

| | BY | DATE |
|---|---|---|
| DESIGN | GSB | 5/04 |
| DESIGN CHK. | MDH | 5/04 |
| PLANS | GSB | 5/04 |
| PLANS CHK. | MDH | 5/04 |

SUBMITTED BY: DATE:

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

RECOMMENDED BY: DATE

APPROVED BY: DATE

CHIEF ENGINEER AND GENERAL MANAGER

SHEET 1 OF 1