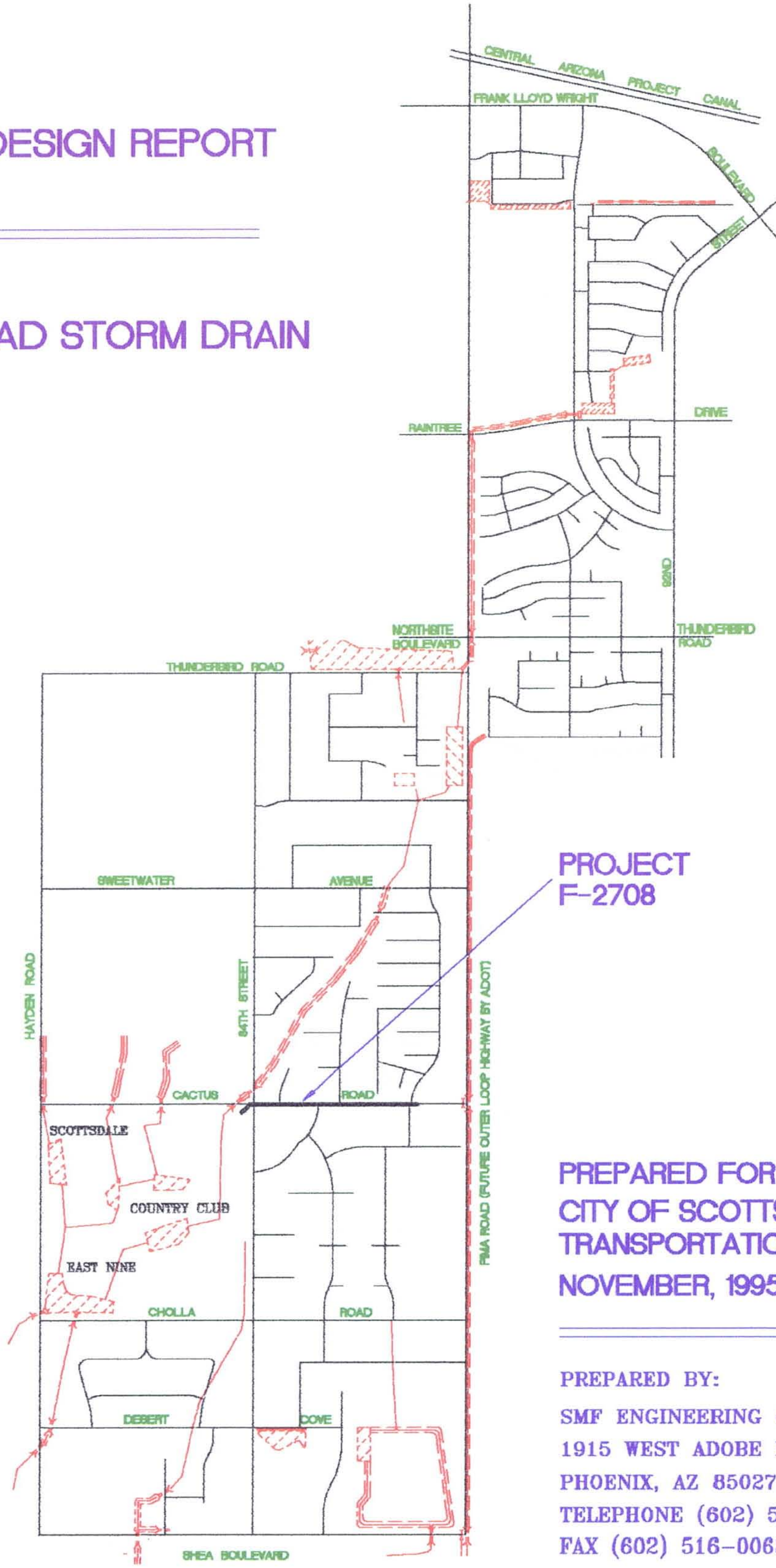
DRAINAGE DESIGN REPORT

CACTUS ROAD STORM DRAIN



PREPARED FOR:
CITY OF SCOTTSDALE
TRANSPORTATION DEPARTMENT
NOVEMBER, 1995

PREPARED BY:
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CERTIFICATE NO.
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CHARLES DEE
SCOTT
Date Signed 11/6/95
ARIZONA, U.S.A.

Table of Contents

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TABLES

SECTION 1

October 26, 1995

I DESCRIPTION OF PROJECT

A. HYDROLOGY

Master Drainage Plan... The Master Drainage Plan[1] sets forth the various proposed major drainage components for both the Thunderbird watershed and the Cholla watershed. The Cactus Road Storm Drain is one of the proposed major drainage components. It is a diversion component; that is, it diverts runoff discharges from the Cholla watershed into the Thunderbird watershed. The storm drain outfalls into Thunderbird wash; south of Cactus Road this Thunderbird wash is generally known as the East Fairway channel of the Scottsdale Country Club (SCC) East Nine. The East Fairway channel and Lake 5 of the SCC are impacted by the additional flow which will be diverted into the channel at Cactus Road. Therefore, the proposed Pima Detention Basin must be constructed and in service prior to placing the Cactus Road Storm Drain into service.

Outer Loop Highway... ADOT's future, depressed, Outer Loop Highway corridor will follow the Pima Road alignment. ADOT's General Plan includes a channel to be constructed on the east side of the Outer Loop Highway. For future conditions, this ADOT channel will obviate the proposed, interim Pima/Sweetwater Detention Basin (see Proposed Improvements Map, Section II, page 3).

Design Periods... The Concept Design Report[2] considers three distinct periods, which are:

1. **Existing Conditions Period** - the period prior to construction of the COS proposed drainage improvements.

2. **Interim Conditions Period** - the period subsequent to construction of the COS proposed drainage improvement but prior to ADOT's Outer Loop Highway construction. COS proposed Drainage Improvements include all features shown on Section II, page 3 except the Desert Cove Storm Drain.

3. **Future Conditions Period** - the period subsequent to construction of both the COS's proposed drainage improvements including the Desert Cove Storm Drain and ADOT's Outer Loop Highway.

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[1] SMF Engineering Corporation, Amendment to Volume II of II, Concept Design Report, March, 1995

[2] ibid.

Existing Conditions Hydrology... The Cholla Wash Basin hydrology for existing conditions is presented in "Volume I of II - EXISTING CONDITIONS HYDROLOGY REPORT" for this project. Volume I describes the Cholla sub-basins and existing drainage facilities in the study area; defines the study area; describes drainage patterns; and describes the source of data, criteria, and methodology. Runoff discharge values were calculated at numerous concentration points for the 2, 5, 10, 25, 50, and 100-year return frequency storms with a 6-hour duration. Concentration point numbers are shown on the Volume I Drainage Area Map and Table 4.6 lists the corresponding discharge values in cfs. The map and table of Volume I have been revised to include the Thunderbird Wash/sub-basins and are presented in the Master Drainage Plan[3].

B. DESIGN STANDARDS AND CRITERIA

The design standards used for this project are City of Scottsdale Design Procedures and Criteria; Section 2 - Drainage Report Presentation; Section 2.2 - Hydrology (Revised March, 1994); Section 3 - Design of Facilities to Manage Storm Water Runoff; the City of Scottsdale code requirements; and the Design Criteria Summary prepared by SMF Engineering Corporation (included herein).

C. DRAINAGE BASINS AND DIVERSION CONCEPTS

Study Area... The study area is shown on the "Drainage Area Map" (Section II, pages 4 & 5). It consists of the Thunderbird Wash and Cholla Wash tributary sub-basins. The location of Thunderbird Wash and Cholla Wash are shown on the "Existing Drainage Facilities Map" (Section II, pages 1 & 2). Generally, the study area north of Thunderbird Road is located between Pima Road and 92nd Street; it is bordered on the north by the CAP canal. Between Shea Boulevard and Thunderbird Road, the study area is located between 82nd Street and Pima Road.

Planned Diversion Concept... If a planned diversion were to be considered, sufficient design/modeling would need to be performed to demonstrate that the affected, downstream areas are provided with at least the same level of flood protection as existed prior to the diversion.

Drainage Basin Overspillage... The study area is separated into two parts by Thunderbird channel; Cholla Basin lies south of it and Thunderbird Basin is located on the north side of it. Observation of storm events and calculations shows that overspillage from Thunderbird Basin occurs for existing conditions, during larger storms at:

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[3] ibid.

1. The Cactus Road / 84th Street existing box culverts (overspillage into the Cholla Drainage Basin)

2. Thunderbird Channel on the east side of Pima Road (overspillage into the Pima Road Channel)

3. Thunderbird channel on the west side of Pima Road (overspillage into the Cholla Drainage Basin)

The HEC-1 models developed in this final design study account for the overspillage at those three locations.

Pima Detention Basin... Pima Detention Basin is a planned, temporary, interim period facility and will be obviated by ADOT's future Outer Loop Channel. The location is shown on the Proposed Improvements Map (Section II, page 3). A part of the runoff discharge from the areas north of Thunderbird Road (700, 800 & 900 series sub-basins) will be detained in the Pima Detention Basin, thus reducing the downstream discharge in Thunderbird Wash.

The area north of Thunderbird Road is relatively large (435 acres) and is expected to contribute a significant discharge, for existing conditions, to the downstream Scottsdale Country Club (SCC) East Nine drainage facilities. The peak discharges and total volume of flow which reach those facilities will be reduced by the Pima Detention Basin.

Cactus Road Diversion Component... For existing conditions, Cactus Road from 84th Street to Pima Road collects flows from those areas north of Cactus Road and diverts those flows to 84th Street where it turns south and continues in 84th Street to Cholla Wash at Cortez Street. The hydraulic capacity of Cholla Wash is considerably less than the runoff flows which enter into it. Also, the surface runoff flows experienced in Cactus Road and 84th Street are considerably greater than the street's water conveyance capacity.

Therefore, a new storm sewer pipe is proposed in Cactus Road from about 87th Street to 84th Street. The storm sewer pipe outfalls into the SCC East Nine drainage facilities at the existing box culvert just west of 84th Street. The proposed Pima Detention Basin will reduce the flows reaching the outfall facilities at the SCC East Nine from Thunderbird Wash, and the Cactus Road storm sewer will increase those flows. Final design of the Cactus Road storm sewer includes modeling the SCC East Nine drainage facilities to ensure a proper balance with the Pima Detention Basin. This balance ultimately resulted in improved conditions at the SCC East Nine.

Scottsdale Country Club East Nine... For both the interim and future periods, post-construction impacts to this area will be beneficial. Essentially, runoff discharges flowing into the SCC East Nine drainage facilities will be reduced. The purpose of the proposed Pima Detention Basin is to reduce flows in Thunderbird channel, reduce the storage requirement for Lake 5 of the SCC East Nine, and reduce the outflow from Lake 2 of the SCC East Nine into those communities downstream.

II MAJOR DESIGN AND EXISTING COMPONENTS

A. PIMA DETENTION BASIN (See Map, Section II, page 1)

Design Period... "ADOT's future depressed Outer Loop Highway will follow the Pima Road alignment. ADOT's General Plan includes a channel to be constructed on the east side of the Outer Loop Highway."...[4] The Pima Detention Basin planned for the interim period by the City of Scottsdale will be replaced by ADOT's Outer Loop Highway channel. Scottsdale's interim detention basin is planned for a ten (10) year life.

Detention Basin Site... The site is located along the west side of Pima Road between Sweetwater Avenue and Sutton Drive; The site is totally within the future Outer Loop Highway ROW. The total area of the site is about ten (10) acres. See Proposed Improvements Map, Section II, page 2.

Tributary Drainage Areas... The tributary area (0.68 sq mi) is bound by CAP canal on the north, Thunderbird Road on the south, Pima Road on the west and 92nd Street on the east. The area designation numbers are of the 700, 800, and 900 series. Runoff discharges from this area cross under Pima Road (east to west) in a box culvert located just south of Thunderbird Road; The flows continue south along the west side of Pima Road in an existing channel / wash to Sutton Drive where the proposed Pima Detention Basin is located.

Functional Parameters... The detention basin volumetric capacity and its outfall discharge have primary effects on the existing system function. The primary existing system components which this detention basin will have an impact on are Thunderbird channel, Cactus / 84th Street box culverts, the SCC East Nine east fairway channel, and the SCC East Nine Lake 5. The detention basin storage capacity and discharge rate is designed such that the peak flow at the Cactus / 84th Street box culverts do not exceed the box hydraulic capacity; and, that the Lake 5 water surface elevation is not increased beyond the existing conditions water surface elevation.

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[4] SMF Engineering Corporation, Hydrology Report 84th Street and Cholla Road Roadway Improvements and 83rd Place and Shea Boulevard Neighborhood Drainage Improvements, Volume I - Existing Conditions (June 21, 1993), section 3, p. 2.

The HEC-2 water surface profile computer run (see Section VIII) shows that the hydraulic capacity of the SCC East Nine fairway channel and Thunderbird channel is adequate and does not control the detention basin design.

Cactus / 84th Street Box Culverts... (See existing "Drainage Facilities Map", Section II, pages 1 and 2). An existing 2-barrel 10' x 2' box culvert is located in Thunderbird channel, under 84th Street, just north of Cactus Road; also, an existing 2-barrel 10' x 2' box culvert is located in Thunderbird channel, under Cactus Road, just west of 84th Street. For existing conditions the capacity of these box culverts is insufficient. However, the box culvert capacity is sufficient for interim and future conditions. Under future conditions, runoff discharges from that part of Thunderbird drainage basin, which lies east of Pima Road, will be intercepted by the Outer Loop Highway channel, thus reducing downstream flows in Thunderbird channel.

Under interim conditions, the runoff discharge flow at these box culverts will be reduced by the Pima Detention Basin when it is put into operation. The Pima Detention Basin is sized so that these culverts will have sufficient capacity and no improvements are necessary to carry the peak flows in Thunderbird channel.

However, some minor catchment facility improvement is recommended in 84th Street at the box culvert to direct street flows from north of Cactus Road into Thunderbird wash.

The following table presents a comparison of box culvert capacity versus expected peak runoff discharges in Thunderbird channel for each of the three periods.

TABLE 1.1 THUNDERBIRD CHANNEL / 84TH STREET BOX CULVERT

Design Period	Box Culvert Capacity (CFS)	100-Year Event Runoff (CFS)
Existing Conditions	400	839
Interim Conditions	400	324
Future Conditions	400	307

Scottsdale Country Club East Nine, Lake 5... the Cactus Road / 84th Street box culverts are the critical design components of the Thunderbird Basin drainage system. The Pima Detention Basin storage volume, which is necessary to reduce runoff flows at the box culverts to a level equal to the culvert's capacity, also reduces the water surface elevation of the SCC East Nine, Lake 5 below that for existing conditions. Therefore, an improved condition is realized at Lake 5.

The following table presents a comparison of water surface elevations and volume in Lake 5 for each of the three periods.

TABLE 1.2	LAKE 5 DETENTION BASIN		
Design Period	Water Surface Elevation	Storage Volume Acre-Feet	Peak Outflow CFS
Existing Conditions	1378.88	17.63	470
Interim Conditions	1378.53	16.02	361
Future Conditions	1378.46	15.70	340

Of the homes surrounding Lake 5, the lowest floor elevation is 1379.68.

B. CACTUS ROAD STORM DRAIN (See Map, Section II, page 3)

Purpose... The purpose of the Cactus Road planned diversion component (storm drain) is to: 1) divert runoff discharges from Cactus Road and 84th Street into the SCC East Nine drainage system (Thunderbird watershed). These flows enter Cholla Wash at about Cortez Street for existing conditions; 2) lower the water surface elevation in Cactus Road to eliminate road closures; and 3) lower the 100-year storm water surface elevation to eliminate flooding the house floor at the southeast corner of Cactus Road and 84th Street.

Existing Conditions... The Cactus Road roadway from Pima Road to 84th Street is improved with asphalt pavement, vertical curb, gutter and sidewalk. It carries surface flows from Pima Road to 84th Street. A small culvert is positioned on the west side of the Pima Road intersection to carry flows under Cactus Road; but, a portion of the larger storm flows are diverted west along Cactus Road. Those runoff discharges north of Cactus Road flow generally south/southwest; Cactus Road intercepts the flow and diverts the discharge to 84th Street where it turns south. The HEC-2 computer model for existing conditions demonstrates that for the 100-year return frequency storm, flows are not retained within the ROW and the depth of flow exceeds eight inches. Also, at the southeast corner of Cactus Road and 84th Street, the 100-year storm water surface elevation (1395.44) exceeds the floor elevation (1395.28).

Proposed Improvements... The Proposed Improvement Plan includes a storm sewer in Cactus Road to intercept the 50-year return frequency discharge and carry it to the SCC East Nine.

However, the 100-year event level of protection is desired; the difference between the 50-year and the 100-year events will surface flow in Cactus Road, and will be intercepted at 84th Street with catch basins. The 8'x4' box section storm drain outfalls into the SCC East Fairway channel.

HEC-1 Model... The Thunderbird Basin HEC-1 model was generated to ensure that an equal or better condition exists in Thunderbird channel and at the SCC East Nine subsequent to construction of drainage improvements.

For the Proposed Improvement Plan which includes the Cactus Road diversion component with an outfall into the SCC East Nine drainage swale, the effects were determined prior to considering the plan valid. See detailed discussion under "**A. PIMA DETENTION BASIN**".

Catchment Facilities... Usually, catch basins are designed to intercept flows for a 2-year storm in accordance with pavement drainage design criteria. "Catch basin or scupper inlets must be sized and located in series along a gutter grade to ensure that the estimated spread of longitudinal street flow will not exceed twelve feet (measured perpendicular to the curb face) during the peak runoff flow determined for a two-year frequency storm."[5]

Also, for the 100-year return frequency storm, ..."The inlets must also be sized and spaced to ensure that the longitudinal street flow at the peak runoff flow rates from a 100-year frequency storm is retained in the public right-of-way and is flowing at a depth no greater than eight inches above the gutter flow line."[6].

However, this proposed storm sewer is a flood control facility and the storm sewer design including catch basins will exceed the usual City criteria: the 100-year storm will be intercepted by the proposed system.

Existing ROW... The existing ROW is 80 feet along Cactus Road from 84th Street to 86th Street; the south half is 40 feet from 86th Street to Pima Road; and, the north half varies from 45 feet to 55 feet between 86th Street and Pima Road. No new ROW is required for this proposed storm sewer in Cactus Road, but a new Drainage Easement is required for the outlet structure at the SCC East Nine drainage swale.

Outfall Structure... For the Proposed Improvement Plan the outfall structure will be located near the existing box culvert under Cactus Road just west of 84th Street. The hydraulic profiles of the drainage swale and the proposed storm sewer have been carefully matched to ensure the proper hydraulic capacity of both systems.

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[5] City of Scottsdale, Design Procedures and Criteria, Section 3 - Design of Facilities to Manage Stormwater Runoff, P. 36.

[6] Ibid.

C. EIGHTY-FOURTH STREET (See Map, Section II, page 3)

Existing Box Culvert... The existing box culvert located under 84th Street just north of Cactus Road in Thunderbird Wash has been observed to overspill and combine with the Cactus Road surface flow. Also, calculations confirm this. For existing conditions, that flow combines with the Cactus Road flow and continues south in 84th Street to Cholla Wash near Cortez Street.

The Proposed Improvement Plan HEC-1 model includes the Pima Detention Basin which eliminates overspillage into Cactus Road and 84th Street.

D. SCOTTSDALE COUNTRY CLUB EAST NINE (See Map, Section II, page 3)

Initial Design... A HEC-1 model was prepared for the SCC East Nine development by Collar, Williams and White Engineering, Inc. (C W & W) in 1984. The improvements included five lakes with a ten-foot depth; the top three feet is for detention requirements. That system is shown on the "Existing Drainage Facilities" map. Thunderbird Wash flows discharge into Lake 5 and Lake 5 discharges into Lake 2 as do Lakes 1, 3, and 4.

The initial hydrology design was based on a 100-year return frequency 2-hour duration storm. Current City of Scottsdale criteria require a 6-hour duration.

The drainage areas shown on the C W & W Drainage Area Map agree very closely to that of this study; except, their drainage area 5 did not account for the detention site along Thunderbird Road which was constructed at a later date. Area 5 is tributary to Thunderbird Wash.

Existing Conditions... "The Scottsdale Country Club drainage facilities consist of a system of drainage swales and five lakes with detention capacity. The system intercepts flows from four major channels which cross Cactus Road between Hayden Road and 84th Street, including the Thunderbird Wash channel which borders this study area on the northwest side between the 84th Street / Cactus Road and the Pima Road / Thunderbird Road intersections."[7]

The Master Drainage Plan says... "Presently, there is a major flooding problem that occurs at the southwestern corner of the Scottsdale Country Club Second Nine. The lake at this location, Lake Number 2, has two culvert outlets, one under Cholla Road and one under Hayden Road. When a 10-year storm occurs on the watershed, water begins to spill out of Lake 2 onto Cholla and Hayden. Most of the water drains

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[7] SMF Engineering Corporation, Hydrology Report 84th Street and Cholla Road Roadway Improvements and 83rd Place and Shea Boulevard Neighborhood Drainage Improvements, Volume I - Existing Conditions (June 21, 1993), section 3, p. 4.

south on Hayden and some is captured by catch basins along Hayden. In a 100-year storm, over 2,000 cfs spills over into Hayden and Cholla."[8]

HEC-1 Model... The COS has a HEC-1 model for the SCC East Nine's basins and drainage facilities. This model originated with the Boyle Report. The Boyle Report says, "The proposed improvements for the Scottsdale Country Club Second Nine are based on data taken from the 'Grading and Drainage Plan for the Scottsdale Country Club Second Nine'. Further design of the proposed improvements would require more accurate data of the site".[9] Consequently, Lake 5 was mapped and new volumetric calculations were performed for this study and report.

For this report, a new Thunderbird Basin HEC-1 model was generated to ensure that an equal or better condition exists in Thunderbird channel and at the SCC East Nine Lake 5 subsequent to construction of drainage improvements. For this new HEC-1 model, the upper limit of Thunderbird Basin is the CAP canal and the lower limit is the outfall at Lake 5. The system of drainage basins tributary to the other SCC East Nine lake network (Lakes 1, 2, 3, & 4) is not included in the new HEC-1 model.

HEC-2 Model Combined Discharges... For the Proposed Improvement Plan, the Thunderbird Wash channel and the new Cactus Road storm sewer discharges will combine and flow into the existing East Fairway swale to lake 5. The East Fairway HEC-2 water surface profile shows that this combined discharge does not exceed the capacity of the SCC East Nine drainage system which includes the East Fairway swale, the approach channel to Lake 5, and Lake 2. HEC-2 calculations show that the East Fairway swale has more than sufficient capacity.

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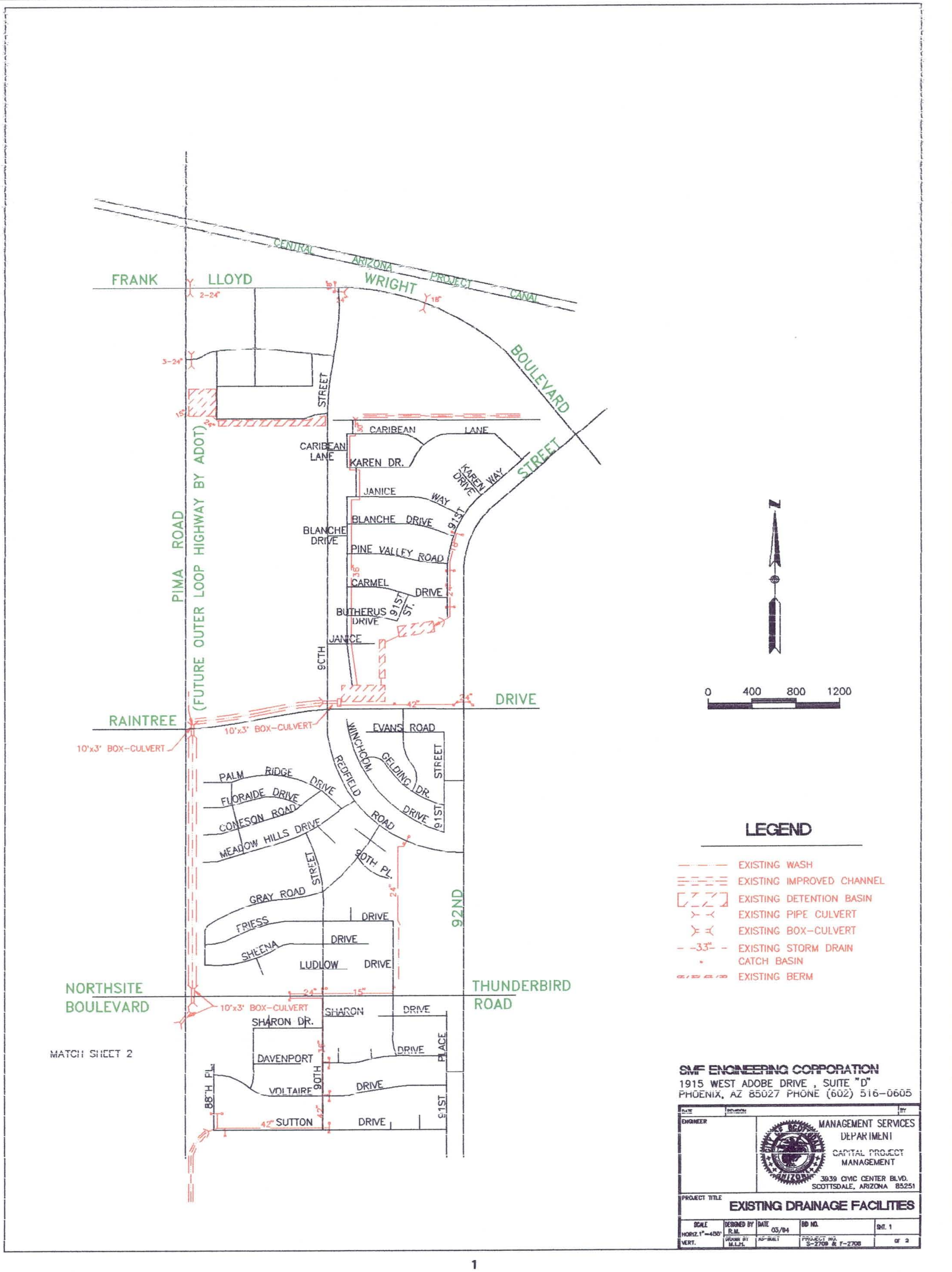
[8] Boyle Engineering Corporation. Hayden / Shea Area Master Drainage Plan, Pima/Doubletree Area Master Drainage Plan, Addendum No. 2, January 25, 1991, p. 2.

[9] Boyle Engineering Corporation. Op. Cit., p. 9.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CARIBEAN LANE
KAREN DR.
KAREN DRIVE
WAY
STREET
JANICE WAY
BLANCHE DRIVE
BLANCHE DRIVE
91ST
PINE VALLEY ROAD
CARMEL DRIVE
BUTHERUS DRIVE
91ST ST.
JANICE
90TH
PIMA ROAD
(FUTURE OUTER LOOP HIGHWAY BY ADOT)
RAINTREE DRIVE
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10'x3' BOX-CULVERT
10'x3' BOX-CULVERT
EVANS ROAD
WINCHCOMB
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STREET
REDFIELD ROAD
DRIVE
91ST
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FLORAIDE DRIVE
CONESON ROAD
MEADOW HILLS DRIVE
STREET
90TH PL.
GRAY ROAD
24"
92ND
FRIESS DRIVE
SHEENA DRIVE
LUDLOW DRIVE
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THUNDERBIRD ROAD
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24"
15"
SHARON DR.
SHARON DRIVE
DAVENPORT DRIVE
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90TH
88TH PL.
VOLTAIRE DRIVE
91ST
42" SUTTON DRIVE
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EXISTING IMPROVED CHANNEL
EXISTING DETENTION BASIN
EXISTING PIPE CULVERT
EXISTING BOX-CULVERT
-33"- EXISTING STORM DRAIN
CATCH BASIN
EXISTING BERM
SMF ENGINEERING CORPORATION
1915 WEST ADOBE DRIVE, SUITE "D"
PHOENIX, AZ 85027 PHONE (602) 516-0605
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BY
ENGINEER
MANAGEMENT SERVICES DEPARTMENT
CAPITAL PROJECT MANAGEMENT
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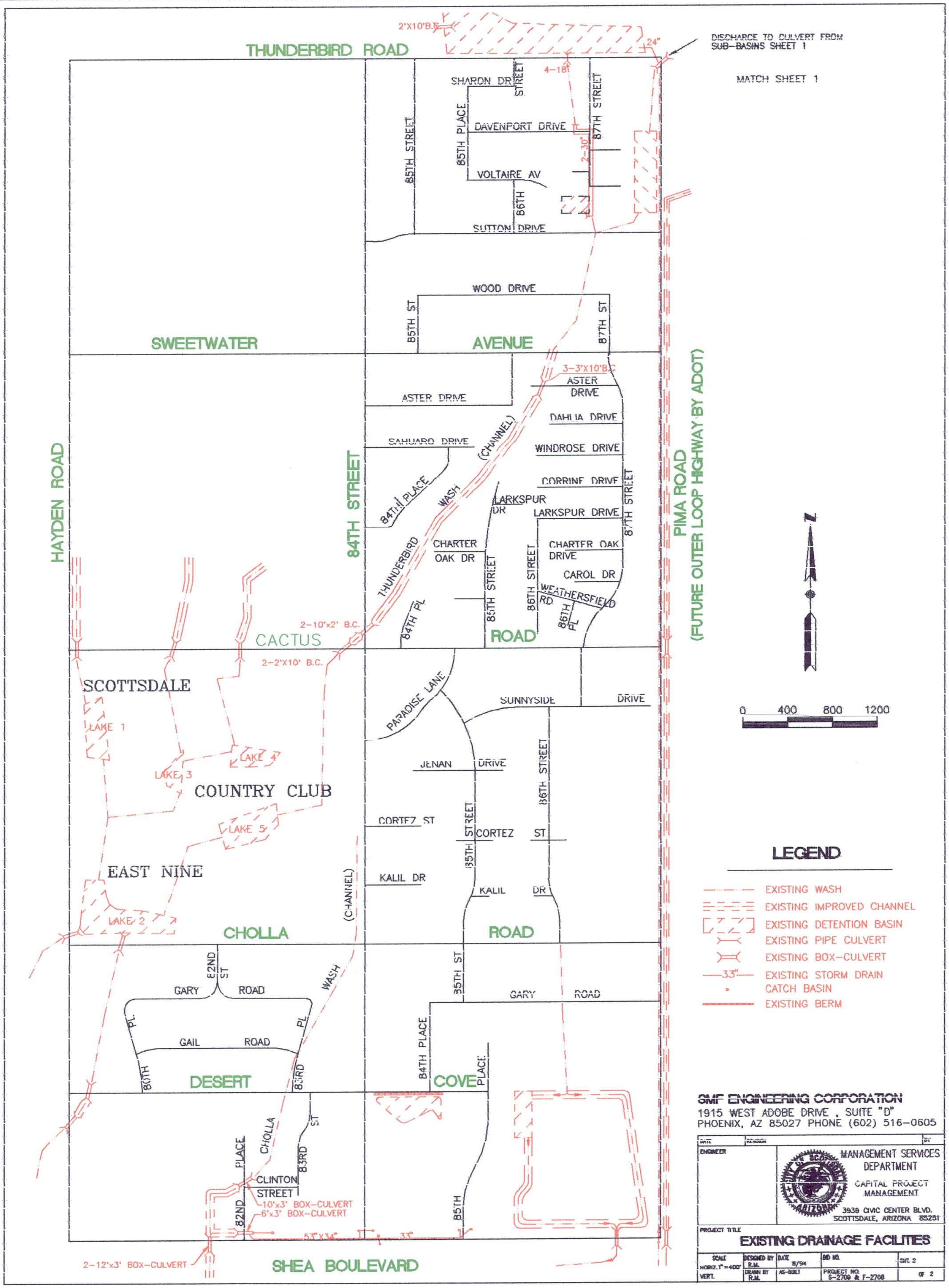
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(CHANNEL)
WINDROSE DRIVE
CORRINE DRIVE
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EAST NINE
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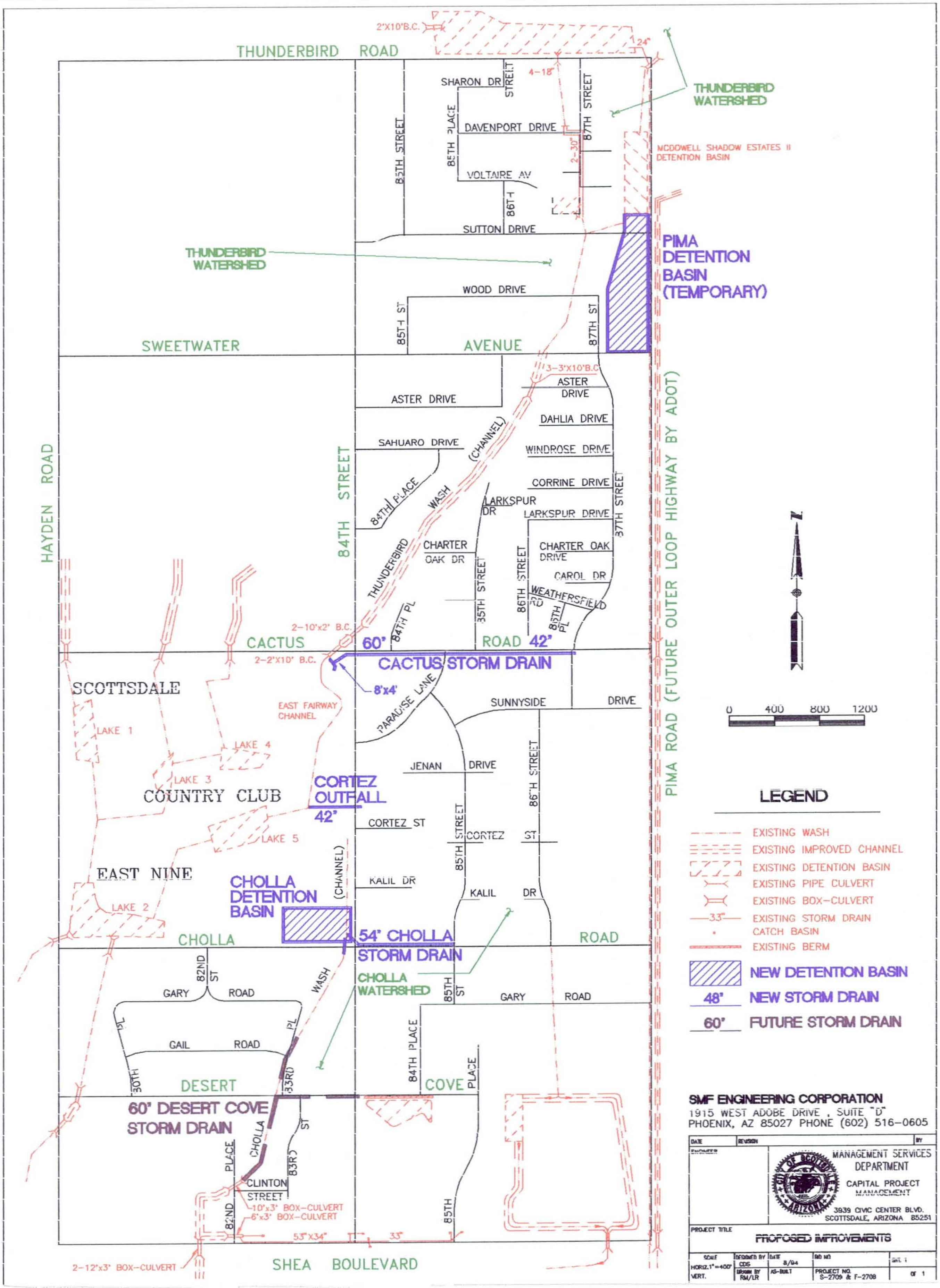
OF 2
2-12'x3' BOX-CULVERT
SHEA BOULEVARD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2'X10'B.C.
24"
4-18"
SHARON DR
86TH STREET
87TH STREET
THUNDERBIRD WATERSHED
DAVENPORT DRIVE
85TH PLACE
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2-30"
MCDOWELL SHADOW ESTATES II DETENTION BASIN
VOLTAIRE AV
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SUTTON DRIVE
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SAHUARO DRIVE
(CHANNEL)
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85TH STREET
86TH STREET
CAROL DR
WEATHERSFIELD RD
84TH PL
86TH PL
2-10'x2' B.C.
CACTUS
60"
ROAD
42"
2-2'X10' B.C.
CACTUS STORM DRAIN
SCOTTSDALE
8'x4'
PARADISE LANE
SUNNYSIDE
DRIVE
0
400
800
1200
EAST FAIRWAY CHANNEL
LAKE 1
LAKE 4
JENAN
DRIVE
86TH STREET
LAKE 3
COUNTRY CLUB
CORTEZ OUTFALL
42"
LEGEND
CORTEZ ST
85TH STREET
CORTEZ
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LAKE 5
EXISTING WASH
EXISTING IMPROVED CHANNEL
EAST NINE
EXISTING DETENTION BASIN
CHOLLA DETENTION BASIN
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KALIL DR
EXISTING PIPE CULVERT
KALIL
DR
EXISTING BOX-CULVERT
LAKE 2
EXISTING STORM DRAIN
CATCH BASIN
CHOLLA
54" CHOLLA STORM DRAIN
ROAD
EXISTING BERM
NEW DETENTION BASIN
82ND ST
WASH
CHOLLA WATERSHED
85TH ST
48"
NEW STORM DRAIN
GARY
ROAD
GARY
ROAD
60"
FUTURE STORM DRAIN
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ROAD
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84TH PLACE
80TH
83RD
DESERT
COVE
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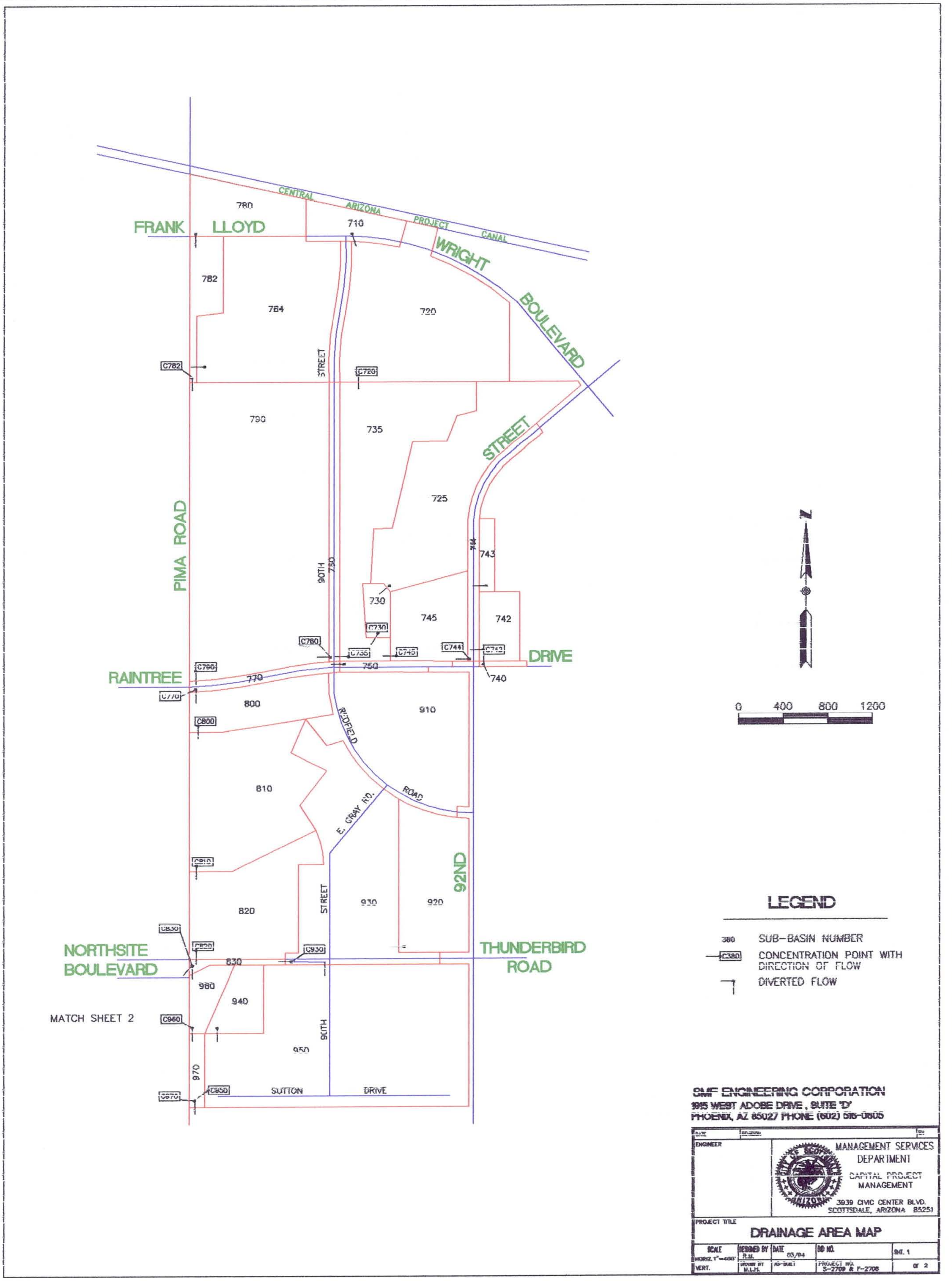
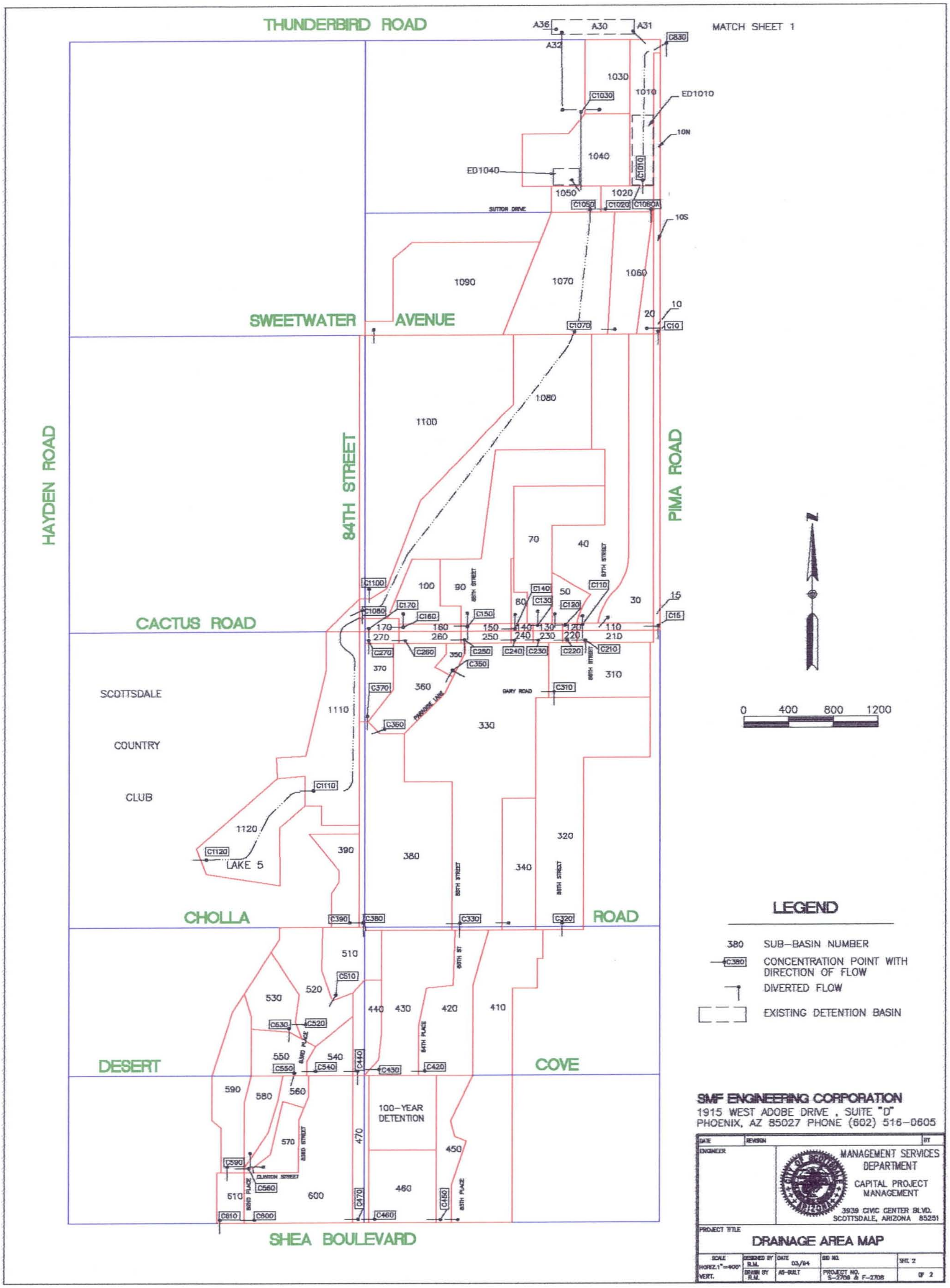
MANAGEMENT SERVICES DEPARTMENT
CAPITAL PROJECT MANAGEMENT
3939 CIVIC CENTER BLVD.
SCOTTSDALE, ARIZONA 85251
PROJECT TITLE
PROPOSED IMPROVEMENTS
2-12'x3' BOX-CULVERT
SHEA BOULEVARD
SCALE HORIZ. 1"=400' VERT.
DESIGNED BY CDS
DRAWN BY RM/LR
DATE 8/94
AS-BUILT
PROJECT NO. S-2709 & F-2708
OF 1


CENTRAL ARIZONA PROJECT CANAL
FRANK LLOYD WRIGHT BOULEVARD
PIMA ROAD
90TH STREET
STREET
RAINTREE DRIVE
REDFIELD ROAD
E. GRAY RD.
92ND STREET
NORTHSITE BOULEVARD
THUNDERBIRD ROAD
SUTTON DRIVE
MATCH SHEET 2
N
0 400 800 1200
LEGEND
380 SUB-BASIN NUMBER
C380 CONCENTRATION POINT WITH DIRECTION OF FLOW
DIVERTED FLOW
SMF ENGINEERING CORPORATION
1915 WEST ADOBE DRIVE, SUITE 'D'
PHOENIX, AZ 85027 PHONE (602) 516-0605
ENGINEER
MANAGEMENT SERVICES DEPARTMENT
CAPITAL PROJECT MANAGEMENT
3939 CIVIC CENTER BLVD.
SCOTTSDALE, ARIZONA 85251
PROJECT TITLE
DRAINAGE AREA MAP
SCALE
VERT.
DESIGNED BY R.M.
DRAWN BY M.L.H.
DATE 03/94
PROJECT NO. S-2709 & F-2706
SHT. 1 OF 2


THUNDERBIRD ROAD
MATCH SHEET 1
SWEETWATER AVENUE
HAYDEN ROAD
84TH STREET
PIMA ROAD
CACTUS ROAD
SCOTTSDALE
COUNTRY
CLUB
LAKE 5
CHOLLA ROAD
DESERT COVE
SHEA BOULEVARD
100-YEAR DETENTION
0 400 800 1200
LEGEND
380 SUB-BASIN NUMBER
C380 CONCENTRATION POINT WITH DIRECTION OF FLOW
DIVERTED FLOW
EXISTING DETENTION BASIN
SMF ENGINEERING CORPORATION
1915 WEST ADOBE DRIVE . SUITE "D"
PHOENIX, AZ 85027 PHONE (602) 516-0605
MANAGEMENT SERVICES DEPARTMENT
CAPITAL PROJECT MANAGEMENT
3939 CIVIC CENTER BLVD.
SCOTTSDALE, ARIZONA 85251
DRAINAGE AREA MAP

Date: 11-2-95
By : Charles D. Scott
SMF Engineering Corporation

Drainage Design Criteria - FINAL

City of Scottsdale
84th Street & Cholla Road
Cholla and Cactus Storm Drain

1) Catch Basins:

- Calculate Peak Flows to Catch Basins with HEC-1. Use peak runoff of sub-basin. Add bypass from catch basin upstream. Assume sub-basin and bypass will peak at the same time.

- Use HEC-12 for catch basin inlet capacity, and pavement drainage spread and depth calculations.

  For Cholla Road:
  - Max Spread is 10.5 feet for a 2-year storm
  - Spread shall be within Right-of-Way for a 100-year storm
  - Max Depth is 8 inches for a 100-year storm

  For 84th Street:
  - Max Spread is 12 feet for a 2-year storm
  - Spread shall be within Right-of-Way for a 100-year storm
  - Max Depth is 8 inches for a 100-year storm

  For Cactus Rd:
  - Max Spread is 23 feet for a 50-year storm
  - Max Depth is 6 inches for a 50-year storm
  - Spread shall be within Right-of-Way for a 100-year storm
  - Max Depth is 8 inches for a 100-year storm

  Clogging Factors
  - Curb Opening Inlet: 1.25 * required length
  - Grate Inlet : 2.0 * required opening
  - Combination Inlet : Curb - 1.25 * required length
Grate - 2.0 * required opening

- Approximately 90% of the total runoff will be intercepted by each Catch Basin.

- Catch Basins in 85th St (Cholla Storm Drain) are designed to intercept the 100-year storm.

- Catch Basins at 84th Street & Cactus Road are designed to intercept the 100-year storm.

2) <u>Storm Drains:</u>

- Hydraulic Gradient
  Cactus - 50-year Storm, and 100-year from 84th Street to outlet structure (8'x4' Box Sections)
  Cholla - 100-year Storm

- Assume that Catch Basins will intercept 100% of the design storm.
  Use HEC-1 to calculate design flows. Combine hydrographs going downstream. Design the Hydraulic Gradient to be a minimum of 6 inches below the catch basin depression.

- Energy losses in main line from LA County (Street and Highway Drainage) as follows:

  - Catch Basin: Entrance Loss = $0.5\ V^2/2g$

  - Manhole Shaft (no increase in flow): Loss = $0.05\ V^2/2g$

  - Junction (increase in flow): Loss(Hj) = $\Delta H + H_{V1} - H_{V2}$

    Where $\Delta H = Q_2V_2 - Q_1V_1 - Q_3V_3COS(\propto)\ /\ .5(A_1+A_2) * g$

  - Expansion: Loss = $(V_1-V_2)^2/2g$

  - Expansion (Outfall): Loss = $1.0 * V^2/2g$

  - Bend (Curve): Loss = $0.002 * \propto * V^2/2g$

  - Bend (Angle): Loss = $0.0033 * \propto * V^2/2g$

  - Friction: Loss = $29 * n^2 * L * V^2/(R^{4/3} * 2g)$

- Manning's n = 0.013 (For RGRCP)
  Manning's n = 0.016 (For CIPCP)

- Minimum Velocity 3 ft/sec Flowing Full or Half Full

- Minimum pipe size is 18 inches

- Minimum cover is 3 feet

- Catch basin connector pipes are designed for the 100-year storm

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1*********************************************                    *********************************************
*                                           *                    *                                           *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)       *                    *   U.S. ARMY CORPS OF ENGINEERS            *
*           SEPTEMBER 1990                  *                    *   HYDROLOGIC ENGINEERING CENTER           *
*             VERSION 4.0                   *                    *         609 SECOND STREET                 *
*                                           *                    *      DAVIS, CALIFORNIA 95616              *
*  RUN DATE  10/20/1994  TIME  11:52:18     *                    *          (916) 756-1104                   *
*                                           *                    *                                           *
*********************************************                    *********************************************
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X     X  XXXXXXX   XXXXX            X
X     X  X        X     X          XX
X     X  X        X                 X
XXXXXXX  XXXX     X          XXXXX  X
X     X  X        X                 X
X     X  X        X     X           X
X     X  XXXXXXX   XXXXX           XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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

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

              ID        84TH STREET AND CHOLLA ROAD
              ID        2-5-10-25-50-100 yr STORM
              ID        ULTIMATE CONDITION:
              ID        --BOX CULVERTS IN CACTUS/84TH INTERSECTION ARE not IMPROVED
              ID        --NEW STORM SEWER IN CACTUS (outfall at box-culvert)
              ID        --INTERCEPTOR AT CORTEZ IN 84TH STREET
              ID        --NO FLOW CROSSING PIMA ROAD AT TBIRD
              ID     **************************************************
              ID        SCOTTSDALE COUNTRY CLUB LAKE 5
              ID     **************************************************
              ID        FILE SCCULT.DAT
              *DIAGRAM
              IT       2                     300
              IO       5
              JR    PREC     .36     .53     .62     .76     .88     1.0

              KK     A30        SUBBASIN A30 RUNOFF
              PH                    0.88    1.61     2.6    2.84       3     3.3
              BA  0.4031
              LS       0      77      11
              UD    0.47

              KK    DA30        DETENTION BASIN AT CPA30
              KM                Outflow to A31 and A32 and A36
              RS       1    STOR       0
              SA       0    0.49    0.94    1.39    1.93
              SE   34.99   35.00   37.00   39.00   41.40
              SQ       0      40   137.4     268     361

              KK     A31        SPLIT FLOW AT DETENTION BASIN DA30
              KM                DI is Total Outflow from Detention Basin (A31+A32+A36)
              KM                DQ is Split to A32 and A36
              DT     A32
              DI       0      40   137.4     268     361
              DQ       0      40   124.4     242     326

              KK  ED1010        ROUTE CA31 TO ED1010
              RS     100    STOR      -1       0
              RC    .060    .040    .060     600   .0086
              RX       0     0.1      50      56      59      65     115   115.1
              RY     105     100      99      95      95      99     100     105

              KK    1010        SUBBASIN 1010 RUNOFF
              BA  .01192
              LS       0      77
              UD    0.08

              KK   C1010        COMBINE 1010 and CA31
              HC       2
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 43         KK  ED1010        EXISTING DETENTION BASIN 1010
 44         RS       1    STOR       0
 45         SA       0    0.41    0.93    1.19    1.45    1.71    2.23
 46         SE    24.7    25.7    26.7    27.2    27.7    28.2    29.2
 47         SQ       0       7      17      21      69     240    1082

 48         KK   C1020        ROUTE DETENTION BASIN OUTFALL TO C1020
 49         RS     100    STOR      -1       0
 50         RC    .050   0.040    .050     220   .0086
 51         RX       0     0.1      50      56      59      65     115   115.1
 52         RY     105     100      99      95      95      99     100     105

 53         KK    1020        SUBBASIN 1020 RUNOFF
 54         BA  .00202
 55         LS       0      77      10
 56         UD    0.06

 57         KK   C1020        COMBINE C1010 AND 1020
 58         HC       2

 59         KK     A32        RETRIEVE SPLIT FLOW AT A32 (A36 and A32)
 60         DR     A32

 61         KK     A32        SPLIT FLOW AT DETENTION BASIN DA30
 62         KM                DI is Split to A32 and A36
 63         KM                DQ is Split to A36 (Box Culvert)
 64         DT     A36
 65         DI       0      40   124.4     242     326
 66         DQ       0      40     110     190     250

 67         KK   C1030        ROUTE A32 TO C1030
 68         RS     100    STOR      -1       0
 69         RC    .060    .040    .060     600   .0080
 70         RX       0     0.1      50      56      59      65     115   115.1
 71         RY     105     100      99      95      95      99     100     105

 72         KK   C1030        ROUTE A32 TO C1030
 73         RK     230   .0036    .012            CIRC    3.53

 74         KK    1030        SUBBASIN 1030 RUNOFF
 75         BA  .00985
 76         LS       0      77
 77         UD     .13

 78         KK   C1030        COMBINE C1030 AND A32
 79         HC       2

 80         KK   C1040        ROUTE C1030 TO C1040
 81         RK     524  0.0040    .012       0    CIRC    3.53
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 82            KK    1040        SUBBASIN 1040 RUNOFF
 83            BA  .01949
 84            LS       0      77      25
 85            UD    0.12

 86            KK  ED1040        EXISTING DETENTION BASIN 1040
 87            RS       1    STOR      -1       0
 88            SA       0    0.52    .597    .713    0.79    0.79
 89            SE    24.0    24.5    25.5    27.0      28      29
 90            SQ       0     1.5       6      13      16      19

 91            KK   C1040        COMBINE C1030 AND 1040
 92            HC       2

 93            KK   C1050        ROUTE C1040 TO C1050
 94            RS     100    STOR      -1       0
 95            RC    .050   0.040    .050     250   .0086
 96            RX       0     0.1      50      56      59      65     115   115.1
 97            RY     105     100      99      95      95      99     100     105

 98            KK    1050        SUBBASIN 1050 RUNOFF
 99            BA  .00387
100            LS       0      77
101            UD    0.07

102            KK   C1050        COMBINE 1050 AND C1040
103            HC       2

104            KK   C1050        COMBINE C1050 AND C1020
105            HC       2

106            KK   C1070        ROUTE C1050 TO C1070
107            RS     100    STOR      -1       0
108            RC    .050   0.040    .050    1150   .0078
109            RX       0     0.1      50      56      60      66     116   116.1
110            RY     105     100      99      95      95      99     100     105

111            KK    1060        SUBBASIN 1060 RUNOFF
112            BA  .01174
113            LS       0      77
114            UD    0.20

115            KK   C1070        ROUTE 1060 TO C1070
116            RS     100    STOR      -1       0
117            RC    .040   0.016    .040     380   .0100
118            RX       0     0.1    21.5    21.6    60.5    60.6      72    72.1
119            RY     105     100      99   98.86   98.86      99     100     105

120            KK    1070        SUBBASIN 1070 RUNOFF
121            BA  .02864
122            LS       0      77      17
123            UD    0.14
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 124           KK   C1070       COMBINE C1050 AND 1060 AND 1070
 125           HC       3

 126           KK   C1080       ROUTE C1070 TO C1080
 127           RS     100    STOR      -1       0
 128           RC    .050   0.040    .050    3100   .0066
 129           RX       0     0.1      30      41      49      60      90    90.1
 130           RY     108     100      99      95      95      99     100     108

 131           KK    1080       SUBBASIN 1080 RUNOFF
 132           BA  .04840
 133           LS       0      77      24
 134           UD    0.16

 135           KK   C1080       COMBINE 1080 AND C1070
 136           HC       2

 137           KK    1090       SUBBASIN 1090 RUNOFF
 138           BA  .03370
 139           LS       0      77      20
 140           UD   0.138

 141           KK   C1100       ROUTE 1090 TO C1100
 142           RS     100    STOR      -1       0
 143           RC    .040   0.016    .040   .0074    2340
 144           RX       0     0.1      20    20.1      60    60.1      80    80.1
 145           RY     105     100      99   98.75   98.75      99     100     105

 146           KK    1100       SUBBASIN 1100 RUNOFF
 147           BA  .07053
 148           LS       0      77      18
 149           UD    0.37

 150           KK   C1100       COMBINE 1100 AND 1090
 151           HC       2

 152           KK   C1080       COMBINE C1100 AND C1080
 153           HC       2

 154           KK      40     SUBBASIN 40 RUNOFF
 155           BA  .03122
 156           LS              77      45
 157           UD     .42

 158           KK   SD110     ROUTE C40 TO SD110
 159           RK     190  0.0010   0.012            CIRC       3

 160           KK      50     SUBBASIN 50 RUNOFF
 161           BA  .00659
 162           LS              77      35
 163           UD     .14
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 164          KK     110      SUBBASIN 110 RUNOFF
 165          BA  .00047
 166          LS                98
 167          UD     .06

 168          KK    C110      COMBINE 110 AND 50
 169          HC       2

 170          KK     210      SUBBASIN 210 RUNOFF
 171          BA  .00114
 172          LS                98
 173          UD     .06

 174          KK   SD210      COMBINE SD110 AND C110 AND 210
 175          HC       3

 176          KK   SD220      ROUTE SD210 TO SD220
 177          RK     255  0.0010  0.012          CIRC        4

 178          KK      70      SUBBASIN 70 RUNOFF
 179          BA  .01106
 180          LS                77      35
 181          UD     .19

 182          KK     120      SUBBASIN 120 RUNOFF
 183          BA  .00042
 184          LS                98
 185          UD     .06

 186          KK    C120      COMBINE C120 AND 70
 187          HC       2

 188          KK   SD220      COMBINE SD210 AND SD220
 189          HC       2

 190          KK   SD230      ROUTE SD220 TO SD230
 191          RK     255  0.0010  0.012          CIRC        4

 192          KK      80      SUBBASIN 80 RUNOFF
 193          BA  .00189
 194          LS                77      30
 195          UD     .10

 196          KK     130      SUBBASIN 130 RUNOFF
 197          BA  .00034
 198          LS                98
 199          UD     .06

 200          KK    C130      COMBINE 80 AND 130
 201          HC       2
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ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK     220       SUBBASIN 220 RUNOFF
BA  .00103
LS                  98
UD     .06

KK    C230       ROUTE C220 TO 230
RS     100    STOR      -1       0
RC    .016    .016    .040     380   .0030     120
RX       0       0    31.8    33.8    33.8    38.8      55      80
RY  100.41   98.41   97.95   97.87   98.37   98.49    99.0    99.9

KK     230       SUBBASIN 230 RUNOFF
BA  .00083
LS                  98
UD     .06

KK    C230       COMBINE C220 AND 230
HC       2

KK   SD230       COMBINE SD220 AND C130 AND C230
HC       3

KK    SD90       ROUTE SD230 TO SD90
RK     205  0.0010   0.012            CIRC       4

KK      90       SUBBASIN 90 RUNOFF
BA  .02922
LS                  77      24
UD     .23

KK    SD90       COMBINE SD230 AND 90
HC       2

KK   SD240       ROUTE SD90 TO SD240
RK     125  0.0010   0.012            CIRC       4

KK     140       SUBBASIN 140 RUNOFF
BA  .00081
LS                  98
UD     .06

KK     240       SUBBASIN 240 RUNOFF
BA  .00150
LS                  98
UD     .06

KK   SD240       COMBINE SD90 AND 140 AND 240
HC       3
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 239          KK   SD250      ROUTE SD240 TO SD250
 240          RK     350  0.0010   0.012           CIRC        4

 241          KK     150      SUBBASIN 150 RUNOFF
 242          BA  .00192
 243          LS                 98
 244          UD     .07

 245          KK     250      SUBBASIN 250 RUNOFF
 246          BA  .00134
 247          LS                 98
 248          UD     .06

 249          KK   SD250      COMBINE SD240 AND 150 AND 250
 250          HC       3

 251          KK   SD260      ROUTE SD250 TO SD260
 252          RK     336  0.0010   0.012           CIRC        5

 253          KK     100      SUBBASIN 100 RUNOFF
 254          BA  .00666
 255          LS                 77       24
 256          UD     .12

 257          KK     160      SUBBASIN 160 RUNOFF
 258          BA  .00058
 259          LS                 98
 260          UD     .06

 261          KK    C160      COMBINE 100 AND 160
 262          HC       2

 263          KK     260      SUBBASIN 260 RUNOFF
 264          BA  .00114
 265          LS                 98
 266          UD     .06

 267          KK   SD260      COMBINE SD250 AND C160 AND 260
 268          HC       3

 269          KK   SD270      ROUTE SD260 TO SD270
 270          RK     194  0.0010   0.012           CIRC        5

 271          KK     170      SUBBASIN 170 RUNOFF
 272          BA  .00047
 273          LS                 77       35
 274          UD     .06

 275          KK     270      SUBBASIN 270 RUNOFF
 276          BA  .00095
 277          LS                 98
 278          UD     .06
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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 279           KK   SD270      COMBINE SD260 AND 170 AND 270
 280           HC       3

 281           KK   SD270      DIVERT EXCESS OF 50YR STORMDRAIN TO 84TH ST SOUTH
 282           DT   ST270
 283           DI       0     131     200
 284           DQ       0       0      69

 285           KK   SDBOX      ROUTE SD270 TO SDBOX
 286           RK     270  0.0010   0.012            CIRC       5

 287           KK   C1080      COMBINE C1080 AND SDBOX
 288           HC       2

 289           KK  C1110N         ROUTE C1080 TO C1110N
 290           RS     100    STOR      -1       0
 291           RC    .040   0.030    .040     900   .0092
 292           RX       0     0.1      20      40      80     100     120   120.1
 293           RY     105     100      99      93      93      99     100     105

 294           KK   1110N         SUBBASIN 1110N RUNOFF
 295           BA  .00396
 296           LS       0      69      18
 297           UD    0.06

 298           KK  C1100N         COMBINE C1110N AND C1080
 299           HC       2

 300           KK   ST270      RETRIEVE ST270 (street flow in 84th street)
 301           DR   ST270

 302           KK   ST280      ROUTE ST270 TO ST280
 303           RS     100    STOR      -1       0
 304           RC    .040    .016    .040     400   .0077
 305           RX       0      24    24.1      40    40.1      56    56.1      80
 306           RY     101   98.93   98.61   98.97   98.97   98.62   98.92     101

 307           KK   SD280      DIVERT EXCESS OF DEPRESSED CURB ON WEST SIDE 84TH ST SOUTH (all)
 308           DT   ST280
 309           DI       0      50
 310           DQ       0      50

 311           KK  C1110N      COMBINE C1110N AND ST280 (flow in channel and gutter 84th St)
 312           HC       2

 313           KK  C1110S      ROUTE C1110N TO C1110S
 314           RS     100    STOR      -1       0
 315           RC    .040   0.030    .040    1050   .0092
 316           RX       0     0.1      20      40      80     100     120   120.1
 317           RY     105     100      99      93      93      99     100     105
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 318           KK   ST280       RETRIEVE ST280 (street flow in 84th street)
 319           DR   ST280

 320           KK    C370       ROUTE ST280 TO 370
 321           RS     100     STOR      -1       0
 322           RC    .040     .016    .040     370   .0077
 323           RX       0       24    24.1      40    40.1      56    56.1      80
 324           RY     101    98.93   98.61   98.97   98.97   98.62   98.92     101

 325           KK     350       SUBBASIN 350 RUNOFF
 326           BA  .00225
 327           LS               77      20
 328           UD     .06

 329           KK    C350       DIVERT C350 TO 330
 330           DT    D330
 331           DI       0      100
 332           DQ       0       50

 333           KK    C360       ROUTE C350 TO 360
 334           RS     100     STOR      -1       0
 335           RC    .040     .016    .040     850   .0040
 336           RX       0       24    24.1      40    40.1      56    56.1      80
 337           RY     101    98.93   98.61   98.97   98.97   98.62   98.92     101

 338           KK     360       SUBBASIN 360 RUNOFF
 339           BA  .01320
 340           LS               77      20
 341           UD     .14

 342           KK     370       SUBBASIN 370 RUNOFF
 343           BA  .00592
 344           LS               77      20
 345           UD     .11

 346           KK    C370       COMBINE D280 AND C350 AND 360 AND 370
 347           HC       4

 348           KK   C380N       ROUTE C370 TO 380N
 349           RS     100     STOR      -1       0
 350           RC    .040     .016    .040     620   .0054
 351           RX       0       20    20.1      40    40.1      60    60.1      80
 352           RY     101    98.93   98.61   98.97   98.97   98.62   98.92     101

 353           KK    380N       SUBBASIN 380N RUNOFF
 354           BA  .00588
 355           LS               77      20
 356           UD     .15
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

357           KK   C380N      COMBINE C370 AND 380N (street flow in 84th street at Kalil)
358           HC       2

359           KK  C1110S      ROUTE C380N TO C1110S
360           RD     280  0.0030   0.012            CIRC       3

361           KK   1110S        SUBBASIN 1110S RUNOFF
362           BA  .01991
363           LS       0      69      18
364           UD    0.09

365           KK  C1110S      COMBINE C1110S AND C380N AND 1110S (flow upstream of box-culvert)
366           HC       3

367           KK   C1120      ROUTE C1110S TO C1120
368           RS     100    STOR      -1       0
369           RC    .020   0.020    .020     200   .0080
370           RX       0     0.1     0.2     0.3    24.3    24.4    24.5    24.6
371           RY     110     110     110     100     100     110     110     110

372           KK    1120        SUBBASIN 1120 RUNOFF
373           BA  .01692
374           LS       0      69      50
375           UD    0.07

376           KK   C1120        COMBINE 1120 AND C1110S
377           HC       2

378           KK   LAKE5        DETENTION BASIN AT LAKE 5
379           RS       1    STOR       0
380           SV       0    6.94   10.21      14   18.59   24.07   30.25
381           SE   73.50   76.09   77.09   78.09   79.09   80.09   81.09
382           SQ       0       0      49     225     535     960    1500
383           ZZ
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1*********************************************                    *********************************************
*                                           *                    *                                           *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)        *                    *  U.S. ARMY CORPS OF ENGINEERS             *
*            SEPTEMBER 1990                 *                    *  HYDROLOGIC ENGINEERING CENTER            *
*             VERSION 4.0                   *                    *        609 SECOND STREET                  *
*                                           *                    *     DAVIS, CALIFORNIA 95616               *
* RUN DATE  10/20/1994  TIME  11:52:18      *                    *         (916) 756-1104                    *
*                                           *                    *                                           *
*********************************************                    *********************************************
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                                   84TH STREET AND CHOLLA ROAD
                                   2-5-10-25-50-100 yr STORM
                                   ULTIMATE CONDITION:
                                   --BOX CULVERTS IN CACTUS/84TH INTERSECTION ARE not IMPROVED
                                   --NEW STORM SEWER IN CACTUS (outfall at box-culvert)
                                   --INTERCEPTOR AT CORTEZ IN 84TH STREET
                                   --NO FLOW CROSSING PIMA ROAD AT TBIRD
                                ***************************************************
                                   SCOTTSDALE COUNTRY CLUB LAKE 5
                                ***************************************************
                                   FILE SCCULT.DAT

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

     IT           HYDROGRAPH TIME DATA
                         NMIN          2  MINUTES IN COMPUTATION INTERVAL
                        IDATE     1    0  STARTING DATE
                        ITIME       0000  STARTING TIME
                           NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE     1    0  ENDING DATE
                       NDTIME       0958  ENDING TIME
                        ICENT         19  CENTURY MARK

                  COMPUTATION INTERVAL     .03 HOURS
                       TOTAL TIME BASE    9.97 HOURS

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

     JP           MULTI-PLAN OPTION
                        NPLAN          1  NUMBER OF PLANS

     JR           MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                        .36       .53       .62       .76       .88      1.00
```

1

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIO 1 .36	RATIO 2 .53	RATIO 3 .62	RATIO 4 .76	RATIO 5 .88	RATIO 6 1.00
					RATIOS APPLIED TO PRECIPITATION					
HYDROGRAPH AT										
+	A30	.40	1	FLOW	50.	117.	163.	244.	321.	403.
				TIME	3.57	3.60	3.57	3.57	3.57	3.57
ROUTED TO										
+	DA30	.40	1	FLOW	47.	105.	144.	210.	271.	311.
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
			** PEAK STAGES IN FEET **							
			1	STAGE	35.14	36.34	37.10	38.11	39.07	40.12
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
DIVERSION TO										
+	A32	.40	1	FLOW	46.	97.	130.	190.	244.	281.
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
HYDROGRAPH AT										
+	A31	.40	1	FLOW	1.	9.	14.	20.	26.	30.
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
ROUTED TO										
+	ED1010	.40	1	FLOW	1.	9.	14.	20.	26.	30.
				TIME	3.80	3.80	3.80	3.80	3.80	3.83
			** PEAK STAGES IN FEET **							
			1	STAGE	95.12	95.80	96.07	96.29	96.49	96.61
				TIME	3.80	3.80	3.80	3.80	3.80	3.83
HYDROGRAPH AT										
+	1010	.01	1	FLOW	1.	6.	9.	15.	21.	27.
				TIME	3.20	3.13	3.13	3.13	3.13	3.13
2 COMBINED AT										
+	C1010	.42	1	FLOW	1.	9.	14.	21.	27.	32.
				TIME	3.20	3.80	3.73	3.80	3.77	3.80
ROUTED TO										
+	ED1010	.42	1	FLOW	1.	7.	10.	14.	18.	20.
				TIME	3.87	4.00	4.10	4.17	4.20	4.30
			** PEAK STAGES IN FEET **							
			1	STAGE	24.83	25.73	25.99	26.43	26.80	27.13
				TIME	3.87	4.00	4.10	4.17	4.20	4.30
ROUTED TO										
+	C1020	.42	1	FLOW	1.	7.	10.	14.	18.	20.
				TIME	3.90	4.00	4.10	4.17	4.20	4.30
			** PEAK STAGES IN FEET **							
			1	STAGE	95.13	95.72	95.87	96.09	96.21	96.30
				TIME	3.90	4.00	4.10	4.17	4.23	4.30

HYDROGRAPH AT										
+	1020	.00	1	FLOW	1.	2.	2.	3.	4.	6.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
2 COMBINED AT										
+	C1020	.42	1	FLOW	1.	7.	10.	14.	18.	21.
				TIME	3.90	4.00	4.10	4.17	4.20	4.30
HYDROGRAPH AT										
+	A32	.00	1	FLOW	46.	97.	130.	190.	244.	281.
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
DIVERSION TO										
+	A36	.00	1	FLOW	45.	87.	114.	154.	192.	218.
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
HYDROGRAPH AT										
+	A32	.00	1	FLOW	1.	10.	16.	35.	53.	63.
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
ROUTED TO										
+	C1030	.00	1	FLOW	1.	10.	16.	35.	53.	63.
				TIME	3.80	3.80	3.80	3.80	3.77	3.80
			** PEAK STAGES IN FEET **							
			1	STAGE	95.14	95.88	96.18	96.76	97.16	97.35
				TIME	3.80	3.80	3.80	3.80	3.77	3.80
ROUTED TO										
+	C1030	.00	1	FLOW	1.	10.	16.	35.	53.	63.
				TIME	3.80	3.80	3.80	3.80	3.77	3.83
HYDROGRAPH AT										
+	1030	.01	1	FLOW	1.	4.	6.	10.	14.	18.
				TIME	3.27	3.20	3.20	3.20	3.17	3.17
2 COMBINED AT										
+	C1030	.01	1	FLOW	1.	10.	17.	36.	54.	65.
				TIME	3.80	3.80	3.80	3.80	3.77	3.80
ROUTED TO										
+	C1040	.01	1	FLOW	1.	10.	17.	36.	54.	64.
				TIME	3.80	3.80	3.80	3.80	3.77	3.83
HYDROGRAPH AT										
+	1040	.02	1	FLOW	9.	17.	22.	32.	40.	49.
				TIME	3.17	3.17	3.17	3.17	3.17	3.17
ROUTED TO										
+	ED1040	.02	1	FLOW	2.	4.	5.	6.	8.	9.
				TIME	3.50	3.57	3.57	3.57	3.57	3.57
			** PEAK STAGES IN FEET **							
			1	STAGE	24.68	25.02	25.23	25.58	25.87	26.18
				TIME	3.50	3.57	3.57	3.57	3.57	3.57
2 COMBINED AT										
+	C1040	.03	1	FLOW	3.	14.	21.	42.	61.	73.
				TIME	3.77	3.80	3.80	3.80	3.77	3.80

ROUTED TO										
+	C1050	.03	1	FLOW	3.	14.	21.	42.	61.	73.
				TIME	3.80	3.80	3.80	3.80	3.80	3.83
			** PEAK STAGES IN FEET **							
			1	STAGE	95.46	96.07	96.33	96.89	97.28	97.49
				TIME	3.80	3.80	3.80	3.80	3.80	3.83
HYDROGRAPH AT										
+	1050	.00	1	FLOW	0.	2.	3.	5.	7.	9.
				TIME	3.17	3.13	3.13	3.10	3.10	3.10
2 COMBINED AT										
+	C1050	.03	1	FLOW	3.	14.	22.	43.	62.	74.
				TIME	3.80	3.77	3.80	3.80	3.77	3.83
2 COMBINED AT										
+	C1050	.45	1	FLOW	4.	21.	31.	55.	77.	92.
				TIME	3.83	3.83	3.83	3.83	3.83	3.83
ROUTED TO										
+	C1070	.45	1	FLOW	4.	21.	31.	55.	77.	92.
				TIME	3.53	3.90	3.93	3.90	3.87	3.90
			** PEAK STAGES IN FEET **							
			1	STAGE	95.48	96.20	96.48	97.01	97.39	97.62
				TIME	3.53	3.90	3.93	3.90	3.87	3.90
HYDROGRAPH AT										
+	1060	.01	1	FLOW	1.	4.	6.	10.	14.	18.
				TIME	3.37	3.30	3.30	3.27	3.27	3.27
ROUTED TO										
+	C1070	.01	1	FLOW	1.	4.	6.	10.	14.	17.
				TIME	3.40	3.33	3.30	3.30	3.30	3.30
			** PEAK STAGES IN FEET **							
			1	STAGE	98.87	98.88	98.89	98.92	98.94	98.96
				TIME	3.40	3.33	3.30	3.30	3.30	3.30
HYDROGRAPH AT										
+	1070	.03	1	FLOW	9.	19.	26.	38.	50.	62.
				TIME	3.20	3.20	3.20	3.20	3.17	3.17
3 COMBINED AT										
+	C1070	.49	1	FLOW	10.	31.	44.	68.	91.	116.
				TIME	3.20	3.27	3.23	3.23	3.23	3.23
ROUTED TO										
+	C1080	.49	1	FLOW	10.	33.	46.	78.	98.	121.
				TIME	3.67	3.47	3.43	3.40	3.37	3.37
			** PEAK STAGES IN FEET **							
			1	STAGE	95.49	96.06	96.31	96.71	96.95	97.17
				TIME	3.67	3.47	3.43	3.40	3.37	3.37
HYDROGRAPH AT										
+	1080	.05	1	FLOW	18.	36.	48.	68.	87.	106.
				TIME	3.20	3.20	3.20	3.20	3.20	3.20

2 COMBINED AT										
+	C1080	.54	1	FLOW	20.	49.	69.	114.	149.	183.
				TIME	3.20	3.47	3.43	3.40	3.37	3.37
HYDROGRAPH AT										
+	1090	.03	1	FLOW	12.	24.	33.	48.	62.	76.
				TIME	3.17	3.20	3.20	3.17	3.17	3.17
ROUTED TO										
+	C1100	.03	1	FLOW	12.	24.	33.	48.	62.	76.
				TIME	3.17	3.20	3.20	3.17	3.17	3.17
			** PEAK STAGES IN FEET **							
			1	STAGE	98.75	98.75	98.75	98.75	98.75	98.75
				TIME	3.17	3.20	3.17	3.17	3.17	3.17
HYDROGRAPH AT										
+	1100	.07	1	FLOW	14.	29.	39.	56.	72.	90.
				TIME	3.43	3.47	3.47	3.43	3.43	3.43
2 COMBINED AT										
+	C1100	.10	1	FLOW	20.	41.	55.	79.	102.	126.
				TIME	3.27	3.30	3.30	3.30	3.27	3.27
2 COMBINED AT										
+	C1080	.64	1	FLOW	39.	87.	121.	190.	249.	307.
				TIME	3.23	3.47	3.43	3.40	3.37	3.37
HYDROGRAPH AT										
+	40	.03	1	FLOW	12.	20.	25.	33.	40.	47.
				TIME	3.47	3.47	3.47	3.47	3.47	3.47
ROUTED TO										
+	SD110	.03	1	FLOW	12.	20.	25.	33.	40.	47.
				TIME	3.47	3.47	3.47	3.47	3.47	3.47
HYDROGRAPH AT										
+	50	.01	1	FLOW	4.	7.	8.	11.	14.	17.
				TIME	3.17	3.17	3.17	3.17	3.17	3.17
HYDROGRAPH AT										
+	110	.00	1	FLOW	1.	1.	2.	2.	2.	3.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
2 COMBINED AT										
+	C110	.01	1	FLOW	4.	7.	9.	13.	16.	19.
				TIME	3.17	3.17	3.17	3.17	3.17	3.17
HYDROGRAPH AT										
+	210	.00	1	FLOW	2.	3.	4.	5.	5.	6.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
3 COMBINED AT										
+	SD210	.04	1	FLOW	14.	23.	28.	37.	46.	54.
				TIME	3.43	3.43	3.43	3.43	3.43	3.43
ROUTED TO										
+	SD220	.04	1	FLOW	14.	23.	28.	37.	45.	54.
				TIME	3.43	3.43	3.43	3.43	3.43	3.43

HYDROGRAPH AT										
+	70	.01	1	FLOW	5.	9.	12.	16.	20.	25.
				TIME	3.23	3.23	3.23	3.23	3.23	3.23
HYDROGRAPH AT										
+	120	.00	1	FLOW	1.	1.	1.	2.	2.	2.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
2 COMBINED AT										
+	C120	.01	1	FLOW	6.	10.	13.	17.	21.	25.
				TIME	3.20	3.23	3.23	3.23	3.23	3.23
2 COMBINED AT										
+	SD220	.05	1	FLOW	18.	30.	37.	49.	60.	72.
				TIME	3.30	3.30	3.30	3.30	3.30	3.30
ROUTED TO										
+	SD230	.05	1	FLOW	18.	30.	37.	49.	60.	72.
				TIME	3.30	3.30	3.30	3.30	3.30	3.30
HYDROGRAPH AT										
+	80	.00	1	FLOW	1.	2.	3.	4.	4.	5.
				TIME	3.13	3.13	3.13	3.13	3.13	3.13
HYDROGRAPH AT										
+	130	.00	1	FLOW	1.	1.	1.	1.	2.	2.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
2 COMBINED AT										
+	C130	.00	1	FLOW	2.	3.	3.	5.	6.	7.
				TIME	3.10	3.10	3.13	3.13	3.13	3.13
HYDROGRAPH AT										
+	220	.00	1	FLOW	2.	3.	3.	4.	5.	6.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
ROUTED TO										
+	C230	.00	1	FLOW	2.	3.	3.	4.	5.	6.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
			** PEAK STAGES IN FEET **							
			1	STAGE	97.88	97.89	97.90	97.90	97.91	97.91
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
HYDROGRAPH AT										
+	230	.00	1	FLOW	1.	2.	3.	3.	4.	4.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
2 COMBINED AT										
+	C230	.00	1	FLOW	3.	5.	6.	8.	9.	10.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
3 COMBINED AT										
+	SD230	.05	1	FLOW	20.	33.	41.	54.	66.	79.
				TIME	3.17	3.20	3.23	3.23	3.23	3.23
ROUTED TO										
+	SD90	.05	1	FLOW	20.	33.	41.	54.	66.	79.
				TIME	3.20	3.23	3.23	3.23	3.23	3.23

HYDROGRAPH AT										
+	90	.03	1	FLOW	9.	18.	24.	34.	43.	53.
				TIME	3.27	3.30	3.30	3.27	3.27	3.27
2 COMBINED AT										
+	SD90	.08	1	FLOW	29.	51.	64.	88.	109.	131.
				TIME	3.27	3.27	3.27	3.27	3.27	3.27
ROUTED TO										
+	SD240	.08	1	FLOW	29.	51.	64.	87.	109.	131.
				TIME	3.27	3.27	3.27	3.27	3.27	3.27
HYDROGRAPH AT										
+	140	.00	1	FLOW	1.	2.	3.	3.	4.	4.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
HYDROGRAPH AT										
+	240	.00	1	FLOW	3.	4.	5.	6.	7.	8.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
3 COMBINED AT										
+	SD240	.09	1	FLOW	30.	52.	66.	90.	112.	134.
				TIME	3.23	3.27	3.27	3.27	3.27	3.27
ROUTED TO										
+	SD250	.09	1	FLOW	30.	52.	66.	90.	111.	134.
				TIME	3.23	3.27	3.27	3.27	3.27	3.27
HYDROGRAPH AT										
+	150	.00	1	FLOW	3.	5.	6.	8.	9.	10.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
HYDROGRAPH AT										
+	250	.00	1	FLOW	2.	4.	4.	5.	6.	7.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
3 COMBINED AT										
+	SD250	.09	1	FLOW	33.	55.	69.	94.	116.	139.
				TIME	3.17	3.23	3.27	3.27	3.27	3.27
ROUTED TO										
+	SD260	.09	1	FLOW	33.	55.	69.	94.	116.	139.
				TIME	3.20	3.27	3.27	3.27	3.27	3.27
HYDROGRAPH AT										
+	100	.01	1	FLOW	3.	6.	8.	11.	14.	17.
				TIME	3.17	3.17	3.17	3.17	3.17	3.17
HYDROGRAPH AT										
+	160	.00	1	FLOW	1.	2.	2.	2.	3.	3.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
2 COMBINED AT										
+	C160	.01	1	FLOW	4.	7.	9.	12.	15.	19.
				TIME	3.13	3.13	3.13	3.13	3.13	3.13
HYDROGRAPH AT										
+	260	.00	1	FLOW	2.	3.	4.	5.	5.	6.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07

3 COMBINED AT										
+	SD260	.10	1	FLOW	38.	62.	78.	104.	129.	155.
				TIME	3.17	3.20	3.20	3.20	3.23	3.23
ROUTED TO										
+	SD270	.10	1	FLOW	37.	62.	78.	104.	129.	154.
				TIME	3.17	3.20	3.20	3.23	3.23	3.23
HYDROGRAPH AT										
+	170	.00	1	FLOW	0.	1.	1.	1.	1.	2.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
HYDROGRAPH AT										
+	270	.00	1	FLOW	2.	3.	3.	4.	4.	5.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
3 COMBINED AT										
+	SD270	.10	1	FLOW	39.	64.	79.	106.	131.	157.
				TIME	3.17	3.17	3.20	3.20	3.20	3.23
DIVERSION TO										
+	ST270	.10	1	FLOW	0.	0.	0.	0.	0.	26.
				TIME	.03	.03	.03	.03	.03	3.23
HYDROGRAPH AT										
+	SD270	.10	1	FLOW	39.	64.	79.	106.	131.	131.
				TIME	3.17	3.17	3.20	3.20	3.20	3.13
ROUTED TO										
+	SDBOX	.10	1	FLOW	39.	64.	79.	106.	131.	131.
				TIME	3.17	3.20	3.20	3.23	3.23	3.17
2 COMBINED AT										
+	C1080	.74	1	FLOW	78.	141.	186.	282.	368.	438.
				TIME	3.20	3.23	3.43	3.40	3.37	3.37
ROUTED TO										
+	C1110N	.74	1	FLOW	78.	147.	185.	275.	364.	443.
				TIME	3.27	3.27	3.23	3.43	3.40	3.40
			** PEAK STAGES IN FEET **							
			1	STAGE	93.54	93.81	93.93	94.21	94.42	94.59
				TIME	3.27	3.27	3.23	3.43	3.40	3.40
HYDROGRAPH AT										
+	1110N	.00	1	FLOW	1.	2.	3.	5.	7.	9.
				TIME	3.07	3.10	3.10	3.10	3.10	3.10
2 COMBINED AT										
+	C1100N	.75	1	FLOW	78.	148.	187.	276.	366.	445.
				TIME	3.27	3.27	3.23	3.43	3.40	3.40
HYDROGRAPH AT										
+	ST270	.00	1	FLOW	0.	0.	0.	0.	0.	26.
				TIME	.03	.03	.03	.03	.03	3.23
ROUTED TO										
+	ST280	.00	1	FLOW	0.	0.	0.	0.	0.	28.
				TIME	.03	.03	.03	.03	.03	3.20

			** PEAK STAGES IN FEET **							
			1	STAGE	98.61	98.61	98.61	98.61	98.61	99.05
				TIME	.00	.00	.00	.00	.00	3.20
DIVERSION TO										
+	ST280	.00	1	FLOW	0.	0.	0.	0.	0.	28.
				TIME	.03	.03	.03	.03	.03	3.20
HYDROGRAPH AT										
+	SD280	.00	1	FLOW	0.	0.	0.	0.	0.	0.
				TIME	.03	.03	.03	.03	.03	.03
2 COMBINED AT										
+	C1110N	.75	1	FLOW	78.	148.	187.	276.	366.	445.
				TIME	3.27	3.27	3.23	3.43	3.40	3.40
ROUTED TO										
+	C1110S	.75	1	FLOW	78.	156.	196.	280.	367.	449.
				TIME	3.37	3.27	3.23	3.50	3.43	3.43
			** PEAK STAGES IN FEET **							
			1	STAGE	93.55	93.84	93.97	94.23	94.43	94.60
				TIME	3.37	3.27	3.23	3.50	3.43	3.43
HYDROGRAPH AT										
+	ST280	.00	1	FLOW	0.	0.	0.	0.	0.	28.
				TIME	.03	.03	.03	.03	.03	3.20
ROUTED TO										
+	C370	.00	1	FLOW	0.	0.	0.	0.	0.	29.
				TIME	.03	.03	.03	.03	.03	3.23
			** PEAK STAGES IN FEET **							
			1	STAGE	98.61	98.61	98.61	98.61	98.61	99.06
				TIME	.00	.00	.00	.00	.00	3.23
HYDROGRAPH AT										
+	350	.00	1	FLOW	1.	2.	3.	4.	6.	7.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
DIVERSION TO										
+	D330	.00	1	FLOW	1.	1.	1.	2.	3.	3.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
HYDROGRAPH AT										
+	C350	.00	1	FLOW	1.	1.	1.	2.	3.	3.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
ROUTED TO										
+	C360	.00	1	FLOW	0.	1.	2.	2.	3.	3.
				TIME	3.37	3.27	3.27	3.23	3.23	3.27
			** PEAK STAGES IN FEET **							
			1	STAGE	98.71	98.76	98.78	98.80	98.82	98.84
				TIME	3.37	3.27	3.27	3.23	3.23	3.27
HYDROGRAPH AT										
+	360	.01	1	FLOW	5.	10.	13.	19.	24.	30.
				TIME	3.17	3.20	3.20	3.20	3.17	3.17

HYDROGRAPH AT										
+	370	.01	1	FLOW	2.	5.	6.	9.	12.	15.
				TIME	3.13	3.17	3.17	3.13	3.13	3.13
4 COMBINED AT										
+	C370	.02	1	FLOW	7.	14.	19.	28.	37.	71.
				TIME	3.17	3.17	3.17	3.20	3.17	3.23
ROUTED TO										
+	C380N	.02	1	FLOW	7.	14.	20.	28.	37.	69.
				TIME	3.23	3.27	3.23	3.20	3.23	3.30
			** PEAK STAGES IN FEET **							
			1	STAGE	98.88	98.95	99.00	99.04	99.09	99.23
				TIME	3.23	3.27	3.23	3.20	3.23	3.30
HYDROGRAPH AT										
+	380N	.01	1	FLOW	2.	4.	6.	8.	10.	13.
				TIME	3.20	3.20	3.20	3.20	3.20	3.20
2 COMBINED AT										
+	C380N	.03	1	FLOW	9.	18.	25.	36.	47.	79.
				TIME	3.23	3.23	3.23	3.20	3.23	3.30
ROUTED TO										
+	C1110S	.03	1	FLOW	9.	18.	25.	36.	47.	78.
				TIME	3.23	3.27	3.23	3.20	3.23	3.30
HYDROGRAPH AT										
+	1110S	.02	1	FLOW	6.	11.	15.	22.	30.	39.
				TIME	3.10	3.13	3.13	3.13	3.13	3.13
3 COMBINED AT										
+	C1110S	.79	1	FLOW	87.	180.	231.	308.	402.	501.
				TIME	3.37	3.27	3.23	3.30	3.27	3.43
ROUTED TO										
+	C1120	.79	1	FLOW	87.	189.	235.	313.	402.	506.
				TIME	3.37	3.27	3.23	3.30	3.27	3.43
			** PEAK STAGES IN FEET **							
			1	STAGE	100.68	101.14	101.30	101.57	101.83	102.13
				TIME	3.37	3.27	3.23	3.30	3.27	3.43
HYDROGRAPH AT										
+	1120	.02	1	FLOW	16.	24.	30.	39.	48.	57.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
2 COMBINED AT										
+	C1120	.81	1	FLOW	90.	198.	248.	324.	419.	515.
				TIME	3.33	3.27	3.23	3.30	3.27	3.43
ROUTED TO										
+	LAKE5	.81	1	FLOW	4.	44.	86.	168.	248.	340.
				TIME	5.97	4.33	4.03	3.77	3.70	3.63
			** PEAK STAGES IN FEET **							
			1	STAGE	76.18	76.99	77.30	77.77	78.16	78.46
				TIME	5.97	4.33	4.03	3.77	3.70	3.63

```
1*********************************************
*                                           *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)       *
*             SEPTEMBER 1990                *
*               VERSION 4.0                 *
*                                           *
* RUN DATE  06/28/1995  TIME  16:40:38      *
*                                           *
*********************************************
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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

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

  1        ID        84TH STREET AND CHOLLA ROAD
  2        ID        2-5-10-25-50-100 yr STORM
  3        ID        INTERIM CONDITION:
  4        ID        FINAL DESIGN *********** SCC BASIN***********
  5        ID        --ASSUME NO SPLIT IN CACTUS/84TH INTERSECTION
  6        ID        --100-YR NEW STORM SEWER IN CACTUS (INclude ADOT R/W FOR INTERIM)
  7        ID        --no bypass into 84th st south. all flows go to scc.
  8        ID        --CACTUS SD TO OUTFALL AT BOX-CULVERT
  9        ID        --NO INTERCEPTOR AT CORTEZ IN 84TH STREET
 10        ID        --No NEW PIMA CHANNEL
 11        ID        --FLOW SPLIT AT NORTH END OF PIMA DETENTION BASINS (1060A)
 12        ID        --NEW INTERIM DETENTION BASINS (2) WEST OF PIMA & NORTH OF SWEETWATER
 13        ID        --36" PIPE TO EAST PIMA.
 14        ID        --3 DETENTION BASINS AT PIMA-LAYOUT UPDATED FOR LANDSCAPING (5-17-95)
 15        ID        --FILE SCCSW7.DAT
 16        ID     ****************************************************************
           *DIAGRAM
 17        IT        2                     300
 18        IO        5
 19        JR     PREC     .36     .53     .62     .76     .88     1.0
 20        ID   JR  PREC      1.0

 21        KK      710         SUBBASIN 710 RUNOFF
 22        PH                     0.88    1.61     2.6    2.84       3     3.3
 23        BA   0.0090
 24        LS        0      77      50
 25        UD     0.07

 26        KK     C720         ROUTE 710 TO C720
 27        RS      100    STOR      -1       0
 28        RC     .060   0.040   0.060     850   .0100
 29        RX        0      .1     100     101     104     105     205   205.1
 30        RY      105     100      99      96      96      99     100     105
 31        RS      100    STOR      -1       0
 32        RC     .060   0.040    .060     460   .0100
 33        RX        0      .1     100     101     106     107     207   207.1
 34        RY      105     100      99      95      95      99     100     105
 35        RS      100    STOR      -1       0
 36        RC     .050   0.030    .050     350   .0034
 37        RX        0      .1     100     109   109.1   118.1     120   120.1
 38        RY      105     100      99      96      96      99      99     105

 39        KK      720         SUBBASIN 720 RUNOFF
 40        BA   0.0655
 41        LS        0      77
 42        UD     0.21

 43        KK     C720         COMBINE 710 AND 720
 44        HC        2
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  45          KK    C720        ROUTE C720 TO C735
  46          RS     100    STOR      -1       0
  47          RC    .040   0.020    .040     130   .0150
  48          RX       0      .1       1       5      15      19    19.1      20
  49          RY     105     100     100      99      99     100     100     105
  50          RC    .040   0.016    .040     400   .0060
  51          RX       0      .1       9     9.1      37    37.1      46    46.1
  52          RY     105     100     100   99.75   99.75     100     100     105
  53          RC    .040   0.016    .040     650   .0080
  54          RX       0      .1       9     9.1      37    37.1      46    46.1
  55          RY     105     100     100   99.75   99.75     100     100     105
  56          RX       0      .1       1       5      15      19    19.1      20
  57          RC    .040   0.016    .040    1400   .0100
  58          RX       0      .1       9     9.1      37    37.1      46    46.1
  59          RY     105     100     100   99.75   99.75     100     100     105

  60          KK     725        SUBBASIN 725 RUNOFF
  61          BA  0.0680
  62          LS       0      77      42
  63          UD    0.20

  64          KK   ED725        EXISTING DETENTION BASIN 725
  65          RS       1    STOR      -1       0
  66          SA    0.78    1.14    1.17     1.2    1.24    1.24    1.24
  67          SE  1468.5    1472  1472.3  1472.6    1473  1473.5    1474
  68          SQ       0       0   10.45   31.23    72.0     100     200

  69          KK     730        SUBBASIN 730 RUNOFF
  70          BA  0.0053
  71          LS       0      77      42
  72          UD    0.05

  73          KK    C730        COMBINE C725 AND 730
  74          HC       2

  75          KK   ED730        EXISTING DETENTION BASIN 730
  76          RS       1    STOR      -1       0
  77          SA    0.76    1.12    1.15    1.18    1.22    1.22
  78          SE  1464.5    1468  1468.3  1468.6    1469  1469.5
  79          SQ       0       0    5.52   17.29    42.0     150

  80          KK     735        SUBBASIN 735 RUNOFF
  81          BA  .05147
  82          LS       0      77      42
  83          UD    0.29

  84          KK    C735        COMBINE C725 AND C730 AND 735
  85          HC       3
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


  86          KK   ED735       EXISTING DETENTION BASIN 735
  87          RS       1    STOR      -1       0
  88          SA    1.04    1.40    1.45    1.51    1.56    1.61    1.61    1.61
  89          SE  1461.9  1465.4  1465.9  1466.4  1466.9  1467.4    1468  1468.5
  90          SQ       0       0     3.2    18.0    49.6   101.8     200     500

  91          KK     740       SUBBASIN 740 RUNOFF
  92          BA  .00055
  93          LS       0      98
  94          UD    0.08

  95          KK     742       SUBBASIN 742 RUNOFF
  96          BA  .00836
  97          LS              77
  98          UD     .11

  99          KK    C742       COMBINE 740 AND 742
 100          HC       2

 101          KK    C744       ROUTE C742 TO C744
 102          RK      95   .0044    .012            CIRC       2

 103          KK     743       SUBBASIN 743 RUNOFF
 104          BA  .00373
 105          LS       0      77      47
 106          UD    0.07

 107          KK    C744       ROUTE 743 TO C744
 108          RS     100    STOR      -1       0
 109          RC    .030   0.016    .030     580   .0085
 110          RX       0      .1      11    11.1      79    79.1      90    90.1
 111          RY     105     100      99   99.82   99.82      99     100     105

 112          KK     744       SUBBASIN 744 RUNOFF
 113          BA  .00661
 114          LS       0      98
 115          UD    0.14

 116          KK    C744       COMBINE C742 AND 743 AND 744
 117          HC       3

 118          KK    C745       ROUTE C744 TO C745
 119          RK     638   .0029    .012            CIRC     3.5

 120          KK     745       SUBBASIN 745 RUNOFF
 121          BA  .01783
 122          LS       0      77
 123          UD    0.17
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 124      KK    C745        COMBINE C744 AND 745
 125      HC       2

 126      KK    C735        ROUTE C745 TO C735
 127      RK     510   .0024    .012            CIRC       4

 128      KK    C735        COMBINE C745 AND 735
 129      HC       2

 130      KK    C760        ROUTE C735 TO C760
 131      RK     130   .0030    .012            TRAP      10    .001

 132      KK     760        SUBBASIN 760 RUNOFF
 133      BA  .01266
 134      LS       0      98
 135      UD    0.19

 136      KK    C760        COMBINE C735 AND 760
 137      HC       2

 138      KK    C790        ROUTE C760 TO C790
 139      RS     100    STOR      -1       0
 140      RC    .050   0.012    .020     900   .0019
 141      RX       0      .1      28      32      37      42     100   100.1
 142      RY     105     100      99      95      95     100     101     105
 143      RC    .050   0.012    .020     250   .0019
 144      RX       0      .1      28    28.1    37.5    37.6      49    49.1
 145      RY     105     100      99      95      95      99     100     105

 146      KK     780        SUBBASIN 780 RUNOFF
 147      BA  .01686
 148      LS       0      77      20
 149      UD    0.13

 150      KK    C782        ROUTE C780 TO C782
 151      RS     100    STOR      -1       0
 152      RC    .020    .025    .050    1210    .010
 153      RX       2       2      30      40      50      60      80     100
 154      RY     105  100.52     100    99.5      98     100   100.5     101

 155      KK     782        SUBBASIN 782 RUNOFF
 156      BA  .01080
 157      LS              77
 158      UD     .18

 159      KK     784        SUBBASIN 784 RUNOFF
 160      BA  .04764
 161      LS              77      42
 162      UD     .19
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 163        KK   ED784       EXISTING DETENTION BASIN 784
 164        RS       1    STOR      -1       0
 165        SA       0    1.09    2.02    2.02
 166        SE  1389.0  1389.5  1392.5  1393.0
 167        SQ       0     1.4      58     768

 168        KK    C782       COMBINE 780 AND C782 AND 784
 169        HC       3

 170        KK    C790       ROUTE C782 TO C790
 171        RS     100    STOR      -1       0
 172        RC    .020    .025    .050    2800    .010
 173        RX       2       2      30      40      50      60      80     100
 174        RY     105  100.52     100    99.5      98     100   100.5     101

 175        KK     790       SUBBASIN 790 RUNOFF
 176        BA  .11345
 177        LS              77
 178        UD     .23

 179        KK    C790       COMBINE 782 AND C760 AND 790
 180        HC       3

 181        KK     750       SUBBASIN 750 RUNOFF
 182        BA  .00313
 183        LS       0      98
 184        UD    0.07

 185        KK    C770       ROUTE C750 TO C770
 186        RS     100    STOR      -1       0
 187        RC    .050   0.016    .016    1100   .0040
 188        RX       0      .1      .2       5     5.1    29.1    29.2    29.3
 189        RY     105   100.5   100.5     100    99.5     100     105     105

 190        KK     770       SUBBASIN 770 RUNOFF
 191        BA  .00505
 192        LS       0      98
 193        UD    0.09

 194        KK    C770       COMBINE C770 AND 770
 195        HC       2

 196        KK    C770       COMBINE C770 AND C790
 197        HC       2

 198        KK    C800       ROUTE C770 TO C800
 199        RS     100    STOR      -1       0
 200        RC    .050   0.020    .050     380   .0037
 201        RX       0      .1      20      36      46      62      82     102
 202        RY     110   106.5     106     100     100     106   106.5     107
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 203          KK     800        SUBBASIN 800 RUNOFF
 204          BA  .01719
 205          LS       0      77
 206          UD    0.16

 207          KK    C800        COMBINE 800 AND C770
 208          HC       2

 209          KK    C810          ROUTE C800 TO C810
 210          RS     100    STOR      -1       0
 211          RC    .050   0.020    .050    1170   .0037
 212          RX       0      .1      20      36      60      76      96     116
 213          RY     110     105   104.5     100     100   104.5     105   105.5

 214          KK     810        SUBBASIN 810 RUNOFF
 215          BA  .04392
 216          LS       0      77      42
 217          UD    0.23

 218          KK    C810        COMBINE 810 AND C800
 219          HC       2

 220          KK    C820          ROUTE C810 TO C820
 221          RS     100    STOR      -1       0
 222          RC    .050   0.020    .050     790   .0037
 223          RX       0      .1      20      36      60      76      96     116
 224          RY     110     105   104.5     100     100   104.5     105   105.5

 225          KK     820        SUBBASIN 820 RUNOFF
 226          BA  .03645
 227          LS       0      77      38
 228          UD    0.16

 229          KK    C820        COMBINE 820 AND C810
 230          HC       2

 231          KK    C830        ROUTE C820 TO C830
 232          RS     100    STOR      -1       0
 233          RC    .012   0.012    .012      97   .0104
 234          RX       0      .1      .2      .3      .4      .5      20    20.1
 235          RY     106     100     100     100     100     100     100     106

 236          KK     910        SUBBASIN 910 RUNOFF
 237          BA  .04977
 238          LS       0      77      65
 239          UD    0.20

 240          KK    C920        ROUTE 910 TO C920
 241          RK     660    .050    .012            CIRC       2
 242          RK     680   .0060    .025            TRAP       1       1
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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 243            KK     920          SUBBASIN 920 RUNOFF
 244            BA  .02748
 245            LS       0      69      49
 246            UD    0.26

 247            KK    C920           COMBINE 910 AND 920
 248            HC       2

 249            KK    C930           ROUTE C920 TO C930
 250            RS     100    STOR      -1       0
 251            RC    .050   0.016    .016     680   .0040
 252            RX       0      .1      15    20.5    20.6    44.5    44.6    44.7
 253            RY     105     100    99.5    99.4    98.9    99.4     100     105

 254            KK     930          SUBBASIN 930 RUNOFF
 255            BA  .05831
 256            LS       0      77      38
 257            UD    0.25

 258            KK    C930          COMBINE C920 AND 930
 259            HC       2

 260            KK    C930          DIVERT FLOW TO C950
 261            DT    D930
 262            DI       0      51     400
 263            DQ       0      51      51

 264            KK    C830           ROUTE C930 TO C830
 265            RS     100    STOR      -1       0
 266            RC    .050   0.016    .016     640   .0028
 267            RX       0      .1     7.5     7.6    34.5    34.6    40.5    50.0
 268            RY     105     100     100    99.5    99.0    99.5    99.7     100

 269            KK     830          SUBBASIN 830 RUNOFF
 270            BA  .00148
 271            LS       0      98
 272            UD    0.07

 273            KK    C830          COMBINE 830 AND C820 AND 930 (Downstream Box-Culvert T-bird)
 274            HC       3

 275            KK    C830          DIVERT FLOW TO C960  (EXISTING DIVERSION)
 276            DT    D830
 277            DI       0     520     718    1045
 278            DQ       0       0     138     445

 279            KK     A30          SUBBASIN A30 RUNOFF
 280            BA  0.4031
 281            LS       0      77      11
 282            UD    0.47
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 283           KK    DA30        DETENTION BASIN AT CPA30
 284           KM                Outflow to A31 and A32 and A36
 285           RS       1    STOR       0
 286           SA       0    0.49    0.94    1.39    1.93
 287           SE   34.99   35.00   37.00   39.00   41.40
 288           SQ       0      40   137.4     268     361

 289           KK     A31        SPLIT FLOW AT DETENTION BASIN DA30
 290           KM                DI is Total Outflow from Detention Basin (A31+A32+A36)
 291           KM                DQ is Split to A32 and A36
 292           DT     A32
 293           DI       0      40   137.4     268     361
 294           DQ       0      40   124.4     242     326

 295           KK    CA31        COMBINE C830 AND A31
 296           HC       2

 297           KK  ED1010        ROUTE CA31 TO ED1010
 298           RS     100    STOR      -1       0
 299           RC    .060    .040    .060     600   .0086
 300           RX       0     0.1      50      56      59      65     115   115.1
 301           RY     105     100      99      95      95      99     100     105

 302           KK    1010        SUBBASIN 1010 RUNOFF
 303           BA  .01192
 304           LS       0      77
 305           UD    0.08

 306           KK   C1010        COMBINE 1010 and CA31
 307           HC       2

 308           KK  ED1010        EXISTING DETENTION BASIN 1010 (McDowell Shadow Estates II)
 309           RS       1    STOR       0
 310           SA       0    0.41    0.93    1.19    1.45    1.71    2.23
 311           SE    24.7    25.7    26.7    27.2    27.7    28.2    29.2
 312           SQ       0       7      17      21      69     240    1082

 313           KK   1060A        SUBBASIN 1060A RUNOFF
 314           BA  .00198
 315           LS       0      77
 316           UD    0.06

 317           KK     10N        SUBBASIN 10N RUNOFF
 318           BA  .00236
 319           LS       0      89
 320           UD    0.06

 321           KK  C1060A        COMBINE ED1010 AND 1060A AND 10N
 322           HC       3
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 323          KK  CPIMAA       ROUTE NEW DETENTION BASIN PIMA-A(Box-Culvert 12'x3' to Basin B)
 324          RS       1    STOR       0
 325          SV       0    0.33    0.71    1.14    1.90    2.17    2.57    2.77    2.97    3.17
 326          SE      19      20      21      22    23.5      24      25    25.5      26      27
 327          SQ      36     102     192     252     348     361     446     489     547     743

 328          KK  C1060A       SPLIT FLOW WITH EXISTING WASH-WEST SPILLWAY (WASH FL=1423.5)
 329          DT  D1060A
 330          DI       0     348     361     405     446     489     547     647     743
 331          DQ       0       0       1       9      26      57     103     167     251

 332          KK   1060B       SUBBASIN 1060B RUNOFF
 333          BA  .00440
 334          LS       0      77
 335          UD    0.06

 336          KK   1060C       SUBBASIN 1060C RUNOFF
 337          BA  .00487
 338          LS       0      77
 339          UD    0.06

 340          KK  C1060C       COMBINE 1060B AND 1060C AND PIMA-A
 341          HC       3

 342          KK  CPIMAB       ROUTE NEW DETENTION BASIN PIMA-B (SPILLWAY ELEV=1421)
 343          RS       1    STOR       0
 344          SV       0    2.01    4.13    6.38    8.74   11.22   13.84   15.22   16.59
 345          SE      16      17      18      19      20      21      22    22.5      23
 346          SQ       0       4      13      21      26      32     235     386     617

 347          KK   1060D       SUBBASIN 1060D RUNOFF
 348          BA  .00488
 349          LS       0      77
 350          UD    0.06

 351          KK  C1060D       COMBINE PIMA-B AND 1060D
 352          HC       2

 353          KK  CPIMAC       ROUTE NEW DETENTION BASIN PIMA-C  (36" PIPE TO PIMA ROAD)
 354          RS       1    STOR       0
 355          SV       0    3.60    7.35   11.13   14.99   19.13   23.43
 356          SE      15      16      17      18      19      20      21
 357          SQ       0      10      20      35      50      60      70

 358          KK     A32       RETRIEVE SPLIT FLOW AT A32 (A36 and A32)
 359          DR     A32

 360          KK     A32       SPLIT FLOW AT DETENTION BASIN DA30
 361          KM               DI is Split to A32 and A36
 362          KM               DQ is Split to A36 (Box Culvert)
 363          DT     A36
 364          DI       0      40   124.4     242     326
 365          DQ       0      40     110     190     250
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 366          KK   C1030        ROUTE A32 TO C1030
 367          RS     100    STOR      -1       0
 368          RC    .060    .040    .060     600   .0080
 369          RX       0     0.1      50      56      59      65     115   115.1
 370          RY     105     100      99      95      95      99     100     105

 371          KK   C1030        ROUTE A32 TO C1030
 372          RK     230   .0036    .012            CIRC    3.53

 373          KK    1030        SUBBASIN 1030 RUNOFF
 374          BA  .00985
 375          LS       0      77
 376          UD     .13

 377          KK   C1030        COMBINE C1030 AND A32
 378          HC       2

 379          KK   C1040        ROUTE C1030 TO C1040
 380          RK     524  0.0040    .012       0    CIRC    3.53

 381          KK    1040        SUBBASIN 1040 RUNOFF
 382          BA  .01949
 383          LS       0      77      25
 384          UD    0.12

 385          KK  ED1040        EXISTING DETENTION BASIN 1040
 386          RS       1    STOR      -1       0
 387          SA       0    0.52    .597    .713    0.79    0.79
 388          SE    24.0    24.5    25.5    27.0      28      29
 389          SQ       0     1.5       6      13      16      19

 390          KK   C1040        COMBINE C1030 AND 1040
 391          HC       2

 392          KK   C1050        ROUTE C1040 TO C1050
 393          RS     100    STOR      -1       0
 394          RC    .050   0.040    .050     250   .0086
 395          RX       0     0.1      50      56      59      65     115   115.1
 396          RY     105     100      99      95      95      99     100     105

 397          KK    1050        SUBBASIN 1050 RUNOFF
 398          BA  .00387
 399          LS       0      77
 400          UD    0.07

 401          KK   C1050        COMBINE 1050 AND C1040
 402          HC       2

 403          KK  D1060A        RETRIEVE SPLIT FLOW AT C1060A
 404          DR  D1060A
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 405        KK    1020        SUBBASIN 1020 RUNOFF
 406        BA  .00198
 407        LS       0      77      10
 408        UD    0.06

 409        KK   C1050        COMBINE C1050 AND C1020 AND D1060A
 410        HC       3

 411        KK   C1070        ROUTE C1050 TO C1070
 412        RS     100    STOR      -1       0
 413        RC    .050   0.040    .050    1150   .0078
 414        RX       0     0.1      50      56      60      66     116   116.1
 415        RY     105     100      99      95      95      99     100     105

 416        KK    1070        SUBBASIN 1070 RUNOFF
 417        BA  .02864
 418        LS       0      77      17
 419        UD    0.14

 420        KK   C1070        COMBINE C1050 AND 1070
 421        HC       2

 422        KK   C1080        ROUTE C1070 TO C1080
 423        RS     100    STOR      -1       0
 424        RC    .050   0.040    .050    3100   .0066
 425        RX       0     0.1      30      41      49      60      90    90.1
 426        RY     108     100      99      95      95      99     100     108

 427        KK    1080        SUBBASIN 1080 RUNOFF
 428        BA  .04840
 429        LS       0      77      24
 430        UD    0.16

 431        KK   C1080        COMBINE 1080 AND C1070
 432        HC       2

 433        KK    1090        SUBBASIN 1090 RUNOFF
 434        BA  .03370
 435        LS       0      77      20
 436        UD   0.138

 437        KK   C1100        ROUTE 1090 TO C1100
 438        RS     100    STOR      -1       0
 439        RC    .040   0.016    .040   .0074    2340
 440        RX       0     0.1      20    20.1      60    60.1      80    80.1
 441        RY     105     100      99   98.75   98.75      99     100     105

 442        KK    1100        SUBBASIN 1100 RUNOFF
 443        BA  .07053
 444        LS       0      77      18
 445        UD    0.37
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 446          KK   C1100        COMBINE 1100 AND 1090
 447          HC       2

 448          KK   C1080        COMBINE C1100 AND C1080
 449          HC       2

 450          KK      40      SUBBASIN 40 RUNOFF
 451          BA  .03122
 452          LS               77      45
 453          UD     .42

 454          KK   SD110      ROUTE C40 TO SD110
 455          RK     190  0.0010   0.012              CIRC       3

 456          KK      10      SUBBASIN 10 RUNOFF
 457          BA  .00536
 458          PH                     0.88    1.61     2.6    2.84     3.0     3.3
 459          LS               89
 460          UD     .10

 461          KK      20      SUBBASIN 20 RUNOFF
 462          BA  .00273
 463          LS               77
 464          UD     .20

 465          KK     C10      COMBINE 10 AND 20
 466          HC       2

 467          KK     C15      ROUTE C10 TO C15
 468          RS     100    STOR      -1       0
 469          RC   0.016   0.025   0.040    2605  0.0070
 470          RX       0      20      40      49      51      60      80     100
 471          RY     100    99.6    99.2      97      97    99.2    99.6     100

 472          KK      15      SUBBASIN 15 RUNOFF
 473          BA  .00559
 474          LS               89
 475          UD     .08

 476          KK     C15      COMBINE C10 AND 15
 477          HC       2

 478          KK     C15     DIVERT C15 TO SOUTH PIMA ROAD
 479          DT     D15
 480          DI       0      19      30      40
 481          DQ       0      19      19      29

 482          KK    C110      ROUTE C15 TO 110
 483          RS     100    STOR      -1       0
 484          RC    .040   0.016    .016     680   .0030
 485          RX      20      40      65      70      70      72     100     100
 486          RY   103.1   102.9  101.75  101.74  101.27  101.35  101.63  103.63
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 487           KK      50       SUBBASIN 50 RUNOFF
 488           BA  .00659
 489           LS               77      35
 490           UD     .14

 491           KK     110       SUBBASIN 110 RUNOFF (up to Pima for Interim)
 492           BA  .00107
 493           LS               98
 494           UD     .07

 495           KK    C110       COMBINE 110 AND 50
 496           HC       2

 497           KK     210       SUBBASIN 210 RUNOFF (up to Pima for Interim)
 498           BA  .00232
 499           LS               98
 500           UD     .08

 501           KK   SD210       COMBINE SD110 AND C110 AND 210 AND 40
 502           HC       4

 503           KK   SD220       ROUTE SD210 TO SD220
 504           RK     255  0.0010   0.012           CIRC       4

 505           KK      70       SUBBASIN 70 RUNOFF
 506           BA  .01106
 507           LS               77      35
 508           UD     .19

 509           KK     120       SUBBASIN 120 RUNOFF
 510           BA  .00042
 511           LS               98
 512           UD     .06

 513           KK    C120       COMBINE C120 AND 70
 514           HC       2

 515           KK   SD220       COMBINE SD210 AND SD220
 516           HC       2

 517           KK   SD230       ROUTE SD220 TO SD230
 518           RK     255  0.0010   0.012           CIRC       4

 519           KK      80       SUBBASIN 80 RUNOFF
 520           BA  .00189
 521           LS               77      30
 522           UD     .10

 523           KK     130       SUBBASIN 130 RUNOFF
 524           BA  .00034
 525           LS               98
 526           UD     .06
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 527           KK    C130      COMBINE 80 AND 130
 528           HC       2

 529           KK     220      SUBBASIN 220 RUNOFF
 530           BA  .00103
 531           LS                 98
 532           UD     .06

 533           KK    C230      ROUTE C220 TO 230
 534           RS     100    STOR      -1       0
 535           RC    .016    .016    .040     380   .0030     120
 536           RX       0       0    31.8    33.8    33.8    38.8      55      80
 537           RY  100.41   98.41   97.95   97.87   98.37   98.49    99.0    99.9

 538           KK     230      SUBBASIN 230 RUNOFF
 539           BA  .00083
 540           LS                 98
 541           UD     .06

 542           KK    C230      COMBINE C220 AND 230
 543           HC       2

 544           KK   SD230      COMBINE SD220 AND C130 AND C230
 545           HC       3

 546           KK    SD90      ROUTE SD230 TO SD90
 547           RK     205  0.0010   0.012            CIRC       4

 548           KK      90      SUBBASIN 90 RUNOFF
 549           BA  .02922
 550           LS                 77      24
 551           UD     .23

 552           KK    SD90      COMBINE SD230 AND 90
 553           HC       2

 554           KK   SD240      ROUTE SD90 TO SD240
 555           RK     125  0.0010   0.012            CIRC       4

 556           KK     140      SUBBASIN 140 RUNOFF
 557           BA  .00081
 558           LS                 98
 559           UD     .06

 560           KK     240      SUBBASIN 240 RUNOFF
 561           BA  .00150
 562           LS                 98
 563           UD     .06
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          KK   SD240     COMBINE SD90 AND 140 AND 240
          HC       3

          KK   SD250     ROUTE SD240 TO SD250
          RK     350  0.0010   0.012             CIRC       4

          KK     150     SUBBASIN 150 RUNOFF
          BA  .00192
          LS                98
          UD     .07

          KK     250     SUBBASIN 250 RUNOFF
          BA  .00134
          LS                98
          UD     .06

          KK   SD250     COMBINE SD240 AND 150 AND 250
          HC       3

          KK   SD260     ROUTE SD250 TO SD260
          RK     336  0.0010   0.012             CIRC       5

          KK     100     SUBBASIN 100 RUNOFF
          BA  .00666
          LS                77      24
          UD     .12

          KK     160     SUBBASIN 160 RUNOFF
          BA  .00058
          LS                98
          UD     .06

          KK    C160     COMBINE 100 AND 160
          HC       2

          KK     260     SUBBASIN 260 RUNOFF
          BA  .00114
          LS                98
          UD     .06

          KK   SD260     COMBINE SD250 AND C160 AND 260
          HC       3

          KK   SD270     ROUTE SD260 TO SD270
          RK     194  0.0010   0.012             CIRC       5

          KK     170     SUBBASIN 170 RUNOFF
          BA  .00047
          LS                77      35
          UD     .06
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 602          KK     270     SUBBASIN 270 RUNOFF
 603          BA  .00095
 604          LS                98
 605          UD     .06

 606          KK   SD270     COMBINE SD260 AND 170 AND 270
 607          HC       3

 608          KK   SDBOX     ROUTE SD270 TO SDBOX
 609          RK     270  0.0010   0.012              CIRC       5

 610          KK   C1080     COMBINE C1080 AND SDBOX
 611          HC       2

 612          KK  C1110N       ROUTE C1080 TO C1110N
 613          RS     100    STOR      -1       0
 614          RC    .040   0.030    .040     900   .0092
 615          RX       0     0.1      20      40      80     100     120   120.1
 616          RY     105     100      99      93      93      99     100     105

 617          KK   1110N       SUBBASIN 1110N RUNOFF
 618          BA  .00396
 619          LS       0      69      18
 620          UD    0.06

 621          KK  C1110N       COMBINE C1110N AND C1080
 622          HC       2

 623          KK  C1110S     ROUTE C1110N TO C1110S
 624          RS     100    STOR      -1       0
 625          RC    .040   0.030    .040    1050   .0092
 626          RX       0     0.1      20      40      80     100     120   120.1
 627          RY     105     100      99      93      93      99     100     105

 628          KK   1110S       SUBBASIN 1110S RUNOFF
 629          BA  .01991
 630          LS       0      69      18
 631          UD    0.09

 632          KK  C1110S       COMBINE C1110N AND C1110S
 633          HC       2

 634          KK   C1120     ROUTE C1110S TO C1120
 635          RS     100    STOR      -1       0
 636          RC    .020   0.020    .020     200   .0080
 637          RX       0     0.1     0.2     0.3    24.3    24.4    24.5    24.6
 638          RY     110     110     110     100     100     110     110     110

 639          KK    1120       SUBBASIN 1120 RUNOFF
 640          BA  .01692
 641          LS       0      69      50
 642          UD    0.07
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 643          KK   C1120         COMBINE 1120 AND C1110S
 644          HC       2

 645          KK   LAKE5         DETENTION BASIN AT LAKE 5
 646          RS       1    STOR       0
 647          SV       0    6.94   10.21      14   18.59   24.07   30.25
 648          SE   73.50   76.09   77.09   78.09   79.09   80.09   81.09
 649          SQ       0       0      49     225     535     960    1500
 650          ZZ
```

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1**********************************************                  *********************************************
 *                                            *                  *                                           *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)        *                  *   U.S. ARMY CORPS OF ENGINEERS            *
 *            SEPTEMBER 1990                  *                  *   HYDROLOGIC ENGINEERING CENTER           *
 *              VERSION 4.0                   *                  *        609 SECOND STREET                  *
 *                                            *                  *     DAVIS, CALIFORNIA 95616               *
 *  RUN DATE  06/28/1995  TIME  16:40:38      *                  *         (916) 756-1104                    *
 *                                            *                  *                                           *
**********************************************                   *********************************************


                                      84TH STREET AND CHOLLA ROAD
                                      2-5-10-25-50-100 yr STORM
                                      INTERIM CONDITION:
                                      FINAL DESIGN *********** SCC BASIN***********
                                      --ASSUME NO SPLIT IN CACTUS/84TH INTERSECTION
                                      --100-YR NEW STORM SEWER IN CACTUS (INclude ADOT R/W FOR INTERIM)
                                      --no bypass into 84th st south. all flows go to scc.
                                      --CACTUS SD TO OUTFALL AT BOX-CULVERT
                                      --NO INTERCEPTOR AT CORTEZ IN 84TH STREET
                                      --No NEW PIMA CHANNEL
                                      --FLOW SPLIT AT NORTH END OF PIMA DETENTION BASINS (1060A)
                                      --NEW INTERIM DETENTION BASINS (2) WEST OF PIMA & NORTH OF SWEETWATER
                                      --36" PIPE TO EAST PIMA.
                                      --3 DETENTION BASINS AT PIMA-LAYOUT UPDATED FOR LANDSCAPING (5-17-95)
                                      --FILE SCCSW7.DAT
                                   ************************************************************

   18 IO          OUTPUT CONTROL VARIABLES
                        IPRNT           5  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE
                            JR  PREC     1.0

      IT          HYDROGRAPH TIME DATA
                         NMIN           2  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1    0  STARTING DATE
                        ITIME        0000  STARTING TIME
                           NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      1    0  ENDING DATE
                       NDTIME        0958  ENDING TIME
                        ICENT          19  CENTURY MARK

                    COMPUTATION INTERVAL     .03 HOURS
                         TOTAL TIME BASE    9.97 HOURS

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

      JP          MULTI-PLAN OPTION
                        NPLAN           1  NUMBER OF PLANS

      JR          MULTI-RATIO OPTION
                      RATIOS OF PRECIPITATION
                      .36       .53       .62       .76       .88      1.00
```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN		RATIOS APPLIED TO PRECIPITATION RATIO 1 .36	RATIO 2 .53	RATIO 3 .62	RATIO 4 .76	RATIO 5 .88	RATIO 6 1.00
HYDROGRAPH AT +	710	.01	1	FLOW	9.	15.	18.	24.	29.	34.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
ROUTED TO +	C720	.01	1	FLOW	9.	15.	19.	24.	29.	34.
				TIME	3.13	3.13	3.13	3.13	3.13	3.13
			** PEAK STAGES IN FEET **							
			1	STAGE	97.16	97.45	97.56	97.72	97.87	97.99
				TIME	3.13	3.13	3.13	3.13	3.13	3.13
HYDROGRAPH AT +	720	.07	1	FLOW	5.	21.	32.	53.	73.	95.
				TIME	3.37	3.30	3.30	3.30	3.27	3.27
2 COMBINED AT +	C720	.07	1	FLOW	10.	27.	40.	64.	86.	111.
				TIME	3.13	3.23	3.23	3.27	3.23	3.23
ROUTED TO +	C720	.07	1	FLOW	10.	27.	42.	65.	88.	113.
				TIME	3.27	3.33	3.27	3.33	3.30	3.27
			** PEAK STAGES IN FEET **							
			1	STAGE	99.84	99.99	100.07	100.15	100.24	100.32
				TIME	3.27	3.33	3.27	3.33	3.30	3.27
HYDROGRAPH AT +	725	.07	1	FLOW	38.	64.	80.	107.	132.	157.
				TIME	3.23	3.23	3.23	3.23	3.23	3.23
ROUTED TO +	ED725	.07	1	FLOW	25.	47.	61.	79.	92.	119.
				TIME	3.40	3.37	3.37	3.37	3.37	3.37
			** PEAK STAGES IN FEET **							
			1	STAGE	1472.52	1472.76	1472.89	1473.12	1473.37	1473.59
				TIME	3.40	3.37	3.37	3.37	3.37	3.37
HYDROGRAPH AT +	730	.01	1	FLOW	5.	8.	10.	14.	17.	21.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
2 COMBINED AT +	C730	.07	1	FLOW	26.	49.	62.	81.	95.	122.
				TIME	3.40	3.37	3.37	3.37	3.37	3.37
ROUTED TO +	ED730	.07	1	FLOW	17.	35.	49.	75.	90.	112.
				TIME	3.67	3.60	3.53	3.50	3.47	3.43

			** PEAK STAGES IN FEET **							
			1	STAGE	1468.60	1468.88	1469.03	1469.15	1469.22	1469.32
				TIME	3.67	3.60	3.53	3.50	3.47	3.43
HYDROGRAPH AT										
+	735	.05	1	FLOW	23.	40.	49.	66.	81.	96.
				TIME	3.33	3.33	3.33	3.33	3.33	3.33
3 COMBINED AT										
+	C735	.20	1	FLOW	42.	91.	122.	188.	242.	303.
				TIME	3.40	3.40	3.37	3.40	3.37	3.37
ROUTED TO										
+	ED735	.20	1	FLOW	26.	66.	94.	153.	204.	288.
				TIME	3.83	3.67	3.63	3.57	3.50	3.43
			** PEAK STAGES IN FEET **							
			1	STAGE	1466.52	1467.05	1467.32	1467.71	1468.01	1468.15
				TIME	3.83	3.67	3.63	3.57	3.50	3.43
HYDROGRAPH AT										
+	740	.00	1	FLOW	1.	1.	2.	2.	2.	3.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
HYDROGRAPH AT										
+	742	.01	1	FLOW	1.	4.	6.	9.	13.	17.
				TIME	3.23	3.17	3.17	3.17	3.17	3.17
2 COMBINED AT										
+	C742	.01	1	FLOW	1.	5.	7.	11.	15.	19.
				TIME	3.17	3.17	3.17	3.17	3.13	3.13
ROUTED TO										
+	C744	.01	1	FLOW	1.	5.	7.	11.	15.	19.
				TIME	3.17	3.17	3.17	3.17	3.17	3.13
HYDROGRAPH AT										
+	743	.00	1	FLOW	3.	6.	7.	10.	12.	14.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
ROUTED TO										
+	C744	.00	1	FLOW	3.	6.	7.	10.	12.	14.
				TIME	3.13	3.17	3.17	3.17	3.17	3.17
			** PEAK STAGES IN FEET **							
			1	STAGE	99.39	99.49	99.55	99.64	99.66	99.67
				TIME	3.13	3.17	3.17	3.17	3.17	3.17
HYDROGRAPH AT										
+	744	.01	1	FLOW	9.	14.	16.	20.	24.	27.
				TIME	3.17	3.17	3.17	3.17	3.17	3.17
3 COMBINED AT										
+	C744	.02	1	FLOW	14.	24.	31.	41.	50.	60.
				TIME	3.17	3.17	3.17	3.17	3.17	3.17
ROUTED TO										
+	C745	.02	1	FLOW	14.	24.	30.	40.	49.	59.
				TIME	3.17	3.20	3.17	3.17	3.17	3.17

HYDROGRAPH AT	+	745	.02	1	FLOW	2.	6.	10.	16.	22.	29.
					TIME	3.33	3.27	3.23	3.23	3.23	3.23
2 COMBINED AT	+	C745	.04	1	FLOW	14.	29.	39.	55.	70.	85.
					TIME	3.20	3.20	3.20	3.20	3.20	3.20
ROUTED TO	+	C735	.04	1	FLOW	14.	29.	38.	55.	70.	85.
					TIME	3.20	3.20	3.20	3.20	3.20	3.20
2 COMBINED AT	+	C735	.24	1	FLOW	27.	72.	103.	169.	227.	324.
					TIME	3.77	3.63	3.60	3.53	3.50	3.43
ROUTED TO	+	C760	.24	1	FLOW	27.	72.	103.	169.	227.	323.
					TIME	3.80	3.63	3.60	3.53	3.50	3.43
HYDROGRAPH AT	+	760	.01	1	FLOW	15.	23.	27.	33.	39.	44.
					TIME	3.23	3.20	3.20	3.20	3.20	3.20
2 COMBINED AT	+	C760	.25	1	FLOW	32.	77.	110.	180.	241.	345.
					TIME	3.23	3.63	3.60	3.53	3.50	3.43
ROUTED TO	+	C790	.25	1	FLOW	32.	77.	110.	180.	240.	350.
					TIME	3.23	3.63	3.60	3.53	3.50	3.43
				** PEAK STAGES IN FEET **							
				1	STAGE	95.78	96.41	96.80	97.52	98.08	99.00
					TIME	3.23	3.63	3.60	3.53	3.50	3.43
HYDROGRAPH AT	+	780	.02	1	FLOW	6.	13.	17.	25.	32.	39.
					TIME	3.17	3.17	3.17	3.17	3.17	3.17
ROUTED TO	+	C782	.02	1	FLOW	6.	13.	17.	24.	33.	40.
					TIME	3.27	3.23	3.23	3.27	3.23	3.23
				** PEAK STAGES IN FEET **							
				1	STAGE	98.58	98.81	98.89	99.03	99.15	99.23
					TIME	3.27	3.23	3.23	3.27	3.23	3.23
HYDROGRAPH AT	+	782	.01	1	FLOW	1.	4.	6.	10.	13.	17.
					TIME	3.33	3.27	3.27	3.23	3.23	3.23
HYDROGRAPH AT	+	784	.05	1	FLOW	27.	46.	58.	77.	95.	113.
					TIME	3.23	3.23	3.23	3.23	3.23	3.23
ROUTED TO	+	ED784	.05	1	FLOW	9.	15.	18.	24.	29.	35.
					TIME	3.57	3.60	3.60	3.60	3.60	3.60

			** PEAK STAGES IN FEET **							
			1	STAGE	1389.88	1390.20	1390.38	1390.70	1390.98	1391.27
				TIME	3.57	3.60	3.60	3.60	3.60	3.60
3 COMBINED AT										
+	C782	.08	1	FLOW	13.	26.	35.	50.	63.	77.
				TIME	3.33	3.27	3.30	3.27	3.27	3.23
ROUTED TO										
+	C790	.08	1	FLOW	14.	27.	37.	50.	63.	77.
				TIME	3.47	3.47	3.40	3.37	3.37	3.40
			** PEAK STAGES IN FEET **							
			1	STAGE	98.83	99.07	99.20	99.35	99.49	99.61
				TIME	3.47	3.47	3.40	3.37	3.37	3.40
HYDROGRAPH AT										
+	790	.11	1	FLOW	9.	34.	53.	87.	121.	156.
				TIME	3.40	3.33	3.33	3.30	3.30	3.30
3 COMBINED AT										
+	C790	.44	1	FLOW	49.	123.	177.	287.	390.	547.
				TIME	3.47	3.57	3.43	3.47	3.40	3.43
HYDROGRAPH AT										
+	750	.00	1	FLOW	5.	8.	10.	12.	14.	16.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
ROUTED TO										
+	C770	.00	1	FLOW	6.	9.	10.	12.	15.	16.
				TIME	3.20	3.17	3.17	3.20	3.20	3.20
			** PEAK STAGES IN FEET **							
			1	STAGE	99.84	99.88	99.89	99.93	99.97	100.00
				TIME	3.20	3.17	3.17	3.20	3.20	3.20
HYDROGRAPH AT										
+	770	.01	1	FLOW	8.	12.	15.	18.	21.	24.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
2 COMBINED AT										
+	C770	.01	1	FLOW	12.	19.	22.	27.	31.	36.
				TIME	3.20	3.17	3.17	3.13	3.13	3.17
2 COMBINED AT										
+	C770	.45	1	FLOW	53.	127.	183.	293.	398.	555.
				TIME	3.47	3.47	3.43	3.47	3.40	3.43
ROUTED TO										
+	C800	.45	1	FLOW	53.	127.	183.	293.	399.	557.
				TIME	3.47	3.47	3.43	3.47	3.43	3.43
			** PEAK STAGES IN FEET **							
			1	STAGE	101.03	101.66	102.03	102.60	103.03	103.59
				TIME	3.47	3.47	3.43	3.47	3.43	3.43
HYDROGRAPH AT										
+	800	.02	1	FLOW	2.	6.	10.	16.	22.	29.
				TIME	3.30	3.23	3.23	3.23	3.23	3.20

2 COMBINED AT										
+	C800	.46	1	FLOW	54.	130.	189.	301.	410.	571.
				TIME	3.47	3.47	3.43	3.47	3.43	3.43
ROUTED TO										
+	C810	.46	1	FLOW	55.	132.	189.	300.	412.	564.
				TIME	3.30	3.50	3.47	3.50	3.47	3.47
			** PEAK STAGES IN FEET **							
			1	STAGE	100.63	101.08	101.32	101.72	102.07	102.45
				TIME	3.30	3.50	3.47	3.50	3.47	3.47
HYDROGRAPH AT										
+	810	.04	1	FLOW	23.	38.	48.	64.	79.	94.
				TIME	3.27	3.27	3.27	3.27	3.27	3.27
2 COMBINED AT										
+	C810	.51	1	FLOW	77.	155.	220.	342.	464.	622.
				TIME	3.30	3.47	3.47	3.43	3.43	3.47
ROUTED TO										
+	C820	.51	1	FLOW	77.	156.	222.	347.	468.	622.
				TIME	3.37	3.47	3.43	3.47	3.43	3.50
			** PEAK STAGES IN FEET **							
			1	STAGE	100.76	101.18	101.45	101.87	102.22	102.60
				TIME	3.37	3.47	3.43	3.47	3.43	3.50
HYDROGRAPH AT										
+	820	.04	1	FLOW	21.	36.	45.	61.	76.	91.
				TIME	3.20	3.20	3.20	3.20	3.20	3.20
2 COMBINED AT										
+	C820	.54	1	FLOW	88.	176.	242.	370.	501.	652.
				TIME	3.37	3.37	3.43	3.47	3.43	3.50
ROUTED TO										
+	C830	.54	1	FLOW	88.	176.	242.	370.	500.	653.
				TIME	3.37	3.30	3.43	3.47	3.43	3.50
			** PEAK STAGES IN FEET **							
			1	STAGE	100.52	100.81	100.99	101.29	101.56	101.84
				TIME	3.37	3.30	3.43	3.47	3.43	3.50
HYDROGRAPH AT										
+	910	.05	1	FLOW	41.	65.	78.	99.	118.	138.
				TIME	3.23	3.23	3.23	3.23	3.23	3.23
ROUTED TO										
+	C920	.05	1	FLOW	41.	64.	77.	98.	117.	137.
				TIME	3.23	3.23	3.23	3.23	3.23	3.23
HYDROGRAPH AT										
+	920	.03	1	FLOW	15.	22.	27.	35.	43.	51.
				TIME	3.27	3.30	3.30	3.30	3.30	3.30
2 COMBINED AT										
+	C920	.08	1	FLOW	55.	86.	104.	133.	159.	186.
				TIME	3.27	3.27	3.27	3.27	3.27	3.27

ROUTED TO										
+	C930	.08	1	FLOW	56.	86.	103.	133.	159.	187.
				TIME	3.27	3.30	3.27	3.30	3.30	3.27
			** PEAK STAGES IN FEET **							
			1	STAGE	99.69	99.86	99.93	100.04	100.13	100.22
				TIME	3.27	3.30	3.27	3.30	3.30	3.27
HYDROGRAPH AT										
+	930	.06	1	FLOW	26.	46.	57.	77.	96.	115.
				TIME	3.30	3.30	3.30	3.30	3.30	3.30
2 COMBINED AT										
+	C930	.14	1	FLOW	82.	132.	161.	211.	254.	300.
				TIME	3.27	3.30	3.30	3.30	3.30	3.27
DIVERSION TO										
+	D930	.14	1	FLOW	51.	51.	51.	51.	51.	51.
				TIME	3.17	3.10	3.07	3.03	3.03	3.00
HYDROGRAPH AT										
+	C930	.14	1	FLOW	31.	81.	110.	160.	203.	249.
				TIME	3.27	3.30	3.30	3.30	3.30	3.27
ROUTED TO										
+	C830	.14	1	FLOW	31.	83.	114.	161.	203.	252.
				TIME	3.30	3.33	3.30	3.33	3.30	3.30
			** PEAK STAGES IN FEET **							
			1	STAGE	99.66	99.97	100.09	100.27	100.39	100.53
				TIME	3.30	3.33	3.30	3.33	3.30	3.30
HYDROGRAPH AT										
+	830	.00	1	FLOW	3.	4.	5.	6.	7.	8.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
3 COMBINED AT										
+	C830	.68	1	FLOW	118.	256.	347.	509.	676.	861.
				TIME	3.37	3.30	3.33	3.37	3.37	3.40
DIVERSION TO										
+	D830	.68	1	FLOW	0.	0.	0.	0.	109.	272.
				TIME	.03	.03	.03	.03	3.37	3.40
HYDROGRAPH AT										
+	C830	.68	1	FLOW	118.	256.	347.	509.	567.	589.
				TIME	3.37	3.30	3.33	3.37	3.37	3.40
HYDROGRAPH AT										
+	A30	.40	1	FLOW	50.	117.	163.	244.	321.	403.
				TIME	3.57	3.60	3.57	3.57	3.57	3.57
ROUTED TO										
+	DA30	.40	1	FLOW	47.	105.	144.	210.	271.	311.
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
			** PEAK STAGES IN FEET **							
			1	STAGE	35.14	36.34	37.10	38.11	39.07	40.12
				TIME	3.70	3.73	3.73	3.77	3.77	3.80

DIVERSION TO										
+	A32	.40	1	FLOW	46.	97.	130.	190.	244.	281.
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
HYDROGRAPH AT										
+	A31	.40	1	FLOW	1.	9.	14.	20.	26.	30.
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
2 COMBINED AT										
+	CA31	1.08	1	FLOW	118.	256.	350.	519.	580.	610.
				TIME	3.37	3.30	3.33	3.40	3.37	3.50
ROUTED TO										
+	ED1010	1.08	1	FLOW	119.	257.	355.	519.	583.	611.
				TIME	3.37	3.40	3.37	3.40	3.40	3.53
			** PEAK STAGES IN FEET **							
			1	STAGE	98.14	99.32	99.76	100.17	100.31	100.36
				TIME	3.37	3.40	3.37	3.40	3.40	3.53
HYDROGRAPH AT										
+	1010	.01	1	FLOW	1.	6.	9.	15.	21.	27.
				TIME	3.20	3.13	3.13	3.13	3.13	3.13
2 COMBINED AT										
+	C1010	1.10	1	FLOW	120.	259.	359.	524.	588.	616.
				TIME	3.37	3.40	3.37	3.40	3.40	3.53
ROUTED TO										
+	ED1010	1.10	1	FLOW	74.	240.	345.	520.	585.	614.
				TIME	3.63	3.47	3.43	3.43	3.43	3.53
			** PEAK STAGES IN FEET **							
			1	STAGE	27.71	28.20	28.33	28.53	28.61	28.64
				TIME	3.63	3.47	3.43	3.43	3.43	3.53
HYDROGRAPH AT										
+	1060A	.00	1	FLOW	0.	1.	2.	3.	4.	5.
				TIME	3.17	3.13	3.10	3.10	3.10	3.10
HYDROGRAPH AT										
+	10N	.00	1	FLOW	2.	4.	5.	7.	8.	10.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
3 COMBINED AT										
+	C1060A	1.10	1	FLOW	74.	241.	347.	522.	587.	616.
				TIME	3.63	3.47	3.40	3.43	3.43	3.53
ROUTED TO										
+	CPIMAA	1.10	1	FLOW	72.	222.	315.	499.	591.	616.
				TIME	3.67	3.57	3.57	3.53	3.47	3.53
			** PEAK STAGES IN FEET **							
			1	STAGE	19.54	21.51	22.99	25.59	26.23	26.35
				TIME	3.67	3.57	3.57	3.53	3.47	3.53
DIVERSION TO										
+	D1060A	1.10	1	FLOW	0.	0.	0.	65.	131.	147.
				TIME	.03	.03	.03	3.53	3.47	3.53

HYDROGRAPH AT										
+	C1060A	1.10	1	FLOW	72.	222.	315.	434.	460.	469.
				TIME	3.67	3.57	3.57	3.53	3.47	3.53
HYDROGRAPH AT										
+	1060B	.00	1	FLOW	1.	2.	4.	6.	8.	11.
				TIME	3.17	3.13	3.10	3.10	3.10	3.10
HYDROGRAPH AT										
+	1060C	.00	1	FLOW	1.	3.	4.	7.	9.	12.
				TIME	3.17	3.13	3.10	3.10	3.10	3.10
3 COMBINED AT										
+	C1060C	1.11	1	FLOW	72.	223.	316.	436.	463.	473.
				TIME	3.67	3.53	3.57	3.53	3.47	3.43
ROUTED TO										
+	CPIMAB	1.11	1	FLOW	36.	140.	234.	379.	429.	447.
				TIME	9.37	3.93	3.83	3.77	3.77	3.73
			** PEAK STAGES IN FEET **							
			1	STAGE	21.02	21.53	22.00	22.48	22.59	22.63
				TIME	9.47	3.93	3.83	3.77	3.77	3.73
HYDROGRAPH AT										
+	1060D	.00	1	FLOW	1.	3.	4.	7.	9.	12.
				TIME	3.17	3.13	3.10	3.10	3.10	3.10
2 COMBINED AT										
+	C1060D	1.11	1	FLOW	36.	140.	234.	379.	429.	448.
				TIME	9.37	3.93	3.83	3.77	3.77	3.73
ROUTED TO										
+	CPIMAC	1.11	1	FLOW	29.	36.	51.	68.	78.	86.
				TIME	9.97	9.97	5.13	5.00	5.03	5.07
			** PEAK STAGES IN FEET **							
			1	STAGE	17.58	18.05	19.06	20.81	21.81	22.60
				TIME	9.97	9.97	5.13	5.00	5.03	5.07
HYDROGRAPH AT										
+	A32	.00	1	FLOW	46.	97.	130.	190.	244.	281.
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
DIVERSION TO										
+	A36	.00	1	FLOW	45.	87.	114.	154.	192.	218.
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
HYDROGRAPH AT										
+	A32	.00	1	FLOW	1.	10.	16.	35.	53.	63.
				TIME	3.70	3.73	3.73	3.77	3.77	3.80
ROUTED TO										
+	C1030	.00	1	FLOW	1.	10.	16.	35.	53.	63.
				TIME	3.80	3.80	3.80	3.80	3.77	3.80
			** PEAK STAGES IN FEET **							
			1	STAGE	95.14	95.88	96.18	96.76	97.16	97.35
				TIME	3.80	3.80	3.80	3.80	3.77	3.80

ROUTED TO +	C1030	.00	1	FLOW	1.	10.	16.	35.	53.	63.
				TIME	3.80	3.80	3.80	3.80	3.77	3.83
HYDROGRAPH AT +	1030	.01	1	FLOW	1.	4.	6.	10.	14.	18.
				TIME	3.27	3.20	3.20	3.20	3.17	3.17
2 COMBINED AT +	C1030	.01	1	FLOW	1.	10.	17.	36.	54.	65.
				TIME	3.80	3.80	3.80	3.80	3.77	3.80
ROUTED TO +	C1040	.01	1	FLOW	1.	10.	17.	36.	54.	64.
				TIME	3.80	3.80	3.80	3.80	3.77	3.83
HYDROGRAPH AT +	1040	.02	1	FLOW	9.	17.	22.	32.	40.	49.
				TIME	3.17	3.17	3.17	3.17	3.17	3.17
ROUTED TO +	ED1040	.02	1	FLOW	2.	4.	5.	6.	8.	9.
				TIME	3.50	3.57	3.57	3.57	3.57	3.57
			** PEAK STAGES IN FEET **							
			1	STAGE	24.68	25.02	25.23	25.58	25.87	26.18
				TIME	3.50	3.57	3.57	3.57	3.57	3.57
2 COMBINED AT +	C1040	.03	1	FLOW	3.	14.	21.	42.	61.	73.
				TIME	3.77	3.80	3.80	3.80	3.77	3.80
ROUTED TO +	C1050	.03	1	FLOW	3.	14.	21.	42.	61.	73.
				TIME	3.80	3.80	3.80	3.80	3.80	3.83
			** PEAK STAGES IN FEET **							
			1	STAGE	95.46	96.07	96.33	96.89	97.28	97.49
				TIME	3.80	3.80	3.80	3.80	3.80	3.83
HYDROGRAPH AT +	1050	.00	1	FLOW	0.	2.	3.	5.	7.	9.
				TIME	3.17	3.13	3.13	3.10	3.10	3.10
2 COMBINED AT +	C1050	.03	1	FLOW	3.	14.	22.	43.	62.	74.
				TIME	3.80	3.77	3.80	3.80	3.77	3.83
HYDROGRAPH AT +	D1060A	.00	1	FLOW	0.	0.	0.	65.	131.	147.
				TIME	.03	.03	.03	3.53	3.47	3.53
HYDROGRAPH AT +	1020	.00	1	FLOW	1.	1.	2.	3.	4.	5.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
3 COMBINED AT +	C1050	.04	1	FLOW	4.	14.	22.	93.	167.	213.
				TIME	3.33	3.77	3.80	3.53	3.57	3.60

ROUTED TO										
+	C1070	.04	1	FLOW	4.	14.	22.	93.	170.	212.
				TIME	3.50	3.90	3.87	3.57	3.53	3.63
			** PEAK STAGES IN FEET **							
			1	STAGE	95.40	95.96	96.22	97.65	98.53	98.89
				TIME	3.50	3.90	3.87	3.57	3.53	3.63
HYDROGRAPH AT										
+	1070	.03	1	FLOW	9.	19.	26.	38.	50.	62.
				TIME	3.20	3.20	3.20	3.20	3.17	3.17
2 COMBINED AT										
+	C1070	.06	1	FLOW	10.	26.	37.	103.	184.	224.
				TIME	3.20	3.27	3.23	3.57	3.53	3.60
ROUTED TO										
+	C1080	.06	1	FLOW	10.	29.	39.	107.	204.	239.
				TIME	3.63	3.50	3.43	3.77	3.70	3.67
			** PEAK STAGES IN FEET **							
			1	STAGE	95.47	95.98	96.17	97.06	97.83	98.05
				TIME	3.63	3.50	3.43	3.77	3.70	3.67
HYDROGRAPH AT										
+	1080	.05	1	FLOW	18.	36.	48.	68.	87.	106.
				TIME	3.20	3.20	3.20	3.20	3.20	3.20
2 COMBINED AT										
+	C1080	.11	1	FLOW	20.	43.	62.	115.	217.	258.
				TIME	3.20	3.50	3.43	3.77	3.70	3.67
HYDROGRAPH AT										
+	1090	.03	1	FLOW	12.	24.	33.	48.	62.	76.
				TIME	3.17	3.20	3.20	3.17	3.17	3.17
ROUTED TO										
+	C1100	.03	1	FLOW	12.	24.	33.	48.	62.	76.
				TIME	3.17	3.20	3.20	3.17	3.17	3.17
			** PEAK STAGES IN FEET **							
			1	STAGE	98.75	98.75	98.75	98.75	98.75	98.75
				TIME	3.17	3.20	3.17	3.17	3.17	3.17
HYDROGRAPH AT										
+	1100	.07	1	FLOW	14.	29.	39.	56.	72.	90.
				TIME	3.43	3.47	3.47	3.43	3.43	3.43
2 COMBINED AT										
+	C1100	.10	1	FLOW	20.	41.	55.	79.	102.	126.
				TIME	3.27	3.30	3.30	3.30	3.27	3.27
2 COMBINED AT										
+	C1080	.22	1	FLOW	39.	79.	114.	172.	273.	338.
				TIME	3.23	3.50	3.43	3.40	3.70	3.63
HYDROGRAPH AT										
+	40	.03	1	FLOW	12.	20.	25.	33.	40.	47.
				TIME	3.47	3.47	3.47	3.47	3.47	3.47

ROUTED TO										
+	SD110	.03	1	FLOW	12.	20.	25.	33.	40.	47.
				TIME	3.47	3.47	3.47	3.47	3.47	3.47
HYDROGRAPH AT										
+	10	.01	1	FLOW	3.	7.	10.	13.	16.	19.
				TIME	3.13	3.13	3.13	3.13	3.13	3.13
HYDROGRAPH AT										
+	20	.00	1	FLOW	0.	1.	1.	2.	3.	4.
				TIME	3.37	3.30	3.30	3.27	3.27	3.27
2 COMBINED AT										
+	C10	.01	1	FLOW	4.	8.	10.	14.	18.	22.
				TIME	3.13	3.13	3.13	3.13	3.13	3.13
ROUTED TO										
+	C15	.01	1	FLOW	5.	9.	11.	15.	19.	23.
				TIME	3.43	3.37	3.33	3.33	3.30	3.30
			** PEAK STAGES IN FEET **							
			1	STAGE	97.49	97.67	97.75	97.85	97.95	98.03
				TIME	3.43	3.37	3.33	3.33	3.30	3.30
HYDROGRAPH AT										
+	15	.01	1	FLOW	4.	8.	11.	15.	18.	22.
				TIME	3.13	3.10	3.10	3.10	3.10	3.10
2 COMBINED AT										
+	C15	.01	1	FLOW	6.	11.	15.	20.	25.	30.
				TIME	3.43	3.37	3.33	3.30	3.30	3.30
DIVERSION TO										
+	D15	.01	1	FLOW	6.	11.	15.	19.	19.	19.
				TIME	3.43	3.37	3.33	3.30	3.27	3.30
HYDROGRAPH AT										
+	C15	.01	1	FLOW	0.	0.	0.	1.	6.	11.
				TIME	.03	.03	.03	3.30	3.30	3.30
ROUTED TO										
+	C110	.01	1	FLOW	0.	0.	0.	0.	6.	13.
				TIME	.03	.03	.03	3.57	3.43	3.40
			** PEAK STAGES IN FEET **							
			1	STAGE	101.27	101.27	101.27	101.40	101.60	101.70
				TIME	.00	.00	.00	3.57	3.43	3.40
HYDROGRAPH AT										
+	50	.01	1	FLOW	4.	7.	8.	11.	14.	17.
				TIME	3.17	3.17	3.17	3.17	3.17	3.17
HYDROGRAPH AT										
+	110	.00	1	FLOW	2.	3.	3.	4.	5.	6.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
2 COMBINED AT										
+	C110	.01	1	FLOW	5.	9.	11.	14.	18.	21.
				TIME	3.13	3.13	3.13	3.17	3.17	3.17

HYDROGRAPH AT										
+	210	.00	1	FLOW	4.	6.	7.	9.	10.	12.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
4 COMBINED AT										
+	SD210	.05	1	FLOW	14.	24.	29.	38.	53.	68.
				TIME	3.40	3.43	3.43	3.43	3.43	3.40
ROUTED TO										
+	SD220	.05	1	FLOW	14.	24.	29.	38.	52.	67.
				TIME	3.40	3.43	3.43	3.43	3.43	3.40
HYDROGRAPH AT										
+	70	.01	1	FLOW	5.	9.	12.	16.	20.	25.
				TIME	3.23	3.23	3.23	3.23	3.23	3.23
HYDROGRAPH AT										
+	120	.00	1	FLOW	1.	1.	1.	2.	2.	2.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
2 COMBINED AT										
+	C120	.01	1	FLOW	6.	10.	13.	17.	21.	25.
				TIME	3.20	3.23	3.23	3.23	3.23	3.23
2 COMBINED AT										
+	SD220	.07	1	FLOW	19.	32.	39.	52.	64.	83.
				TIME	3.20	3.23	3.23	3.23	3.23	3.40
ROUTED TO										
+	SD230	.07	1	FLOW	19.	32.	39.	52.	64.	83.
				TIME	3.23	3.23	3.27	3.27	3.27	3.40
HYDROGRAPH AT										
+	80	.00	1	FLOW	1.	2.	3.	4.	4.	5.
				TIME	3.13	3.13	3.13	3.13	3.13	3.13
HYDROGRAPH AT										
+	130	.00	1	FLOW	1.	1.	1.	1.	2.	2.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
2 COMBINED AT										
+	C130	.00	1	FLOW	2.	3.	3.	5.	6.	7.
				TIME	3.10	3.10	3.13	3.13	3.13	3.13
HYDROGRAPH AT										
+	220	.00	1	FLOW	2.	3.	3.	4.	5.	6.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
ROUTED TO										
+	C230	.00	1	FLOW	2.	3.	3.	4.	5.	6.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
			** PEAK STAGES IN FEET **							
			1	STAGE	97.88	97.89	97.90	97.90	97.91	97.91
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
HYDROGRAPH AT										
+	230	.00	1	FLOW	1.	2.	3.	3.	4.	4.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07

2 COMBINED AT											
+	C230	.00	1	FLOW	3.	5.	6.	8.	9.	10.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
3 COMBINED AT										
+	SD230	.07	1	FLOW	23.	37.	45.	59.	72.	86.
				TIME	3.17	3.17	3.17	3.20	3.20	3.40
ROUTED TO										
+	SD90	.07	1	FLOW	22.	36.	45.	59.	72.	85.
				TIME	3.17	3.17	3.20	3.20	3.20	3.40
HYDROGRAPH AT										
+	90	.03	1	FLOW	9.	18.	24.	34.	43.	53.
				TIME	3.27	3.30	3.30	3.27	3.27	3.27
2 COMBINED AT										
+	SD90	.10	1	FLOW	31.	53.	67.	91.	113.	138.
				TIME	3.23	3.27	3.27	3.27	3.27	3.27
ROUTED TO										
+	SD240	.10	1	FLOW	31.	53.	67.	91.	113.	137.
				TIME	3.23	3.27	3.27	3.27	3.27	3.27
HYDROGRAPH AT										
+	140	.00	1	FLOW	1.	2.	3.	3.	4.	4.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
HYDROGRAPH AT										
+	240	.00	1	FLOW	3.	4.	5.	6.	7.	8.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
3 COMBINED AT										
+	SD240	.10	1	FLOW	33.	55.	69.	93.	116.	141.
				TIME	3.20	3.23	3.23	3.23	3.23	3.27
ROUTED TO										
+	SD250	.10	1	FLOW	32.	55.	69.	93.	116.	140.
				TIME	3.20	3.23	3.27	3.27	3.27	3.27
HYDROGRAPH AT										
+	150	.00	1	FLOW	3.	5.	6.	8.	9.	10.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
HYDROGRAPH AT										
+	250	.00	1	FLOW	2.	4.	4.	5.	6.	7.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
3 COMBINED AT										
+	SD250	.11	1	FLOW	36.	59.	73.	98.	121.	146.
				TIME	3.17	3.20	3.23	3.23	3.23	3.27
ROUTED TO										
+	SD260	.11	1	FLOW	36.	59.	73.	98.	121.	146.
				TIME	3.17	3.20	3.23	3.23	3.23	3.27
HYDROGRAPH AT										
+	100	.01	1	FLOW	3.	6.	8.	11.	14.	17.
				TIME	3.17	3.17	3.17	3.17	3.17	3.17

HYDROGRAPH AT										
+	160	.00	1	FLOW	1.	2.	2.	2.	3.	3.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
2 COMBINED AT										
+	C160	.01	1	FLOW	4.	7.	9.	12.	15.	19.
				TIME	3.13	3.13	3.13	3.13	3.13	3.13
HYDROGRAPH AT										
+	260	.00	1	FLOW	2.	3.	4.	5.	5.	6.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
3 COMBINED AT										
+	SD260	.11	1	FLOW	40.	66.	82.	110.	135.	162.
				TIME	3.17	3.17	3.20	3.20	3.20	3.20
ROUTED TO										
+	SD270	.11	1	FLOW	40.	66.	82.	110.	135.	161.
				TIME	3.17	3.20	3.20	3.20	3.20	3.20
HYDROGRAPH AT										
+	170	.00	1	FLOW	0.	1.	1.	1.	1.	2.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
HYDROGRAPH AT										
+	270	.00	1	FLOW	2.	3.	3.	4.	4.	5.
				TIME	3.07	3.07	3.07	3.07	3.07	3.07
3 COMBINED AT										
+	SD270	.12	1	FLOW	41.	68.	84.	112.	138.	165.
				TIME	3.17	3.17	3.20	3.20	3.20	3.20
ROUTED TO										
+	SDBOX	.12	1	FLOW	41.	68.	84.	112.	137.	164.
				TIME	3.17	3.20	3.20	3.20	3.20	3.20
2 COMBINED AT										
+	C1080	.33	1	FLOW	80.	145.	187.	265.	351.	436.
				TIME	3.20	3.20	3.20	3.40	3.37	3.37
ROUTED TO										
+	C1110N	.33	1	FLOW	80.	150.	191.	260.	346.	438.
				TIME	3.27	3.27	3.23	3.23	3.40	3.40
			** PEAK STAGES IN FEET **							
			1	STAGE	93.56	93.82	93.95	94.17	94.38	94.58
				TIME	3.27	3.27	3.23	3.23	3.40	3.40
HYDROGRAPH AT										
+	1110N	.00	1	FLOW	1.	2.	3.	5.	7.	9.
				TIME	3.07	3.10	3.10	3.10	3.10	3.10
2 COMBINED AT										
+	C1110N	.34	1	FLOW	81.	151.	193.	263.	347.	440.
				TIME	3.27	3.27	3.23	3.23	3.40	3.40
ROUTED TO										
+	C1110S	.34	1	FLOW	81.	156.	198.	271.	349.	440.
				TIME	3.37	3.27	3.23	3.30	3.43	3.43

			** PEAK STAGES IN FEET **							
			1	STAGE	93.57	93.84	93.97	94.20	94.39	94.58
				TIME	3.37	3.27	3.23	3.30	3.43	3.43
HYDROGRAPH AT										
+	1110S	.02	1	FLOW	6.	11.	15.	22.	30.	39.
				TIME	3.10	3.13	3.13	3.13	3.13	3.13
2 COMBINED AT										
+	C1110S	.36	1	FLOW	83.	162.	208.	281.	364.	450.
				TIME	3.37	3.27	3.23	3.30	3.27	3.43
ROUTED TO										
+	C1120	.36	1	FLOW	83.	174.	215.	285.	366.	453.
				TIME	3.37	3.27	3.23	3.30	3.27	3.43
			** PEAK STAGES IN FEET **							
			1	STAGE	100.67	101.09	101.23	101.47	101.73	101.98
				TIME	3.37	3.27	3.23	3.30	3.27	3.43
HYDROGRAPH AT										
+	1120	.02	1	FLOW	16.	24.	30.	39.	48.	57.
				TIME	3.10	3.10	3.10	3.10	3.10	3.10
2 COMBINED AT										
+	C1120	.37	1	FLOW	86.	183.	229.	297.	383.	463.
				TIME	3.37	3.27	3.23	3.30	3.27	3.43
ROUTED TO										
+	LAKE5	.37	1	FLOW	2.	36.	70.	160.	265.	355.
				TIME	6.40	4.33	4.07	3.93	3.90	3.80
			** PEAK STAGES IN FEET **							
			1	STAGE	76.14	76.83	77.21	77.72	78.22	78.51
				TIME	6.40	4.33	4.07	3.93	3.90	3.80

HYDRAULIC GRADIENT WORKSHEET

SMF Engineering Corporation

Client : City of Scottsdale
Project : 84th Street and Cholla Road
Comments : New Storm Drain in Cactus Road
Final Design
Main Line (50 yr storm), Outfall at Box-culvert (100 yr storm)

By: RM/LR
Checked: CDS
10/27/95 09:57 AM

Station	Structure	Pipe	Diam	Design	Velocity Head		Energy Losses											Change	Hydr Grad	Hydr Grad
		Lenght		Q	Up Strm	Dn Strm	Pipe	Angle	Bend/	MH	Contr/	Angle	D3	Angle	D4	Junction	Total	Hydr Grad	Elevation	Elevation
		[ft]	[ft]	[cfs]	Hv1	Hv2	Frict	[Degr]	Curve		Exp	[Degr]	Q3	[Degr]	Q4		Ht	Hv2+Ht-Hv1	Up Stream	Dn Stream
																			G=1399.99	
29+75	Catch Basin					0.63					**0.31**						0.31	0.94	1398.83	1397.89
	Pipe	38.0	2.00	20.00	0.63	0.63	**0.29**						2.00		2.00		0.29	0.29	1397.89	1397.59
29+93	Manhole				0.63	0.27				**0.03**	**0.08**	45.00	20.00	45.00	20.00	**-0.07**	0.04	-0.32	1397.59	1397.91
	Pipe	203.0	3.50	40.00	0.27	0.27	**0.32**	90.00	**0.05**				2.50		1.50		0.37	0.37	1397.91	1397.55
27+90	PrefabCross				0.27	0.35						90.00	4.40	90.00	1.60	**0.17**	0.17	0.26	1397.55	1397.29
	Pipe	255.0	3.50	46.00	0.35	0.35	**0.53**						2.50				0.53	0.53	1397.29	1396.76
25+35	Manhole				0.35	0.35				**0.02**	**0.00**	90.00	14.00			**0.19**	0.20	0.20	1396.76	1396.55
	Pipe	255.0	4.00	60.00	0.35	0.35	**0.44**						1.50		2.00		0.44	0.44	1396.55	1396.11
22+80	PrefabCross				0.35	0.43						90.00	2.70	90.00	3.30	**0.15**	0.15	0.22	1396.11	1395.89
	Pipe	188.0	4.00	66.00	0.43	0.43	**0.39**	30.70	**0.03**				2.50				0.42	0.42	1395.89	1395.47
20+94	Manhole				0.35	0.31				**0.02**	**0.01**	90.00	21.50			**0.08**	0.11	0.07	1395.47	1395.40
	Pipe	34.0	5.00	87.50	0.31	0.31	**0.04**						2.50				0.04	0.04	1395.40	1395.36
20+60	PrefabTee				0.43	0.48						90.00	21.50			**0.34**	0.34	0.39	1395.36	1394.97
	Pipe	110.0	5.00	109.00	0.48	0.48	**0.19**						1.50		1.50		0.19	0.19	1394.97	1394.78
19+50	Prefab Cross				0.48	0.50						90.00	1.00	90.00	2.00	**0.05**	0.05	0.08	1394.78	1394.70
	Pipe	350.0	5.00	112.00	0.50	0.50	**0.64**						1.50		1.50		0.64	0.64	1394.70	1394.06
16+00	Manhole				0.50	0.54				**0.03**		90.00	2.50	90.00	1.60	**0.07**	0.10	0.14	1394.06	1393.92
	Pipe	337.0	5.00	116.00	0.54	0.54	**0.66**						2.00		1.50		0.66	0.66	1393.92	1393.26
12+63	Prefab Cross				0.54	0.67						90.00	10.00	90.00	3.00	**0.26**	0.26	0.39	1393.26	1392.87
	Pipe	178.0	5.00	129.00	0.67	0.67	**0.43**						1.50		2.50		0.43	0.43	1392.87	1392.44
10+85	Junction Structure				0.67	0.41					**0.03**	90.00	19.50	90.00	16.50	**0.00**	0.04	-0.22	1392.44	1392.66
	8'x4' Box	276.0	6.10	165.00	0.41	0.41	**0.38**	36.35	**0.05**								0.43	0.43	1392.66	1392.23
8+09	Headwall Outlet				0.41						**0.41**						0.41		1392.23	1392.23

HYDRAULIC GRADIENT WORKSHEET

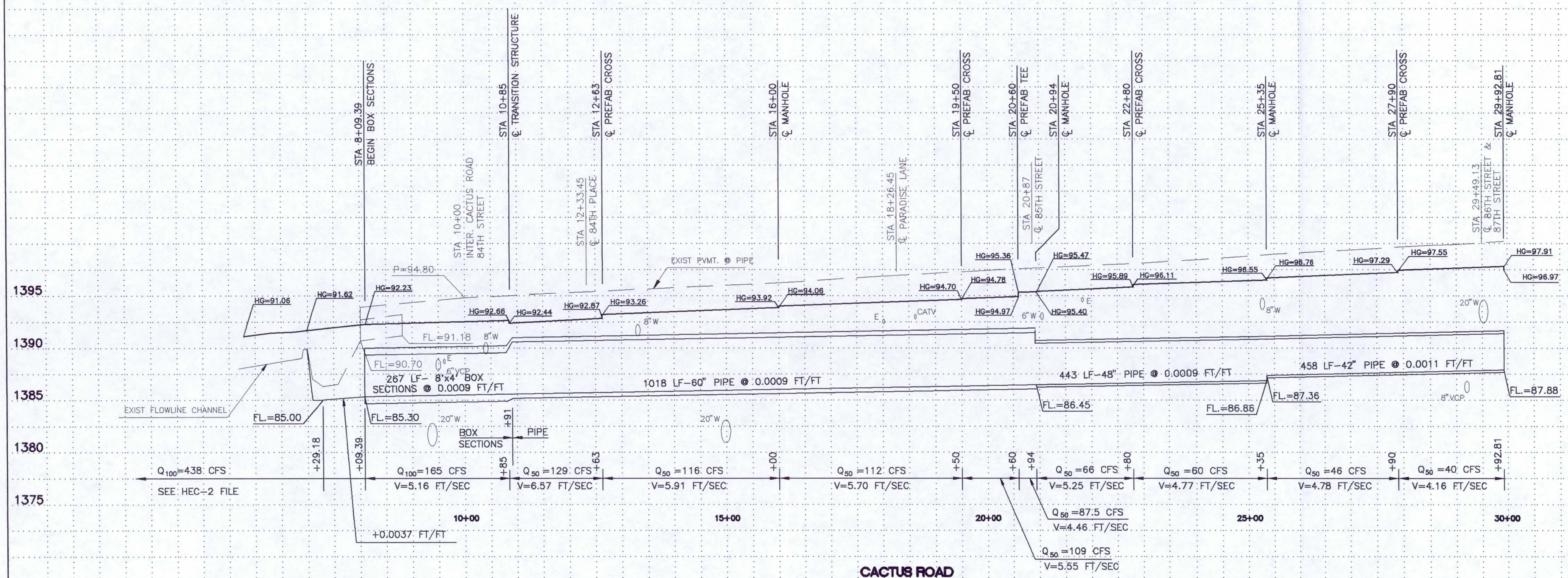
SMF Engineering Corporation

Client : City of Scottsdale
Project : 84th Street and Cholla Road
Comments : New Storm Drain in Cactus Road
Final Design
Main Line (100 yr storm), Outfall at Box-culvert (100 yr storm)

By: RM/LR
Checked: CDS
10/27/95 09:57 AM

Station	Structure	Pipe Lenght [ft]	Diam [ft]	Design Q [cfs]	Velocity Head Up Strm Hv1	Velocity Head Dn Strm Hv2	Energy Losses Pipe Frict	Energy Losses Angle [Degr]	Energy Losses Bend/ Curve	Energy Losses MH	Energy Losses Contr/ Exp	Energy Losses Angle [Degr]	Energy Losses D3 Q3	Energy Losses Angle [Degr]	Energy Losses D4 Q4	Energy Losses Junction	Total Ht	Change Hydr Grad Hv2+Ht-Hv1	Hydr Grad Elevation Up Stream	Hydr Grad Elevation Dn Stream
																			G=1399.99	
29+75	Catch Basin				0.00	0.87					0.43						0.43	1.30	1400.88	1399.57
	Pipe	38.0	2.00	23.50	0.87	0.87	0.41						2.00		2.00		0.41	0.41	1399.57	1399.17
29+93	Manhole				0.87	0.37				0.04	0.10	45.00	23.50	45.00	23.50	-0.09	0.06	-0.44	1399.17	1399.61
	Pipe	203.0	3.50	47.00	0.37	0.37	0.44	90.00	0.07				2.50		1.50		0.51	0.51	1399.61	1399.10
27+90	PrefabCross				0.37	0.49						90.00	5.10	90.00	1.90	0.24	0.24	0.36	1399.10	1398.75
	Pipe	255.0	3.50	54.00	0.49	0.49	0.73						2.50				0.73	0.73	1398.75	1398.02
25+35	Manhole				0.49	0.51				0.02	0.00	90.00	18.00			0.31	0.33	0.35	1398.02	1397.66
	Pipe	255.0	4.00	72.00	0.51	0.51	0.64						1.50		2.00		0.64	0.64	1397.66	1397.03
22+80	PrefabCross				0.51	0.61						90.00	3.10	90.00	3.90	0.21	0.21	0.31	1397.03	1396.72
	Pipe	188.0	4.00	79.00	0.61	0.61	0.57	30.70					2.50				0.57	0.57	1396.72	1396.15
20+94	Manhole				0.51	0.45			0.00	0.03	0.01	90.00	26.50			0.14	0.17	0.11	1396.15	1396.04
	Pipe	34.0	5.00	105.50	0.45	0.45	0.06						2.50				0.06	0.06	1396.04	1395.98
20+60	PrefabTee				0.61	0.69			0.00			90.00	26.50			0.49	0.49	0.56	1395.98	1395.42
	Pipe	110.0	5.00	131.00	0.69	0.69	0.28						1.50		1.50		0.28	0.28	1395.42	1395.14
19+50	Prefab Cross				0.69	0.72						90.00	1.00	90.00	2.00	0.06	0.06	0.10	1395.14	1395.05
	Pipe	350.0	5.00	134.00	0.72	0.72	0.92						1.50		1.50		0.92	0.92	1395.05	1394.12
16+00	Manhole				0.72	0.78				0.04		90.00	3.00	90.00	2.00	0.11	0.15	0.20	1394.12	1393.92
	Pipe	337.0	5.00	139.00	0.78	0.78	0.95						2.00		1.50		0.95	0.95	1393.92	1392.97
12+63	Prefab Cross				0.78	0.97						90.00	12.30	90.00	3.70	0.38	0.38	0.57	1392.97	1392.40
	Pipe	178.0	5.00	155.00	0.97	0.97	0.63						1.50		2.50		0.63	0.63	1392.40	1391.77
10+85	Junction Structure				0.97	0.41		0.00	0.00		0.12	90.00	5.40	90.00	4.60	-0.45	-0.33	-0.89	1391.77	1392.66
	8'x4' Box	276.0	6.10	165.00	0.41	0.41	0.38	36.35	0.05								0.43	0.43	1392.66	1392.23
8+09	Headwall Outlet				0.41	0.00					0.41						0.41	0.00	1392.23	1392.23

SMF Scott, Meyer, Ferguson
ENGINEERING CORPORATION
1915 West Adobe Drive, Suite "D"
Phoenix, Arizona 85027
Telephone (602)516-0605, FAX (602)516-00



CACTUS STORM DRAIN
50/100 YEAR - HYDRAULIC PROF

DATE	REVISION
ENGINEER	

MUNICIPAL S
DEPARTM
CAPITAL P
MANAGEM
3939 CIVIC CEN
SCOTTSDALE, ARIZ

PROJECT TITLE: CACTUS ROAD STORM DRAIN

SCALE	DESIGNED BY	CHECKED BY	BID NO.
HORIZ. 1" = 100'	CDS	CDS	96-
VERT. 1" = 5'	DRAWN BY MC	AS-BUILT	PROJECT NO. F2708

Licensed to: SMF Engineering Corporation, Phoenix, AZ
Project : Cactus Road Left 50-Yr Return Frequency

```
Sta 29+75                                      INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    = 20.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 1    C2=0.00  A2= 0.00 Qrunoff= 20.0    Slope2= 0.0587 a      = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade   =  0.0055 Slope3= 0.0160 W      = 1.42 Length=34.00
............................................................................................
                                               OUTPUT
Flowby=  0.0 Qtotal= 20.0 Qint= 19.8 Flowby dn=  0.2 Depth=0.50 Spread= 27.15 Veloc= 3.37
--------------------------------------------------------------------------------------------
                                               INPUT
    End of this reach of Catch Basins
    Flowby dn flows to Catch Basin  4
............................................................................................
                                               OUTPUT
    Flowby dn=  0.2
--------------------------------------------------------------------------------------------
Sta 29+34                                      INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    = 20.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 2    C2=0.00  A2= 0.00 Qrunoff= 20.0    Slope2= 0.0587 a      = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade   =  0.0054 Slope3= 0.0060 W      = 1.42 Length=34.00
............................................................................................
                                               OUTPUT
Flowby=  0.0 Qtotal= 20.0 Qint= 17.2 Flowby dn=  2.8 Depth=0.38 Spread= 51.53 Veloc= 2.49
--------------------------------------------------------------------------------------------
Sta 27+90                                      INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    =  2.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 4    C2=0.00  A2= 0.00 Qrunoff=  2.0    Slope2= 0.0587 a      = 3.25 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade   =  0.0034 Slope3= 0.0173 W      = 2.50 Length= 9.88
............................................................................................
                                               OUTPUT
Flowby=  3.0 Qtotal=  5.0 Qint=  5.0 Flowby dn=  0.1 Depth=0.35 Spread= 16.54 Veloc= 2.08
--------------------------------------------------------------------------------------------
Sta 25+35                                      INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    =  2.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 6    C2=0.00  A2= 0.00 Qrunoff=  2.0    Slope2= 0.0587 a      = 3.25 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade   =  0.0033 Slope3= 0.0217 W      = 2.50 Length= 9.88
............................................................................................
                                               OUTPUT
Flowby=  0.1 Qtotal=  2.1 Qint=  2.1 Flowby dn=  0.0 Depth=0.27 Spread= 10.02 Veloc= 1.82
--------------------------------------------------------------------------------------------
Sta 22+80                                      INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    =  6.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 7    C2=0.00  A2= 0.00 Qrunoff=  6.0    Slope2= 0.0587 a      = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade   =  0.0080 Slope3= 0.0200 W      = 1.42 Length=13.00
............................................................................................
                                               OUTPUT
Flowby=  0.0 Qtotal=  6.0 Qint=  5.4 Flowby dn=  0.6 Depth=0.33 Spread= 13.65 Veloc= 3.15
--------------------------------------------------------------------------------------------
                                               INPUT
    End of this reach of Catch Basins
    Flowby dn flows to Catch Basin  10
............................................................................................
                                               OUTPUT
    Flowby dn=  0.6
```

```
Sta 20+95                                INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    = 21.5    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 8    C2=0.00  A2= 0.00 Qrunoff= 21.5    Slope2= 0.0587 a      = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0072 Slope3= 0.0100 W      = 1.42 Length=37.00
.............................................................................................
                                         OUTPUT
Flowby=  0.0 Qtotal= 21.5 Qint= 20.1 Flowby dn=  1.4 Depth=0.43 Spread= 35.98 Veloc= 3.30
```

```
                                         INPUT
    End of this reach of Catch Basins
    Flowby dn flows to Catch Basin  10
.............................................................................................
                                         OUTPUT
    Flowby dn=  1.4
```

```
Sta 20+60                                INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    = 21.5    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 9    C2=0.00  A2= 0.00 Qrunoff= 21.5    Slope2= 0.0587 a      = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0072 Slope3= 0.0100 W      = 1.42 Length=37.00
.............................................................................................
                                         OUTPUT
Flowby=  0.0 Qtotal= 21.5 Qint= 20.1 Flowby dn=  1.4 Depth=0.43 Spread= 35.98 Veloc= 3.30
```

```
Sta 19+50                                INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    =  4.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 10   C2=0.00  A2= 0.00 Qrunoff=  4.0    Slope2= 0.0587 a      = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0037 Slope3= 0.0159 W      = 1.42 Length=13.00
.............................................................................................
                                         OUTPUT
Flowby=  3.5 Qtotal=  7.5 Qint=  6.6 Flowby dn=  0.9 Depth=0.38 Spread= 20.14 Veloc= 2.30
```

```
Sta 16+00                                INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    =  9.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 11   C2=0.00  A2= 0.00 Qrunoff=  9.0    Slope2= 0.0587 a      = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0021 Slope3= 0.0165 W      = 1.42 Length=13.00
.............................................................................................
                                         OUTPUT
Flowby=  0.9 Qtotal=  9.9 Qint=  8.5 Flowby dn=  1.4 Depth=0.46 Spread= 24.43 Veloc= 2.00
```

```
Sta 12+63                                INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    = 15.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 12   C2=0.00  A2= 0.00 Qrunoff= 15.0    Slope2= 0.0587 a      = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0030 Slope3= 0.0160 W      = 1.42 Length=20.00
.............................................................................................
                                         OUTPUT
Flowby=  1.4 Qtotal= 16.4 Qint= 14.4 Flowby dn=  2.0 Depth=0.51 Spread= 28.27 Veloc= 2.55
```

```
Sta 10+85                                INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    =  4.7    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 13   C2=0.00  A2= 0.00 Qrunoff=  4.7    Slope2= 0.0587 a      = 2.00 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade  =  0.0010 Slope3= 0.0140 W      = 1.42 Length=13.00
.............................................................................................
                                         OUTPUT
Flowby=  2.0 Qtotal=  6.7 Qint=  6.6 Flowby dn=  0.1 Depth=0.44 Spread= 27.04 Veloc= 1.30
```

```
                              INPUT
   End of this reach of Catch Basins
   Flowby dn flows to Catch Basin
.......................................................................
                              OUTPUT
   Flowby dn=  0.1
```

```
Sta 25+35                        INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    = 20.0    Slope1= 0.0100 Gutter= 2.00 Area   =11.00
CB ID  = 3    C2=0.00  A2= 0.00 Qrunoff= 20.0    Slope2= 0.0100 a      = 0.00 Perim  =19.40
Grt P-1-7/8   C3=0.00  A3= 0.00 Grade   =  0.0000 Slope3= 0.0100 W      = 0.00 Length=10.00
.......................................................................
                                 OUTPUT
Flowby=  0.0 Qtotal= 20.0 Qint= 20.0 Flowby dn=  0.0 Depth=0.78 Spread= 77.88 Veloc= 0.00
```

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

Prepared by: Date:10/27/95 Time:13:21:44 Checked by: Date:

```
PAVEMENT DRAINAGE PROGRAM - HEC-12                                            Page    1
Licensed to: SMF Engineering Corporation, Phoenix, AZ
Project     : Cactus Road Right 50-Yr Return Frequency
-----------------------------------------------------------------------------------------
Sta 27+90                                  INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    =  5.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 1    C2=0.00  A2= 0.00 Qrunoff=   5.0    Slope2= 0.0587 a     = 3.25 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade   =  0.0034 Slope3= 0.0173 W     = 2.50 Length= 9.88
.........................................................................................
                                           OUTPUT
Flowby=  0.0 Qtotal=  5.0 Qint=  5.0 Flowby dn=  0.0 Depth=0.35 Spread= 16.54 Veloc= 2.07
-----------------------------------------------------------------------------------------
Sta 22+80                                  INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    =  9.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 2    C2=0.00  A2= 0.00 Qrunoff=   9.0    Slope2= 0.0587 a     = 3.25 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade   =  0.0037 Slope3= 0.0159 W     = 2.50 Length= 9.88
.........................................................................................
                                           OUTPUT
Flowby=  0.0 Qtotal=  9.0 Qint=  7.4 Flowby dn=  1.6 Depth=0.41 Spread= 21.65 Veloc= 2.40
-----------------------------------------------------------------------------------------
Sta 19+50                                  INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    =  7.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 3    C2=0.00  A2= 0.00 Qrunoff=   7.0    Slope2= 0.0587 a     = 3.25 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade   =  0.0021 Slope3= 0.0165 W     = 2.50 Length= 9.88
.........................................................................................
                                           OUTPUT
Flowby=  1.6 Qtotal=  8.6 Qint=  7.7 Flowby dn=  0.9 Depth=0.44 Spread= 23.10 Veloc= 1.94
-----------------------------------------------------------------------------------------
Sta 16+00                                  INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    =  6.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 4    C2=0.00  A2= 0.00 Qrunoff=   6.0    Slope2= 0.0587 a     = 3.25 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade   =  0.0030 Slope3= 0.0160 W     = 2.50 Length= 9.88
.........................................................................................
                                           OUTPUT
Flowby=  0.9 Qtotal=  6.9 Qint=  6.4 Flowby dn=  0.5 Depth=0.38 Spread= 20.21 Veloc= 2.08
-----------------------------------------------------------------------------------------
Sta 12+63                                  INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    =  5.0    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 5    C2=0.00  A2= 0.00 Qrunoff=   5.0    Slope2= 0.0587 a     = 3.25 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade   =  0.0030 Slope3= 0.0160 W     = 2.50 Length= 9.88
.........................................................................................
                                           OUTPUT
Flowby=  0.5 Qtotal=  5.5 Qint=  5.4 Flowby dn=  0.1 Depth=0.36 Spread= 18.52 Veloc= 1.97
-----------------------------------------------------------------------------------------
Sta 10+85                                  INPUT
Intens.= 0.00 C1=0.00  A1= 0.00 Qadd    = 29.3    Slope1=99.9999 Gutter= 1.42 Area  = 0.00
CB ID  = 6    C2=0.00  A2= 0.00 Qrunoff= 29.3     Slope2= 0.0587 a     = 3.25 Perim = 0.00
Curb Opening  C3=0.00  A3= 0.00 Grade   =  0.0010 Slope3= 0.0140 W     = 2.50 Length=30.50
.........................................................................................
                                           OUTPUT
Flowby=  0.1 Qtotal= 29.4 Qint= 29.4 Flowby dn=  0.0 Depth=0.73 Spread= 47.47 Veloc= 1.86
```

CRITERIA

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

PAVEMENT DRAINAGE PROGRAM

SMF Pavement Drainage Program - HEC 12

Version 2.11

Introduction

This program "Pavement Drainage" was developed by SMF Engineering Corporation. With this program, it is possible to calculate interception and bypass of a series of catch basins. The methodology and equations as published in the Federal Highway Administration's Hydraulic Engineering Circular No. 12 (HEC-12) is the basis of this program for the calculation of catch basin interception and flowby rates. The spread and depth calculations use the modified Manning Equations for composite channel sections. If your agency does not use the HEC-12 methodology for catch basins, you can still use the program for spread and depth.

This program is quite simple to use and we hope that the manual we are providing is sufficient to get you a quick start. This manual should be used in conjunction with the FHWA HEC-12, "Drainage of Highway Pavements (order number PB84 215003). You can order a copy of the FHWA HEC-12 circular from the National Technical Information Service, Springfield, VA 22161. Phone (703) 487-4650.

If you have any questions or suggestions about the program, please call:

Charles D. Scott, PE & RLS or Lynn Ruskin
SMF Engineering Corporation
1915 West Adobe Drive, Suite D
Phoenix, AZ 85027
(602) 516-0605 (voice)
(602) 516-0068 (fax)

To Start:

Copy the contents of the disk into the directory you will be using (e.g. HEC12). To start the program, enter **HEC12**. To familiarize yourself with the program enter the name of the sample file:

```
Enter Drive and Directory: C:\HEC12
Enter Filename           : [Return]
```

This provides a listing of all files in the directory. You can move through your directory with the arrows keys. Pressing return will select the file highlighted. If you press **Esc**, you will return to "Enter Filename".

or, you can enter:

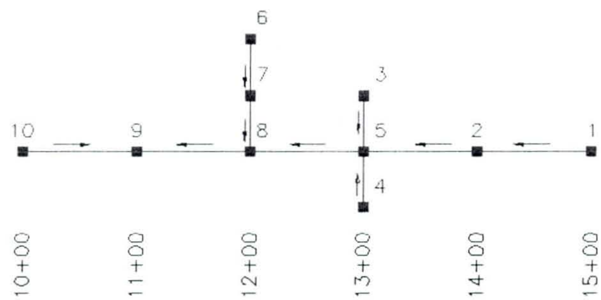
```
Enter Drive and Directory: C:\HEC12
Enter Filename           : SAMPLE1
```

The screen will now show the main menu with the first catch basin, which is located at the upstream terminal.

To start a new file just enter a new filename. The program will then take you directly to the criteria menu.

Main Menu:

It is very important to place the catch basins in the right order. We suggest that you always start your project by drawing up a diagram showing all catch basins, for example:



The first catch basin (number 1) should be the one at the farthest upstream end of the reach. Then add the next catch basin (number 2) downstream, which accepts the bypass. When you have several subreaches, as shown above, you have to add an imaginary catch basin to save the bypass. For this imaginary catch basin, you can enter the ID number of the catch basin that the bypass flows to and enter an 'x' at the "Type of Inlet".

From the Main Menu, you can choose to Add, Insert, Delete or Edit the worksheet that is currently shown (further description follows). You can also Page Up and Page Down through your reach.

F-5 - Criteria:

When you start the program, it will check for the filename you entered. If it exists, it will continue to the main menu. If it can not find the path and filename, it creates the path and file and brings you to the criteria screen. You can enter your project name with up to 45 characters.

Printouts: All printout is configured for a printer with at least 12 characters per inch (cpi). A laser printer will have to be set to a 12 cpi font for good results.

You can select the following printers for output, entering any page length:

1 - IBM Proprinter
2 - Hewlett Packard
3 - Other (Epson FX-80, etc)

Clogging Factors: Please note that you have to add all clogging factors for all catch basins listed before you can run the program. When calculating interception rates, the program will divide the length or area of the catch basin by the clogging factor. If you have entered a curb opening length of 10' and a clogging factor of 1.25', the program will calculate an interception rate for an 8' catch basin. For example, if you have a catch basin that is 20% clogged (80% open), the clogging factor will be 100/80 = 1.25 and if the clogging is 50% (50% open), the clogging factor will be 100/50 = 2. Therefore, most likely your clogging factor will vary between 1.0 and 2.0.

__F-10__

F-10 will save your input data and return you to the first catch basin worksheet. There are no provisions in this program for changing a file name or saving an edited file to a different name. To save an edited file as a different name, you will need to copy the unedited file to its new name first, outside of HEC-12, then call up the new file and edit it.

__F-1 - Add__

This feature will add catch basin data for a new worksheet at the most downstream end of the reach. Note the worksheet counter in the bottom right hand corner. If you enter the first three parameters, "Station", "Catch Basin ID nr" and "Type of Inlet", and then press **F-10**, the program will bring forward the remaining parameters from the previous catch basin. If you get an "Incomplete Worksheet", you have not entered all of the information necessary or are copying a parameter from the previous catch basin which is not compatible with the one you are creating. The "Incomplete Worksheet" only works in the "Add", "Insert" or "Edit" mode.

For Type of Inlet, enter;

"1" for curb opening inlet
"2.1" through "2.8" for grate inlet
"3" for slotted drain
"4.1" through "4.8" for combination inlet

The following Grate Type can be entered;

2.1 or 4.1	P - 1-7/8	Figure 8, HEC-12
2.2 or 4.2	P - 1-7/8 - 4	Figure 8, HEC-12
2.3 or 4.3	P - 1-1/8	Figure 9, HEC-12
2.4 or 4.4	CV - 3-1/4 - 4-1/4	Figure 10, HEC-12
2.5 or 4.5	45 - 2-1/4 - 4	Figure 11, HEC-12
2.6 or 4.6	45 - 3-1/4 - 4	Figure 12, HEC-12
2.7 or 4.7	30 - 3-1/4 - 4	Figure 11, HEC-12
2.8 or 4.8	Reticuline	Figure 13, Hec-12

You can either press **Esc** to quit or press **F-10** to save your worksheet. **F-10** will only work if there are no input errors.

F-2 - Insert

This feature works the same as the "Add" feature but inserts a new catch basin before the one displayed. Please note the sheet counter in the bottom right hand corner of the screen.

F-3 - Delete

"Delete" will delete the catch basin that is shown on the screen.

F-4 - Edit

This feature will allow you to edit any parameter. Use the arrow keys and instructions at the top of the screen. Saving an edited file overwrites the previous file; see **F-10** for instructions on how to save an edited file under a different name.

F-6 - Run

If you run the program and it aborts, it means that you have made an error and you will have to go into the "Edit" mode to find it. If the program runs successfully, you will find yourself at the first catch basin with the output parameters on the bottom of the screen. You can "Page Up" and "Page Down" through your reach.

F-7 - Print:

Make sure the number of lines in the criteria section is the same as for the printer you have selected.

Catch Basin Types

1. Curb Opening Inlet:

You will have to enter only the length of the curb opening.

On Grade - Like the FHWA HEC-12, this program does not limit the depth at the curb for which the equation is applicable. However, when you review your output, you should try to maintain depth below curb (See paragraph 7.2, FHWA HEC-12).

In Sag - When the depth calculated with a weir equation is larger than h (= 4-inch + depression) the orifice equation will be used. Minimum depth will then be h. Enter 0 for the longitudinal grade (See paragraph 8.2, FHWA HEC-12).

2. Grate Inlet:

You will have to enter the area, perimeter, and length of the catch basin.

On Grade - The grate type used for splash-over velocity is different for each grate type as shown on Chart 7, FHWA HEC-12. This chart has been incorporated into this program (See paragraph 7.1, FHWA HEC-12).

In Sag - For depth smaller than 0.8', the weir equation is used and for depth greater than 0.8', the orifice equation is used. Enter 0 for the longitudinal grade (See Paragraph 8.2, FHWA HEC-12).

3. Slotted Drain:

You will have to enter both area and length.

On Grade - The slotted drain equation assumes a weir will occur on one side only (See paragraph 7.3, FHWA HEC-12).

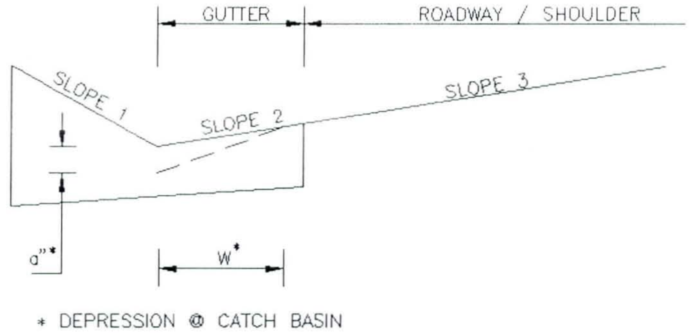
In Sag - For depths smaller than 0.4' the weir equation is used. For depths greater than 0.4', the orifice equation is used. Enter 0 for the longitudinal grade (See paragraph 8.3, FHWA HEC-12).

4. Combination Inlets:

When you enter "4.1" - "4.8" for "Type of Inlet" you also will need to enter the area of the grate, the length of the grate, and the length of the upstream curb opening. If you have a combination inlet without an upstream curb opening, you essentially have a grate. In that case, either enter a "2.1" through "2.8" for inlet type, or enter "0.01" for the length of the upstream curb opening with "4.1" - "4.8" for inlet type. A "0" entered for length would cause an "Incomplete Worksheet".

On Grade - With an upstream curb opening, the program first calculates the interception for a curb opening and then calculates the interception for a grate (See paragraph 7.4, FHWA HEC-12).

In Sag - The program uses the weir equations for both grate and curb opening upstream, unless the depth calculated is greater than h (= 4-inch + depression). For depths greater than h, the grate will be calculated with the weir equation and the curb opening upstream with the orifice equation. Enter 0 for the longitudinal grade (See paragraph 8.4, FHWA HEC-12).



TYPICAL X-SECTION

Design Terms and Abbreviations used in SMF - HEC 12 program
(Also read the "Glossary of Design Terms" in HEC-12, p. XIII & XIV)

Parameter	: Description	Limitations
Sta	: Station	8 characters
CBID	: Identification Number for Catch Basins	3 characters
C1, C2, C3	: Coefficient of Runoff	0 ≤ C1 ≤ 1
A1, A2, A3	: Drainage Area (acres)	0 ≤ A1 < 100
Intensity	: Rainfall Intensity (inches/hour)	0 ≤ Intens ≤ 20
Qadd	: Additional Runoff (cfs)	0 ≤ Qadd ≤ 100
Grade	: Longitudinal Gutter Grade (ft/ft)	0 < Grade ≤ 0.200
Slope1	: Cross-Slope Face of Curb (ft/ft)	0 < Slope1 < 100
Slope2	: Cross-Slope of Gutter (ft/ft)	0 < Slope2 < 1
Slope3	: Cross-Slope Roadway Pavement or shoulder (ft/ft)	0 < Slope3 < 1
Gutter	: Width of Gutter (ft)	0 < Gutter < 90
a	: Catch Basin Depression below normal gutter line (inch)	0 ≤ A < 10
W	: Width of Depression (ft)	0 ≤ W < 10
Area	: Area of Grate excluding the steel bars (sf)	0 ≤ Area < 100
Perim	: Length of Weir excluding the steel bars (ft)	0 ≤ Perim < 100
Lgrate	: Length grate for combination inlet (ft)	0 < Lgrate < 100
Length	: Length of Catch Basin (ft) (if combination inlet, length upstream of grate)	0 < Length < 100
Flowby	: Flow received as bypass from upstream string of Catch Basin(s) (cfs)	
Qrunoff	: Total Runoff contributed by this area (cfs)	
Qtotal	: Total Flow contributing to this Catch Basin (cfs)	{(C1*A1)+(C2+A2)+(C3+A3)} rli+Qadd ≠ 0
Qint	: Flow intercepted by this Catch Basin (cfs)	
Flowby dn	: Flow Bypassed (cfs)	
Depth	: Depth of Flow in Gutter, upstream of Catch Basin (ft)	
Spread	: Width of Flow from gutter line, upstream of CB (ft)	
Veloc	: Velocity in gutter upstream of CB (ft/sec)	
Manning's n Gutter	: Coefficient for roughness	0 < n < 1
Manning's n Pavement	: Coefficient for roughness	0 < n < 1
Printer Emulation	: Type of printer	1, 2, or 3
Clogging Factor (CF)	: Ratio of CB opening / unclogged opening	0 < CF < 100

HYDRAULIC GRADIENT WORKSHEET

SMF Engineering Corporation

Client : City of Scottsdale
Project : 84th Street and Cholla Road
Comments : New Storm Drain in Cactus Road
Trunk Final Design - 50 Yr Storm
Connector Pipes on North Side of Cactus Road (100 yr storm)

By: RM/LR
Checked: CDS
10/27/95 08:21 AM

Station	Structure	Pipe Lenght [ft]	Diam [ft]	Design Q [cfs]	Velocity Head Up Strm Hv1	Velocity Head Dn Strm Hv2	Energy Losses: Pipe Frict	Angle [Degr]	Bend/ Curve	MH	Contr/ Exp	Angle [Degr]	Q3 [cfs]	Angle [Degr]	Q4 [cfs]	Junction	Total Ht	Change Hydr Grad Hv2+Ht-Hv1	Hydr Grad Elevation Up Stream	Hydr Grad Elevation Dn Stream
																			G=1399.99	
29+75	CB					0.87					**0.43**						0.43	1.30	1399.24	1397.94
	Pipe	38.0	2.00	23.50	0.87	0.87	**0.35**										0.35	0.35	1397.94	1397.59
29+46	Manhole				0.87														1397.59	
																			G=1399.99	
29+75	CB					0.87					**0.43**						0.43	1.30	1399.10	1397.80
	Pipe	23.0	2.00	23.50	0.87	0.87	**0.21**										0.21	0.21	1397.80	1397.59
29+46	Manhole				0.87														1397.59	
																			G=1399.00	
27+90	CB					0.45					**0.23**						0.23	0.68	1398.26	1397.58
	Pipe	8.0	2.00	17.00	0.45	0.45	**0.04**										0.04	0.04	1397.58	1397.54
27+90	CB				0.45	0.23					**0.12**						0.12	-0.11	1397.54	1397.65
	Pipe	55.0	2.50	19.00	0.23	0.23	**0.10**										0.10	0.10	1397.65	1397.55
27+90	Prefab X				0.23														1397.55	
																			G=1398.20	T.C.=1398.7
25+35	CB					0.26					**0.13**						0.13	0.39	1397.68	1397.29
	Pipe	8.0	2.50	20.00	0.26	0.26	**0.02**										0.02	0.02	1397.29	1397.28
25+35	CB				0.26	0.40					**0.20**						0.20	0.35	1397.28	1396.93
	Pipe	55.0	2.50	25.00	0.40	0.40	**0.17**										0.17	0.17	1396.93	1396.76
25+35	Manhole				0.40														1396.76	
																			G=1397.40	
22+80	CB					0.24					**0.12**						0.12	0.37	1396.71	1396.34
	Pipe	62.0	1.50	7.00	0.24	0.24	0.23										0.23	0.23	1396.34	1396.11
22+80	Manhole				0.24														1396.1[illegible]	

HYDRAULIC GRADIENT WORKSHEET

SMF Engineering Corporation

Client : City of Scottsdale
Project : 84th Street and Cholla Road
Comments : New Storm Drain in Cactus Road
Trunk Final Design - 50 Yr Storm
Connector Pipes on North Side of Cactus Road (100 yr storm)

By: RM/LR
Checked: CDS
10/27/95 09:57 AM

Station	Structure	Pipe Lenght [ft]	Diam [ft]	Design Q [cfs]	Velocity Head Up Strm Hv1	Velocity Head Dn Strm Hv2	Energy Losses Pipe Frict	Angle [Degr]	Bend/ Curve	MH	Contr/ Exp	Angle [Degr]	Q3 [cfs]	Angle [Degr]	Q4 [cfs]	Junction	Total Ht	Change Hydr Grad Hv2+Ht-Hv1	Hydr Grad Elevation Up Stream	Hydr Grad Elevation Dn Stream
																			G=1397.30	
85th St,	CB					0.45					0.23						0.23	0.68	1396.35	1395.67
	Pipe	58.0	2.50	26.50	0.45	0.45	0.20										0.20	0.20	1395.67	1395.47
20+94	Manhole				0.45														1395.47	
																			G=1397.30	
85th St,	CB					0.45					0.23						0.23	0.68	1396.38	1395.70
	Pipe	97.0	2.50	26.50	0.45	0.45	0.34										0.34	0.34	1395.70	1395.36
20+60	Prefab Tee				0.45														1395.36	
																			G=1396.50	
19+50	CB					0.28					0.14						0.14	0.42	1395.37	1394.95
	Pipe	39.0	1.50	7.50	0.28	0.28	0.17										0.17	0.17	1394.95	1394.78
19+50	Prefab Tee				0.28														1394.78	
																			G=1395.60	
16+00	CB					0.50					0.25						0.25	0.75	1395.08	1394.34
	Pipe	36.0	1.50	10.00	0.50	0.50	0.28										0.28	0.28	1394.34	1394.06
16+00	Manhole				0.50														1394.06	
																			G=1394.70	
12+63	CB					0.57					0.28						0.28	0.85	1394.31	1393.46
	Pipe	33.0	2.00	19.00	0.57	0.57	0.20										0.20	0.20	1393.46	1393.26
12+63	Prefab X				0.57														1393.26	
																			G=1394.60	
10+85	CB					0.22					0.11						0.11	0.33	1392.87	1392.54
	Pipe	29.0	1.50	6.70	0.22	0.22	0.10										0.10	0.10	1392.54	1392.44
10+85	Prefab Junc.				0.22														1392.44	

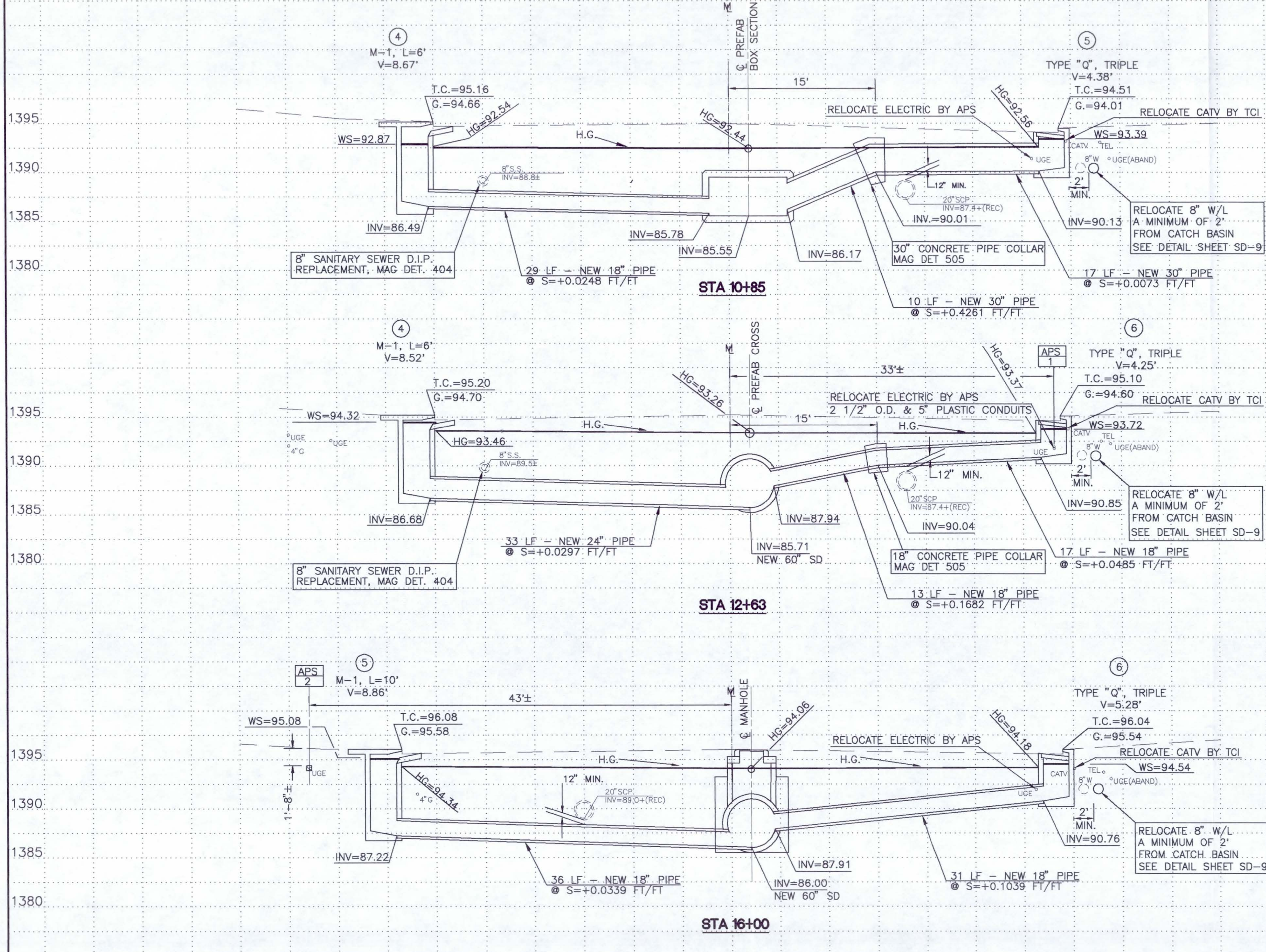
HYDRAULIC GRADIENT WORKSHEET

SMF Engineering Corporation

Client : City of Scottsdale
Project : 84th Street and Cholla Road
Comments : New Storm Drain in Cactus Road
Trunk Final Design - 50 Yr Storm
Connector Pipes on South Side of Cactus Road (100 yr storm)

Station	Structure	Pipe	Diam	Design	Velocity Head		Energy Losses											Change	Hydr Grad	Hydr Grad
		Lenght		Q	Up Strm	Dn Strm	Pipe	Angle	Bend/	MH	Contr/	Angle	Q3	Angle	Q4	Junction	Total	Hydr Grad	Elevation	Elevation
		[ft]	[ft]	[cfs]	Hv1	Hv2	Frict	[Degr]	Curve		Exp	[Degr]	[cfs]	[Degr]	[cfs]		Ht	Hv2+Ht-Hv1	Up Stream	Dn Stream
																			G=1399.06	
27+90	CB					0.18					0.09						0.09	0.27	1397.84	1397.57
	Pipe	8.0	1.50	6.00	0.18	0.18	0.02										0.02	0.02	1397.57	1397.55
27+90	Prefab X				0.18														1397.55	
																			G=1397.50	
22+80	CB					0.16					0.08						0.08	0.24	1396.36	1396.12
	Pipe	8.0	2.00	10.00	0.16	0.16	0.01										0.01	0.01	1396.12	1396.11
22+80	Prefab X				0.16														1396.11	
																			G=1396.60	
19+50	CB					0.37					0.18						0.18	0.55	1395.51	1394.96
	Pipe	31.0	1.50	8.60	0.37	0.37	0.18										0.18	0.18	1394.96	1394.78
19+50	Prefab X				0.37														1394.78	
																			G=1395.50	
16+00	CB					0.24					0.12						0.12	0.37	1394.54	1394.18
	Pipe	31.0	1.50	7.00	0.24	0.24	0.12										0.12	0.12	1394.18	1394.06
16+00	Manhole				0.24														1394.06	
																			G=1394.60	
12+63	CB					0.24					0.12						0.12	0.35	1393.72	1393.37
	Pipe	30.0	1.50	6.90	0.24	0.24	0.11										0.11	0.11	1393.37	1393.26
12+63	Prefab X				0.24														1393.26	
																			G=1394.10	
10+85	CB					0.56					0.28						0.28	0.83	1393.39	1392.56
	Pipe	27.0	2.50	29.40	0.56	0.56	0.12										0.12	0.12	1392.56	1392.44
10+85	Prefab Junc.				0.56														1392.44	

SMF Scott, Meyer, Ferguson
ENGINEERING CORPORATION
1915 West Adobe Drive, Suite "D"
Phoenix, Arizona 85027
Telephone (602)516-0605, FAX (602)516-



* THE ELEVATION OF EXISTING UTILITIES IS UNKNOWN UNLESS NOTED ON THE PROFILE.

PLAN/PROFILE NOTE

STA 10+85 LT & RT	(4) (
STA 12+63 LT & RT	(4) (
STA 16+00 LT & RT	(5) (

CONNECTOR PIPE PROFIL

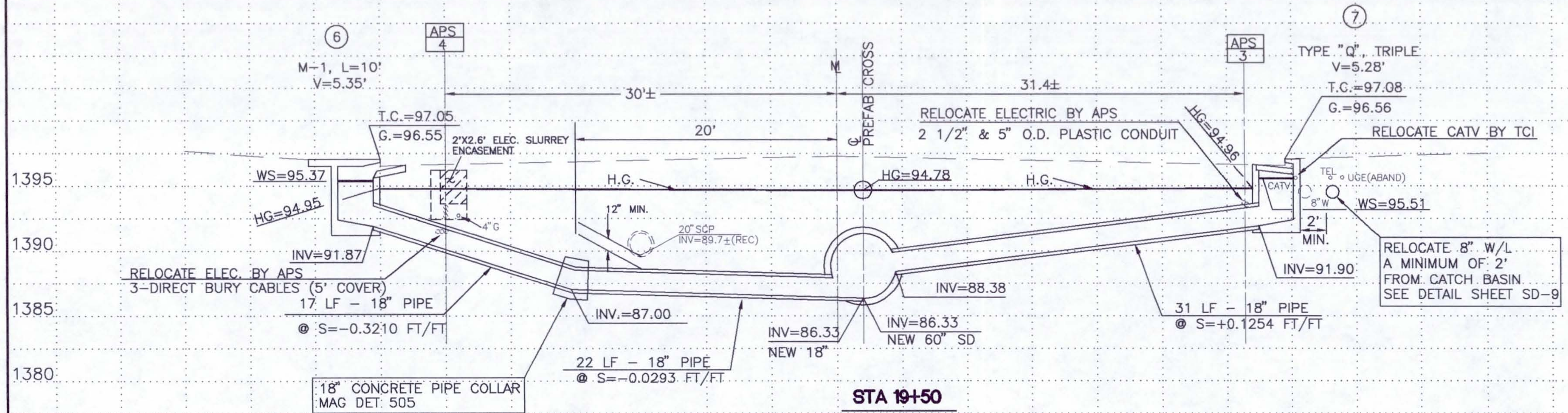
DATE | REVISION
ENGINEER

MUNICIPAL S
DEPARTM
CAPITAL P
MANAGE
3939 CIVIC CEN
SCOTTSDALE, ARIZ

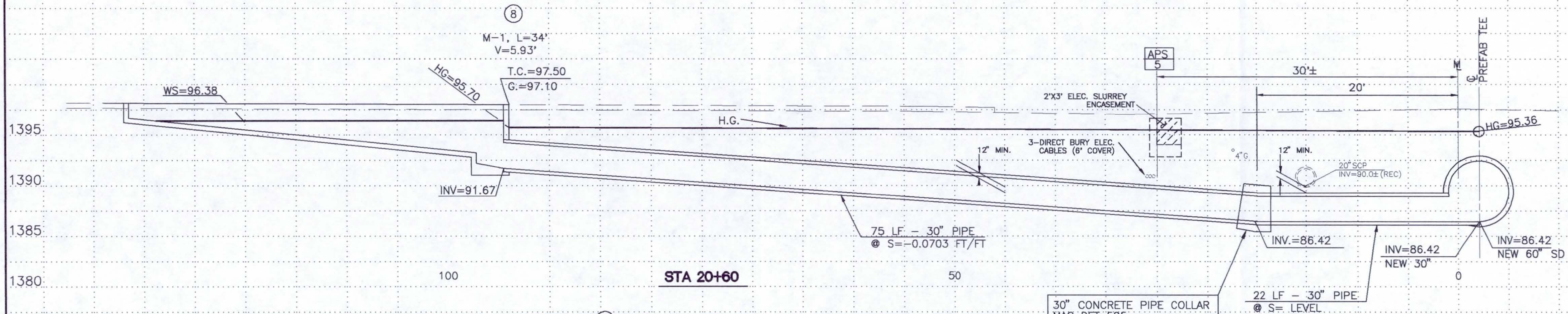
PROJECT TITLE
CACTUS ROAD STORM DR

SCALE	DESIGNED BY	CHECKED BY	BID NO.
HORIZ. 1"=5'	CDS	MC	96-55
VERT. 1"=5'	DRAWN LR	AS-BUILT	PROJECT NO. F2708

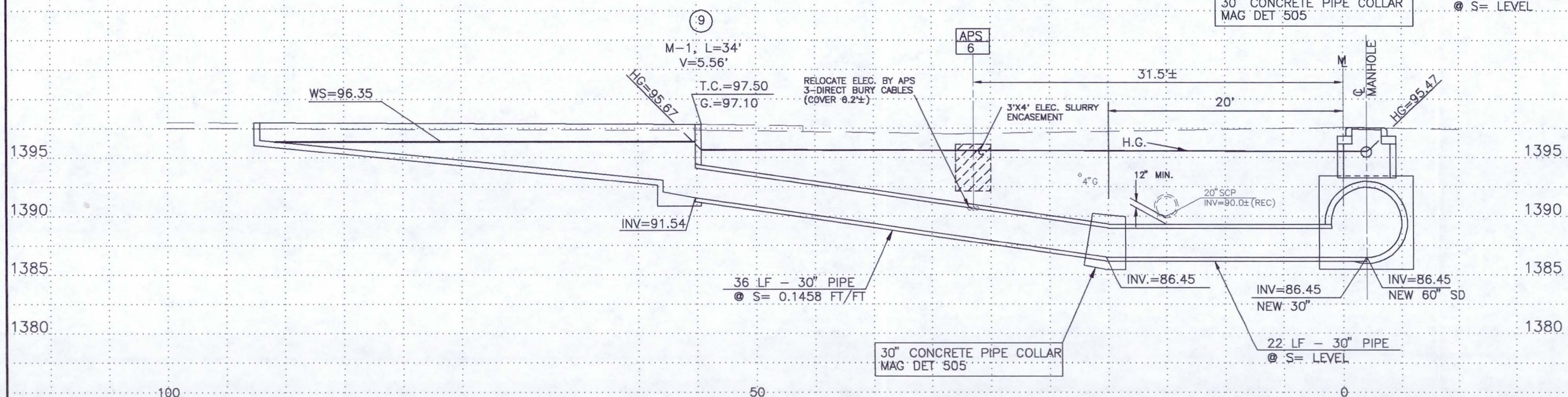
SMF Scott, Meyer, Ferguson
ENGINEERING CORPORATION
1915 West Adobe Drive, Suite "D"
Phoenix, Arizona 85027
Telephone (602)516-0605, FAX (602)516-0



STA 19+50



STA 20+60



STA 20+95

* THE ELEVATION OF EXISTING UTILITIES IS UNKNOWN UNLESS NOTED ON THE PROFILE.

PLAN/PROFILE NOTE

STA 19+50 LT & RT	6
STA 20+60 LT	8
STA 20+95 LT	9

CONNECTOR PIPE PROFILE

DATE | REVISION

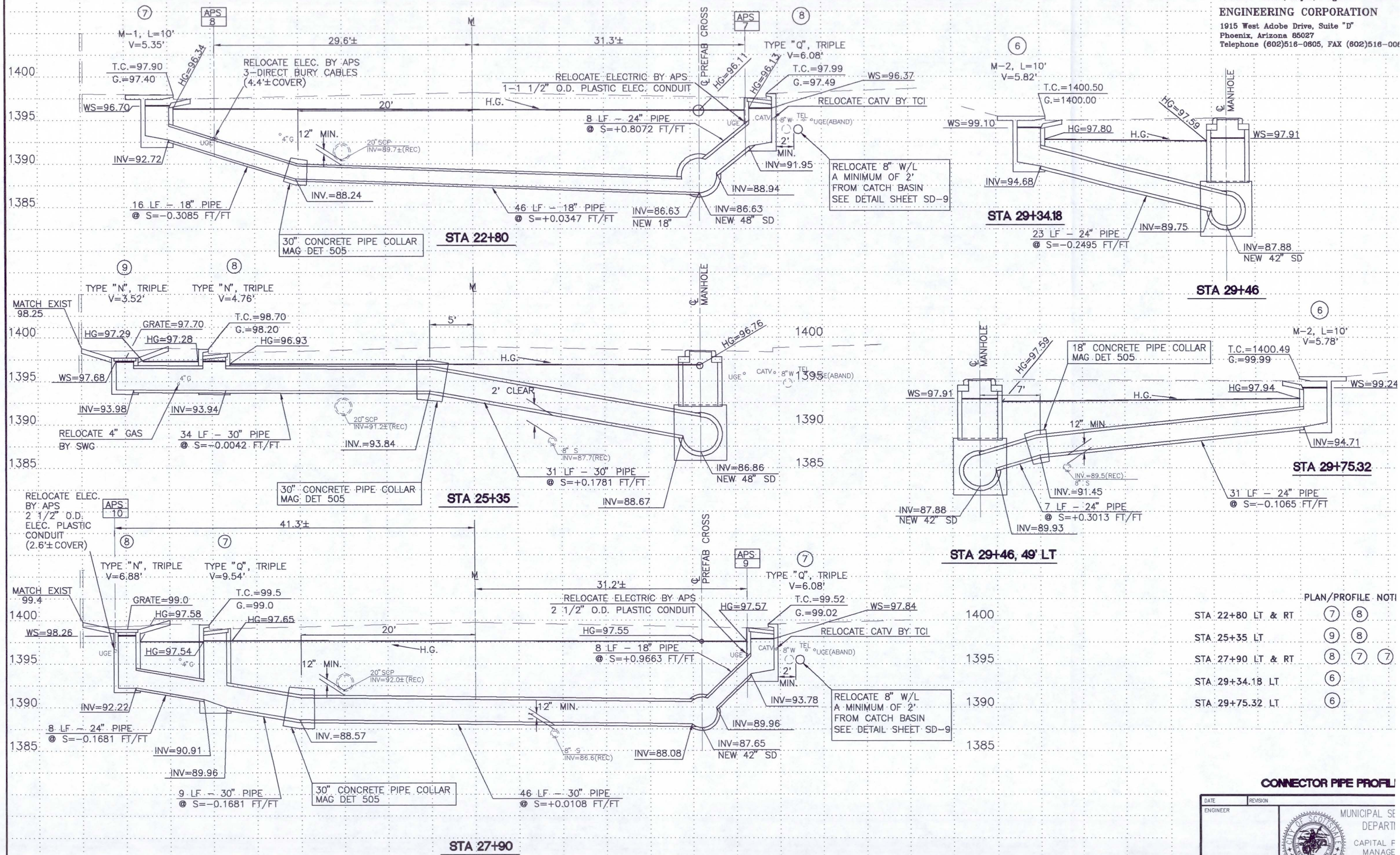
ENGINEER

MUNICIPAL S
DEPARTM
CAPITAL PR
MANAGEM
3939 CIVIC CENT
SCOTTSDALE, ARIZO

PROJECT TITLE
CACTUS ROAD STORM DR

SCALE	DESIGNED BY	CHECKED BY	BID NO.
HORIZ. 1"=5'	CDS	MC	96-55
VERT. 1"=5'	DRAWN IR	AS-BUILT	PROJECT NO. F2708

SMF Scott, Meyer, Ferguson
ENGINEERING CORPORATION
1915 West Adobe Drive, Suite "D"
Phoenix, Arizona 85027
Telephone (602)516-0605, FAX (602)516-006



PLAN/PROFILE NOTI

STA 22+80 LT & RT	(7) (8)
STA 25+35 LT	(9) (8)
STA 27+90 LT & RT	(8) (7) (7
STA 29+34.18 LT	(6)
STA 29+75.32 LT	(6)

* THE ELEVATION OF EXISTING UTILITIES IS UNKNOWN UNLESS NOTED ON THE PROFILE.

CONNECTOR PIPE PROFIL

DATE | REVISION
ENGINEER

MUNICIPAL SE
DEPARTI
CAPITAL F
MANAGE
3939 CIVIC CEN
SCOTTSDALE, ARIZ

PROJECT TITLE
CACTUS ROAD STORM D

SCALE HORIZ. 1"=5' VERT. 1"=5' | DESIGNED BY CDS | CHECKED BY MC | BID NO. 96-55
DRAWN LR | AS-BUILT | PROJECT NO. F2708

```
1*************************************************
 * HEC-2 WATER SURFACE PROFILES                  *
 *                                               *
 * Version   4.6.2; May 1991                     *
 *                                               *
 * RUN DATE    23FEB95    TIME    10:10:22       *
 *************************************************
```

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*******************************************
 * U.S. ARMY CORPS OF ENGINEERS           *
 * HYDROLOGIC ENGINEERING CENTER          *
 * 609 SECOND STREET, SUITE D             *
 * DAVIS, CALIFORNIA 95616-4687           *
 *        (916) 756-1104                  *
*******************************************
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```
X     X XXXXXXX  XXXXX           XXXXX
X     X X       X     X         X     X
X     X X       X                     X
XXXXXXX XXXX    X        XXXXX   XXXXX
X     X X       X               X
X     X X       X     X         X
X     X XXXXXXX  XXXXX          XXXXXXX
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THIS RUN EXECUTED 23FEB95 10:10:22

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*******************************************
HEC-2 WATER SURFACE PROFILES

Version   4.6.2;  May 1991
*******************************************

T1     84TH STREET AND CACTUS ROAD DRAINAGE IMPROVEMENT PROJECT
T2     SUBCRITICAL FLOW IN FAIRWAY SOUTH OF CACTUS - FILE FAIRULS.DAT
T3     ULTIMATE CONDITION-STORM DRAIN OUTFALL AT BOX-CULVERT
T4     NO CORTEZ CONNECTOR

J1  ICHECK    INQ    NINV    IDIR    STRT   METRIC   HVINS     Q      WSEL     FQ

       0        2      0       0       0       0        0       0   1378.46     1

J2  NPROF    IPLOT   PRFVS   XSECV   XSECH    FN     ALLDC    IBW    CHNIM   ITRACE

      0        0      -1

J3  VARIABLE CODES FOR SUMMARY PRINTOUT

     38       43       13       14       15       42       53       54       8       1
      2       17

QT       1      515
NC     .04      .04     .030       .1       .3
X1   10.00        3     9930    10060
GR    1379     9930  1373.53    10000     1382    10060

X1   11.00        6     9918    10070       46       47       45
GR    1384     9918     1379     9940     1379     9974     1376    10000   1381.5    10070
GR  1383.7    10100

X1   12.00        5     9951    10065       50       48       51
GR    1384     9951     1378     9983   1377.2    10000     1378    10015     1383    10065

X1   13.00        4     9952    10045       50       42       46
GR    1386     9952     1378     9987     1377    10000     1384    10045

X1   14.00        4     9940    10060       61       51       57
GR    1386     9940     1379     9977     1378    10000     1387    10060

X1   15.00        4     9935    10070       16       15       16
GR    1386     9935     1379     9978     1378    10000     1387    10070
```

X1	16.00	8	9945	10075	42	58	50			
GR	1386	9931	1384	9945	1383	9954	1380	9965	1379	9978
GR	1377.5	10000	1379	10030	1383	10075				
X1	17.00	8	9942	10050	42	56	47			
GR	1387	9942	1382	9968	1380	9978	1379	9994	1378.1	10000
GR	1379	10010	1380	10020	1385	10050				
QT	1	501								
NC	.040	.040	.012							
X1	18.00	4	9986.9	10013.1	32	58	44			
GR	1386	9986.9	1378	9987	1378	10013	1386	10013.1		
X1	19.00	4	9986.9	10013.1	56	66	60			
GR	1386	9986.9	1378.5	9987	1378.5	10013	1386	10013.1		
X1	20.00	4	9986.9	10013.1	57	57	57			
GR	1386	9986.9	1378.9	9987	1378.9	10013	1386	10013.1		
X1	21.00	4	9986.9	10013.1	44	44	44			
GR	1386	9986.9	1379.1	9987	1379	10013	1386	10013.1		
X1	22.00	4	9986.9	10013.1	52	52	52			
GR	1386	9986.9	1379.4	9987	1379.4	10013	1386	10013.1		
NC	.040	.040	.030							
X1	23.00	4	9986.9	10013.1	54	54	54			
GR	1386	9986.9	1380	9987	1380	10013	1386	10013.1		
X1	24.00	33	9965.9	10044.2	39	1	22			
GR	1394.4	9781.4	1394.1	9787.7	1392.6	9795.2	1391.0	9797.9	1391.0	9804.4
GR	1391.6	9810.0	1391.3	9819.1	1389.1	9832.1	1388.8	9844.9	1389.6	9856.7
GR	1389.3	9867.7	1386.9	9881.9	1385.1	9891.5	1383.1	9903.7	1382.4	9914.3
GR	1382.3	9927.2	1382.5	9941.2	1383.2	9948.1	1384.5	9956.5	1385.0	9963.0
GR	1384.8	9965.9	1381.9	9974.3	1381.4	9979.3	1380.4	9989.9	1380.2	9999.2
GR	1380.2	10000.0	1380.1	10007.5	1380.6	10016.3	1381.9	10027.0	1382.4	10029.7
GR	1386.2	10044.2	1386.6	10053.4	1386.4	10059.5				
X1	25.00	62	9933.8	10044.2	26	1	15			
GR	1384.8	9690.2	1385.2	9697.2	1386.0	9703.4	1386.7	9708.1	1386.6	9710.5
GR	1385.4	9716.6	1384.9	9722.5	1385.4	9732.4	1386.1	9737.7	1386.8	9745.4
GR	1388.0	9753.2	1388.9	9757.7	1389.5	9764.8	1389.6	9769.6	1389.6	9777.4
GR	1389.3	9786.8	1388.7	9787.7	1388.6	9792.7	1388.4	9799.1	1388.5	9802.2
GR	1388.9	9803.5	1388.8	9808.4	1388.7	9815.9	1388.4	9824.9	1388.2	9833.4
GR	1388.3	9836.2	1388.3	9842.2	1388.5	9852.1	1388.5	9860.5	1388.3	9866.9
GR	1388.0	9875.2	1387.0	9882.4	1386.6	9888.9	1386.2	9894.4	1386.7	9899.1
GR	1387.2	9905.1	1387.7	9911.1	1387.9	9915.7	1387.6	9921.5	1386.4	9925.9
GR	1384.5	9933.8	1383.7	9939.5	1383.6	9942.9	1384.6	9947.6	1385.0	9951.6
GR	1385.1	9957.5	1382.2	9966.5	1381.1	9972.5	1380.9	9975.7	1381.1	9984.1
GR	1381.0	9994.4	1380.8	9999.3	1380.5	10000.0	1380.1	10002.5	1380.6	10006.4
GR	1380.8	10014.1	1381.6	10021.9	1382.4	10031.5	1382.5	10034.7	1386.2	10044.2
GR	1386.6	10053.4	1386.4	10059.5	0.0	0.0	0.0	0.0	0.0	0.0

QT	1	445								
X1	26.00	43	9951.5	10037.1	48	1	24			
GR	1385.6	9734.1	1385.6	9737.7	1385.5	9741.8	1385.8	9747.0	1386.5	9751.6
GR	1387.5	9755.0	1388.0	9759.6	1387.5	9763.3	1386.5	9769.2	1385.8	9772.3
GR	1385.5	9776.4	1385.6	9783.1	1385.6	9789.2	1386.2	9798.4	1386.8	9809.3
GR	1387.1	9816.1	1386.7	9822.1	1386.0	9833.6	1385.8	9843.2	1385.5	9856.1
GR	1385.3	9867.4	1384.7	9876.1	1384.7	9883.7	1384.7	9895.3	1385.2	9904.5
GR	1386.4	9921.9	1386.9	9928.4	1386.7	9934.8	1386.3	9942.4	1384.9	9951.5
GR	1382.9	9960.1	1381.5	9972.9	1381.2	9984.6	1381.1	9999.2	1381.1	10000.0
GR	1381.1	10011.7	1381.8	10022.3	1383.3	10030.6	1384.7	10037.1	1386.3	10042.8
GR	1386.4	10047.0	1386.6	10055.9	1386.6	10058.9	0.0	0.0	0.0	0.0
X1	27.00	39	9954.7	10036.4	50	50	50			
GR	1385.9	9745.3	1386.0	9754.7	1386.1	9766.8	1386.3	9780.6	1386.1	9789.9
GR	1386.0	9795.0	1385.9	9802.0	1386.0	9810.8	1386.7	9819.6	1387.1	9822.3
GR	1387.5	9831.4	1387.4	9840.3	1386.8	9851.3	1386.0	9861.3	1385.5	9870.2
GR	1385.1	9884.2	1386.4	9893.2	1387.8	9901.7	1388.0	9905.9	1387.7	9911.2
GR	1387.6	9917.9	1388.1	9924.8	1388.9	9932.7	1388.9	9937.1	1387.8	9945.3
GR	1385.9	9954.7	1384.0	9965.9	1382.4	9976.1	1381.5	9983.4	1381.4	9989.8
GR	1381.4	10000.0	1381.3	10012.6	1381.8	10020.1	1385.3	10036.4	1386.3	10043.0
GR	1386.7	10045.8	1386.8	10048.9	1386.8	10056.9	1386.8	10059.0	0.0	0.0
X1	28.00	42	9964.2	10037.3	50	50	50			
GR	1386.2	9753.2	1386.5	9756.2	1386.8	9759.2	1386.9	9763.6	1387.5	9768.7
GR	1388.5	9773.7	1389.4	9777.1	1389.8	9781.3	1389.8	9786.8	1388.3	9792.0
GR	1386.8	9798.2	1387.1	9806.6	1386.9	9813.3	1386.4	9822.7	1385.9	9832.7
GR	1386.0	9835.2	1385.7	9853.2	1385.9	9861.4	1386.6	9867.9	1387.2	9874.4
GR	1387.2	9881.1	1386.6	9888.4	1385.6	9897.2	1385.1	9905.4	1385.7	9916.9
GR	1386.2	9925.7	1386.5	9936.3	1386.8	9945.4	1386.2	9953.4	1384.2	9964.2
GR	1382.6	9975.7	1381.7	9984.5	1381.5	9992.7	1381.5	10000.0	1381.4	10011.1
GR	1381.7	10020.0	1382.9	10028.3	1385.6	10037.3	1386.3	10042.6	1386.6	10048.7
GR	1387.1	10055.8	1387.1	10058.9	0.0	0.0	0.0	0.0	0.0	0.0
X1	29.00	29	9913.2	10036.8	53	53	53			
GR	1386.5	9762.5	1386.6	9764.1	1387.3	9769.4	1386.9	9776.0	1386.9	9786.1
GR	1386.6	9796.4	1386.7	9807.3	1386.6	9816.1	1386.0	9825.8	1385.7	9840.1
GR	1385.5	9842.5	1385.4	9852.5	1385.2	9864.6	1384.9	9878.9	1384.3	9894.8
GR	1383.9	9913.2	1383.6	9928.0	1382.9	9943.7	1382.5	9959.6	1382.0	9977.6
GR	1381.9	9992.5	1381.7	10000.0	1381.6	10013.2	1381.7	10018.5	1382.2	10022.7
GR	1384.1	10030.3	1385.9	10036.8	1387.2	10043.1	1387.7	10045.9	0.0	0.0
X1	30.00	36	9938.5	10036.9	46	46	46			
GR	1386.9	9770.4	1386.9	9773.2	1387.7	9777.4	1387.9	9784.5	1388.5	9792.9
GR	1389.2	9799.1	1389.4	9803.1	1389.1	9811.3	1388.7	9816.6	1388.6	9822.0
GR	1388.8	9828.2	1389.4	9833.2	1388.9	9838.1	1388.2	9846.6	1388.0	9847.4
GR	1387.9	9851.0	1387.7	9856.0	1386.9	9865.0	1385.7	9872.9	1385.4	9881.6
GR	1385.1	9896.5	1385.3	9911.8	1385.9	9925.7	1385.8	9938.5	1385.0	9949.8
GR	1384.1	9958.9	1382.6	9969.8	1382.0	9979.8	1381.9	9993.2	1381.8	10000.0
GR	1381.9	10013.7	1382.0	10022.4	1382.9	10029.1	1385.3	10036.9	1387.0	10043.6
GR	1387.6	10046.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

X1	31.00	33	9967.5	10031.1	46	46	46			
GR	1386.9	9779.5	1387.1	9782.5	1387.9	9787.7	1388.3	9794.4	1388.9	9800.3
GR	1389.3	9804.9	1389.4	9809.4	1389.9	9814.8	1389.9	9820.3	1389.2	9826.4
GR	1388.3	9834.0	1387.7	9845.7	1387.0	9850.5	1386.3	9867.1	1385.3	9888.8
GR	1385.4	9908.9	1385.9	9924.8	1385.9	9941.1	1385.5	9954.8	1384.8	9961.3
GR	1383.6	9967.5	1382.4	9975.2	1382.2	9983.7	1381.9	9998.8	1381.9	10000.0
GR	1382.0	10013.2	1382.1	10020.8	1382.8	10024.3	1384.5	10031.1	1386.2	10037.6
GR	1387.4	10044.2	1387.7	10048.6	1387.8	10048.7	0.0	0.0	0.0	0.0
X1	32.00	36	9949.1	10032.5	51	51	51			
GR	1387.4	9788.8	1387.4	9791.3	1388.2	9792.3	1388.9	9797.2	1389.8	9803.6
GR	1390.3	9808.3	1390.3	9814.0	1389.8	9820.4	1388.4	9827.7	1388.0	9831.5
GR	1388.0	9837.7	1388.5	9844.9	1388.7	9845.8	1388.6	9851.6	1387.7	9858.9
GR	1386.8	9869.1	1385.6	9879.9	1385.1	9893.7	1385.3	9910.8	1385.4	9926.4
GR	1385.3	9938.2	1384.4	9949.1	1383.4	9959.0	1382.5	9969.2	1382.2	9979.2
GR	1382.1	9994.2	1382.1	10000.0	1382.2	10012.4	1382.4	10017.9	1383.2	10022.9
GR	1385.4	10032.5	1386.5	10039.5	1387.5	10046.3	1388.1	10051.5	1388.1	10063.3
GR	1388.2	10065.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	33.00	27	9952.7	10034.5	52	52	52			
GR	1387.8	9798.8	1387.9	9800.0	1388.9	9800.8	1389.0	9808.9	1389.8	9820.4
GR	1390.3	9833.0	1390.6	9842.0	1390.1	9849.2	1389.4	9855.8	1388.3	9869.5
GR	1386.6	9890.3	1386.0	9908.1	1384.7	9925.5	1384.8	9939.0	1384.0	9952.7
GR	1383.0	9965.7	1382.4	9977.5	1382.3	9996.1	1382.2	10000.0	1382.4	10016.2
GR	1382.6	10021.0	1383.6	10025.8	1385.5	10034.5	1386.9	10042.1	1387.8	10047.4
GR	1388.1	10060.0	1388.0	10064.1	0.0	0.0	0.0	0.0	0.0	0.0
X1	34.00	27	9952.6	10029.9	47	47	47			
GR	1388.0	9805.6	1388.0	9807.2	1389.2	9808.0	1389.4	9814.3	1389.8	9825.5
GR	1390.3	9836.9	1390.3	9847.7	1390.1	9857.4	1389.7	9858.6	1389.0	9875.6
GR	1388.1	9887.7	1387.6	9904.7	1387.0	9922.4	1386.3	9938.6	1385.7	9952.6
GR	1383.4	9962.3	1382.5	9976.0	1382.3	9982.7	1382.5	9992.5	1382.5	10000.0
GR	1382.5	10010.2	1383.3	10020.4	1385.6	10029.9	1387.4	10039.1	1388.5	10046.0
GR	1388.4	10055.8	1388.5	10064.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	35.00	30	9951.7	10046.5	50	50	50			
GR	1388.1	9814.9	1388.2	9816.3	1388.8	9816.8	1389.5	9821.7	1389.5	9827.8
GR	1389.3	9845.1	1388.7	9859.5	1389.0	9868.6	1388.8	9871.9	1388.3	9883.6
GR	1388.6	9895.7	1388.4	9908.1	1388.2	9921.8	1387.6	9935.7	1387.0	9948.0
GR	1386.5	9951.7	1385.2	9960.2	1383.4	9974.4	1382.9	9982.2	1382.9	9992.4
GR	1382.6	10000.0	1382.7	10008.0	1383.1	10015.6	1383.8	10021.4	1385.8	10031.6
GR	1387.5	10040.0	1388.4	10046.5	1388.4	10052.3	1388.5	10062.6	1388.5	10064.1
X1	36.00	32	9948.8	10031.9	50	50	50			
GR	1388.0	9823.9	1388.0	9826.2	1388.9	9829.1	1389.2	9833.5	1389.0	9841.0
GR	1388.6	9851.3	1388.6	9864.7	1388.6	9864.9	1388.5	9874.1	1388.0	9877.2
GR	1387.5	9883.7	1386.8	9889.9	1387.1	9898.3	1387.7	9908.1	1387.8	9917.4
GR	1387.2	9929.4	1386.8	9939.3	1386.4	9948.8	1384.9	9957.3	1383.7	9969.9
GR	1383.1	9981.1	1382.7	9993.1	1382.3	10000.0	1382.3	10001.5	1382.4	10009.9
GR	1382.8	10017.9	1383.6	10023.1	1385.5	10031.9	1386.9	10039.1	1387.7	10047.4
GR	1387.9	10055.6	1387.9	10064.0	0.0	0.0	0.0	0.0	0.0	0.0

X1	37.00	24	9938.8	10041.1	58	55	55			
GR	1388.1	9834.8	1388.2	9837.1	1389.0	9841.0	1389.3	9846.2	1389.4	9855.9
GR	1389.3	9866.2	1388.6	9873.8	1387.9	9885.7	1387.3	9888.4	1387.0	9895.4
GR	1386.0	9902.0	1385.5	9911.2	1385.1	9924.8	1384.7	9938.8	1384.4	9953.1
GR	1384.0	9964.8	1383.8	9979.0	1383.3	9994.4	1383.2	10000.0	1383.2	10010.9
GR	1383.4	10021.8	1385.3	10031.7	1387.4	10041.1	1388.5	10047.5	0.0	0.0
X1	38.00	26	9951.6	10034.7	48	46	47			
GR	1388.7	9840.8	1388.7	9843.8	1389.4	9847.4	1389.8	9853.1	1389.8	9862.0
GR	1389.4	9870.6	1389.2	9881.5	1389.0	9889.9	1388.6	9893.8	1388.4	9898.5
GR	1387.3	9907.2	1386.1	9916.8	1385.7	9928.8	1385.9	9940.6	1385.6	9951.6
GR	1385.2	9962.8	1384.5	9976.4	1383.7	9986.5	1383.7	9999.2	1383.7	10000.0
GR	1383.7	10010.9	1383.9	10019.1	1385.4	10025.7	1387.6	10034.7	1389.0	10040.3
GR	1389.4	10046.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	39.00	26	9954.2	10024.9	52	52	53			
GR	1389.1	9847.8	1389.1	9850.3	1389.8	9855.5	1389.7	9861.1	1389.7	9869.8
GR	1389.7	9877.7	1389.4	9886.6	1389.4	9895.1	1389.3	9896.8	1389.2	9904.0
GR	1388.7	9912.0	1387.7	9922.8	1386.7	9932.9	1386.5	9944.1	1386.7	9954.2
GR	1386.4	9964.5	1385.7	9971.6	1384.5	9981.9	1384.1	9992.6	1383.9	10000.0
GR	1384.0	10009.0	1384.7	10017.2	1386.4	10024.9	1387.8	10031.6	1388.9	10038.4
GR	1389.6	10044.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	40.00	24	9954.2	10042.3	48	47	46			
GR	1389.5	9855.3	1389.7	9860.4	1390.3	9871.5	1390.1	9882.6	1389.8	9894.0
GR	1389.4	9905.8	1389.5	9906.3	1389.5	9912.7	1389.0	9922.6	1388.7	9933.0
GR	1389.4	9945.0	1389.8	9954.2	1389.1	9961.9	1387.3	9971.5	1385.8	9980.4
GR	1385.0	9987.0	1384.7	9995.8	1384.8	10000.0	1384.8	10012.4	1385.4	10021.7
GR	1386.3	10028.3	1388.1	10036.4	1389.6	10042.3	1390.2	10044.6	0.0	0.0
X1	41.00	21	9972.3	10039.6	47	60	54			
GR	1389.8	9863.1	1389.8	9870.8	1390.0	9882.2	1389.8	9897.1	1389.7	9914.0
GR	1389.5	9921.6	1390.0	9929.5	1390.2	9941.2	1390.3	9953.5	1390.5	9966.4
GR	1390.3	9972.3	1387.8	9982.0	1386.0	9987.8	1385.4	9994.8	1385.3	10000.0
GR	1385.3	10013.0	1385.8	10022.6	1388.0	10030.8	1389.4	10039.6	1389.9	10045.7
GR	1389.9	10045.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	42.00	27	9959.9	10036.7	48	60	54			
GR	1390.1	9878.1	1390.1	9880.9	1390.6	9885.8	1390.1	9891.7	1389.8	9900.5
GR	1389.3	9907.4	1388.9	9915.6	1389.3	9923.6	1389.2	9924.1	1389.4	9930.4
GR	1389.4	9941.1	1389.2	9949.9	1389.0	9959.9	1388.4	9970.9	1387.9	9978.5
GR	1387.1	9986.1	1385.8	9995.4	1385.6	10000.0	1385.8	10006.2	1386.6	10014.0
GR	1387.6	10021.3	1388.0	10028.3	1389.2	10036.7	1390.2	10045.2	1391.3	10052.5
GR	1391.4	10059.1	1391.5	10063.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	43.00	26	9961.6	10030.9	42	45	44			
GR	1390.4	9898.2	1390.5	9900.0	1391.0	9903.4	1391.0	9909.6	1391.2	9921.5
GR	1390.8	9930.4	1390.7	9940.4	1390.8	9950.0	1390.8	9951.2	1390.8	9961.6
GR	1390.2	9969.6	1388.0	9982.0	1386.9	9989.1	1385.5	9996.6	1386.4	10000.0
GR	1387.3	10005.9	1387.6	10012.6	1388.6	10018.0	1389.9	10024.0	1390.6	10030.9
GR	1391.1	10039.3	1390.8	10047.5	1390.2	10054.9	1390.5	10065.3	1391.2	10071.1
GR	1391.5	10076.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

X1	44.00	24	9953.8	10031.0	53	46	50			
GR	1390.9	9920.8	1390.9	9921.8	1391.5	9926.8	1391.5	9934.7	1391.2	9944.8
GR	1390.6	9953.8	1389.3	9969.4	1388.1	9980.6	1387.4	9988.7	1386.5	9992.4
GR	1386.2	9996.4	1387.2	10000.0	1387.1	10004.9	1388.3	10014.3	1389.7	10021.7
GR	1391.6	10031.0	1392.4	10037.7	1392.4	10045.0	1392.0	10057.7	1391.3	10066.2
GR	1391.0	10068.5	1391.2	10077.7	1391.1	10088.5	1391.1	10090.1	0.0	0.0
X1	45.00	21	9960.3	10040.7	52	44	49			
GR	1391.6	9938.4	1393.3	9939.9	1394.6	9947.1	1394.8	9952.4	1393.9	9960.3
GR	1391.1	9973.2	1388.5	9984.7	1387.1	9992.7	1386.5	9997.5	1387.2	10000.0
GR	1387.6	10006.0	1388.0	10014.2	1389.3	10024.1	1390.7	10031.8	1391.6	10040.7
GR	1391.4	10051.7	1391.5	10063.6	1391.5	10075.1	1391.8	10083.6	1392.4	10090.3
GR	1392.6	10094.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	46.00	26	9968.0	10040.3	56	25	51			
GR	1391.8	9946.8	1392.8	9948.8	1393.0	9953.2	1393.0	9958.9	1391.4	9968.0
GR	1388.2	9979.6	1388.0	9986.8	1387.5	9993.0	1386.7	9999.0	1387.1	10000.0
GR	1387.7	10006.2	1387.9	10011.6	1388.1	10019.7	1389.4	10027.3	1391.0	10035.0
GR	1392.5	10040.3	1393.0	10042.1	1393.1	10044.4	1393.2	10055.5	1393.3	10067.6
GR	1393.1	10074.8	1392.0	10079.8	1392.1	10085.8	1392.2	10091.6	1392.5	10100.3
GR	1392.5	10104.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
QT	1	438								
X1	47.00	31	9969.4	10036.4	68	11	47			
GR	1392.5	9926.3	1392.5	9928.4	1393.3	9929.3	1393.5	9934.3	1393.5	9943.0
GR	1393.7	9953.0	1393.4	9960.0	1392.0	9969.4	1390.0	9978.8	1388.3	9985.0
GR	1388.2	9991.6	1388.2	9994.2	1387.3	9998.4	1387.4	10000.0	1387.5	10003.3
GR	1388.3	10009.4	1388.3	10014.2	1388.6	10022.0	1389.9	10027.5	1391.0	10032.5
GR	1392.0	10036.4	1392.9	10039.8	1393.3	10045.3	1393.3	10052.6	1393.3	10056.3
GR	1393.4	10073.0	1392.3	10079.4	1392.2	10081.9	1392.2	10092.7	1392.7	10106.4
GR	1392.8	10109.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	48.00	30	9935.5	10054.0	58	28	46			
GR	1392.6	9875.3	1394.5	9877.4	1394.8	9881.6	1394.6	9887.9	1393.8	9894.4
GR	1393.2	9902.9	1392.5	9907.6	1393.2	9915.7	1394.2	9922.7	1395.0	9928.3
GR	1394.0	9935.5	1393.0	9944.8	1392.0	9955.2	1390.4	9964.5	1389.2	9971.9
GR	1388.3	9980.7	1387.8	9994.0	1387.7	10000.0	1388.0	10008.4	1388.8	10017.6
GR	1389.6	10023.9	1390.2	10033.5	1391.4	10042.9	1391.9	10048.3	1392.2	10054.0
GR	1392.9	10062.6	1393.0	10070.7	1392.6	10078.7	1392.4	10087.7	1392.6	10093.0
X1	49.00	33	9956.1	10042.2	53	45	52			
GR	1392.7	9826.6	1392.7	9830.2	1393.1	9833.6	1392.9	9840.1	1393.0	9847.7
GR	1394.1	9855.7	1394.9	9862.1	1395.8	9870.4	1396.2	9877.9	1396.3	9886.1
GR	1396.6	9894.3	1396.5	9901.0	1396.2	9905.6	1395.9	9915.4	1394.8	9922.4
GR	1394.5	9932.2	1394.0	9941.5	1392.5	9948.4	1392.1	9956.1	1389.9	9967.8
GR	1388.2	9975.8	1387.8	9986.0	1387.4	9994.3	1387.3	10000.0	1387.6	10009.1
GR	1388.8	10017.6	1390.2	10026.6	1391.3	10033.4	1392.0	10042.2	1392.5	10052.1
GR	1392.4	10060.9	1392.5	10069.6	1392.5	10076.7	0.0	0.0	0.0	0.0

X1	50.00	38	9971.8	10054.9	46	51	49			
GR	1392.8	9791.1	1393.0	9797.7	1393.5	9806.4	1394.3	9814.1	1395.1	9822.4
GR	1395.4	9831.2	1395.7	9841.2	1397.1	9848.3	1397.9	9856.0	1398.2	9863.6
GR	1397.5	9872.4	1397.2	9882.7	1396.5	9892.2	1395.6	9903.3	1396.5	9913.9
GR	1396.6	9914.1	1395.7	9923.3	1394.0	9932.7	1392.5	9941.3	1392.7	9952.8
GR	1392.5	9962.4	1393.1	9971.8	1392.5	9977.1	1390.7	9983.4	1388.8	9990.3
GR	1387.7	9996.8	1387.4	10000.0	1387.5	10004.9	1388.3	10011.2	1389.2	10021.0
GR	1390.5	10027.6	1391.4	10035.9	1392.0	10043.3	1392.6	10051.4	1393.1	10054.9
GR	1393.2	10059.9	1392.7	10064.7	1392.6	10070.3	0.0	0.0	0.0	0.0
X1	51.00	41	9953.2	10092.0	39	65	50			
GR	1392.8	9772.5	1393.6	9780.6	1394.0	9786.4	1395.2	9792.4	1395.6	9798.1
GR	1395.1	9807.1	1394.6	9812.7	1395.7	9820.8	1396.1	9828.9	1396.2	9837.9
GR	1396.5	9848.6	1396.7	9857.4	1397.0	9868.2	1397.5	9874.2	1397.0	9880.6
GR	1396.4	9890.1	1395.9	9898.7	1394.8	9901.5	1394.4	9911.4	1393.3	9920.8
GR	1394.2	9930.3	1395.4	9938.0	1395.6	9946.7	1394.6	9953.2	1393.1	9960.2
GR	1391.8	9969.7	1390.1	9979.0	1388.5	9988.8	1387.6	9999.2	1387.4	10000.0
GR	1387.5	10006.2	1388.7	10013.8	1389.3	10019.5	1390.2	10026.7	1390.7	10033.7
GR	1390.8	10042.4	1391.0	10053.2	1391.6	10064.4	1392.2	10076.8	1392.9	10092.0
GR	1393.2	10099.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
X1	52.00	38	9948.2	10036.5	38	67	50			
GR	1393.0	9763.1	1393.0	9765.1	1393.5	9768.7	1393.7	9776.3	1394.6	9790.3
GR	1395.7	9801.4	1397.0	9808.7	1397.4	9814.2	1396.9	9827.4	1396.8	9836.2
GR	1397.0	9849.5	1397.4	9859.4	1397.8	9867.9	1396.4	9878.3	1394.4	9882.1
GR	1394.8	9889.5	1394.8	9897.1	1394.2	9915.4	1393.8	9931.4	1393.6	9948.2
GR	1393.1	9958.8	1392.8	9968.5	1391.1	9976.4	1388.9	9987.8	1387.8	9993.1
GR	1387.9	10000.0	1388.4	10009.0	1389.8	10017.6	1391.4	10024.8	1392.4	10031.4
GR	1392.9	10036.5	1392.8	10043.7	1392.5	10056.7	1392.9	10068.1	1394.3	10079.6
GR	1395.5	10088.7	1396.2	10093.5	1396.3	10096.8	0.0	0.0	0.0	0.0
X1	53.00	40	9927.1	10116.8	38	69	50			
GR	1393.1	9761.0	1393.6	9765.0	1393.6	9772.6	1394.5	9783.3	1395.4	9793.8
GR	1396.4	9804.7	1397.0	9814.7	1397.5	9824.8	1398.3	9829.0	1398.5	9837.6
GR	1397.3	9845.3	1395.1	9851.1	1394.6	9862.9	1394.7	9873.2	1394.6	9886.2
GR	1394.6	9901.1	1393.7	9927.1	1393.1	9947.1	1392.0	9961.5	1390.7	9970.5
GR	1389.3	9980.3	1388.5	9987.4	1388.1	9994.2	1388.5	10000.0	1389.1	10012.3
GR	1389.6	10021.7	1390.0	10027.1	1390.8	10036.6	1391.3	10049.6	1391.5	10061.7
GR	1391.8	10079.2	1392.0	10090.6	1392.4	10104.5	1393.0	10116.8	1393.0	10128.3
GR	1392.7	10141.8	1393.0	10157.6	1393.2	10174.7	1393.4	10195.6	1393.4	10199.0
X1	54.00	60	9951.2	10092.4	38	64	47			
GR	1393.3	9764.2	1393.4	9767.3	1393.9	9771.0	1393.9	9776.5	1393.8	9785.0
GR	1395.0	9791.0	1396.2	9799.6	1397.4	9805.8	1398.5	9810.3	1399.6	9815.9
GR	1400.0	9820.8	1399.8	9825.6	1398.2	9834.4	1397.5	9848.0	1395.8	9859.3
GR	1393.8	9869.0	1395.3	9880.5	1394.6	9887.5	1395.8	9894.9	1394.6	9898.5
GR	1395.0	9905.2	1394.9	9911.8	1394.3	9919.8	1394.3	9920.2	1394.1	9938.3
GR	1393.6	9951.2	1393.4	9962.8	1390.8	9974.7	1388.8	9981.2	1388.5	9986.8
GR	1387.7	9990.7	1388.1	9995.1	1388.6	9998.3	1388.6	10000.0	1389.0	10007.3
GR	1389.6	10013.5	1389.8	10020.0	1390.6	10027.5	1391.3	10034.7	1392.1	10041.6
GR	1393.0	10047.4	1392.8	10052.2	1392.3	10059.7	1391.5	10067.0	1391.3	10076.4
GR	1391.8	10086.3	1393.0	10092.4	1394.4	10100.0	1395.0	10105.7	1394.6	10112.1
GR	1394.1	10113.4	1393.5	10122.2	1393.7	10129.7	1393.9	10136.6	1394.9	10141.1

GR	1395.1	10146.4	1394.3	10149.8	1393.8	10159.9	1393.5	10172.2	1393.6	10182.4
X1	54.10	15	9972	10028	17	24	20			
GR	1395	9904	1394	9913	1393	9921	1392	9926	1391	9953
GR	1391.8	9964	1391	9972	1391	9977	1390	9983	1389.9	10000
GR	1390	10016	1391	10018	1392	10021	1393	10028	1394	10038
X1	55.00	46	9949.2	10082.6	26	40	32			
GR	1393.4	9776.9	1393.4	9779.9	1394.0	9784.2	1394.0	9791.5	1394.0	9799.3
GR	1394.8	9807.9	1395.7	9818.2	1396.4	9827.4	1397.5	9836.7	1397.6	9846.5
GR	1397.3	9853.7	1396.5	9864.0	1395.5	9876.5	1396.2	9885.1	1396.2	9893.7
GR	1395.8	9902.5	1395.2	9904.4	1394.2	9910.5	1394.1	9918.7	1394.9	9919.9
GR	1395.5	9924.7	1395.1	9940.4	1395.5	9949.2	1394.2	9960.6	1393.7	9970.2
GR	1391.6	9977.8	1389.4	9981.4	1386.5	9990.6	1386.0	9994.0	1386.0	10000.0
GR	1386.0	10010.6	1386.5	10013.6	1388.9	10020.4	1391.1	10028.0	1391.4	10035.2
GR	1391.8	10045.8	1392.1	10058.4	1392.8	10072.7	1393.0	10082.6	1393.3	10093.5
GR	1394.0	10101.4	1393.9	10107.8	1393.1	10115.0	1392.9	10122.2	1392.9	10134.8
GR	1392.7	10143.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

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THIS RUN EXECUTED 23FEB95 10:10:23

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HEC-2 WATER SURFACE PROFILES

Version 4.6.2; May 1991

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NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

ULTIMATE CONDITION-STORM

SUMMARY PRINTOUT

	SECNO	Q	QLOB	QCH	QROB	ELMIN	SSTA	ENDST	DEPTH	CWSEL	CRIWS	K*XNCH
	10.000	515.00	.00	515.00	.00	1373.53	9936.91	10034.92	4.93	1378.46	.00	30.00
*	11.000	515.00	.00	515.00	.00	1376.00	9976.69	10034.24	2.69	1378.69	1378.69	30.00
*	12.000	515.00	.00	515.00	.00	1377.20	9975.21	10029.61	2.26	1379.46	1379.46	30.00
*	13.000	515.00	.00	515.00	.00	1377.00	9978.37	10019.11	2.97	1379.97	1379.97	30.00
	14.000	515.00	.00	515.00	.00	1378.00	9967.28	10018.93	2.84	1380.84	.00	30.00
	15.000	515.00	.00	515.00	.00	1378.00	9965.08	10024.14	3.10	1381.10	.00	30.00
*	16.000	515.00	.00	515.00	.00	1377.50	9959.62	10057.77	3.97	1381.47	.00	30.00
*	17.000	515.00	.00	515.00	.00	1378.10	9971.44	10027.87	3.20	1381.30	.00	30.00
*	18.000	501.00	.00	501.00	.00	1378.00	9986.96	10013.04	3.27	1381.27	.00	12.00
	19.000	501.00	.00	501.00	.00	1378.50	9986.96	10013.04	2.61	1381.11	.00	12.00
*	20.000	501.00	.00	501.00	.00	1378.90	9986.97	10013.03	2.25	1381.15	1381.15	12.00
*	21.000	501.00	.00	501.00	.00	1379.00	9986.97	10013.03	2.31	1381.31	1381.31	12.00
*	22.000	501.00	.00	501.00	.00	1379.40	9986.97	10013.03	2.25	1381.65	1381.65	12.00
*	23.000	501.00	.00	501.00	.00	1380.00	9986.96	10013.04	2.25	1382.25	1382.25	30.00
*	24.000	501.00	47.01	453.99	.00	1380.10	9901.81	10033.55	3.32	1383.42	.00	30.00
	25.000	501.00	.00	501.00	.00	1380.10	9962.71	10037.06	3.32	1383.42	.00	30.00
	26.000	445.00	.00	445.00	.00	1381.10	9957.72	10031.31	2.35	1383.45	.00	30.00

	SECNO	Q	QLOB	QCH	QROB	ELMIN	SSTA	ENDST	DEPTH	CWSEL	CRIWS	K*XNCH
*	27.000	445.00	.00	445.00	.00	1381.30	9969.11	10028.00	2.20	1383.50	.00	30.00
	28.000	445.00	.00	445.00	.00	1381.40	9967.36	10031.17	2.36	1383.76	.00	30.00
*	29.000	445.00	.09	444.91	.00	1381.60	9907.19	10030.02	2.43	1384.03	.00	30.00
	30.000	445.00	.00	445.00	.00	1381.80	9959.22	10032.86	2.26	1384.06	.00	30.00
	31.000	445.00	.61	444.39	.00	1381.90	9964.73	10029.65	2.23	1384.13	.00	30.00
	32.000	445.00	.00	445.00	.00	1382.10	9949.75	10027.85	2.23	1384.33	.00	30.00
	33.000	445.00	1.18	443.82	.00	1382.20	9944.80	10029.74	2.25	1384.45	.00	30.00
	34.000	445.00	.00	445.00	.00	1382.30	9957.53	10025.48	2.23	1384.53	.00	30.00
*	35.000	445.00	.00	445.00	.00	1382.60	9964.76	10025.59	2.02	1384.62	.00	30.00
*	36.000	445.00	.00	445.00	.00	1382.30	9956.42	10029.84	2.75	1385.05	.00	30.00
	37.000	445.00	3.70	441.30	.00	1383.20	9922.02	10031.08	1.99	1385.19	.00	30.00
*	38.000	445.00	.00	445.00	.00	1383.70	9960.34	10025.21	1.59	1385.29	1385.29	30.00
	39.000	445.00	.00	445.00	.00	1383.90	9969.81	10022.53	1.98	1385.88	.00	30.00
*	40.000	445.00	.00	445.00	.00	1384.70	9976.33	10029.14	1.79	1386.49	1386.49	30.00
*	41.000	445.00	.00	445.00	.00	1385.30	9984.12	10027.60	1.84	1387.14	1387.14	30.00
*	42.000	445.00	.00	445.00	.00	1385.60	9976.08	10028.71	2.46	1388.06	1388.06	30.00
*	43.000	445.00	.00	445.00	.00	1385.50	9977.78	10018.68	3.25	1388.75	1388.75	30.00
*	44.000	445.00	.00	445.00	.00	1386.20	9966.26	10020.97	3.36	1389.56	.00	30.00
	45.000	445.00	.00	445.00	.00	1386.50	9979.10	10026.66	3.27	1389.77	.00	30.00
*	46.000	445.00	.00	445.00	.00	1386.70	9972.35	10031.16	3.50	1390.20	.00	30.00
	47.000	438.00	.00	438.00	.00	1387.30	9977.64	10029.07	2.95	1390.25	.00	30.00
	48.000	438.00	.00	438.00	.00	1387.70	9963.54	10036.36	2.86	1390.56	.00	30.00
	49.000	438.00	.00	438.00	.00	1387.30	9963.60	10029.63	3.39	1390.69	.00	30.00
*	50.000	438.00	.00	438.00	.00	1387.40	9983.72	10028.63	3.21	1390.61	.00	30.00
	51.000	438.00	.00	438.00	.00	1387.40	9974.07	10053.21	3.60	1391.00	.00	30.00
	52.000	438.00	.00	438.00	.00	1387.80	9976.59	10023.29	3.26	1391.06	.00	30.00

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	SECNO	Q	QLOB	QCH	QROB	ELMIN	SSTA	ENDST	DEPTH	CWSEL	CRIWS	K*XNCH
	53.000	438.00	.00	438.00	.00	1388.10	9965.71	10055.14	3.29	1391.39	.00	30.00
	54.000	438.00	.00	438.00	.00	1387.70	9971.65	10079.72	3.77	1391.47	.00	30.00
*	54.100	438.00	16.72	421.28	.00	1389.90	9936.20	10019.87	1.72	1391.62	1391.62	30.00
*	55.000	438.00	.00	438.00	.00	1386.00	9975.50	10061.17	6.23	1392.23	.00	30.00