DESIGN CONCEPT REPORT

FOR THE

SKYLINE FAN

TOWN OF BUCKEYE
CONTRACT #2012-006
SEI PROJECT NUMBER 04234

FEBRUARY 2014

SUNRISE ENGINEERING

DESIGN CONCEPT REPORT

FOR

SKYLINE FAN

TOWN OF BUCKEYE &
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

FEBRUARY 2014

TOWN OF BUCKEYE CONTRACT NO. 2012-006
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY PROJECT NO. PCN 211.06.20
SEI PROJECT NO. 04234

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Registered Professional Engineer (Civil)
CERTIFICATE NO.
43301
Ricky M.
Holston
Date Signed 2/14/2014
ARIZONA, U.S.A.
Expires 9/30/14

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EXECUTIVE SUMMARY

The Skyline Fan Design Concept Report (DCR) documents the conceptual design development of four alternatives to control storm water flows at the apex of Skyline Fan. With the project in place an estimated 698 acres of land will be removed from the floodway and floodplain. Skyline Fan is an alluvial fan upstream of the Buckeye Flood Retarding Structure #3 (FRS #3) at Watson Road north of I-10 within the Town of Buckeye. The project is sited on Arizona State Land Department (ASLD) land. Land ownership within the fan is divided among ASLD, private, District, and Arizona Department of Transportation (ADOT).

Previous studies in the area include the Sun Valley ADMP. The ADMP suggested a full fan solution with multiple retention basins and a walled levee corridor along Skyline Wash. The estimated cost of the ADMP solution was considered too high to be feasible.

The Town of Buckeye (Town) submitted the project to the Flood Control District of Maricopa County's (District) Capital Project program. The District and the Town entered into an intergovernmental agreement (IGA) to identify and develop conceptual non-whole fan flood control solutions that satisfy the project goals. The IGA specified that no dams or dam like structures were to be considered. The scope of work specified three predetermined alternatives with a fourth to be determined during the project. Project milestones included:

- Base Conditions Hydrology Model Update
- Preliminary Alternatives Analysis
- Brainstorming Meeting
- Alternatives Analysis
- Recommended Alternative Selection Meeting
- ASLD and Stakeholder Meetings
- Recommended Alternative Analysis
- Design Concept Report and Conceptual Plan and Profile Drawings
- Public Meeting
- Town of Buckeye Council Meeting

The project updated the hydrology models to NOAA 14 rainfall. The rainfall updated resulted in a slight reduction of the peak flow at the apex.

A Preliminary Alternatives Analysis was conducted in preparation for the Brainstorming meeting. The Preliminary Alternatives Analysis provided conceptual element sizing for the three predetermined alternatives using the updated hydrology and costs.

The brainstorming meeting was held at the District with representatives from the Town, District, and Sunrise. The Preliminary Alternatives Analysis results were presented to the attendees, and comments were solicited to for the current alternatives and determination of the fourth alternative.

Alternatives Analysis further refined conceptual details for the four alternatives. The conceptual design details were refined with Town of Buckeye (Town) and Flood Control District of Maricopa County (District) guidance and standards. Hydrologic and Hydraulic modeling was conducted for each alternative to determine the effects of each Alternative with respect to the existing natural and engineered drainage systems. Design details were developed to determine cost and feasibility of each alternative. The four alternatives and their conceptual costs are:

- *Alternative 1A* (Predetermined), estimated cost $6.5 to $6.6 million, basin and single low flow pipe. A large fully incised detention basin with 15-foot water depth and outlet pipe routed to Prospect Wash.
- *Alternative 1B* (Alternative 4), estimated cost $7.9 to $8.0 million, basin and dual low flow pipes. A detention basin with 10-foot water depth, one outlet pipe routed to Prospect Wash, and the other outlet pipe routed to Skyline Wash.
- *Alternative 2* (Predetermined), $29.0 to $62.6 million, channel only, a high flow channel to route full apex flow to Buckeye Flood Retarding Structure No. 3 (FRS No. 3).
- *Alternative 3* (Predetermined), $12.8 to $17.1 million, basin and channel, a mid-size detention basin and medium flow channel.
- *Alternative 4* is to be determined, renamed Alternative 1B.

All Alternatives divert flows to Prospect Wash. Prospect Wash has excess capacity, partial caliche side slopes, and is deeply incised when compared to Skyline Wash, which is a typical alluvium wash, wide and shallow. The District identified that flows diverted via a 48-inch pipe (approximately 177 cubic per second) would be considered negligible for purposes of lateral erosion in Prospect Wash. The District requires that appropriate measures to mitigate scour and lateral erosion in Prospect Wash would be necessary for diverted flows greater than 177 cubic feet per second. Appropriate measures consist of installing rip rap on the side slopes and establishing a lateral erosion setback.

The Alternatives Analysis was presented to the stakeholders and ASLD at two different meetings. ASLD was provided the analysis to review prior to the meeting held in June. At the meeting ASLD's comments and concerns were noted and discussed. ASLD chose Alternative 1A as their recommended alternative and expressed support for the project as it is currently presented.

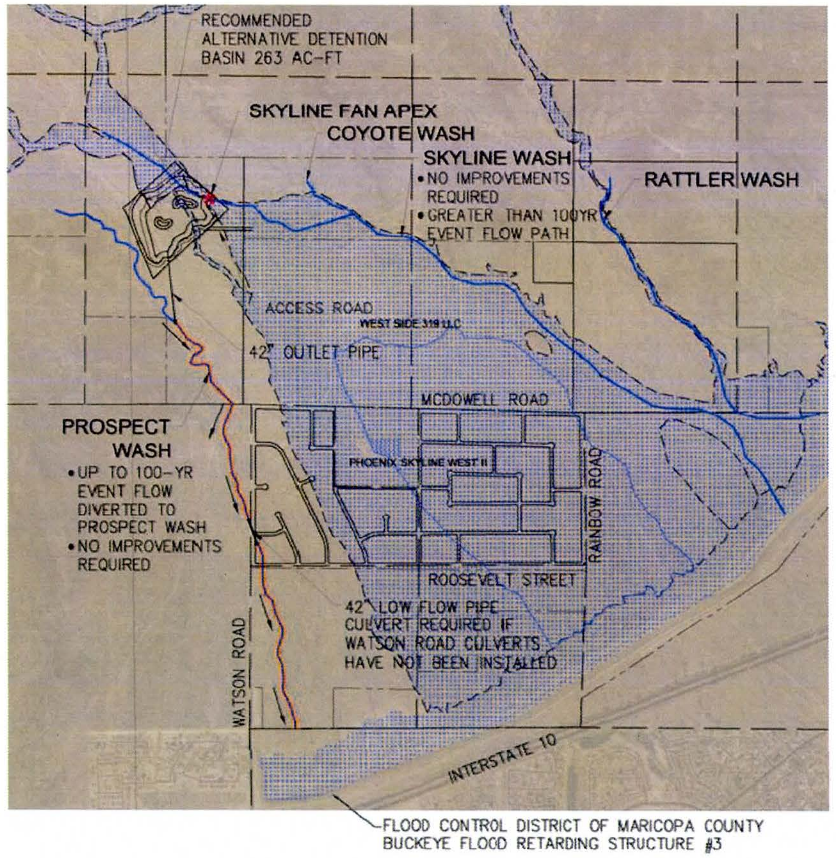
A second meeting was held in July to present the Alternatives Analysis and to the stakeholders. The stakeholders are the two majority private landowners on Skyline Fan. The stakeholders expressed support for the project with no significant concerns.

The Recommended Alternative selected by the project team is Alternative 1A with steel reinforced portland cement concrete (PCC) inlet with an estimated cost of $7.6 to $7.7 million. The alternative design was further refined by adding details for the terraced inlet structure, trench drain outlet structure and emergency overflow.

The project was initially presented to the Town of Buckeye Town Council. Afterward, the project was presented to the public at a public meeting at the Town of Buckeye in August.

An IGA will be required between the Town and the District for final design and construction. Funding sources from both parties will be required to be in place prior to executing the IGA.

Final design will include final design of the project, 404 permitting, and floodplain delineation to remove benefit areas out of the floodplain.



Skyline Fan DCR Recommended Alternative

1 INTRODUCTION

The DCR for Skyline Fan Design Concept Report (DCR) developed conceptual details for four alternatives to control the Skyline Fan apex. The conceptual design details were refined with Town of Buckeye (Town) and Flood Control District of Maricopa County (District) guidance and standards. Hydrologic and Hydraulic modeling was conducted for each model to determine the effects of each Alternative with respect to the existing natural and engineered drainage systems. Design details were developed to determine cost and feasibility of each alternative.

The four Alternatives are intended to control the Skyline Fan apex by detention and/or diversion of storm water at the apex. Of the four alternatives three have already been identified by the Town and District's scope of work for the project.

- *Alternative 1* Basin only, a large fully incised detention basin at the apex with low flow outlet onto the fan or existing wash.
- *Alternative 2* Channel only, a high flow channel to route full apex flow to Buckeye Flood Retarding Structure No. 3 (FRS No. 3).
- *Alternative 3* Basin and Channel, a mid-size detention basin and medium flow channel.
- *Alternative 4* is to be determined.

The DCR is the one of many milestones of the project. Other prior milestones included:

- *Data Collection* consisting of research of existing reports and mapping updates.
- *Base Hydrology Conditions Analysis,* updated the original hydrology model to NOAA 14 and other minor updates. This model became the base model for all alternative modeling.
- *Preliminary Alternatives Analysis,* conducted preliminary modeling and costs of the three pre-identified alternatives for use at the Brainstorming Meeting.
- *Brainstorming Meeting* was conducted to provide preliminary comments for the three pre-identified alternatives and select a fourth alternative. See **Appendix N** for Brainstorming Meeting notes.
- *Geotechnical Investigation* conducted a seismic refraction survey and soil samples.

The DCR will provide the basis for the selection of the Recommended Alternative. An analysis will be conducted on the Recommended Alternative that will further refine the design and costs. Finally conceptual 15% plans will be developed from the Recommended Alternative. All of the design refinement effort will be documented in the final DCR.

The Alternative Analysis further refined Alternative 1 into two Alternatives. The fourth alternative was studied as Alternative 1B. Alternative 1A and 1B are:

- *Alternative 1A* Basin and single low flow pipe per the scope of work. A detention basin with 15-foot water depth and outlet pipe routed to Prospect Wash.
- *Alternative 1B* Basin and dual low flow pipes. A detention basin with 10-foot water depth, one outlet pipe routed to Prospect Wash, and the other outlet pipe routed to Skyline Wash.

All Alternatives divert flows to Prospect Wash. Prospect Wash has excess capacity, partial caliche side slopes, and is deeply incised when compared to Skyline Wash, which is a typical alluvium wash, wide and shallow. Therefore Prospect Wash is the prime candidate to receive diverted flows. The District identified that flows diverted via a 48-inch pipe (approximately 177 cubic feet per second) would be considered negligible for purposes of lateral erosion in Prospect Wash.The District requires that appropriate measures to mitigate scour and lateral erosion in Prospect Wash would be necessary for diverted flows greater than 177 cubic feet per second. Appropriate measures consist of installing rip rap on the side slopes and establishing a lateral erosion setback.

After the Preliminary Alternatives Analysis. was conducted it became apparent that Alternatives 2 and 3 were very costly compared to the other Alternatives. This was due to the cost of improving Prospect Wash. Therefore efforts were concentrated on Alternatives 1A and 1B.

The Recommended Alternative is Alternative 1A. This alternative was further developed to design the inlet, outlet and overflow weir.

1.1 Study Area

The study area of the Skyline Fan includes the watersheds of Prospect Wash, Rattler Wash, Skyline Wash and its tributaries, and the downstream area from the Skyline Fan apex to the Buckeye Flood Retarding Structure (FRS) No. 3. The watersheds are located within the foothills of the White Tank Mountains, approximately 17.5 miles west of central Phoenix, and north of Interstate 10 within Sections 20, 21, 22, 25, 26, 27, 28, 29, 32, 33, 34, 35, 36, of Township 2 North, Range 3 West, and Sections 2, 3 and 4 of Township 1 North, Range 3 West, of the Gila and Salt River Base and Meridian, located in Maricopa County, Arizona. It covers a contribution area of approximately 8.75 square miles and a total of approximately 11.1 river miles. See **Figure 1.1.1 Study Area**.

On the effective Flood Insurance Rate Map (FIRM) the 1-percent chance floodplain Zone AE on Inactive Alluvial Fan were mapped along Prospect Wash, Rattler Wash, Skyline Wash and its tributaries. The majority of the area between the Skyline Fan apex, located approximately two miles north of I-10 and west of Watson Road, and the FRS No. 3 is mapped as 1-percent chance floodplain Zone A on Active Alluvial Fan (FEMA, 1988, Revised 2013). See **Figure 1.1.2 Flood Insurance Rate Map Panel 2110L & Figure 1.1.3 Flood Insurance Rate Map Panel 2102L**.

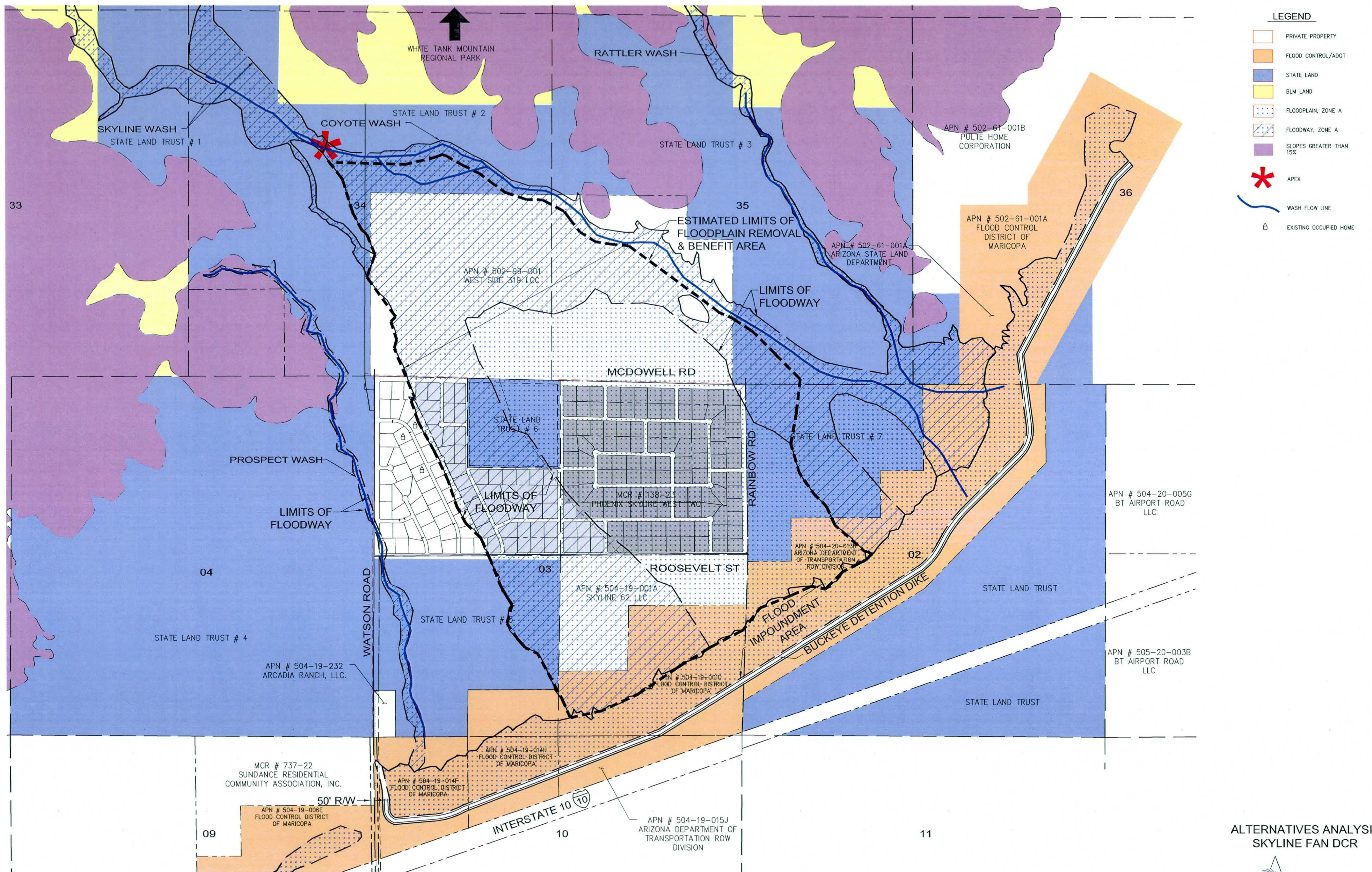
Skyline Apex - Looking North

1.2 Existing Data & Reports

Previous studies include:

- White Tanks Wash Flood Insurance Study, Hydrologic Analysis FCD 90-64 (ALPHA Engineering Group, Inc., 1993 and 1994)
- Skyline Wash and Tributaries Floodplain Delineation Study (Delineation Study), FCD 96-08 (DEI, 1998)
- Flood Insurance Study and Flood Insurance Rate Map (FEMA, 1995, Revised 2005), which is based on the DEI Delineation Study
- Phase 1 Buckeye/Sun Valley Area Drainage Master Study (ADMS), FCD 2002C027 (PBS&J 2005)
- Sun Valley Area Drainage Master Plan (ADMP), Step 3, Vol 7, FCD 2004C049, (JE Fuller 2006)

Other studies mentioned in the DEI 1998 study include hydrologic and design studies performed by the Soil Conservation Service (SCS) for the construction of the Buckeye FRS's; Dames and Moore performed a Dam Break Study for the Buckeye structures and a study and report that was developed by Field and Pearthree to assess the Geologic Mapping of Flood Hazards in the White Tank Mountains.



P:\Buckeye\04234Skyline Wash DCR\Dwg\Exhibits\Skyline DCR Ownership - Study Area - 02-20-13.dwg Apr 30, 2013 2:35pm rhatton

ALTERNATIVES ANALYSIS
SKYLINE FAN DCR

NORTH
NTS

SUNRISE ENGINEERING
2152 SOUTH VINEYARD, SUITE 123
MESA, ARIZONA 85210
TEL 480.768.8600 · FAX 480.768.8609
www.sunrise-eng.com

FIGURE 1.1.1
STUDY AREA

NOTES TO USERS

This map is for use in administering the Nation Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Arizona State Plane Central zone (FIPSZONE 0202). The **horizontal datum** was NAD 83 HARN, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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This web tool allows users to obtain point-specific datum conversion values by zooming in and hovering over a VERTCON checkbox on the layers menu on the left side of the screen. The VERTCON grid referenced in this web application was also used to convert existing flood elevations from NGVD 29 to NAVD 88.

To obtain current elevation, description, and/or location information for National Geodetic Survey bench marks shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at http://www.ngs.noaa.gov. To obtain information about Geodetic Densification and Cadastral Survey bench marks produced by the Maricopa County Department of Transportation, please visit the Flood Control District of Maricopa County website at:
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Base map information shown on this FIRM was derived from multiple sources. Aerial imagery was provided in digital format by the Maricopa County Department of Public Works, Flood Control District. The imagery is dated October 2009 to November 2009. Additional National Agricultural Imagery Program (NAIP) imagery was provided by the Arizona State Land Department (ALRIS) and is dated 2007. The coordinate system used for the production of the digital FIRM is State Plane Arizona Central NAD83 HARN, International Feet.

The **profile base line** depicted on this map represents the hydraulic modeling baselines that match flood profiles in the FIS report. As a result of improved topographic data, the profile base line, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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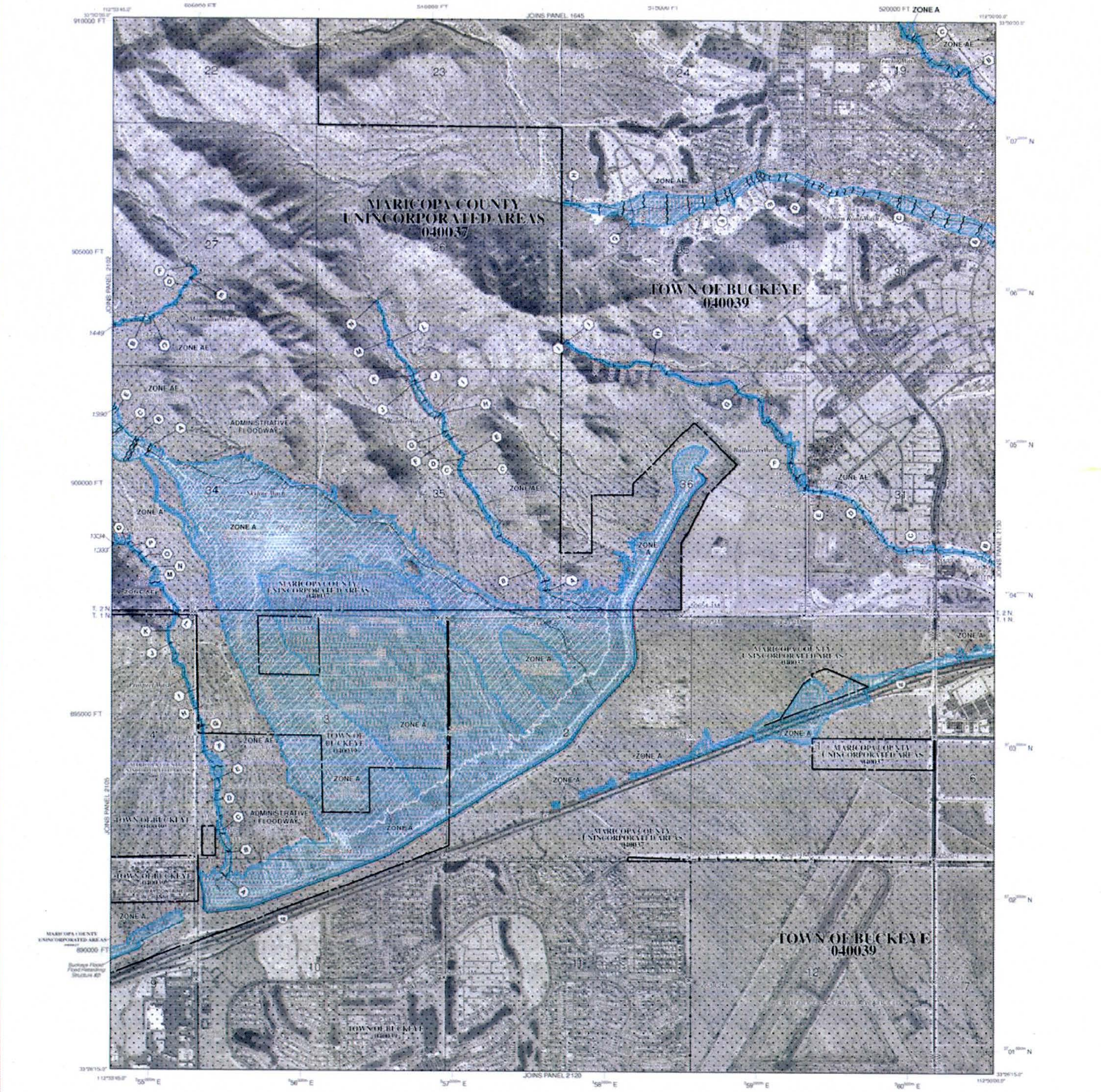
For information on available products associated with this FIRM, visit the **FEMA Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.

*ADMINISTRATIVE FLOODWAY DESIGNATED IN ACCORDANCE WITH LOCAL REGULATIONS FOR MANAGEMENT OF THESE AREAS.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

(A)—(A)	Cross section line
(23)- - -(23)	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN	1000-meter Universal Transverse Mercator grid ticks, zone 12
6000000 M	5000-foot grid ticks: Arizona State Plane coordinate system, central zone (FIPSZONE 0202), Transverse Mercator
DX5510	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
April 15, 1988
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 4, 1991 September 30, 1995 July 19, 2001 September 30, 2005
October 16, 2013 - to add floodway, to update corporate limits, to incorporate previously issued letters of map revision, to add special flood hazard areas, to change floodway, to add base flood elevation, to advance suffix, to add roads and road names, and to change base flood elevations.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 2110L

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 2110 OF 4425
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	2110	L
BUCKEYE, TOWN OF	040039	2110	L

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
04013C2110L

MAP REVISED
OCTOBER 16, 2013

Federal Emergency Management Agency

FIGURE 1.1.2

NOTES TO USERS

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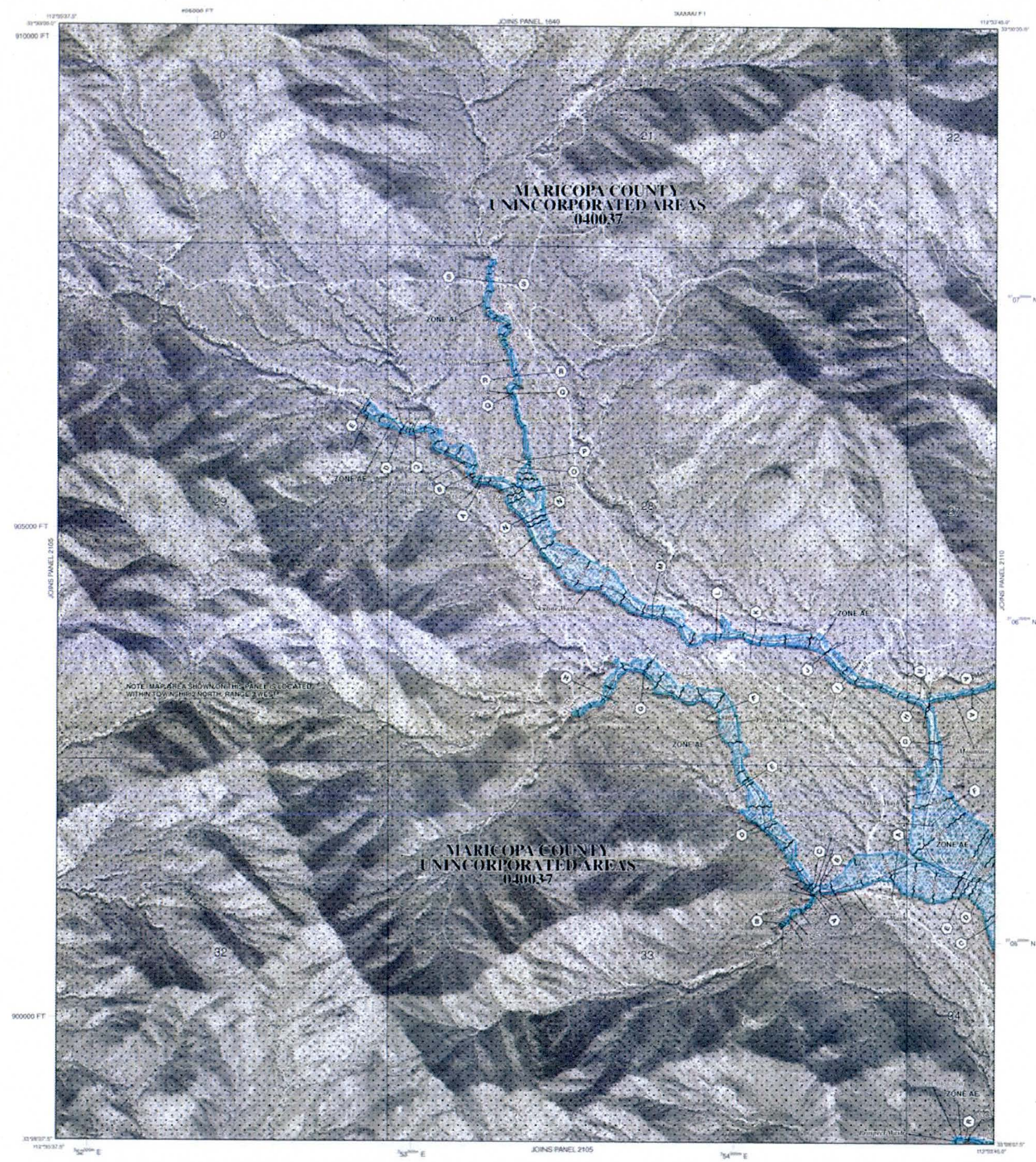

LEGEND

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ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- (A)—(A) Cross section line
- (23)- - -(23) Transect line
- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4275000mN — 1000-meter Universal Transverse Mercator grid ticks, zone 12
- 6000000 M — 5000-foot grid ticks: Arizona State Plane coordinate system, central zone (FIPSZONE 0202), Transverse Mercator
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- • M1.5 — River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
April 15, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
September 4, 1991, September 30, 1995, July 19, 2001, September 30, 2005
October 16, 2013 - to update corporate limits, to change floodway, to change base flood elevations, to add base flood elevation, to add floodway, to add special flood hazard areas to advance suffix, to incorporate previously issued letters of map revision, and to add roads and road names.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

PANEL 2102L

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP
MARICOPA COUNTY, ARIZONA
AND INCORPORATED AREAS

PANEL 2102 OF 4425
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MARICOPA COUNTY	040037	2102	L

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER 04013C2102L

MAP REVISED OCTOBER 16, 2013

Federal Emergency Management Agency

FIGURE 1.1.3

The Sun Valley ADMP was completed in December 2006. The ADMP provided recommendations for a structural solution to control apex flows. The recommended solution for Skyline Wash was a large basin at the apex with an outflow rate of approximately 400 cubic feet per second, which is 10% of the inflow rate of ~4,000 cubic feet per second. The outflow was directed down Skyline Wash with a walled levee corridor that used flood walls to line the wash. The flood walls reached heights of up to 14 feet in some areas, as the footing has to be below the scour depth. The ADMP also recommended two additional detention basins at the north east portions of Skyline Fan to control incoming flow from Coyote Wash and Rattler Wash. Lastly the ADMP recommended the use of grade control structures in Skyline Wash to control scour. The estimated cost of the improvements was $35.5 million. The ADMP used 10-foot contour mapping that showed Skyline Wash as flat, no incising, which required the flood walls to mitigate. The ADMP was a whole fan solution as it provided controls at all incoming concentrated flow points.

The topographic survey and DTM data were provided by the District from:

Project ID............1044
Contract Number.......FCD 96-08
Project Name..........Skyline Wash FDS
Topo ID...............144
Flight date........03/04/1997
Contour Interval...2'
DTM Data...........Yes
Vertical Datum.....NGVD29
Horizontal Datum...Stateplane NAD83, Arizona Central, International Feet

1.3 Objective

The project shall control the 100-year peak flow at the Skyline Fan apex which will also reduce or eliminate alluvial fan sheet flooding within a portion of the Skyline Fan. A reduction of alluvial fan sheet flooding may provide 100-year level of protection for the benefited area and allow for a reduction in area of the regulatory floodway and floodplain. The District and Town's IGA for final design will determine if a floodplain delineation will be a requirement during or after final design.

There is potential for an estimated 698 acres to be removed from floodway and floodplain. Private land owners will see an estimated 252 acres removed from the floodplain and an estimated 294 acres from the floodway. ASLD benefit from an estimated 54 acres removed from floodplain and an estimated 98 acres of floodway. See **Figure 1.3.1 Benefits Map**.

The predetermined Alternatives are not whole fan solutions like the ADMP. During the District's Prioritization Process, the Town proposed a non-full fan approach. The District agreed to examine this approach through the preparation of this DCR. A non-full fan approach is viable if the Recommended Alternative does not adversely affect the areas on the fan that do not benefit from the Recommended Alternative. In addition, the Recommended Alternative should show that it is as good as or better than the ADMP solution.

1.4 Project Partners

Coordination amongst project partners and the project consultants has occurred throughout the project. Coordination includes the kick-off meeting, brainstorming meeting, site visit, project coordination meetings, informal meetings, and frequent email and telephone correspondence. See **Appendix O** for project meeting notes.

The project stakeholders consist of:

- Mauricio Iacuelli, P.E. – Town of Buckeye
- Private Land Owners
- Arizona State Land Department (ASLD)

District project personal consist of:

- Anthony Beuché, P.E. – Project Manager
- Scott Vogel, P.E.
- Kathryn Gross - Hydrology
- Bing Zhao, P.E. – River Mechanics
- Shimin Li, P.E. – River Mechanics
- Harry Cooper, R.L.A. – Landscape Architect

1.5 Deliverables

The project deliverables consist of:

- Base Conditions Hydrology Analysis Technical Memorandum
- Alternative Analysis
- Recommended Alternative Analysis
- Design Concept Report
- Conceptual Plan and Profile Drawings

The technical memorandum reports are intermediate points for the District and project stakeholders to provide comments while working towards the goal of the final DCR. The final memo reports with comment revisions will be included in the final DCR.

1.6 Acknowledgements

We would like to thank the Town of Buckeye and the District for their valued input and continued guidance throughout the project. Special thanks go to Mauricio Iacuelli and Hans Koppenhoefer, Town Project Managers, and Tony Beuché, District Project Manager.

1.7 Project Consultants

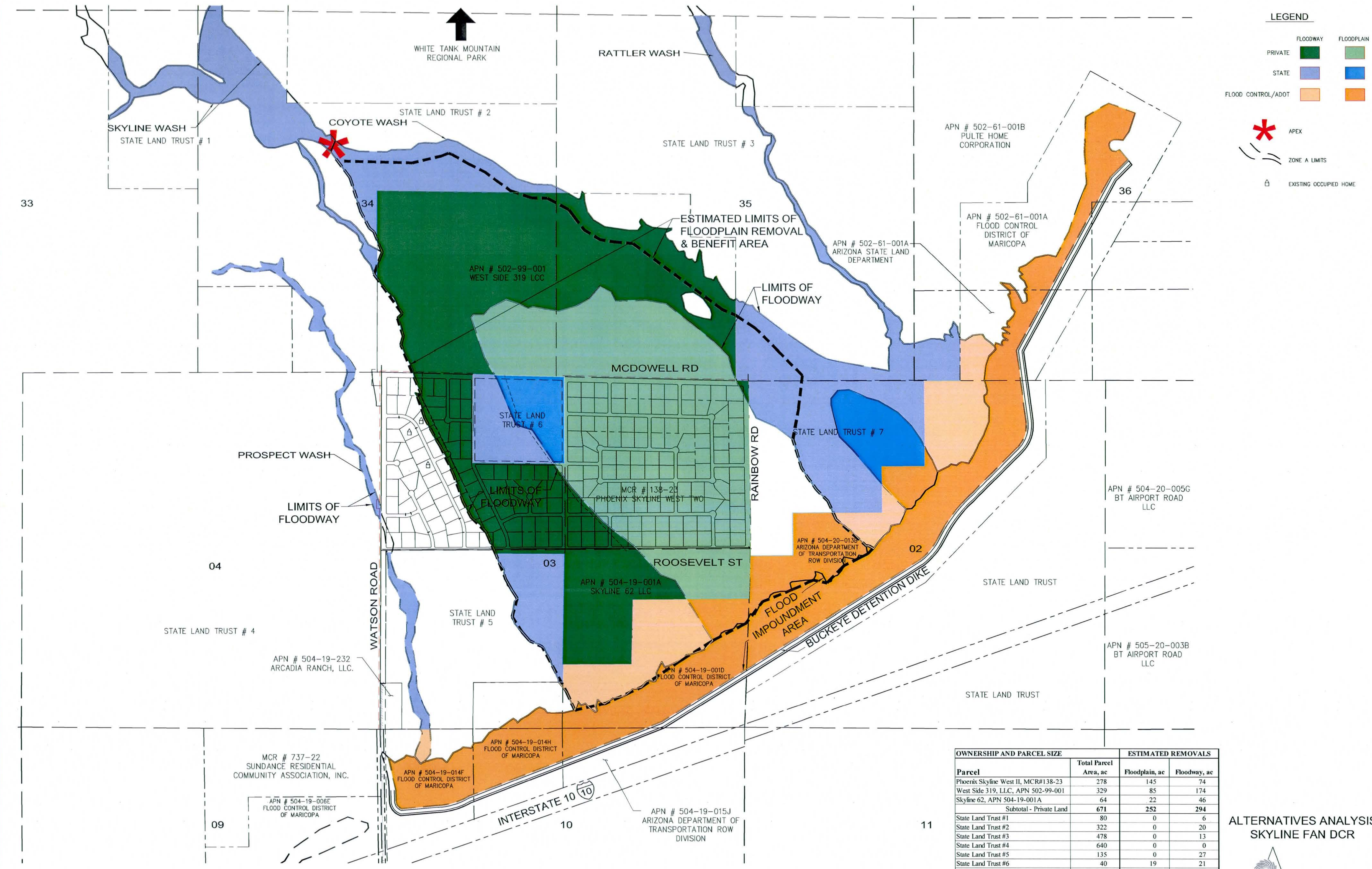
Sunrise Engineering, Inc. is the prime consultant for the project. The Sunrise team consists of:

- Gregory D. Potter, P.E. - Principal
- Ricky M Holston, P.E., CFM - Project Manager
- Li Qi, P.E. CFM - Project Hydrologist
- Randy Perham, EIT, CFM – Engineering Technician.
- Tony Elley, R.L.S., CFedS – Survey Manager

Terracon is a partner consultant for geotechnical engineering for project. Their team consists of:

- Donald R. Clark, P.E. – Senior Principal
- Aderson M. Viera, Ph. D., P.E – Project Manager

Skyline Wash – North of Apex



OWNERSHIP AND PARCEL SIZE		ESTIMATED REMOVALS	
Parcel	Total Parcel Area, ac	Floodplain, ac	Floodway, ac
Phoenix Skyline West II, MCR#138-23	278	145	74
West Side 319, LLC, APN 502-99-001	329	85	174
Skyline 62, APN 504-19-001A	64	22	46
Subtotal - Private Land	**671**	**252**	**294**
State Land Trust #1	80	0	6
State Land Trust #2	322	0	20
State Land Trust #3	478	0	13
State Land Trust #4	640	0	0
State Land Trust #5	135	0	27
State Land Trust #6	40	19	21
State Land Trust #7	116	35	11
Subtotal - Stand Land	**1,811**	**54**	**98**

FIGURE 1.3.1
BENEFITS MAP

ALTERNATIVES ANALYSIS
SKYLINE FAN DCR

SUNRISE ENGINEERING
2152 SOUTH VINEYARD, SUITE 123
MESA, ARIZONA 85210
TEL 480.768.8600 · FAX 480.768.8609
www.sunrise-eng.com

P:\Buckeye\04234Skyline Wash DCR\Dwg\Exhibits\Skyline DCR Ownership - Benefits Map - 03-26-13.dwg Apr 30, 2013 2:38pm rholston

2 PROJECT & DESIGN CRITERIA

Project and design criteria for the DCR established the basis by which the alternatives were developed and refined. Project criteria are project specific guidance which leads project decision making. Typically project criteria are guidance provided in the IGA, Scope of Work, the ADMP, and team agreements. Design criteria are the criteria used to design project elements. Design criteria consist of Town design standards, District guidelines, and the ADMP.

2.1 Project Criteria

Project criteria were established for the project that established the Alternatives and how they were refined. The project criteria were developed by the project partners. Criteria includes no dams as alternatives, control of flow at the apex, diversion of flows, routing of greater than 100-yr events, flowage easements to existing washes, and Prospect Wash flow limits.

The IGA between the Town and the District excludes consideration of dams at the request of the Town. Therefore the Scope of Work for this DCR does not consider dams for any alternatives. Permitting and maintenance of a dam structure is not economical for this project.

The project partners agreed all washes on the fan will no longer be considered alluvial, but will be considered riverine assuming flow at the apex is controlled. This allows the flows and capacity of existing washes to be calculated using conventional hydrology and hydraulic methods. If flow at the apex is uncontrolled it has to be assumed that the flow in any given wash or sheet flow area on the fan is full apex flow. The full apex flow can jump washes, cause erosion, and create new flow paths. This is an unstable and uncontrolled state. Control of the 100-year event flow at the apex will also allow FEMA to support a potential reduction of regulatory floodplain on the fan.

The Alternatives propose changes in routings and locations at FRS No.3. The District performed an unsteady state analysis on FRS No. 3. The study analyzed the effects of concentrated flows on the structure. The study concluded the changed flow patterns do not change the hydraulics of the structure. See **Appendix A** for **Skyline Wash Proposed Basin, Impacts to Buckeye FRS No.3**.

The District states, FRS No. 3 sediment storage will have inconsequential effects due to the Alternatives. FRS No. 3 was constructed to store sediment accumulated over 100 years without removal. The Alternative basins will have little effect on the cost of the operation and maintenance of FRS No. 3.

The Alternatives propose routing flood events up to and including the 100-year event through a detention basin then routing or diverting flows to Skyline Wash or Prospect Wash. Alternative 2 proposes diversion of all uncontrolled flow to Prospect Wash. A flowage easement from ASLD will not be required over Prospect Wash for low flows diverted from their historic path. ASLD cannot require a flowage easement for natural washes unless it is improved.

There are two options for routing of greater than 100-year event flows. Option 1, flows are routed in their historic path down Skyline Wash, or Option 2, flow continues to be diverted to Prospect Wash. For Option 1, the District will require a flood structure hazard analysis be performed at final design that will give guidance to the downstream population, that the structure is a 100-year structure and there is potential that an event greater than the design event can flow out of the emergency spillway. This option is the preferred option, as this places flow in the historic flow path, which does not change historic conditions or flood potential.

Option 2, events greater than the 100-year event will continue to be diverted to Prospect Wash. This option will require a flowage easement from ASLD and possibly other private land owners over Prospect Wash for the diversion of flows. The diversion would decrease flood potential on the fan and around Skyline Wash. However the increased flows could create flooding issues around Prospect Wash. This option was considered by the project team during the DCR and deemed to be unnecessary.

Prospect Wash design criteria was established to provide recommendations for the improvements to the wash for peak flow rates and flow durations greater than historic that are diverted to the wash. Higher peak flow rates increase flow velocities, scour, and reduce free board. Longer flow durations increase the potential for lateral migration and scour. Prospect Wash flow improvements are divided into two categories, low flow and high flow. Low flows do not require improvements; conversely high flows do require improvements.

Prospect Wash is fully incised with near vertical side slopes in many sections. The western edge of the wash is rock side slope that form the base of the adjacent mountain. The eastern side slope of the wash is a combination of alluvium and caliche. Currently Prospect Wash is not hydraulically connected to the Skyline alluvial fan system. Although at some point in the past it is feasible that Skyline Wash flowed into Prospect Wash, which may be how the deep flow line was incised. Skyline Wash has since moved to the middle of the fan and is no longer a tributary to Prospect Wash.

Prospect Wash North of McDowell Road – Looking North

The extents of the caliche and the solubility of the caliche are unknown. It is generally accepted that caliche is less prone to scour and erosion then bare soil. There are no known means to correlate material compressive strength or hardness with resistance to erosion. There are no economical ways to determine the extents of the caliche therefore the extent and solubility will remain unknown throughout the project.

Prospect Wash is considered riverine due to its hydraulic disconnect from Skyline Fan. The wash is subject to riverine erosion hazards. Due to the complexity of determining the extents and erodibility of the caliche the District directed the team to treat Prospect Wash as an erodible riverine channel, meaning the channel can migrate laterally.

The District has defined low flow to be lower than 177 cubic feet per second. This flow rate was established by the peak flow rate of a 48-inch "low flow" pipe from a 10-foot deep detention basin. The District concluded with the input of Dr. Gant Yasanayake, Senior Geotechnical Engineer with Maricopa County Department of Transportation that Prospect Wash could convey the low flow diversion without adverse impacts to the channel bottom or side slopes. It was also recommended that regular maintenance include a monitoring program for lateral erosion.

2.2 Design Criteria

Design criteria are a combination of published standards and project specific design criteria. Published standards include the Town's Storm Water Drainage System Design Manual #500, August 2007 and the Districts' Hydrology and Hydraulics Manuals 2011.

The Town's Design Manual requirements that apply to this project are:

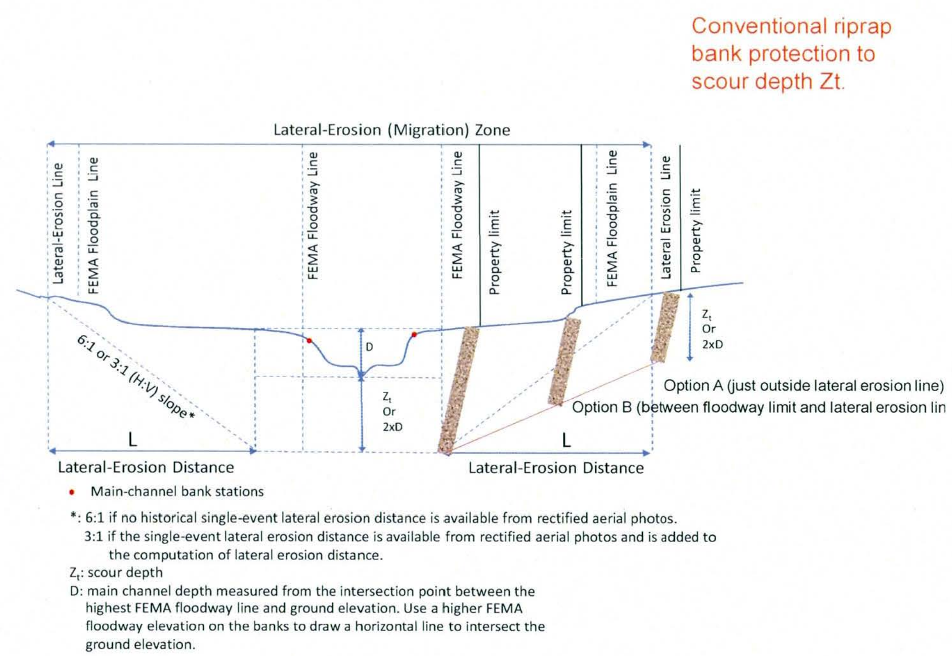
- Detention basins with a max water depth of greater than 3-feet require a six foot view fence and approval by the Public Works Director.
- All retention/detention facilities must be disposed of or be evacuated within 36-hours.
- Headwalls must be per MAG standard detail 501-3 with trash racks per Town of Buckeye construction detail B-508.

A letter has been sent to the Town Engineer requesting a waiver of Town criteria that the project cannot meet. Once received from the Town the letter will be attached herein.

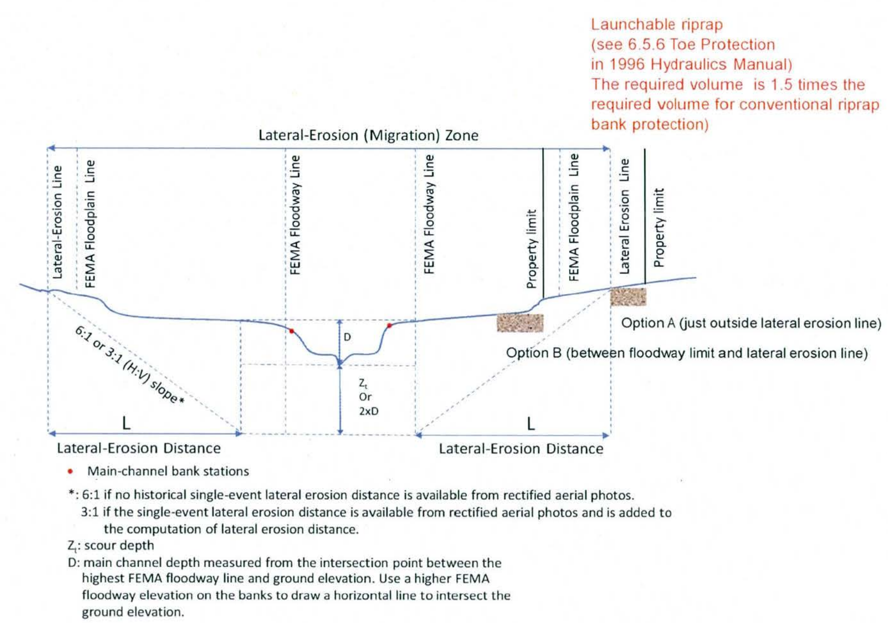
Prospect Wash high flow criteria was developed for placement of rip rap revetment on the existing wash banks. The District provided draft guidelines for Lateral-Erosion Zone mitigation guidelines. A lateral-erosion migration zone setback is required out at a 6:1 slope from the intersection of the floodway and the scour depth. The project incurs a cost for an easement for the additional area beyond the floodway to the lateral-erosion line. The easement can be eliminated if rip rap is placed at the floodway line. The lateral-erosion line can be reduced by placing rip rap anywhere in between the lateral-erosion line and the floodway. There are two options of rip rap, conventional rip rap or launchable rip rap.

Conventional rip rap is installed from the surface down to the scour depth. Conventional rip rap can be installed anywhere between the floodway line and the lateral-erosion line. Minimum rip rap is required where the lateral erosion setback line is maximum. The most amount of rip rap is required where the rip rap is placed at the floodway line.

Launchable rip rap is an alternative to conventional rip rap. Launchable rip rap requires 50% more rip rap than the conventional amount and is placed at the surface anywhere between the floodway and the lateral-erosion line. If the channel migrates the rip rap will fall into the channel providing bank protection. Launchable rip rap is desirable to minimize deep excavation versus conventional rip rap. Like conventional rip rap the least amount of rip rap is required at the lateral-erosion line. The most amount of rip rap is required at the floodway line.



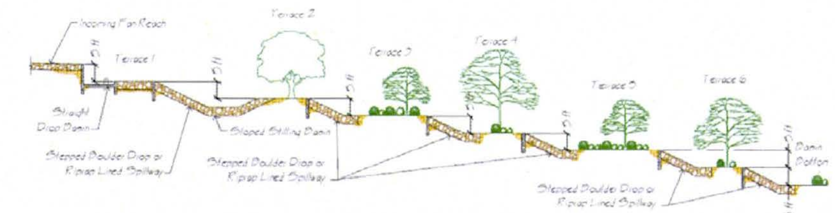
Draft Guidelines - Lateral-Erosion Migration - Conventional Rip Rap



Draft Guidelines - Lateral-Erosion Migration – Launchable Rip Rap

2.3 ADMP Design Criteria

The Sun Valley ADMP provided recommendations for inlet structures and aesthetic treatment. The ADMP recommended an arched terraced inlet structure due to the height difference of the incoming wash and high flow rates. The width of each drop is wider to lower unit flow rates over the drops. The first step of the inlet is a concrete straight drop, the second step is a stepped boulder drop and rip rap stilling basin, the remaining drops are stepped boulder drops without the stilling basin. The terraces allow for trees to be planted that screen the structure.



Terraced Inlet Structure – Sun Valley ADMP 2006

Aesthetic treatment for basins shall generally follow the guidelines given in the ADMP. However, a revised plant palette will be developed prior to design. **Note non-italicized entries denote criteria modified or added to ADMP criteria.**

Perimeter

- *Provide a 50-foot landscaped buffer area between the top of the basin and adjacent development.*
- *Place the operation and maintenance (O&M) road within the buffer area and design to allow for multiple uses such as walking and biking.*
- *Avoid cross slopes over 3% and longitudinal slopes over 4%.*
- *Establish the finish grade of the road surface no higher than 2 inches above the adjacent landscaped areas.*
- *Construct O&M road with native inert material as the finished surface. Material will be stabilized with a polymer stabilizing product.*
- *Design the O&M road to be curvilinear to mimic the organic basin configuration.*
- *Construct landscape berming in the buffer area to blend with the natural landforms of the Bajada character unit.*
- *Minimize disturbance of native vegetation, especially large trees, in the buffer zone to the extent possible.*
- *Supplement the existing vegetation in the buffer zone to provide a landscape setting for the multi-use O&M road and to blend the vegetation of the basin into the adjacent landscape.*
- *Provide ADA accessible grades on all road surfaces.*

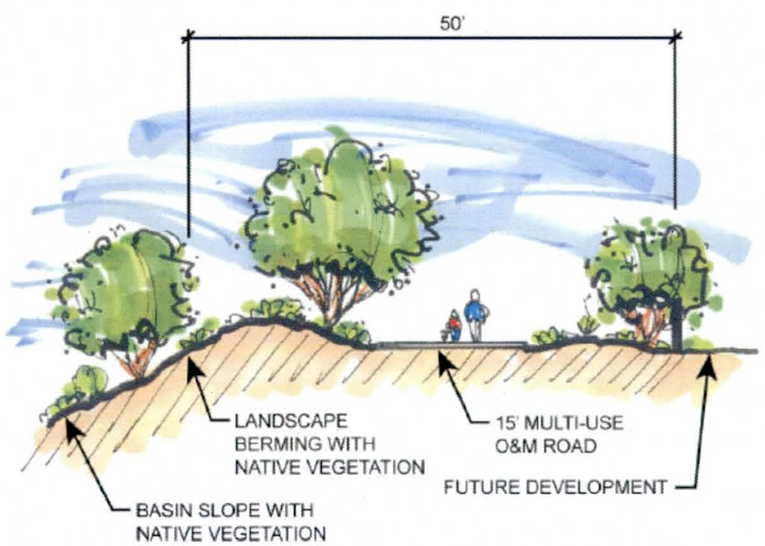
- Excavated material may be placed within the buffer area to reduce the quantity of material that must be removed from the basin site.

Configuration

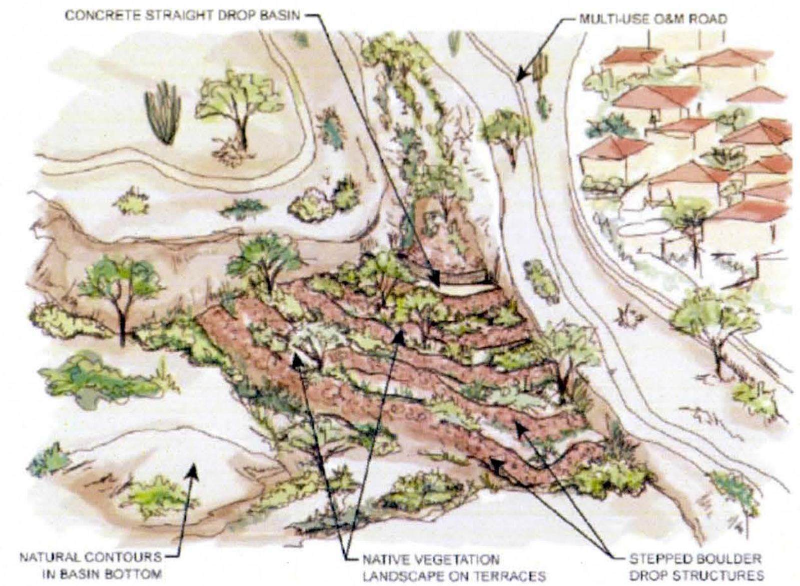
- *Design the configuration of the basins to minimize height of cut slopes.*
- *Design the overall form of the basin to be freeform to blend with the natural topography and reduce visibility and apparent size of the basin.*
- *Warp and vary side slope ratios from 4:1 to 8:1 in a form to mimic the existing topography. Mix of slopes to be approximately: 25%–4:1, 40% –6:1, 8:1-25%, and shallower than 8:1–10%.*
- *Design basins with irregularly shaped terraces so that the height of any single slope does not exceed 10 vertical feet.*
- *Design landscape on terraces to mimic native vegetation patterns.*
- *Create natural, rounded transitions from side slopes to basin bottom.*
- *Over-excavate basin bottom areas to a depth of one (1) foot and plate with topsoil and desert varnish.*
- *Design basin bottom to be irregular and undulating, to mimic the natural topography of the area surrounding the site.*
- *Create islands of landscape area in the basin bottom that are above the low flow conditions.*
- *Round top of basin side slopes and blend grading into berms in the buffer area.*
- *Develop the low flow drainage feature in the basin bottom to mimic local small washes.*

Pre-Construction Activities

- Stockpile large boulders from all disturbance areas.
- *Stockpile topsoil from a minimum of 4-12" depth.*



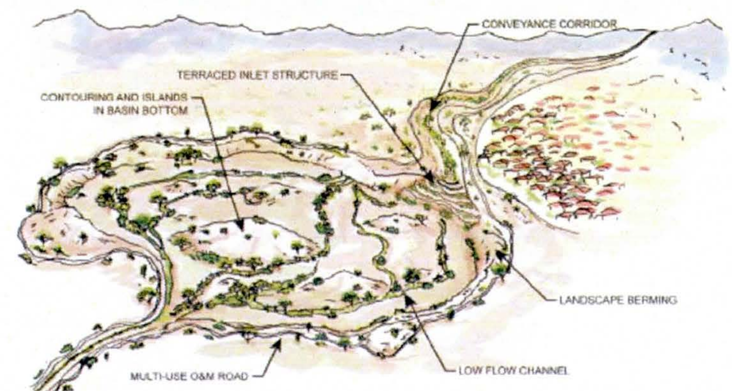
Basin Top Cross Section – Sun Valley ADMP 2006



Conceptual Inlet Structure – Sun Valley ADMP 2006

Vegetation

- *Use Sonoran desert plant material from the Natural Sonoran Desert Theme plant list provided in Section 5.6.4 of Sun Valley ADMP.*
- *Plant list will include plants identified as appropriate for the Bajada character unit.*
- *Select specific species native to the basin location to respond to the context of the landscape character around the basin.*
- Salvage native trees and plants including saguaro and small cactus species, maintain for replanting in the landscape or action off.
- *Design the buffer landscape to transition the density, type, size, form, color, and texture of the plant material with the species found in the surrounding landscape.*
- *Locate vegetation along both sides of the O&M road to break the view of the line of the road alignment and to provide shade.*
- *Locate trees in the landscape to maintain view corridors to mountains and nearby landforms.*
- *Trees, shrubs, and ground covers should be arranged in an irregular pattern along the sides, bottom, and top of the basin side slopes to complement the character of the surrounding natural landscape.*
- *Consider views from the areas above and below the basin when considering the placement and organization of plant material to reduce the apparent size of the basin.*
- *Install temporary irrigation system to establish plant material or use tall pot plant material.*



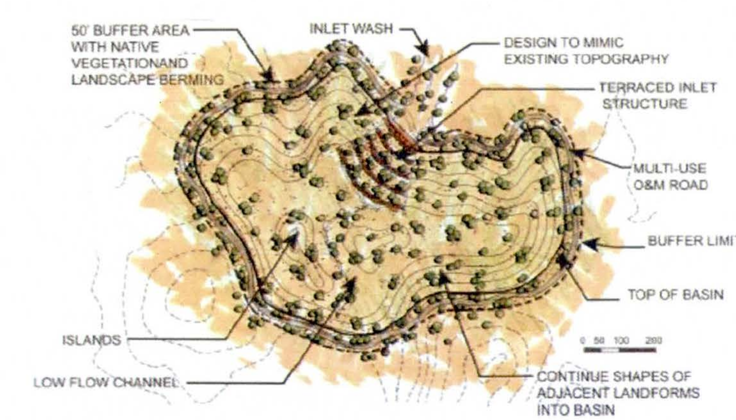
Conceptual Basin – Sun Valley ADMP 2006

Inlet Structures

- *Design terraced inlet structures with stepped boulder drop structures between terraces. Drop structures will use native desert boulders as much as possible.*
- *Design the structures to use the materials, shapes, colors and textures that blend with the surrounding desert.*
- *Colors of materials should not have a light reflective value of more than 5% above the adjacent soil and vegetation values.*
- *Landscape the terraces of the structure with native species in patterns that mimic the surrounding landscape.*

Outlet Structures

- *Design structures with natural materials and/or integral color concrete to blend with the surrounding landscape.*
- *Design structures using form liners to provide textures to blend with the surrounding landscape.*
- *Design headwalls with slopes to follow the proposed grading of the basin slopes.*
- *Construct grates and metal components of structures with Cor-ten or other steel that will develop a natural weathered color.*



Basin plan with Aesthetic Treatment – Sun Valley ADMP 2006

2.4 Cost Criteria

Alternative costs were estimated from quantities derived from development of the Alternative designs. Probable unit costs were derived from averages or median prices from District bid tabulations.

Earthwork unit costs were provided by CSW Contractors. CSW is a heavy civil contractor in the Phoenix area with large scale earthwork experience. The unit costs given are bid costs and include the support equipment to complete the work, but do not include mobilization and other contractor overhead line items.

The unit cost for excavation is $1.75 per cubic yard to load a scraper. Ripping, if required, ranges from $0.10 - $0.20 per cubic yard.

Cost to haul export up to a two mile round trip in a scraper is $0.65 per cubic yard. Cost to haul export further requires transfer to a truck for transport, five miles is $4.46 per cubic yard, 10 miles is $6.05 per cubic yard, and 15 miles is $7.56 per cubic yard. Export of site materials will be limited to scraper hauls due to the high cost of transfer and transport.

Construction water for excavation and dust control requires 40 gallons per cubic yard of excavation. Structural fill placement requires 60 gallons per cubic yard of excavation. A water truck is estimated to cost $3,000 per month. A 10,000 gallon water tower, to fill the truck, is estimated to cost $1,500 per month. Construction water will be supplied by the Town. The fee to purchase water from the Town of Buckeye currently costs $3.30 per 1,000 gallons.

The nearest water source to the site is approximately 1.5 miles away on Watson Road. A pump, generator, and piping will be required to pump the water to the water tower. A generator pump skid is estimated to cost $50 per hour. Piping is estimated to be 6-inch HDPE SDR-11 placed on the ground. HDPE pipe is estimated to cost $10 per linear foot. HDPE pipe will require joint fusing at $150 per hour, approximately 10 joints can be completed in one hour.

A unit cost of $0.29 per cubic yard was estimated for Town water costs, assuming a 6 month construction time, excavation of one million cubic yard of export, and includes piping, pump, and generator.

A unit cost of $0.20 per cubic yard for placement of structure fill was estimated for the purchase of the required water. It is assumed the truck, tower, generator, pump, and piping are already accounted for the in the excavation water unit cost.

The cost to salvage and re-locate native plants found within the project area is estimated at $2,000.00 per acre.

The unit cost for perimeter fencing is $5.00 per linear-foot for 4 strand smooth wire fence. Maintenance entry gates will be placed at two locations and are estimated to be $2,000 each.

ASLD fees have been estimated for flowage easements, stumpage fees, and excavated material royalties. The flowage easement unit cost of $10,000 per acre is assumed to be 40% of the land acquisition unit cost of $25,000 per acre.

Flowage easement area for Prospect Wash at high flow rates used the average floodway width at existing flow (997 cubic feet per second), 70 feet, by the total wash length, approximately 1.8 miles.

Stumpage fees will be assessed on the project based on the native plant inventory. Fees are calculated on destroyed or damaged protected plant species. The fees are typically 10% to 20% of the market value of the plant. It is assumed that all native plant species will be moved to a nursery during construction and finally placed on-site after construction. An assumed stumpage fee for a low plant loss of $20,000 was used for estimation purposes.

Excavated material royalties are royalties assessed on excavated materials exported from ASLD. Royalties are typically 5%-6% of the gross value of the material on a per ton basis. For estimation purposes a gross value of $0.50 per ton was assumed on the material. It is also assumed the weight per cubic yard of the excavated material will be 1.3 tons per yard. This cost is not applicable if the material is kept on ASLD lands.

The 3-year maintenance cost is estimated based on $6.00 per cubic yard excavation and haul of 17.7 acre-feet of sediment. Hydroseed of the sediment settlement area is estimated to be $3,000 per acre with approximately 6 acres of disturbance.

Mosquito control will be required for any standing water over 36-hours. It has been estimated that a once per year application of mosquito pellets will be required at an estimated cost of $40,000 per application.

2.5 Seismic Refraction Test Results

Terracon performed a seismic refraction survey and soil sampling at the locations shown on the Sampling Exhibit in **Appendix B**. The survey assessed the excavation conditions of the subsurface soil in the fan and Skyline Wash. The survey results found the underlying soils to generally be rippable. See Seismic Refraction Test Results in **Appendix B**.

Caterpillar has published data for rippablity of materials. Generally all but the hardest and/or smoothest caliche and rock is rippable. Given a caliche layer can be seen in Prospect Wash, there is a high probability a caliche layer is present in Skyline fan. Terrcon had direct experience in the Verrado site in the White Tanks (i.e. the old Caterpillar proving grounds directly east of Skyline Wash). They found ripping was not a problem with the right piece of equipment in the cemented soils. After the material was ripped it could be picked up with scrapers, although the size of the ripped material might limit the type of scraper that could be used. The photos they took of the visible cemented layers indicated enough rock that ripping should not be a problem.

The limit to the seismic refraction survey is that it cannot identify if a hard layer is cemented soil / caliche or rock. Geotechnical borings are recommended to validate the Geotechnical Engineers opinion that the hard layer is not rock and is rippable. The borings are recommended during the construction drawings phase.

3 HYDROLOGY

Hydrology models were modified to reflect each Alternative to determine changes in flows with the Alternative in place. The hydrograph analysis models used were modified from two existing HEC-1 models that were originally developed by DEI Professional Services, Inc. (DEI) and provided to Sunrise Engineering, Inc. (SEI) by the District. In July 2012, SEI performed a series of preliminary HEC-1 model runs and summarized the results in a Technical Memorandum entitled Base Conditions Hydrology Analysis. The DCR is the continuation of the base conditions analysis. The methodologies, input data, and practices used for the hydrologic analysis are given herein.

3.1 Base Conditions Hydrology Update Summary

An initial model update was performed that changed the rainfall in the HEC-1 model to the lower NOAA Atlas 14 and other minor model revisions. The update was submitted as the Base Conditions Hydrology Analysis Technical Memorandum (SEI, July 2012).

In the Delineation Study (DEI, 1998) the watershed hydrology was modeled using the U.S. Army Corps of Engineers (USACE) Flood Hydrograph Package HEC-1, Version 4.0.1 (USACE, 1991) in accordance with the Drainage Design Manual for Maricopa County, Volume I Hydrology (District, 1995). The model input data files including SKYLINE6.DAT (for 100-year 6-hour local storm) and SKYLINE.DAT (for 100-year 24-hour general storm) were developed by DEI for District in 1998. These HEC-1 models are called DEI/ District models hereafter.

The DEI/District HEC-1 models were modified to reflect the updated current conditions. These HEC-1 models modified July 2012 are called Base Conditions models hereafter.

1. It was agreed by the Town, District and SEI that there are no significant changes in the watershed conditions since the Delineation Study was completed in 1998.
2. The NOAA Atlas 14 point rainfall depths of the 100-year 6-hour and 100-year 24-hour events are 2.80 and 3.97 inches in the study area, and were used to replace the NOAA Atlas 2 rainfalls.
3. The District Hydrology Manual, 2011 includes depth-area reduction factors to convert the point rainfall depths to area-averaged depths. These factors were used in the Base Conditions models, which are slightly different with those used in the DEI/ District models.
4. There are no modifications made on the 6- and 24-hour rainfall distributions for the Base Conditions models.
5. Soil data used in the Base Conditions models is the same as the DEI/ District models.
6. Land use update is not a task of the Base Conditions Analysis, but will/may be performed in the future phases of the DCR.
7. There are no modifications made on the rainfall losses in the Base Conditions models since the watershed delineation, soil data and land use types do not change.
8. There are no modifications made on the S-graphs in the Base Conditions models since the watershed delineation, soil data and land use types do not change.
9. Flow divisions were modeled at the Skyline Wash apex and Skyline Wash downstream of Coyote-Skyline Wash confluence. There are no modifications made on the flow diversions in the Base Conditions models.

Results of the Base Conditions models were presented in the Base Conditions Hydrology Analysis Technical Memorandum (SEI, July 2012) and were accepted by the District. By comparing the model results it was found that the 6-hour storm peak discharges reduce by 26.4 – 39.0% and the 24-hour storm 7.2 – 11.3%, and peak times maintain almost the same for both storm events (by using the NOAA Atlas 14 rainfall).

Model output is included in **Appendix C**, also see **Figure 3.1.1 Base Conditions HEC-1 Model Results** which shows that the peak discharge values generated by both the 6- and 24-hour storm events in sub-watersheds, routing or diverting channels, and at the hydrograph combining and diverting locations.

3.2 Preliminary Alternative Models

Preliminary models were run for Alternatives 1, 2, & 3 as presented in the scope of work. The results of the models were used at the Brainstorming meeting. The preliminary Alternative hydrology analysis models were modeled with the 100-year 24-hour storm.

3.2.1 Alternative 1 Model

The following modifications were made in the 24-hour Base Conditions model:

1. A 267 acre-feet conceptual detention basin DB13 was added immediately downstream of HC13 (Skyline Wash Apex).
2. A 48-inch diameter reinforced concrete pipe (RCP) was conceptually designed for the low flow outlet of DB13. The stage outflow curve was calculated using a drainage design computer program HY8.
3. Flow diversion at DI13 (downstream of DB13) was modified: 100% hydrograph at HC13 was routed to S27 (Prospect Wash). In the Base Conditions models, this flow was split and routed to S14 (Skyline/Coyote Wash) and S24 (alluvial fan area).
4. A new channel (5-foot bottom width) is added between Skyline Wash Apex and Prospect Wash.
5. Other related modifications.

Model output is included in **Appendix D,** also see **Figure 3.2.1.1 Alternative 1 Preliminary HEC-1 Model Results**.

3.2.2 Alternative 2 Model

The following modifications were made in the 24-hour Base Conditions model:

1. Flow diversion at DI13 (downstream of DB13) was modified: 100% hydrograph at HC13 was routed to S27 (Prospect Wash). In the Base Conditions models, this flow was split and routed to S14 (Skyline/Coyote Wash) and S24 (alluvial fan area).
2. A new channel (120-foot bottom width) is added between Skyline Wash Apex and Prospect Wash.
3. Other related modifications.

Model output is included in **Appendix E,** also see **Figure 3.2.2.1 Alternative 2 Preliminary HEC-1 Model Results**.

3.2.3 Alternative 3 Model

The following modifications were made in the 24-hour Base Conditions model:

1. A 150 acre-feet conceptual detention basin DB13 was added immediately downstream of HC13 (Skyline Wash Apex). The area to the freeboard line is 198 acre-feet and the area within the high water line is 150 acre-feet.
2. An 11' × 6' concrete box culvert was conceptually designed for the outlet works of DB13. The stage outflow curve was calculated using HY8.
3. Flow diversion at DI13 (downstream of DB13) was modified: 100% hydrograph at HC13 was routed to S27 (Prospect Wash). In the Base Conditions models, this flow was split and routed to S14 (Skyline/Coyote Wash) and S24 (alluvial fan area).
4. A new channel (25-foot bottom width) is added between Skyline Wash Apex and Prospect Wash.
5. Other related modifications.

Model output is included in **Appendix F**, also see **Figure 3.2.3.1 Alternative 3 Preliminary HEC-1 Model Results**.

ALTERNATIVES ANALYSIS
SKYLINE FAN DCR

FIGURE 3.1.1
BASE CONDITIONS HEC 1 MODEL RESULTS
MODIFIED FROM DEI PROFESSIONAL SERVICES, INC. DELINEATION STUDY REPORT (1998)

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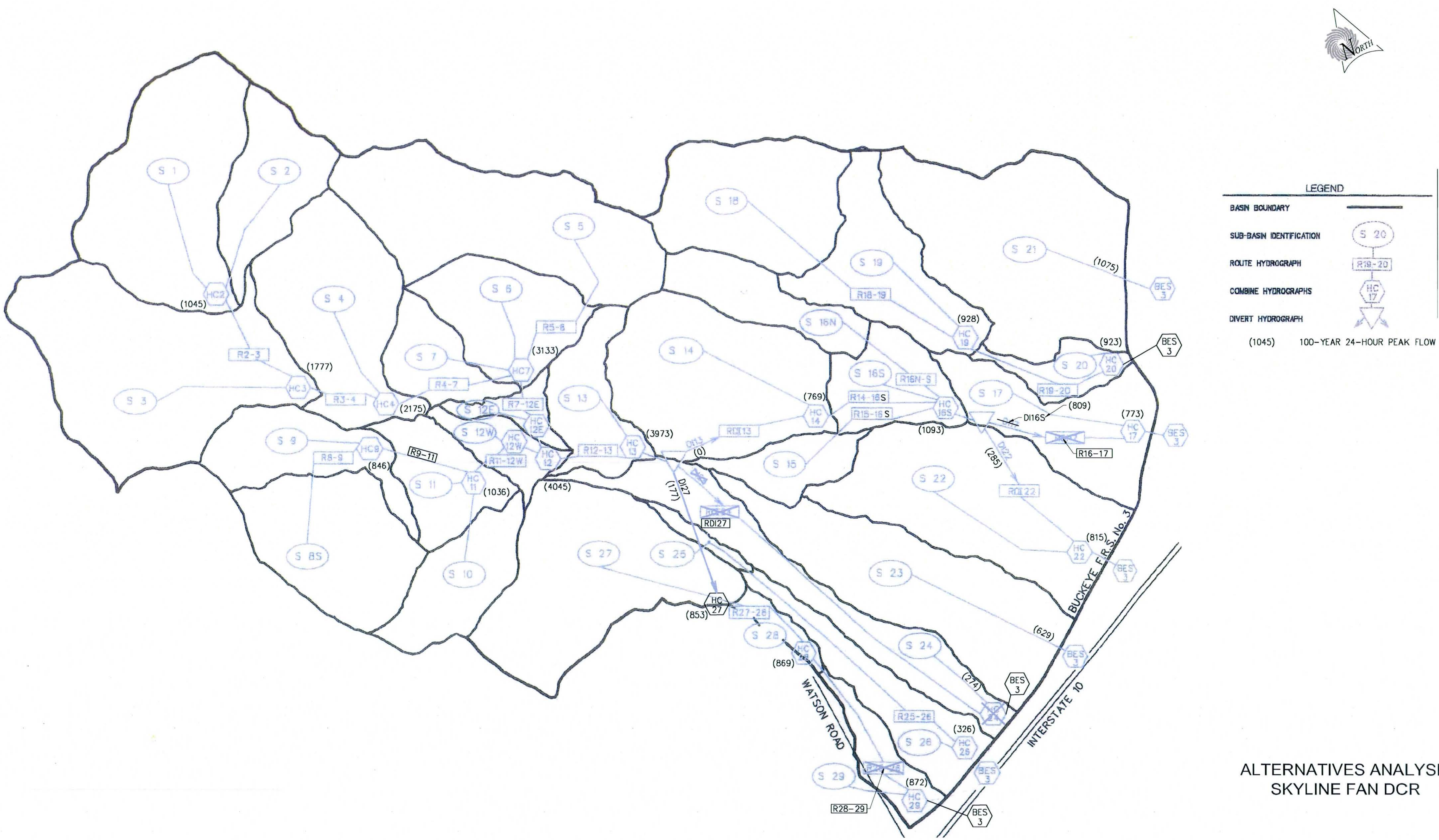

ALTERNATIVES ANALYSIS
SKYLINE FAN DCR

FIGURE 3.2.1.1
ALTERNATIVE 1 HEC 1 MODEL RESULTS
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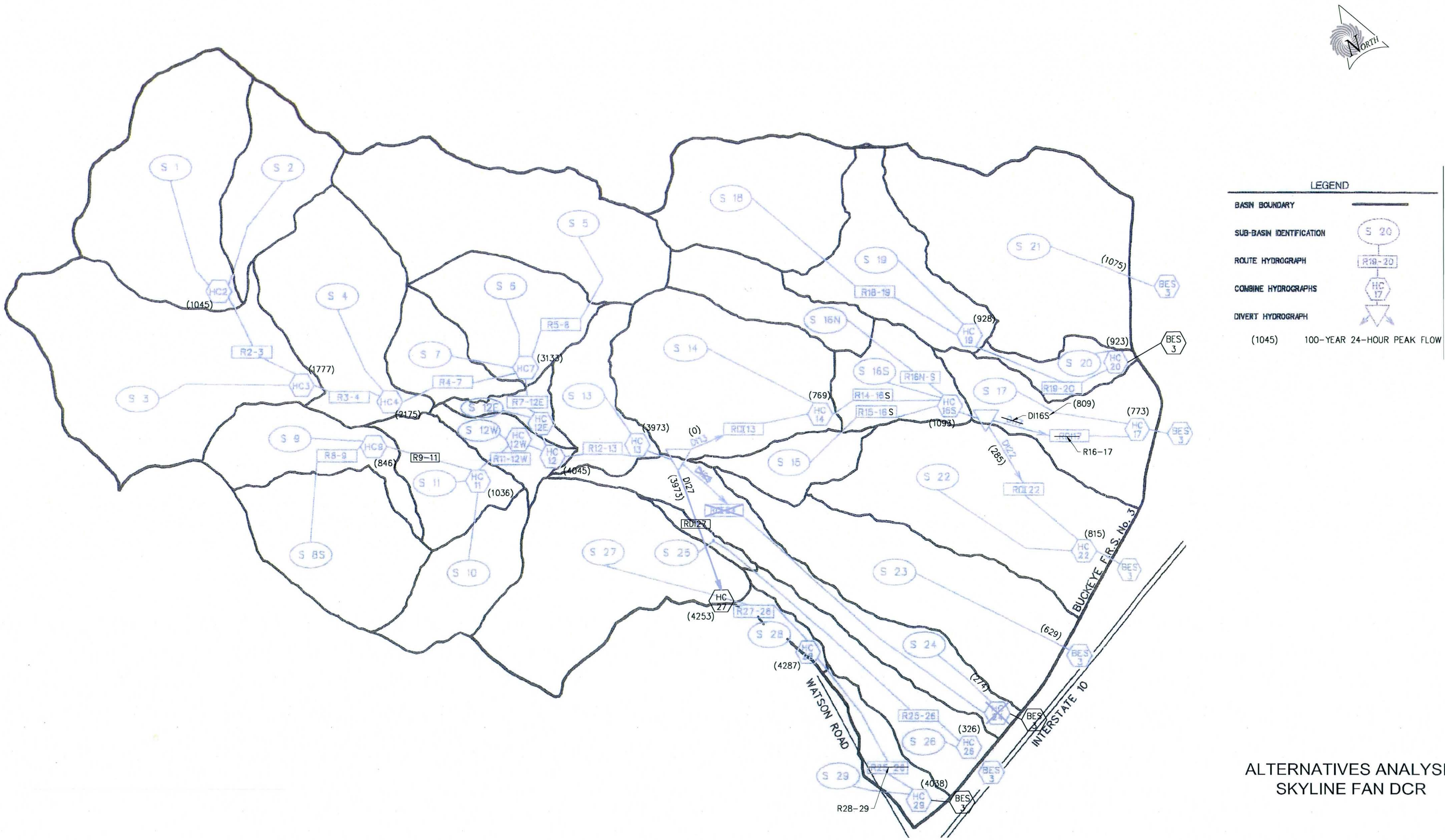
P:\Buckeye\04234Skyline Wash DCR\Dwg\Exhibits\Figure 3.x.1 Alternative 1A HEC-1 Model Results.dwg May 21, 2013 12:02pm cchristian



ALTERNATIVES ANALYSIS
SKYLINE FAN DCR

FIGURE 3.2.2.1
ALTERNATIVE 2 HEC 1 MODEL RESULTS
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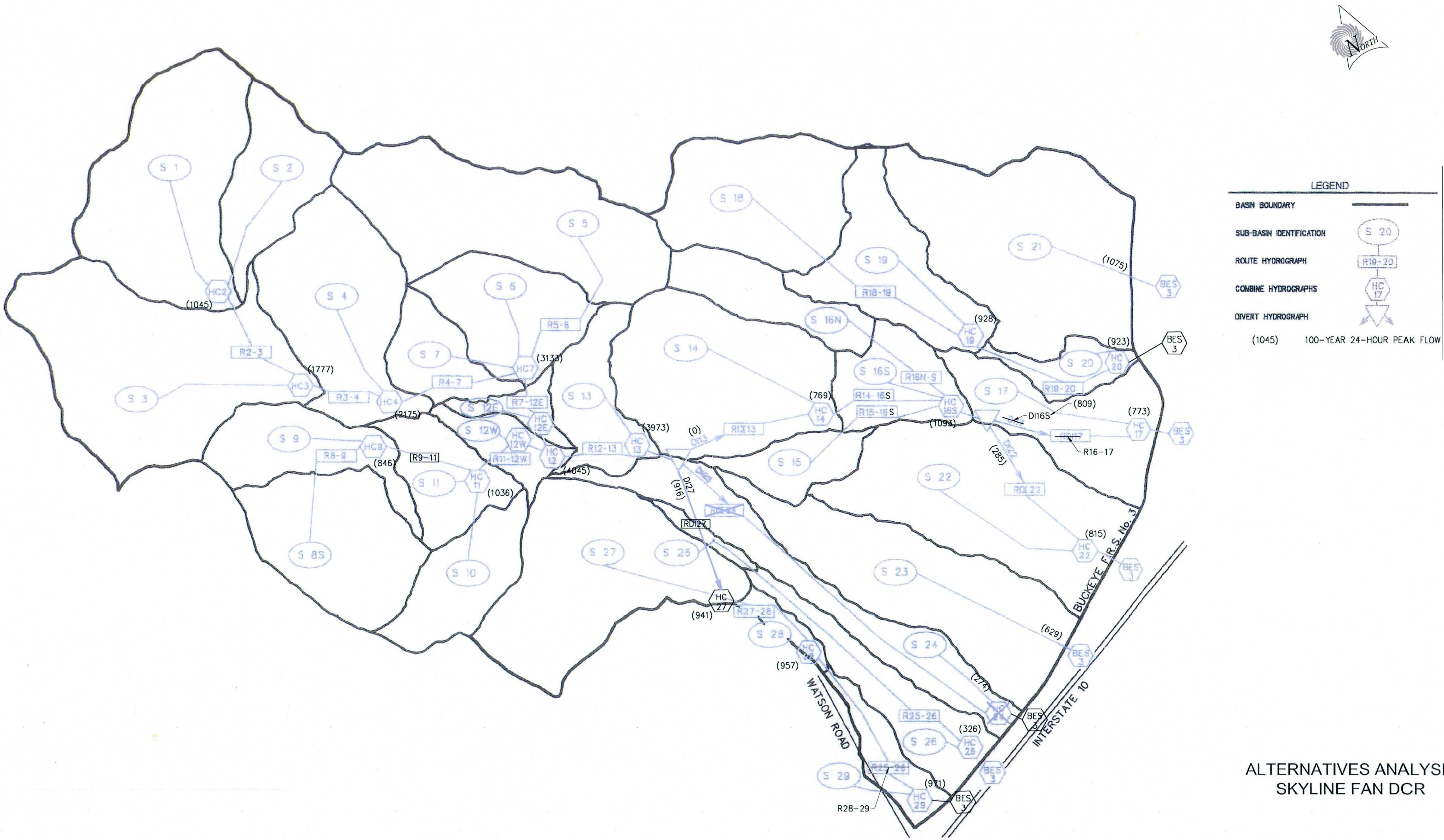

ALTERNATIVES ANALYSIS
SKYLINE FAN DCR

FIGURE 3.2.3.1
ALTERNATIVE 3 HEC 1 MODEL RESULTS
MODIFIED FROM DEI PROFESSIONAL SERVICES, INC. DELINEATION STUDY REPORT (1998)

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3.3 Alternative Analysis Models

After comparing the preliminary model results, potential costs, and other factors for the three alternatives, the project partners agreed that Alternative 1 warranted a more detailed conceptual design. For a better understanding of the hydrologic conditions and impacts from the proposed flood control development, Alternative 1 was further analyzed for the following two options for the 100-year 6- and 24-hour storms:

1. Alternative 1A A large fully incised 15-foot deep detention basin at the apex with low flow outlet to Prospect Wash.
2. Alternative 1B A large fully incised 10-foot deep detention basin at the apex with dual low flow outlets to Prospect Wash and Skyline Wash, north leg.

3.3.1 Alternative 1A

The following modifications were made in the 100-year 24-hour storm Preliminary Alternative 1 model:

1. A starting 245 acre-feet (235 acre-feet + 9.79 acre-feet of sediment) water volume conceptual detention basin DB13 (as modeled) was added to replace the 267 acre-feet basin. The stage-storage relationship was modeled using AutoCAD Civil 3D. The actual peak volume required, 237 acre-feet was determined from the stage-storage and outfall rating table. Sediment storage was revised after modeling to 17.7 acre-feet. Therefore, the volume required is 255 acre-feet (237 acre-feet + 17.7 acre-feet). Alternative 1A grading design provided a volume of 253 acre-feet. The recommended alternative grading design provided a volume of 256 acre-feet.
2. A 42-inch diameter stormdrain pipe was conceptually designed for the low flow outlet of DB13. The stage outflow curve was calculated as a culvert using the stormwater modeling computer software HydroCAD.
3. Other related modifications.
4. A 100-year 6-hour storm model was set up based on the preliminary and Alternative 1A models.

Model output is included in **Appendix G**. **Figure 3.3.1.1 Alternative 1A HEC-1 Model Results** shows the peak discharge values generated by both the 6- and 24-hour storm events in sub-watersheds, routing or diverting channels, and at the hydrograph combining and diverting locations.

3.3.2 Alternative 1B

1. The 215 acre-feet conceptual detention basin DB13 (previous model starting volume) was modified to 224 acre-feet based on a more accurate stage-storage relationship that was modeled using AutoCAD Civil 3D.
2. Three 48-inch diameter stormdrain pipes were conceptually designed for the low flow outlet of DB13. The stage outflow curve was calculated as culverts using HydroCAD.
3. Flow diversion at DI13 (downstream of DB13) was modified: 1/3 hydrograph at HC13 was routed to S27 (Prospect Wash) and 2/3 to S14 (Skyline/Coyote Wash).
4. Other related modifications.
5. A 100-year 6-hour storm model was set up based on the preliminary and Alternative 1A models.

Model output is included in **Appendix H**. **Figure 3.3.2.1 Alternative 1B HEC-1 Model Results** shows the peak discharge values generated by both the 6- and 24-hour storm events in sub-watersheds, routing or diverting channels, and at the hydrograph combining and diverting locations.

For comparison purposes, Alternative 2 and 3 model results are shown in **Figures 3.2.2.1 Alternative 2 Preliminary HEC-1 Model Results** and **3.2.3.1 Alternative 3 Preliminary HEC-1 Model Results**.

3.3.3 Model Output Summary

Alternative 1A and 1B model results for selected critical locations within the study area are summarized in **Table 3.3.3.1** and **3.3.3.2**.

Table 3.3.3.1 Summary of Alternative 1A Model Results at Selected Locations

Location (-)	HEC-1 ID (-)	Q 100-Year 6-Hour (cubic feet per second)	Time to Peak 100-Year 6-Hour (hours)	Q 100-Year 24-Hour (cubic feet per second)	Time to Peak 100-Year 24-Hour (hours)
Skyline Wash Apex	HC13	2,597	4.35	3,973	12.30
Skyline Flow Split: Maintained in Skyline Wash	DI13	0	0[1]	0	0[2]
Skyline Flow Split: Routed to Prospect Wash	DI27	151	5.70	171	13.70
Skyline Wash (Main Split) at FRS No.3	HC17	493	4.40	773	12.35
Prospect Wash at FRS No.3	HC29	945	4.20	887	12.20

[1,2] No spilt flow maintained in Skyline Wash.

Table 3.3.3.2 Summary of Alternative 1B Model Results at Selected Locations

Location (-)	HEC-1 ID (-)	Q 100-Year 6-Hour (cubic feet per second)	Time to Peak 100-Year 6-Hour (hours)	Q 100-Yearr 24-Hour (cubic feet per second)	-
Skyline Wash Apex	HC13	2,597	4.35	3,973	12.30
Skyline Flow Split: Maintained in Skyline Wash	DI13	272	5.25	337	13.15
Skyline Flow Split: Routed to Prospect Wash	DI27	136	5.25	169	13.15
Skyline Wash (Main Split) at FRS No.3	HC17	493	4.40	778	12.35
Prospect Wash at FRS No.3	HC29	953	4.20	864	12.20

3.4 Hydrology Conclusion

1. The peak discharges at all locations in the study area are significantly reduced by using the NOAA Atlas 14 rainfall depths.

2. The peak discharges generated from a 100-year 6-hour local storm are higher than the 100-year 24-hour general storm at all sub-basin outlets – HEC-1 ID S1, S2, and S29.

3. The hydrograph combinations at some locations result in higher peak discharge of a 100-year 24-hour storm than a 100-year 6-hour storm – HEC-1 ID HC3, HC4, HC7, HC12, HC13, HC14, HC17 and HC22, which are impacted by the hydrographs from Skyline Wash and/or its tributaries.

ALTERNATIVES ANALYSIS
SKYLINE FAN DCR

FIGURE 3.3.1.1
ALTERNATIVE 1A HEC 1 MODEL RESULTS
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ALTERNATIVES ANALYSIS
SKYLINE FAN DCR

FIGURE 3.3.2.1
ALTERNATIVE 1B HEC 1 MODEL RESULTS
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4 HYDRAULICS, SCOUR, & SEDIMENTATION

Hydraulic, scour and sedimentation calculations were performed for Prospect Wash and Skyline Wash. The calculations determined existing wash capacities, scour depth, sediment yield, and a representative flow rate for Skyline Wash.

4.1 Prospect Wash

Alternatives 2 and 3 proposed diverting 4,000 cubic feet per second and 900 cubic feet per second to Prospect Wash, respectively. Capacity of the wash at the Alternative flow rates was checked using the open channel hydraulic computer program HEC-RAS by the Army Corps of Engineers. The existing FIS study models were obtained and run at the higher flow rate. See **Appendix I** for model output. See the Alternatives sections for discussion regarding results.

Scour potential in Prospect Wash was calculated with the Drainage Design Management System for Windows (DDMSW) computer program by the District. The scour module of DDMSW uses actual channel cross section geometry to compute the scour potential at the chosen flow rates. Cross section geometry was extracted from HEC-RAS and imported into DDMSW. Sediment grain size used was an average as calculated in the ADMP. These calculations were completed prior to the soils data being available. However the ADMP average grain size is less than Terracon's soil samples. Smaller grain size has higher erosion potential, therefore the results presented here are conservative. See **Appendix J** for model output. See Alternatives sections for discussion regarding results.

Scour potential in Prospect Wash was estimated for the low flow rate of 177 cubic feet per second. The base condition scour estimate is the base condition hydrology 100-year, 6-hour peak flow of 971 cubic feet per second and the use of the Lacey equation for sediment laden flow. The low flow scour was estimated using Alternative 1A 100-year, 6-hour flow of 997 cubic feet per second for long term scour and the low flow rate of 177 cubic feet per second for general scour with the Blench equation for clear water flow. All calculations were performed using DDMSW. Two sample cross sections were used, river mile 0.2 and 0.9 which correlate to sections B and I on the FIRM. The low flow scour shows a 15% increase in scour potential. Generally the scour rates in Prospect Wash are about 5 to 6 feet. Therefore even with the slight increase in low flow scour potential Prospect Wash will not be adversely effected by the low flow diversion. See **Appendix J** for model output. See **Table 4.1.1 Prospect Wash Low Flow Scour.**

Table 4.1.1 Prospect Wash Low Flow Scour

Existing Scour				Low Flow Scour		
Cross Section (FIRM)	Q (cubic feet per second)	Method (-)	Total Scour (feet)	Q (cubic feet per second)	Method (-)	Total Scour (feet)
0.29 (B)	971	Lacey	5.39	177	Blench	5.58
0.9 (I)	971	Lacey	5.62	177	Blench	6.48

The low flow rate of 177 cubic feet per second in Prospect Wash approximates to between the 2-year and 5-year storm events. The approximate year event is found by taking the percentage of the flow versus the 100-year flow (177/847= 21%) and correlating it the Hydrology Manual Table 6.1. A 5-year event is 25% of the 100-year event and a 2-year event is 10%. Therefore the Prospect Wash low flow rate of 177 cubic feet per second is representative of a little less than the 5-year event

4.2 Skyline Wash

For Skyline Wash flow capacity, scour potential, wash sediment load, and representative flow calculations were performed. Existing flow capacity of Skyline Wash was determined using the computer program FlowMaster by Bentley. FlowMaster uses Mannings equation for single cross sections only. Cross sections were generated in ACAD Civil 3D using the District provided topo and DTM. The cross sections were imported into FlowMaster. The water surface in each cross section was set at the maximum level for the cross section or the existing flow rate of the wash. See **Appendix K** for cross section locations and FlowMaster output. See Alternative sections for discussions regarding results.

Skyline Wash has three potential washes downstream of the apex. Skyline "north" to the north a little south of the unnamed wash at the base of the rock mountain. Skyline "middle" in the middle in alluvium. Skyline "south" is also in alluvium. See exhibit in **Appendix K** for Skyline Wash north, middle, south, and their confluence with Coyote Wash. The "middle" is the route used in the FIS study for Skyline Wash routings. The middle section was used for the representative flow calculations as it had the highest flow available. It was determined the north leg and an unnamed leg further to the north convey 244 cubic feet per second per cross section 8. The downstream sections appear to have greater capacity but only 244 cubic feet per second from Skyline Wash will flow into them. Cross Section 1 of the middle wash has an existing capacity of about 577 cubic feet per second, therefore the middle leg has the greatest existing capacity of the north middle and south legs.

Scour potential in Skyline Wash was calculated with DDMSW. Cross section geometry was extracted from the topographic survey with ACAD Civil3D and imported into DDMSW. Sediment grain size used was an average as calculated in the ADMP. See **Appendix L** for model output. See Alternatives sections for discussion regarding results.

Sediment yield in Skyline Wash was calculated using DDMSW. Sediment grain size used was an average of the soil samples collected by Terracon. See **Appendix L** for model output. The three year maintenance volume is one 100-year event plus three annual events, 11.15 acre-foot + (2.18 acre-feet X 3) = 17.7 acre-feet. See **Table 4.2.1 Skyline Wash Sediment Yield** and Alternatives sections for discussion regarding results. It should be noted that the District has had to do little maintenance on the FRS#3, implying the sediment yield from Skyline Wash is left on the Fan or is lower the current sediment yield calculations estimate.

Table 4.2.1 Sediment Yield Skyline Wash

Event (Year)	Q (cubic feet per second)	Wash Load (acre-feet)	Bed Load (acre-feet)	Total Yield (acre-feet)
10	1,724	4.39	0.26	4.65
100	3,973	10.21	0.94	11.15
Annual	-	2.07	0.12	2.18

The representative flow in Skyline Wash is the flow rate out of the detention basin that has scour potential equal to or less than the existing scour potential. The difference in scour is attributed to the sediment dropping out in the basin creating clear water flow which has higher scour potential. The existing conditions will have a higher flow rate for a given scour potential because sediment laden water has lower scour potential.

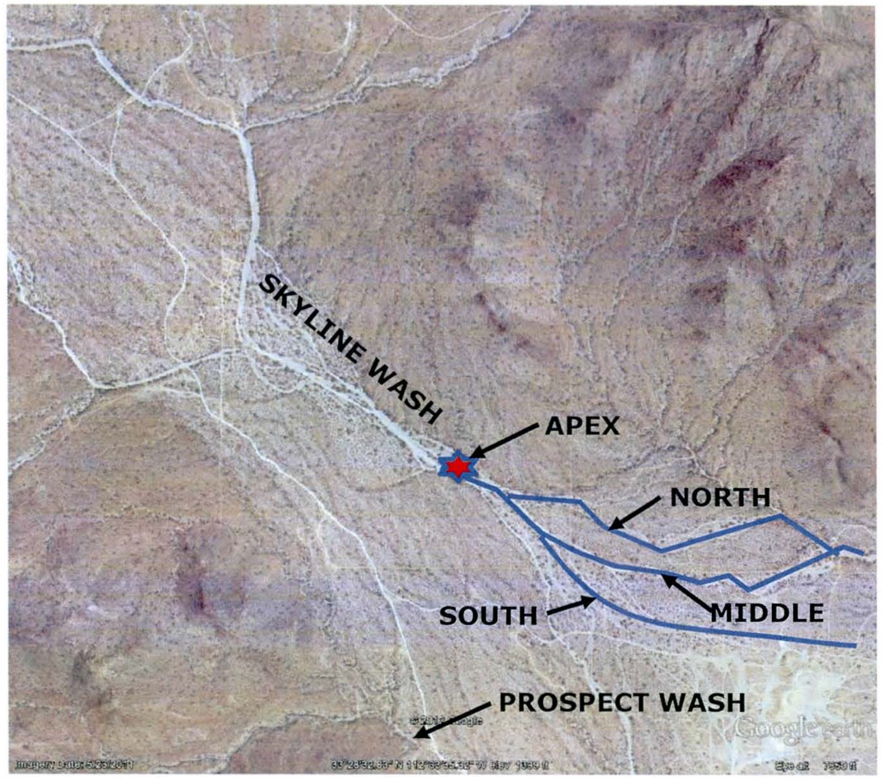
To calculate the representative flow three representative cross sections were selected, sections 1, 2, and 5. The total scour of each section was calculated using DDMSW and the Lacey Equation for sediment laden flow. The results are the same as the previous scour calculations. The scour calculations were run again using the Blench Equation for clear flow. The flow rate in the channel was lowered until the total scour in each section was less than or equal to the existing total scour. Cross section 1 controlled and the controlling flow rate was carried through all sections. The representative flow was found to be 400 cubic feet per second. This approximates to between a two and five year storm events. The approximate year event is found by taking the percentage of the flow versus the 100-year flow (400/1971= 20%) and correlating it the Hydrology Manual Table 6.1. A 5-year event is 25% of the 100-year event and a 2-year event is 10%. Therefore the Skyline Wash representative flow rate of 400 cubic feet per second is representative of a little less than the 5-year event. See **Appendix M** for model output. See **Table 4.2.2 Skyline Wash Representative Flow Calculations Summary** and Alternatives sections for discussion regarding results.

Table 4.2.2 Skyline Wash Representative Flow Calculations Summary

	Existing Flow			Representative Flow		
Cross Section (-)	Q (cubic feet per second)	Method (-)	Total Scour (feet)	Q (cubic feet per second)	Method (-)	Total Scour (feet)
CS1	577	Lacey	5.71	400	Blench	5.67
CS2	1,715	Lacey	8.46	400	Blench	5.85
CS5	1,906	Lacey	7.53	400	Blench	4.37

CS1 Controls Overall

The Skyline representative flow rate of 400 cubic feet per second is representative of a little less than the 5-year event. This calculation is based on 100-year flow rate of 1,971cubic feet per second routed to Skyline Wash. The calculated representative flow for Skyline is 400 cubic feet per second and the ratio of these flows is 400/1,971 which is equal to 20%. According to the Hydrology Manual Table 6.1, a 5-year event is 25% of the 100-year event and a 2-year event is 10%.



Skyline Wash Apex

5 ALTERNATIVE 1A – BASIN + SINGLE LOW FLOW

Estimated Cost - $6.5 to $6.6 Million

5.1 Description

Alternative 1A is one of two basin only alternatives, where a large basin is used to detain all the run-off from a 100-yr event and meter the outflow in a low flow pipe. This Alternative consists of a fully incised basin with low flow pipe outlet to Prospect Wash. See **Figure 5.1.1 Alternative 1A Overall Plan and Figure 5.1.2 Alternative 1A Concept Plan**

Basin

The basin volume required is 255 acre-feet (237 acre-feet peak volume in model + 17.7 acre-feet sediment) and 253 acre-feet (408,000 cubic yards) has been provided which is 2 acre-feet less due to grading design. The volume includes 3 years of the estimated sediment volume. The drain down time for the basin is approximately 85 hours after the peak level in the basin is reached. The basin bottom will include a low flow channel, stilling basin and minimal contouring. The basin has been sited so that the downstream end of the basin is at the apex. The high water elevation is one foot below the Skyline Wash invert. The basin side slopes will meander with an average slope of 6:1 on the downstream end and sides and 8:1 at the upstream end. The basin has a total water depth of 15 feet and 1 foot of freeboard.

There is an estimated 925,000 cubic yards of cut required to excavate the basin. The excess earthwork is due to the large quantities of dirt above the high water line that have to be excavated. And the slope of Skyline Wash is approximately 2%. This results in the upstream slope being very long to intersect existing grade. See **Figure 5.1.2 Alternative 1A Concept Plan**

The earthwork estimate assumes a two mile round trip for export of the dirt. The West Side 319, LLC property may need approximately 280,000 cubic yards to fill the existing excavation pit. This could be the first possible place to take the dirt. Remaining areas include spreading it over private property, stockpiling for State Land use or selling it to a materials vendor.

Landscape islands have been added to the basin to break up the large flat bottom space and increase blending of the basin within the surrounding area.

Inlet

The basin inlet structure is a terraced structure with 5-foot steps per the Sun Valley ADMP. The first drop will consist of a riprap spillway with stilling basin as the unit flow rate of the channel is within allowable limits. The next drops will be widened out further to such that the unit flow rate per foot of structure is lower at every step reducing the energy level in every drop. The drops will be sloped riprap spillways with drop heights between 2 and 5 feet. Planted terraces will be used at every step to encourage plant growth and mask the structure.

Outlet

The basin will drain to Prospect Wash via a 42-inch pipe. The pipe will carry a peak flow rate of 171cfs. The pipe will be connected to a perforated stand pipe and slide gate structure. The stand pipe open end serves as an emergency by-pass with the elevation set at high water and will include a floating debris guard. A slide gate will be a manual gate that can be opened to by-pass the stand pipe and provide a second level of redundancy.

The pipe will exit to Prospect Wash with a headwall. Rip rap will be required to prevent localized scour at the exit point.

The third and final level of redundancy is the maintenance road elevation set at the high water level/Skyline Wash invert. The overflow structure will act as a broad crested weir and require rip rap on the upstream and downstream edges. It will be sized to convey a 100-yr event. Should a back to back 100-year event occur the second event will be passed through the system without damage to the basin.

Watson Road & Roosevelt Street Crossings

Culverts are required at roadway crossings. Prospect Wash crosses Watson Road and Roosevelt Street. This Alternative increases the flow duration in Prospect Wash. Therefore the Alternative is responsible for adding a 42-inch low flow pipe culvert to convey the flow under Watson Road and Roosevelt Street and will not adversely affect existing conditions.

It is anticipated that Watson Road will be paved and culverts installed by the Town's Regional Park Project prior to the construction of this project. The culverts would be sized to convey the existing flow in Prospect Wash, 971 cubic feet per second. Therefore, this project would not be required to install culverts. However, if no culverts have been installed at the time of construction for this project then this project will be required to install low-flow culverts. The Town's park project will not affect the requirements for the culvert installed across Roosevelt Street.

Maintenance

Maintenance will be required to clear the basin of deposited sediment from large storm events. It has been conservatively estimated that a total of 17.7 cubic yards of sediment from large storm events will be removed every three years. The amount of sediment removal in a three-year span will most likely be less. The 100-year storm event could produce 11.15 acre-feet of sediment and the annual yield could produce 2.18 acre-feet of sediment. The 100-year storm plus three annual storms equates to 17.7 acre-feet of sediment. This has a very low probability that this will occur every three years. This may occur once or twice in a lifetime. There most likely will be six to seven acre-feet of removal every three years provided that it rains every year. Approximately six acres has been allocated for a sediment pool area where excess sediment will be relocated. Maintenance also includes hydroseed of the disturbed maintenance area in order to re-establish plant material.

Advantages

1. Single basin with single outlet pipe, simple.
2. No improvements to Prospect Wash.
3. 15-foot depth decreases earthwork volumes over Alternative 1B.

Disadvantages

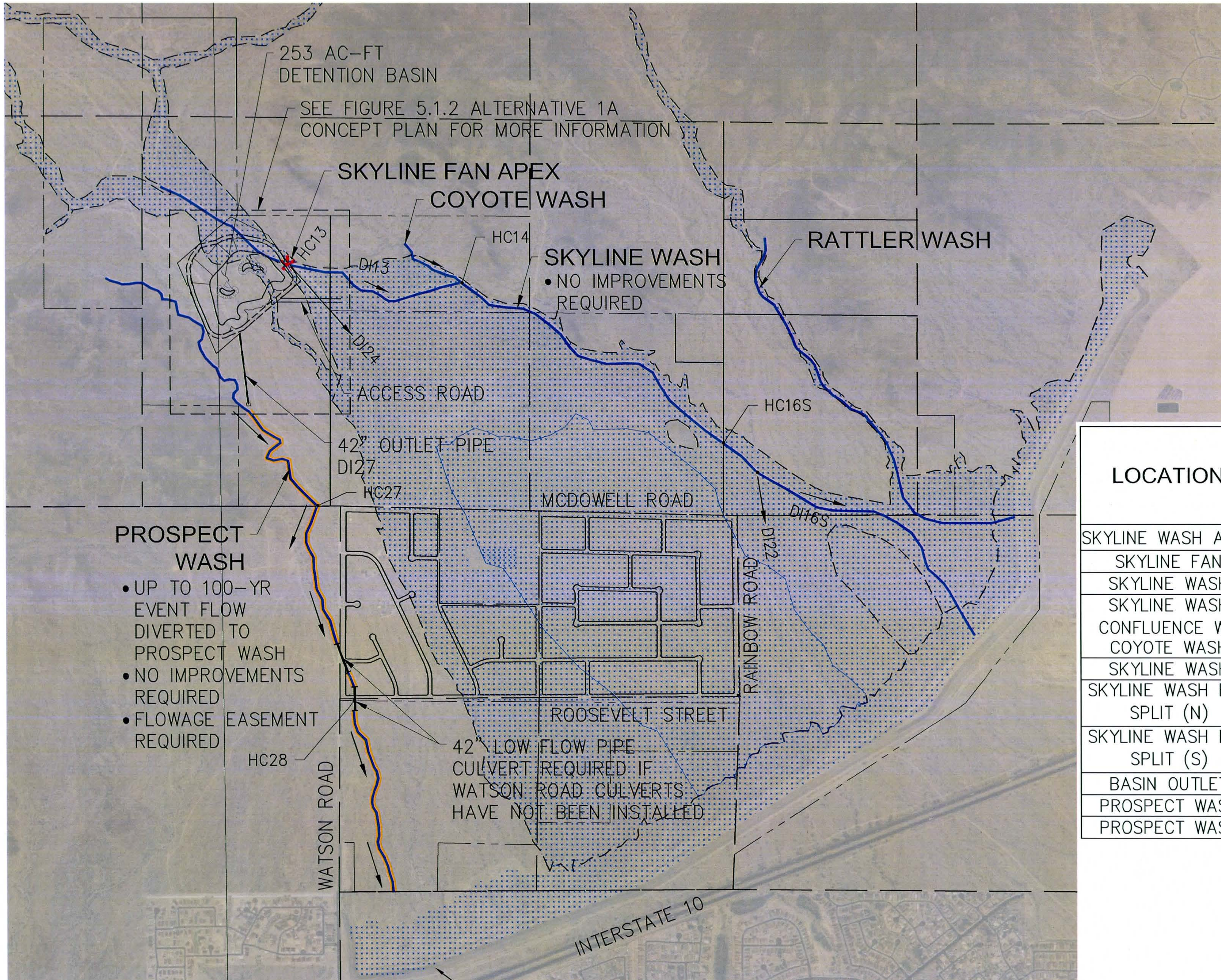
1. On-going basin maintenance, sediment removal.
2. Large basin size, more earthwork.
3. Single low flow outlet pipe, single pipe could plug, longer drain down times.
4. Maintenance may require removal of up to 17.7 acre-feet of sediment deposits every three years

5.2 Hydrology and Hydraulics

Hydrology modeling for this Alternative routes all flow in Skyline Wash into the basin then to Prospect Wash. The flow in Skyline Wash from the apex to Coyote Wash will only receive local runoff that is generated downstream of the apex. Additional flow reductions are seen in Skyline Wash downstream of the confluence with Coyote Wash. The flow reductions improve flooding conditions for properties adjacent to the wash.

The low flow diverted to Prospect Wash may create localized scour and/or sedimentation in the bottom of the wash. However, the localized scour and/or sedimentation that may occur will not adversely affect large flow conveyance. Wash capacity is not a concern either as the low flow rate is approximately 20% of the existing flow rate for the wash.

Flow duration on Prospect Wash will increase significantly. The existing time to peak flow is approximately 12-hours. With the basin installed the low flow will peak at 14-hours and drain down over the next 85-hours. A drain down time exceeding 36 hours will require vector control.



LEGEND

HC19 — HEC-1 ID

ROUTING UP TO 100-YR EVENT

ZONE A FLOODWAY / FLOODPLAIN

LOCATION	HEC-1 ID	100-YR, 24-HR FLOW		DIFFERENCE (CFS)
		EXISTING (CFS)	PROPOSED (CFS)	
SKYLINE WASH APEX	HC-13	3973	3973	0
SKYLINE FAN	DI-24	2002	0	-2002
SKYLINE WASH	DI-13	1971	0	-1971
SKYLINE WASH CONFLUENCE W/ COYOTE WASH	HC-14	1852	769	-1083
SKYLINE WASH	HC-16S	1906	1093	-813
SKYLINE WASH FAN SPLIT (N)	DI-16S	1343	809	-534
SKYLINE WASH FAN SPLIT (S)	DI-22	563	285	-278
BASIN OUTLET	DI-27	0	171	+171
PROSPECT WASH	HC-27	852	864	+12
PROSPECT WASH	HC-28	848	882	+34

NORTH

SCALE 0 750' 1500'
HORIZ: 1" = 1500'

FIGURE 5.1.1 - ALTERNATIVE 1A OVERALL PLAN

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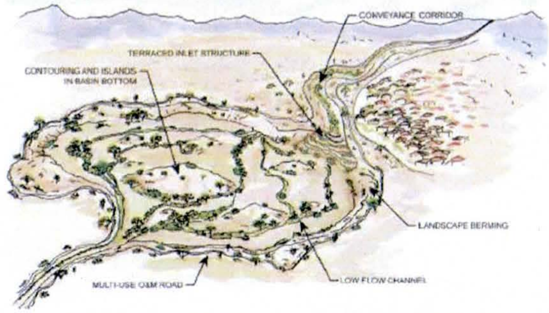
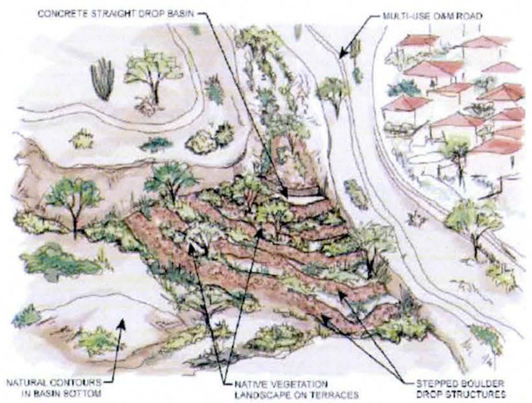
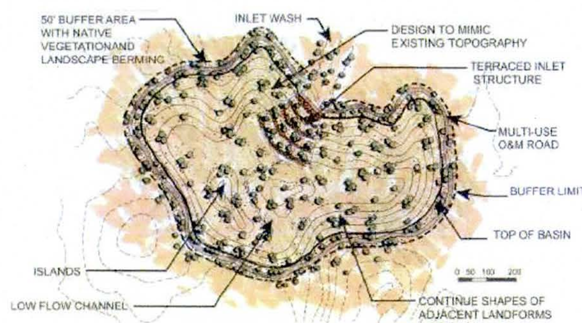


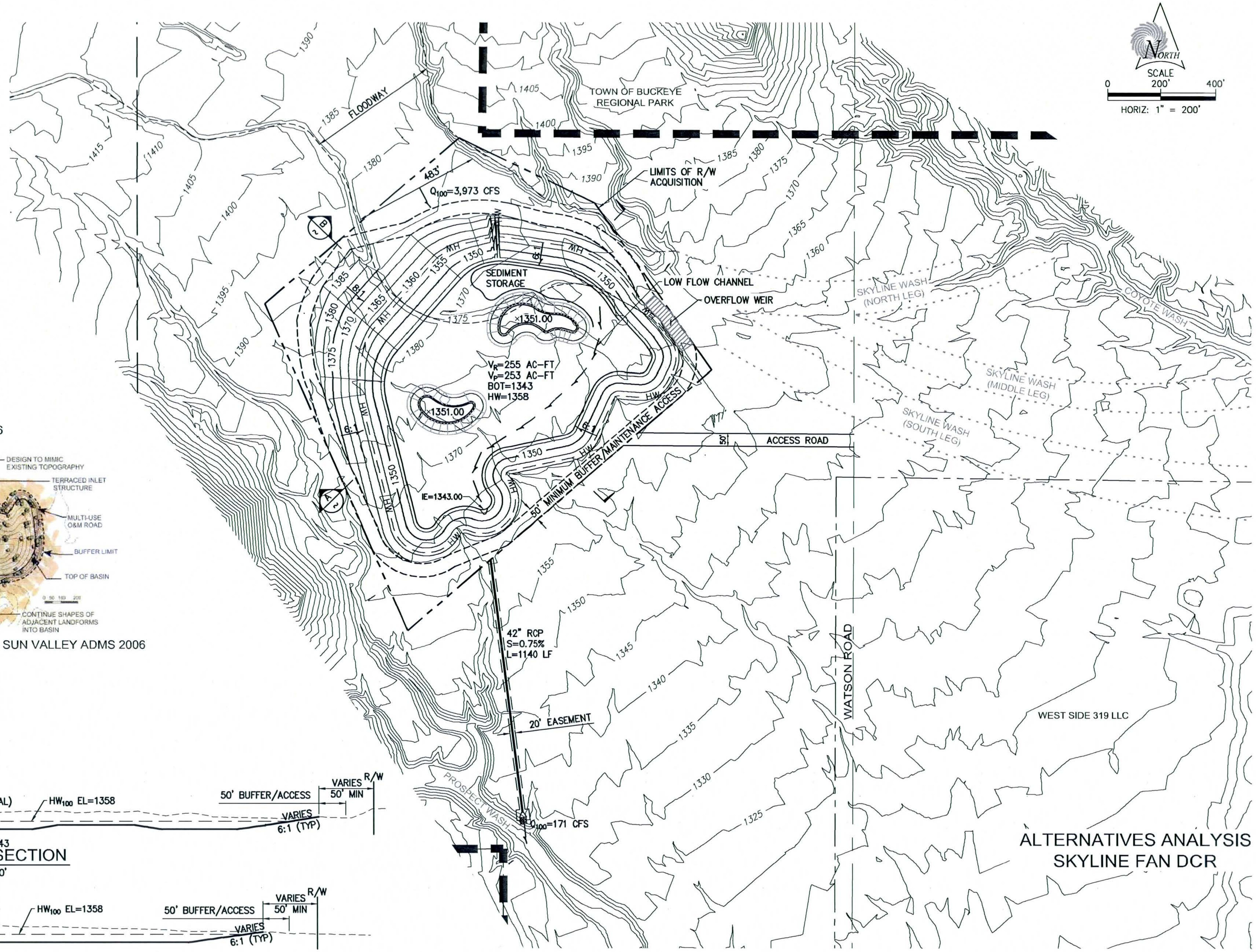
CONCEPTUAL BASIN - SUN VALLEY ADMS 2006



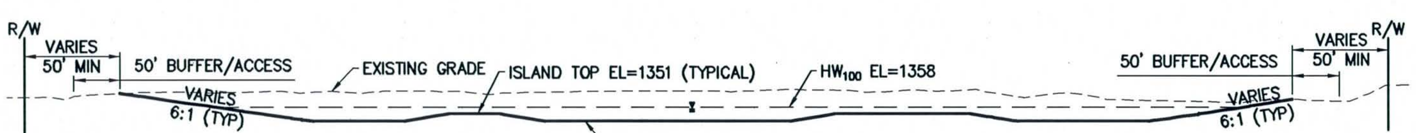
CONCEPTUAL INLET STRUCTURE - SUN VALLEY ADMS 2006



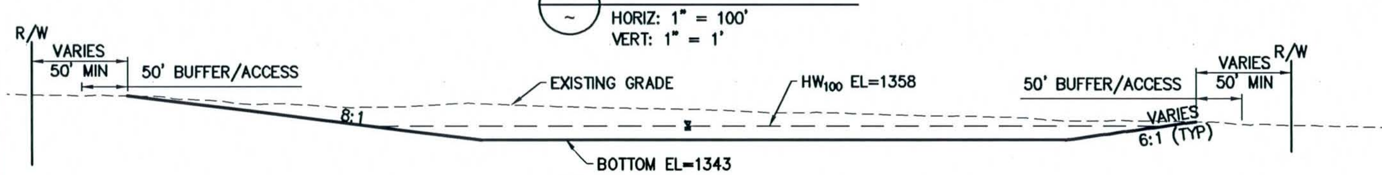
BASIN PLAN WITH AESTHETIC TREATMENT- SUN VALLEY ADMS 2006



ALTERNATIVES ANALYSIS
SKYLINE FAN DCR



A CROSS-SECTION
HORIZ: 1" = 100'
VERT: 1" = 1'



B CROSS-SECTION
HORIZ: 1" = 100'
VERT: 1" = 1'

FIGURE 5.1.2
ALTERNATIVE 1A CONCEPT PLAN

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P:\Ward\03570 SkyWash\dwg\Apex Solution\xref\swas-x-apex basin new alt 1a rev4.dwg Jan 24, 2014 12:19pm hpowell

Costs have been added to the cost estimate for single mosquito control applications on an annual basis. Actual costs will vary based on the actual storm events that occur in a given time period.

5.3 Cost Estimate

Three options have been given for the cost estimate.
Option 1, place fill on-site and purchase material from ASLD. This option assumes that fill is placed on the project site such that no additional scraper haul fee will be incurred. Material will be compacted requiring additional effort for the compaction and construction water. Also a royalty will be paid to ASLD for the material.

Option 2, place fill on-site, ASLD retains ownership. This option assumes that fill is placed on-site, within or very near to the project site on ASLD land such that no additional scraper haul fee will be incurred. Material will be compacted requiring additional effort for the compaction and construction water. Material shall be retained by ASLD, therefore no royalty required.

Option 3, place fill off-site, no compaction. This option assumes that fill is hauled within a 2 mile round trip by the scrapers and stockpiled without compaction. A royalty will be paid to ASLD for the material.

It should be noted that the excess material can be used for landscape berming as well as portions being kept by ASLD with some being hauled away.

SUNRISE ENGINEERING

ALTERNATIVE 1A
PRELIMINARY

Engineer's Opinion of Probable Cost *

FOR CONCEPTUAL USE ONLY

Project: Sky Wash Apex Improvments 1/28/14
Prepared By: RMH, RMP

Alt 1A basin 253 ac-ft, 15-ft water depth, single low flow pipe to Prospect Wash

Item Description	Total	Unit	Unit Price	Total
Sky Wash Detention Basin				
State Land Acquisition (Basin, Perimeter Rd, Access Rd)	40	AC	$25,000	$1,000,000
Terraced Sloped Riprap Inlet Structure	1	EA	$500,000	$500,000
4 Strand Smooth Wire Fencing	5,200	LF	$5.00	$26,000
Maintenance Entry Gates	2	EA	$2,000.00	$4,000
Earthwork - Excavation Only	925,000	CY	$1.75	$1,618,750
Earthwork - Ripping (Below initial 5' of top soil)	602,333	CY	$0.20	$120,467
Construction Water and Dust Control - Excavation	925,000	CY	$0.29	$268,250
Native Plant Salvage	40	AC	$2,000.00	$80,000
Detention Basin Outlet Pipe				
State Land Acquisition (Outlet Pipes)	0.5	AC	$25,000	$12,500
Concrete Overflow Structure	1	LS	$250,000	$250,000
42-inch Low Flow Outlet Pipes	1,140	LF	$90	$102,600
Outlet Catch Basin Structure	1	EA	$20,000	$20,000
42-inch CMP (Watson Road and Roosevelt Street)	600	LF	$90	$54,000
Head Walls (Prospect Wash Culverts)	6	EA	$5,000	$30,000
Rip Rap (Pipe Outlets and Culverts- D_{50} = 12")	40	CY	$40	$1,600
ASLD Fees				
Stumpage Fee	1	LS	$20,000	$20,000

Item Description	Total	Unit	Unit Price	Total
Option 1 - Place Fill On-site (Acquire from ASLD)				
Compaction of Fill Material	925,000	CY	$0.40	$370,000
Construction Water and Dust Control - Compaction	925,000	CY	$0.20	$185,000
ASLD Excavated Material - Royalties	1,202,500	TN	$0.03	$36,075
			Land & Construction Cost	**$4,699,242**
			Landscaping (10%)	**$470,000**
			Contingency (15%)	**$700,000**
			Engineering & Administration (15%)	**$700,000**
			OPTION 1 - BASIN AND OUTLET TOTAL	**$6,600,000**
Option 2 - Place Fill On-site (ASLD Retains Ownership)				
Compaction of Fill Material	925,000	CY	$0.40	$370,000
Construction Water and Dust Control - Compaction	925,000	CY	$0.20	$185,000
			Land & Construction Cost	**$4,663,167**
			Landscaping (10%)	**$470,000**
			Contingency (15%)	**$700,000**
			Engineering & Administration (15%)	**$700,000**
			OPTION 2 - BASIN AND OUTLET TOTAL	**$6,500,000**
Option 3 - Place Fill Off-site (Haul ≤ 2 Miles, No Compaction)				
Earthwork - Haul Only	925,000	CY	$0.65	$601,250
ASLD Excavated Material - Royalties	1,202,500	TN	$0.03	$36,075
			Land & Construction Cost	**$4,745,492**
			Landscaping (10%)	**$470,000**
			Contingency (15%)	**$710,000**
			Engineering & Administration (15%)	**$710,000**
			OPTION 3 - BASIN AND OUTLET TOTAL	**$6,600,000**
Maintenance (3 Year Cycle)				
Mosquito Control	3	YR	$40,000.00	$120,000
Sediment Removal	30,000	CY	$6.00	$180,000
Hydroseed	6	AC	$3,000.00	$18,000
			Total Maintenance Cost	**$318,000**

*In providing opinions of probable construction cost the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as the accuracy if such opinions compared to bid or actual costs.

6 ALTERNATIVE 1B – BASIN + DUAL LOW FLOW

Estimated Cost - $7.9 to $8.0 Million

6.1 Description

Alternative 1B is the second basin only alternative. It consists of a fully incised basin with dual low flow pipe outlets to Prospect Wash and the north leg of Skyline Wash. See **Figure 6.1.1 Alternative 1B Overall Plan** and **Figure 6.1.2 Alternative 1B Concept Plan**

Basin

The basin volume required and provided is 224 acre-feet (361,000 cubic yards). The volume includes 3 years of the estimated sediment volume. The drain down time for the basin is approximately 74 hours after the peak level in the basin is reached. The basin bottom will include a low flow channel and minimal contouring. The basin has been sited so that the downstream end of the basin is at the apex. The high water elevation is one foot below the Skyline Wash invert. The basin side slopes will meander with an average slope of 6:1 on the downstream end and sides and 8:1 at the upstream end. The basin has a total water depth of 10 feet and 1 foot of freeboard. The basin depth is 5 feet shallower than Alternative 1A due to the differences in invert of Skyline Wash and Prospect Wash. The low flow pipe invert in Skyline Wash controlled the basin invert.

There is an estimated 1,125,000 cubic yards of cut required to excavate the basin. The excess earthwork is due to the large quantities of dirt above the high water line that have to be excavated. And the larger area required for the shallower basin. The slope of Skyline Wash is approximately 2%. This results in the upstream slope being very long to intersect existing grade. See **Figure 6.1.2 Alternative 1B Concept Plan**.

The earthwork estimate assumes a two mile round trip for export of the dirt. The West Side 319, LLC property may need approximately 280,000 cubic yards to fill the existing excavation pit. This could be the first possible place to take the dirt. Remaining areas include spreading it over private property, stockpiling for State Land use, or selling it to a materials vendor.

Landscape islands have been added to the basin to break up the large flat bottom space and increase blending of the basin within the surrounding area.

Inlet

The basin inlet structure is a terraced structure with 5-foot steps per the Sun Valley ADMP. The first drop will consist of a riprap spillway with stilling basin as the unit flow rate of the channel is within allowable limits. The next drops will be widened out further to such that the unit flow rate per foot of structure is lower at every step reducing the energy level in every drop. The drop will be sloped riprap drops with drop heights of 2 to 5 feet. Planted terraces will be used at every step to encourage plant growth and mask the structure.

Outlet

The basin will have two low flow drains one to Prospect Wash via a 48-inch pipe and another to the north leg of Skyline Wash via two 48-inch pipes. The Prospect Wash pipe will carry a peak flow rate of 169 cubic feet per second. Skyline Wash pipes will carry a peak flow rate of 337 cubic feet per second.

The pipes will be connected to perforated stand pipes and slide gate structures. The stand pipes open end serves as an emergency by-pass with the elevation set at high water and will include a floating debris guard. The slide gates will be a manual gate that can be opened to by-pass the stand pipe and provide a second level of redundancy. In the case of dual pipes only one slide gate will be used.

The pipes will exit to Prospect and Skyline Wash's with headwalls. Rip rap will be required to prevent localized scour at the exit points.

The third and final level of redundancy is the maintenance road set at the high water level/Skyline Wash invert. The overflow structure will act as a broad crested weir and require rip rap on the upstream and downstream edges. It will be sized to convey a 100-yr event. Should a back to back 100-year event occur the second event will be passed through the system without damage to the basin.

Watson Road & Roosevelt Street Crossings

Culverts are required at roadway crossings. Prospect Wash crosses Watson Road and Roosevelt Street. This Alternative increases the flow rate and duration in Prospect Wash. Therefore the Alternative is responsible for adding 48-inch pipe culverts to convey the low flow under Watson Road and Roosevelt Street without adversely affecting existing conditions.

It is anticipated that Watson Road will be paved and culverts installed by the Town's Regional Park Project prior to the construction of this project. The culverts would be sized to convey the existing flow in Prospect Wash, 971 cubic feet per second. Therefore, this project would not be required to install culverts. However, if no culverts have been installed at the time of construction for this project then this project will be required to install low-flow culverts. The Town's park project will not affect the installation of the culverts across Roosevelt Street.

Maintenance will be required to clear the basin of deposited sediment. It has been estimated that a total of 17.7 cubic yards of sediment from large storm events will be removed every three years. Approximately six acres has been allocated for a sediment pool area where excess sediment will be relocated. Maintenance also includes hydroseed of the disturbed maintenance area in order to re-establish plant material.

Advantages

1. Single basin with dual outlet pipe; bigger area, more shallow basin and smaller volume.
2. No improvements to Prospect Wash.
3. Low flow to Skyline Wash.
4. Smaller basin volume compared to Alternative 1A.
5. Dual low flow outlet structures increase redundancy for drain down.

Disadvantages

1. On-going basin maintenance, sediment removal.
2. 10-foot depth increases earthwork volumes compared to Alternative 1A and required land purchase from ASLD.
3. Maintenance may require removal of up to 17.7 acre feet of sediment deposits every three years.

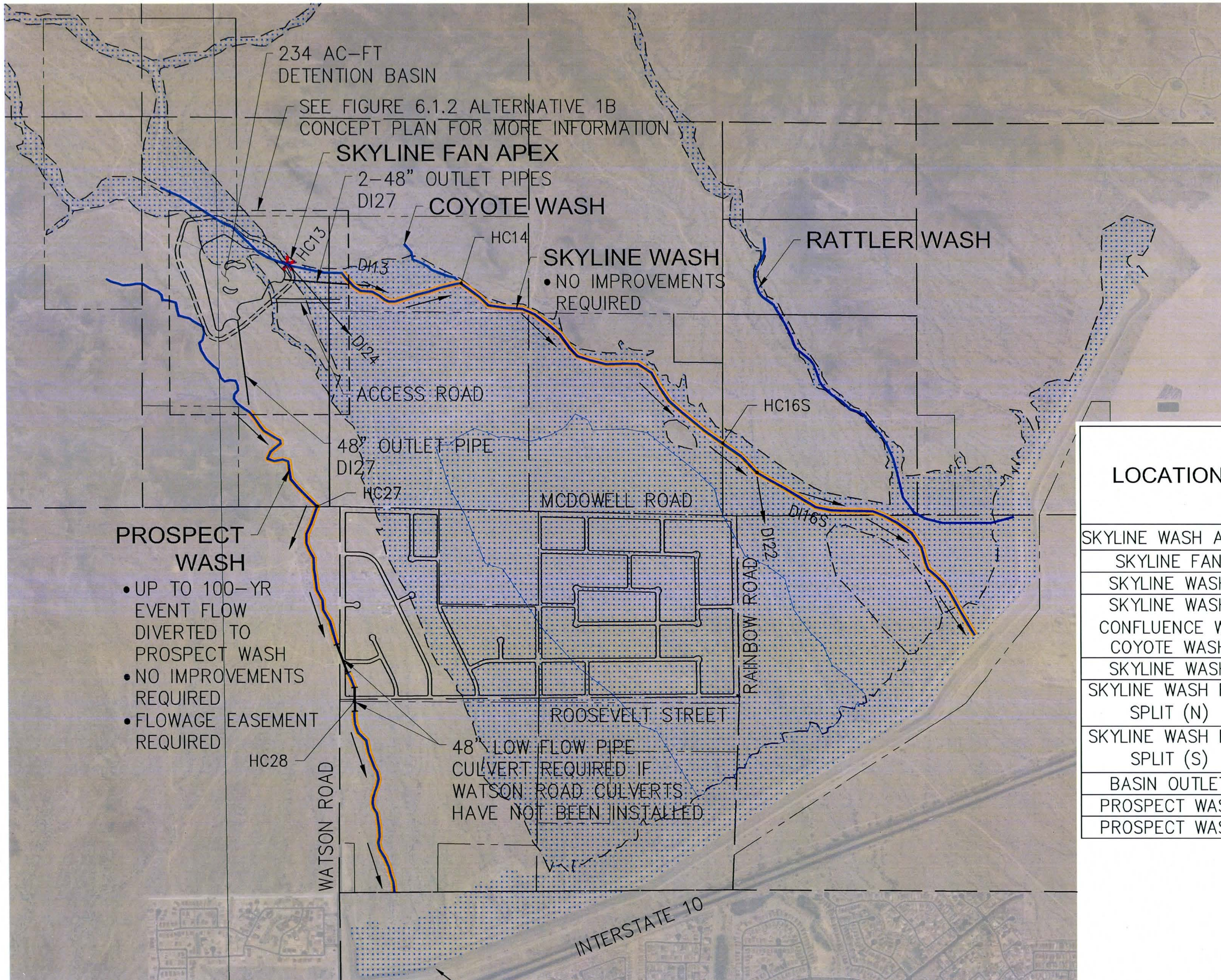
6.2 Hydrology and Hydraulics

Hydrology modeling for this Alternative routes all flow in Skyline Wash into the basin then to Prospect Wash and Skyline Wash. Additional flow reductions are seen in Skyline Wash downstream of the confluence with Coyote Wash. The flow reductions improve flooding conditions for properties adjacent to the wash.

The low flow diverted to Prospect Wash may increase localized scour and/or sedimentation in the wash. However, the localized scour and/or sedimentation that may occur will not adversely affect large flow conveyance. Wash capacity is not a concern either as the low flow rate is approximately 20% of the existing flow rate for the wash.

Flow duration in Prospect Wash will increase significantly. The existing time to peak flow is approximately 12-hours. With the basin installed the low flow will peak at 13-hours and drain down over the next 74-hours.

The allowable flow to Skyline Wash was determined by calculating a representative flow for Skyline Wash. The representative flow is the flow with a scour potential that is equal to or less than the existing condition. The difference being the existing scour is calculated with existing flow and sediment laden water. The representative flow scour was calculated with clear water which has higher scour potential. The flow goes to zero in the basin, dropping out sediment which is released as clear water. The representative flow calculated for Skyline Wash is 400 cfs.



LOCATION	HEC-1 ID	100-YR, 24-HR FLOW EXISTING (CFS)	100-YR, 24-HR FLOW PROPOSED (CFS)	DIFFERENCE (CFS)
SKYLINE WASH APEX	HC-13	3973	3973	0
SKYLINE FAN	DI-24	2002	0	-2002
SKYLINE WASH	DI-13	1971	337	-1634
SKYLINE WASH CONFLUENCE W/ COYOTE WASH	HC-14	1852	774	-1078
SKYLINE WASH	HC-16S	1906	1099	-807
SKYLINE WASH FAN SPLIT (N)	DI-16S	1343	812	-531
SKYLINE WASH FAN SPLIT (S)	DI-22	563	287	-276
BASIN OUTLET	DI-27	0	169	+169
PROSPECT WASH	HC-27	852	852	0
PROSPECT WASH	HC-28	848	860	+12

FIGURE 6.1.1 - ALTERNATIVE 1B OVERALL PLAN

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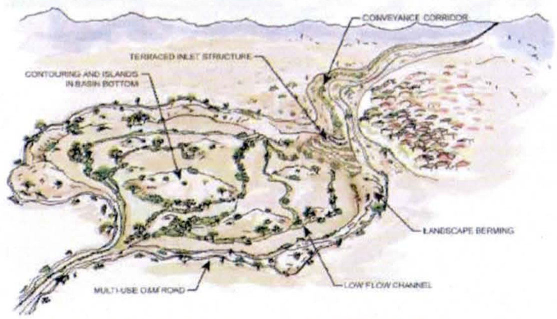
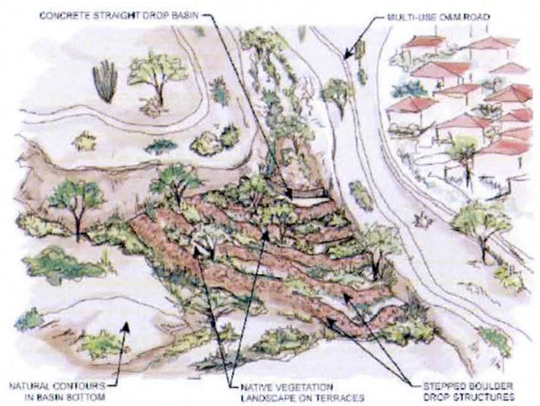
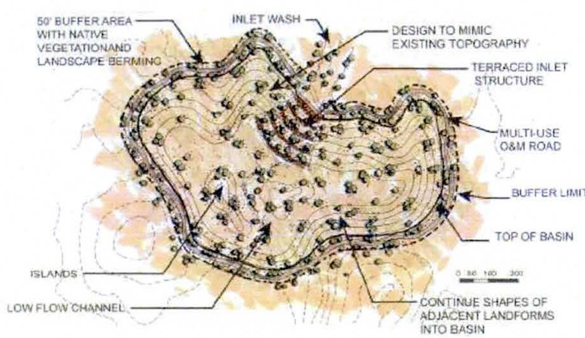


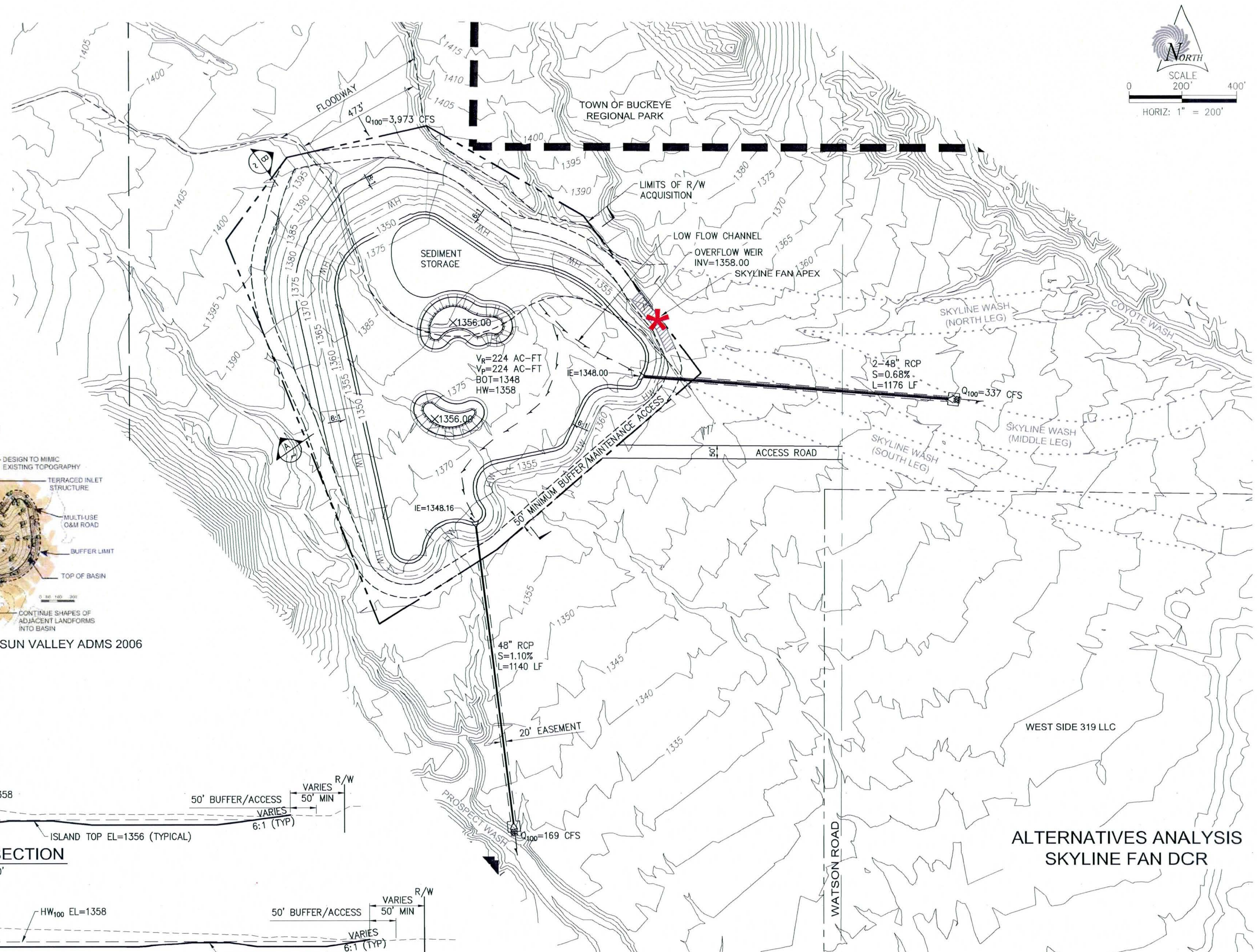
CONCEPTUAL BASIN - SUN VALLEY ADMS 2006



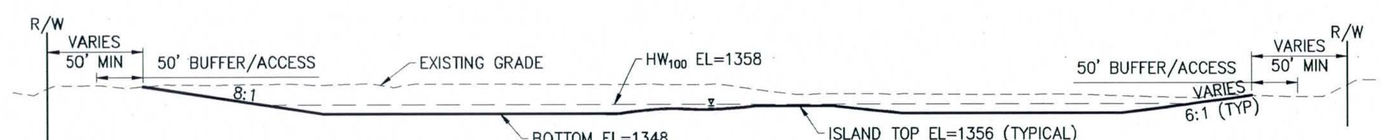
CONCEPTUAL INLET STRUCTURE - SUN VALLEY ADMS 2006



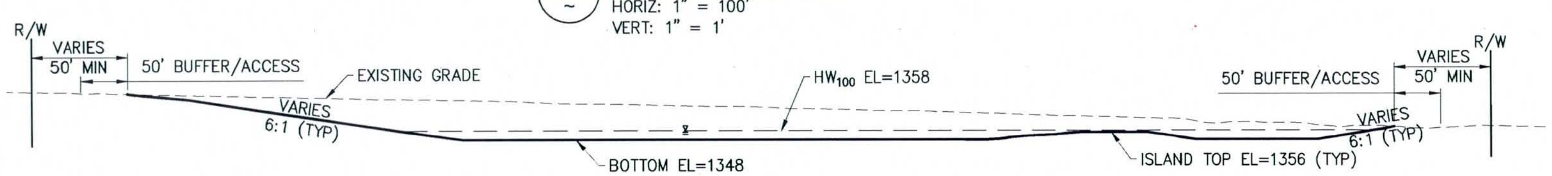
BASIN PLAN WITH AESTHETIC TREATMENT- SUN VALLEY ADMS 2006



ALTERNATIVES ANALYSIS
SKYLINE FAN DCR



A CROSS-SECTION
HORIZ: 1" = 100'
VERT: 1" = 1'



B CROSS-SECTION
HORIZ: 1" = 100'
VERT: 1" = 1'

FIGURE 6.1.2 - ALTERNATIVE 1B CONCEPT PLAN

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P:\Buckeye\04234Skyline Wash DCR\Dwg\Exhibits\swas-x-apex basin new alt 1b rev3.dwg Aug 08, 2013 12:32pm cchristian

6.3 Cost Estimate

Three options have been given for the cost estimate.

Option 1, place fill on-site and purchase material from ASLD. This option assumes that fill is placed within the project site such that no additional scraper haul fee will be incurred. Material will be compacted requiring additional effort for the compaction and construction water. Also a royalty will be paid to ASLD for the material.

Option 2, place fill on-site, ASLD retains ownership. This option assumes that fill is placed on-site, within or very near to the project site on ASLD land such that no additional scraper haul fee will be incurred. Material will be compacted requiring additional effort for the compaction and construction water. Material shall be retained by ASLD, therefore no royalty required.

Option 3, place fill off-site, no compaction. This option assumes that fill is hauled within a 2 mile round trip by the scrapers and stockpiled without compaction. A royalty will be paid to ASLD for the material.

It should be noted that the excess material can be used for landscape berming as well as portions being kept by ASLD with some being hauled away.

ALTERNATIVE 1B
PRELIMINARY

Engineer's Opinion of Probable Cost *

FOR CONCEPTUAL USE ONLY

Project: Sky Wash Apex Improvments 1/28/14
Prepared By: RMH, RMP
Alt 1B basin 224 ac-ft, 10-ft water depth, Dual low flow pipes to Prospect & Skyline Wash

Item Description	Total	Unit	Unit Price	Total
Sky Wash Detention Basin				
State Land Acquisition (Basin, Perimeter Rd, Access Rd)	46	AC	$25,000	$1,150,000
Terraced Sloped Riprap Inlet Structure	1	EA	$500,000	$500,000
4 Strand Smooth Wire Fencing	5,500	LF	$5.00	$27,500
Maintenance Entry Gates	2	EA	$2,000.00	$4,000
Earthwork - Excavation Only	1,125,000	CY	$1.75	$1,968,750
Earthwork - Ripping (Below initial 5' of top soil)	753,933	CY	$0.20	$150,787
Construction Water and Dust Control - Excavation	1,125,000	CY	$0.29	$326,250
Native Plant Salvage	46	AC	$2,000.00	$92,000
Detention Basin Outlet Pipe				
State Land Acquisition (Outlet Pipes)	1.0	AC	$25,000	$25,000
Concrete Overflow Structure	1	LS	$250,000	$250,000
48-inch Low Flow Outlet Pipes	3,500	LF	$90	$315,000
Outlet Catch Basin Structure	2	EA	$20,000	$40,000
48-inch CMP (Watson Road and Roosevelt Street)	600	LF	$90	$54,000
Head Walls (Basin and Culverts)	9	EA	$5,000	$45,000
Rip Rap (Pipe Outlets and Culverts- D_{50} = 12")	80	CY	$40	$3,200
ASLD Fees				
Stumpage Fee	1	LS	$20,000	$20,000

Option 1 - Place Fill On-site (Acquire from ASLD)				
Compaction of Fill Material	1,125,000	CY	$0.40	$450,000
Construction Water and Dust Control - Compaction	1,125,000	CY	$0.20	$225,000
ASLD Excavated Material - Royalties	1,462,500	TN	$0.03	$43,875
			Land & Construction Cost	**$5,690,362**
			Landscaping (10%)	**$570,000**
			Contingency (15%)	**$850,000**
			Engineering & Administration (15%)	**$850,000**
			OPTION 1 - BASIN AND OUTLET TOTAL	**$8,000,000**
Option 2 - Place Fill On-site (ASLD Retains Ownership)				
Compaction of Fill Material	1,125,000	CY	$0.40	$450,000
Construction Water and Dust Control - Compaction	1,125,000	CY	$0.20	$225,000
			Land & Construction Cost	**$5,646,487**
			Landscaping (10%)	**$560,000**
			Contingency (15%)	**$850,000**
			Engineering & Administration (15%)	**$850,000**
			OPTION 2 - BASIN AND OUTLET TOTAL	**$7,900,000**
Option 3 - Place Fill Off-site (Haul ≤ 2 Miles, No Compaction)				
Earthwork - Haul Only	1,125,000	CY	$0.65	$731,250
ASLD Excavated Material - Royalties	1,462,500	TN	$0.03	$43,875
			Land & Construction Cost	**$5,746,612**
			Landscaping (10%)	**$570,000**
			Contingency (15%)	**$860,000**
			Engineering & Administration (15%)	**$860,000**
			OPTION 3 - BASIN AND OUTLET TOTAL	**$8,000,000**
Maintenance (3 Year Cycle)				
Mosquito Control	3	YR	$40,000.00	$120,000
Sediment Removal	30,000	CY	$6.00	$180,000
Hydroseed	6	AC	$3,000.00	$18,000
			Total Maintenance Cost	**$318,000**

*In providing opinions of probable construction cost the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as the accuracy if such opinions compared to bid or actual costs.

7 ALTERNATIVE 2 – CHANNEL ONLY

Estimated Cost - $29.0 to 62.6 Million

7.1 Description

Alternative 2 is the channel only alternative. This alternative consists of large channel routed to Prospect Wash. This alternative does not require a detention basin. See **Figure 7.1.1 Alternative 2 Concept Plan**.

Channel
The channel required is a trapezoidal shape sized for full apex flow of 3,973 cubic feet per second. The bottom width is 120-feet. Water depth is 3 feet with 2 feet of freeboard. Side slopes are 4:1, with total top width approximately 160-feet. The channel will need to be lined with rip rap to prevent scour.

Inlet
The channel would begin upstream of the apex perpendicular to flow to act as a drop. Wash flow would drop into the channel, have to turn 90 degrees and continue flowing downstream. This would force all the flow into the channel. The drop would require revetment to prevent scour. Placing the inlet channel perpendicular to the existing channel mitigates migration of the existing channel.

Outlet
The channel outlet to Prospect Wash will be an invert to invert. The outlet will require a large concrete energy dissipation structure to prevent scour in Prospect Wash.

Prospect Wash
Prospect Wash will require improvements as the flow rate is above the 177cubic feet per second low flow limit. Improvements include grade control structures and side slope revetment.

Watson Road & Roosevelt Street Crossings
Prospect Wash crosses Watson Road and Roosevelt Street. The Alternative increases the flow in Prospect Wash. Therefore the Alternative is responsible for adding box culverts to convey the flow that is added under Watson Road and Roosevelt Street. A box culvert 10-feet by 5-feet by 16 barrels would be required to convey the design flow.

It is anticipated that Watson Road will be paved and culverts installed by the Town's Regional Park Project prior to the construction of this project. The culverts would be sized to convey the existing flow in Prospect Wash, 971 cubic feet per second. This project would be required to install additional culverts so the total conveyance capacity is that required by the Alternative. However, if no culverts have been installed at the time of construction for this project, then this project will be required to install all culverts required to convey the Alternative flow. The Town's park project does not affect the installation of culverts across Roosevelt Street.

Advantages
1. Single channel, no basin, simple.
2. Minimized maintenance when compared to basin sediment removal.
3. Decreased earthwork.

Disadvantages
1. Cost
2. Four times the flow rate in Prospect Wash.
3. Prospect Wash will require rip rap revetment.
4. Construction and maintenance of 16 large size culverts.

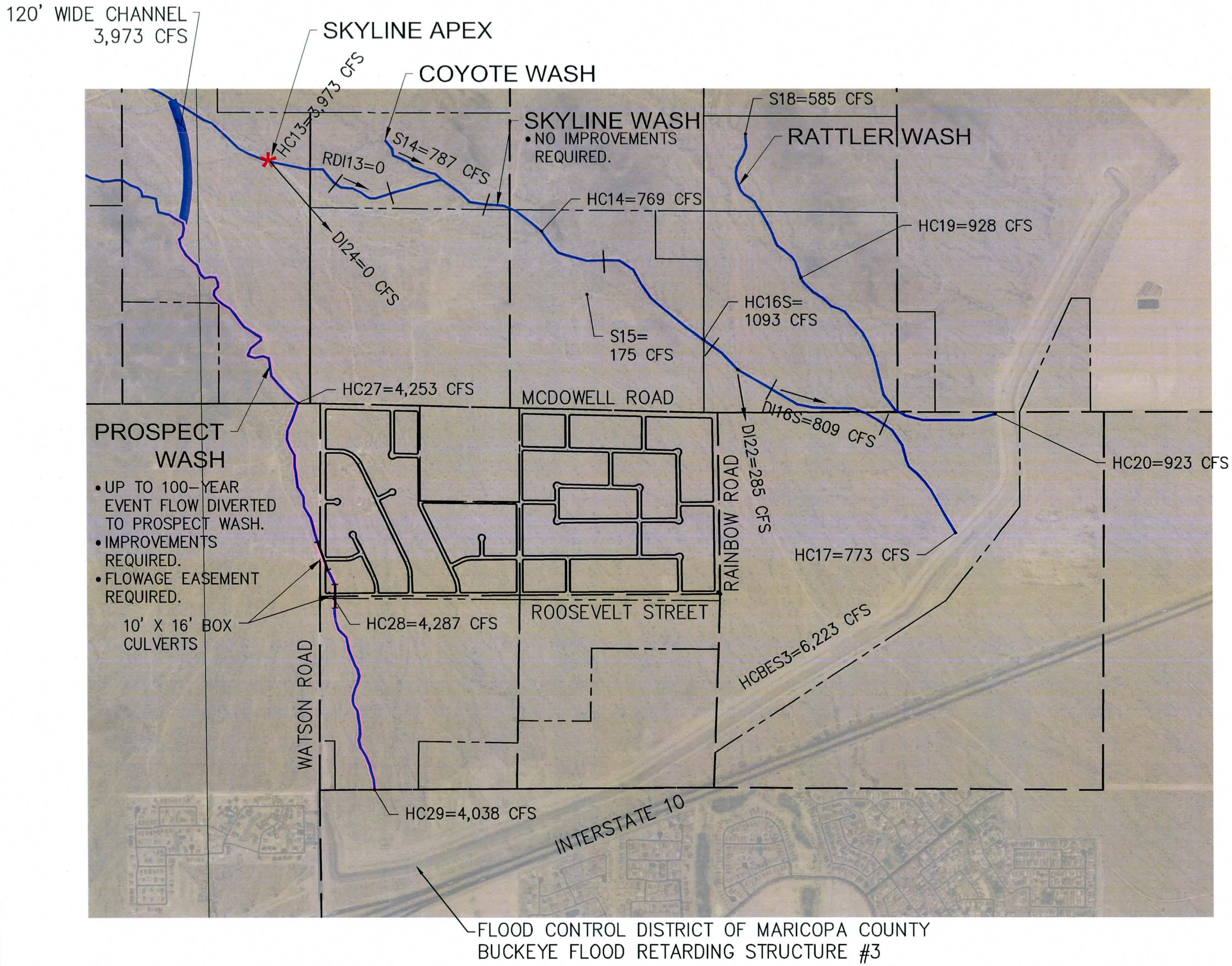
7.2 Hydrology and Hydraulics

Hydrology modeling for this Alternative routes all flow in Skyline Wash to Prospect Wash. This quadruples the flow in Prospect Wash. The flow in Skyline Wash from the apex to Coyote Wash will only receive local runoff that is generated downstream of the apex. Additional flow reductions are seen in Skyline Wash downstream of the confluence with Coyote Wash. The reduction of flow in Skyline Wash and the fan improve flooding conditions for properties adjacent to the wash.

Prospect Wash was modeled with HEC-RAS for the additional flow rate. The reaches north of Roosevelt Road had the capacity to carry the additional flow. Downstream of Roosevelt Road the flow over topped the channel. Therefore channel widening improvements would be required for the channel south of Roosevelt. Road.

7.3 Cost Estimate

Costs for Prospect Wash rip rap revetment were calculated by calculating the rip rap and easement area required to the lateral-erosion line. Areas of caliche will not require improvements. Since limits of caliche are unknown, costs are given for 0% caliche and 50% caliche. In addition to each cost scenario of percent caliche, the costs have been broken into three options of conventional rip rap and two options of launchable rip rap. Conventional rip rap requires excavation to scour depth. Launchable rip rap requires 50% more rock but can be placed at the surface minimizing excavation costs. Option A for both rip rap configurations places the rip rap where the lateral-erosion line is maximum and the rip rap is minimum, Option B is half way between A and C, and Option C rip rap is placed at the floodway line. Option C is not allowed for launchable rip rap.



LEGEND

HC19 = HEC-1 ID
= ROUTING UP TO 100-YEAR EVENT

MODEL NOTES:
ALTERNATIVE 2 – CHANNEL ONLY
120' WIDE BOTTOM ROUTED TO PROSPECT WASH

100-YR, 24 HOUR EVENT NOAA ATLAS 14 RAINFALL

FIGURE 7.1.1
ALTERNATIVE 2 CONCEPT PLAN

ALTERNATIVES ANALYSIS
SKYLINE FAN DCR

NORTH

SCALE 0 750' 1500'
HORIZ: 1" = 1500'

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ALTERNATIVE 2
PRELIMINARY

Engineer's Opinion of Probable Cost *

FOR CONCEPTUAL USE ONLY

Project: Sky Wash Apex Improvements 1/28/14
Prepared By: RMH, RMP

Item Description	Total	Unit	Unit Price	Total
Prospect Wash Diversion Channel				
State Land Acquisition (Channel)	7	AC	$25,000	$183,655
Earthwork - Excavation**	51,852	CY	$1.75	$90,741
Rip Rap (Outlet Channel Liner- D_{50} = 12")	13,436	CY	$40	$537,435
10' x 5' x 16 Box Culvert (Watson and Roosevelt	600	LF	$8,000	$4,800,000
Head Walls (Box Culverts)	4	EA	$50,000	$200,000
ASLD Fees				
Flowage Easement - Prospect Wash	15	AC	$10,000	$153,069
Stumpage Fee	1	LS	$20,000	$20,000
Excavated Material - Royalties	67,407	TN	$0.03	$2,022
			Land & Construction Cost	**$5,986,922**
			Landscape (10%)	**$600,000**
			Contingency (15%)	**$900,000**
			Engineering & Administration (15%)	**$900,000**
			BASIN AND OUTLET TOTAL	**$8,400,000**

Prospect Wash Improvements

Conventional - Option A				
State Land Acquisition (Prospect Wash)	127	AC	$25,000	$3,184,038
Earthwork - Excavation	151,772	CY	$9	$1,365,948
Rip Rap (Scour Protection- D_{50} = 48")	151,772	CY	$158.00	$23,979,969
Conventional - Option B				
State Land Acquisition (Prospect Wash)	93	AC	$25,000	$2,335,007
Earthwork - Excavation	161,846	CY	$18	$2,913,231
Rip Rap (Scour Protection- D_{50} = 48")	161,846	CY	$158.00	$25,571,694
Conventional - Option C				
State Land Acquisition (Prospect Wash)	59	AC	$25,000	$1,485,976
Earthwork - Excavation	171,920	CY	$36	$6,189,133
Rip Rap (Scour Protection- D_{50} = 48")	171,920	CY	$158.00	$27,163,419
Launchable - Option A				
State Land Acquisition (Prospect Wash)	109	AC	$25,000	$2,719,751
Earthwork - Excavation	227,658	CY	$6	$1,365,948
Rip Rap (Scour Protection- D_{50} = 48")	227,658	CY	$158.00	$35,969,954
Launchable - Option B				
State Land Acquisition (Prospect Wash)	74	AC	$25,000	$1,840,468
Earthwork - Excavation	242,769	CY	$6	$1,456,615
Rip Rap (Scour Protection- D_{50} = 48")	242,769	CY	$158.00	$38,357,541

Prospect Wash Totals

	50% Caliche		0% Caliche	
	PROSPECT WASH TOTAL* **	PROJECT TOTAL***	**PROSPECT WASH TOTAL*** **	PROJECT TOTAL***
Conventional - Option A	**$20,600,000**	$29,000,000	**$37,100,000**	$45,500,000
Conventional - Option B	**$21,600,000**	$30,000,000	**$40,100,000**	$48,500,000
Conventional - Option C	**$23,600,000**	$32,000,000	**$45,300,000**	$53,700,000
Launchable - Option A	**$27,800,000**	$36,200,000	**$52,100,000**	$60,500,000
Launchable - Option B	**$28,300,000**	$36,700,000	**$54,200,000**	$62,600,000

*In providing opinions of probable construction cost the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as the accuracy if such opinions compared to bid or actual costs.

** Excavation assumes excavation and placement of soil on-site up to 2 miles round trip. If excavation requires export off-site the transport cost is $4.46 per CY for 5 mile round trip up to $7.56 per CY for 15 mile round trip.

*** Includes Contingency, Engineering, & Administration

8 ALTERNATIVE 3 – BASIN AND CHANNEL

Estimated Cost - $12.8 to 17.1 Million

8.1 Description

Alternative 3 is a mid-sized basin with high flow channel outlet to Prospect Wash. See **Figure 8.1.1 Alternative 3 Concept Plan**.

Basin

The basin volume estimated to be required is 187.7 acre-feet (170 acre-feet + 17.7 acre-feet of sediment storage). The basin volume provided is 198 acre-feet. This volume includes 3 years of the estimated sediment volume. The basin is flat bottomed to maximize storage volume. The basin has been sited so that the downstream end of the basin is at the apex. The high water elevation is one foot below the Skyline Wash invert. The basin side slopes are 4:1 on the downstream end and sides and 6:1 at the upstream end. The basin has a total water depth of 10 feet and 1 foot of freeboard. There is an estimated 991,000 cubic yards of cut required to excavate the basin. The excess earthwork is due to the large quantities of dirt above the high water line that have to be excavated. Additionally, the slope of Skyline Wash goes up at approximately 2%. The upstream slope ends up being very long to intersect existing grade.

Landscape islands can be added to the basin to increase the look and blending of the basin within the surrounding area.

Inlet

The basin inlet structure is a terraced structure with 5-foot steps per the Sun Valley ADMS. The first drop will consist of a concrete drop structure with stilling basin. The next drops will be widened out such that the unit flow rate per foot of structure is low enough to use 5-foot sloped rip rap drops. Planted terraces will be used at every step to encourage plant growth and mask the structure.

Outlet

The basin outlet is an 11-foot by 6-foot single barrel box culvert. The outlet culvert invert is equal to the basin bottom. The culvert conveys water to the water channel downstream at a point where the top of the channel daylights at the existing grade.

The outlet channel is a trapezoidal channel sized for a flow of 916 cubic feet per second. The bottom width is 45-feet. Water depth is 3 feet with 2 feet of freeboard. Side slopes are 4:1, with total top width approximately 85-feet. The channel is lined with rip rap to prevent scour. Rip rap will be required at the wash outlets to prevent scour.

An overflow structure, constructed of concrete, will be required at an outlet wash invert so storms greater than the 100-year event are passed through the system without damage to the basin. The overflow structure required is a spillway/weir made of concrete. The emergency spillway has been placed at Skyline Wash. However, the emergency spillway can be Prospect Wash if the Town obtains flowage easements from the downstream property owners.

Watson Road & Roosevelt Street Crossings

Prospect Wash crosses Watson Road and Roosevelt Street. The Alternative increases the flow in Prospect Wash. Therefore the Alternative is responsible for adding a box culvert to convey the flow that is added under Watson Road and Roosevelt Street. Box culverts 10-feet by 5-feet by 4 barrels are required to convey the design flow.

It is anticipated that Watson Road will be paved and culvert installed by the Town's Regional Park Project prior to the construction of this project. The culverts would be sized to convey the existing flow in Prospect Wash, 971 cubic feet per second. This project would be required to install additional culverts so the total conveyance capacity is that required by the Alternative. However, if no culverts have been installed at the time of construction for this project, then this project will be required to install all culverts required to convey the Alternative flow. The Town's park project does not affect the installation of culverts across Roosevelt Street.

Maintenance will be required to clear the basin of deposited sediment. It has been estimated that a total of 17.7 cubic yards of sediment from large storm events will be removed every three years. Approximately six acres has been allocated for a sediment pool area where excess sediment will be relocated. Maintenance also includes hydroseed of the disturbed maintenance area in order to re-establish plant material.

Advantages

1. Single smaller basin.
2. Decreased earthwork.
3. No peak flow increase in Prospect Wash.

Disadvantages

1. Cost
2. Prospect Wash will require rip rap revetment.
3. Maintenance may require removal of up to 17.7-acre feet of sediment deposits every three years.

8.2 Hydrology and Hydraulics

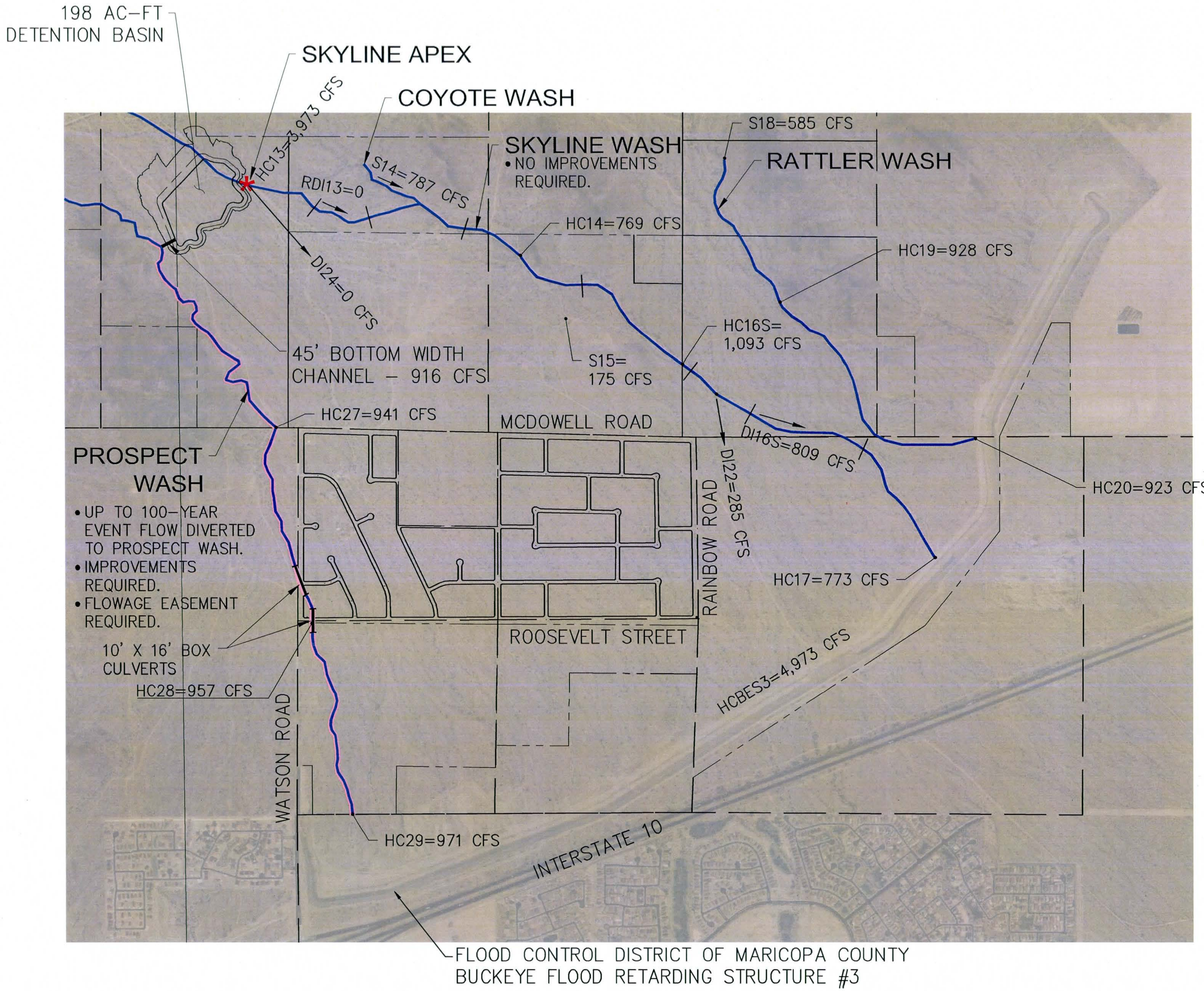
Hydrology modeling for this Alternative routes all flow in Skyline Wash to a mid-sized basin then to Prospect Wash. The basin outflow is 916 cubic feet per second for no increase in peak flow in Prospect Wash. The flow in Skyline Wash from the apex to Coyote Wash will only receive local runoff that is generated downstream of the apex. Additional flow reductions are seen in Skyline Wash downstream of the confluence with Coyote Wash. The reduction of flow in Skyline Wash and the fan improve flooding conditions for properties adjacent to the wash.

Prospect Wash was modeled with HEC-RAS at the existing flow rate. The wash has no capacity changes.

The duration of flow to Prospect Wash would increase.

8.3 Cost Estimate

The District required Prospect Wash revetment even though there is a minor flow increase. Costs for Prospect Wash rip rap revetment were calculated by calculating the rip rap and easement area required to the lateral-erosion line. Areas of caliche will not require improvements. Since limits of caliche are unknown, costs are given for 0% caliche and 50% caliche. In addition to each cost scenario of percent caliche, the costs have been broken into three options of conventional rip rap and two options of launchable rip rap. Conventional rip rap requires excavation to scour depth. Launchable rip rap requires 50% more rock but can be placed at the surface minimizing excavation costs. Option A for both rip rap configurations places the rip rap where the lateral-erosion line is maximum and the rip rap is minimum, Option B is half way between A and C, and Option C rip rap is placed at the floodway line. Option C is not allowed for launchable rip rap.



LEGEND

HC19 = HEC–1 ID

▬ = ROUTING UP TO 100–YEAR EVENT

MODEL NOTES:

ALTERNATIVE 3 – 198 AC–FT DETENTION BASIN
AREA = 39 ACRES
DEPTH = 14 FT
WATER MAX DEPTH = 11 FT

11' X 6' X 1 RCB BASIN OUTLET
10' X 5' X 4 BOX CULVERT
WATSON & ROOSEVELT
CROSSINGS

45' BOTTOM WIDTH CHANNEL
ROUTED TO PROSPECT WASH

100–YR, 24 HOUR EVENT NOAA ATLAS 14 RAINFALL

ALTERNATIVES ANALYSIS
SKYLINE FAN DCR

NORTH

SCALE 0 750' 1500'
HORIZ: 1" = 1500'

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FIGURE 8.1.1
ALTERNATIVE 3 CONCEPT PLAN

P:\Buckeye\04234Skyline Wash DCR\Dwg\Exhibits\EX Wash with Alt 3 Routing Exhibit.dwg Jan 24, 2014 12:27pm hpowell

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ALTERNATIVE 3
PRELIMINARY

Engineer's Opinion of Probable Cost *

FOR CONCEPTUAL USE ONLY

Project: Sky Wash Apex Improvements 1/28/14
Prepared By: RMH, RMP
Alt 3 Basin, 198 ac-ft, 10-ft water depth, 900cfs outflow to Prospect Wash

Item Description	Total	Unit	Unit Price	Total
Sky Wash Detention Basin				
State Land Acquisition (Basin)	39	AC	$25,000	$975,000
Terraced Sloped Riprap Inlet Structure	1	EA	$500,000	$500,000
Earthwork - Excavation**	991,000	CY	$1.75	$1,734,250
Earthwork - Ripping (Below initial 5' of Top Soil)	753,933	CY	$0.20	$150,787
4 Strand Smooth Wire Fencing	5,500	LF	$5.00	$27,500
Maintenance Entry Gate	2	EA	$2,000.00	$4,000
Construction Water and Dust control - Excavation	1,125,000	CY	$0.29	$326,250
Native Plant Salvage	46	AC	$2,000.00	$92,000
Detention Basin Outlet Channel				
State Land Acquisition (Outlet Channel)	4	AC	$25,000	$97,567
Culvert Outlet 11' x 6'	1	LS	$250,000	$250,000
Riprap Overflow Protection	850	CY	$40.00	$34,000
Earthwork - Excavation	24,074	CY	$1.75	$42,130
Rip Rap (Outlet Channel Liner- D_{50} = 12")	7,186	CY	$40	$287,435
10' x 5' x 4 Box Culvert (Watson Road and	600	LF	$2,000	$1,200,000
Head Walls (Box Culverts)	4	EA	$50,000	$200,000
ASLD Fees				
Flowage Easement - Prospect Wash	15	AC	$10,000	$153,069
Stumpage Fee	1	LS	$20,000	$20,000
Excavated Material - Royalties	1,288,300	TN	$0.03	$38,649
			Land & Construction Cost	**$6,132,636**
			Landscape (10%)	**$610,000**
			Contingency (15%)	**$920,000**
			Engineering & Administration (15%)	**$920,000**
			BASIN AND OUTLET TOTAL	**$8,600,000**

Prospect Wash Improvements				
Conventional - Option A				
State Land Acquisition (Prospect Wash)	82	AC	$25,000	$2,057,371
Earthwork - Excavation	35,613	CY	$9	$320,520
Rip Rap (Scour Protection- D_{50} = 22")	35,613	CY	$66.00	$2,350,478
Conventional - Option B				
State Land Acquisition (Prospect Wash)	62	AC	$25,000	$1,546,340
Earthwork - Excavation	40,079	CY	$18	$721,428
Rip Rap (Scour Protection- D_{50} = 22")	40,079	CY	$66.00	$2,645,236
Conventional - Option C				
State Land Acquisition (Prospect Wash)	41	AC	$25,000	$1,035,310
Earthwork - Excavation	44,545	CY	$36	$1,603,634
Rip Rap (Scour Protection- D_{50} = 22")	44,545	CY	$66	$2,939,995
Launchable - Option A				
State Land Acquisition (Prospect Wash)	72	AC	$25,000	$1,811,482
Earthwork - Excavation	53,420	CY	$6	$320,520
Rip Rap (Scour Protection- D_{50} = 22")	53,420	CY	$66	$3,525,716
Launchable - Option B				
State Land Acquisition (Prospect Wash)	51	AC	$25,000	$1,270,199
Earthwork - Excavation	60,119	CY	$6	$360,714
Rip Rap (Scour Protection- D_{50} = 22")	60,119	CY	$66	$3,967,854
Maintenance (3 Year Cycle)				
Mosquito Control	3	YR	$40,000.00	$120,000
Sediment Removal	30,000	CY	$6.00	$180,000
Hydroseed	6	AC	$3,000.00	$18,000
			Total Maintenance Cost	**$318,000**

Prospect Wash Totals

	50% Caliche		0% Caliche	
	PROSPECT WASH TOTAL***	PROJECT TOTAL***	PROSPECT WASH TOTAL***	PROJECT TOTAL***
Conventional - Option A	$4,400,000	$13,000,000	$6,100,000	$14,700,000
Conventional - Option B	$4,200,000	$12,800,000	$6,400,000	$15,000,000
Conventional - Option C	$4,900,000	$12,900,000	$7,300,000	$15,900,000
Launchable - Option A	$4,900,000	$13,500,000	$7,400,000	$16,000,000
Launchable - Option B	$5,000,000	$13,600,000	$8,500,000	$17,100,000

*In providing opinions of probable construction cost the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as the accuracy if such opinions compared to bid or actual costs.

** Excavation assumes excavation and placement of soil on-site up to 2 miles round trip. If excavation requires export off-site the transport cost is $4.46 per CY for 5 mile round trip up to $7.56 per CY for 15 mile round trip.

*** Includes Contingency, Engineering, & Administration

9 RECOMMENDED ALTERNATIVE

Estimated Cost - $7.6 to 8.4 Million

Alternative 1A has been chosen as the Recommended Alternative. It was selected by the project team and ASLD. The project team believes the combination of low cost and simplicity are the greatest strengths of this alternative. The simplicity stems from the single basin below grade with single outlet to a deep incised Prospect Wash.

The Recommended Alternative was further refined from Alternative 1A by further developing the inlet structure, the outlet structure, and the overflow weir. Three inlet options have been developed, riprap, roller compacted concrete (RCC), and portland cement concrete (PCC). During development of the inlet, the required volume of the basin is 255 acre-feet. The basin volume provided is 256 acre-feet which was revised from the Alternatives Analysis to accommodate the access road that will be routed entirely around the basin. See the **Recommended Alternative Concept Plan Figure 9.1** and the Conceptual Plans located in **Appendix Q**.

9.1 Inlet Structure

Alternate inlet structures were developed to determine conceptual costs of using inlets with different material types. Riprap was the suggested material type in the ADMP. However riprap is could be dislodged by large debris and maintenance is an issue. RCC and PCC alternates are a more robust option with easier maintenance. The PCC inlet is the least costly of the three. PCC allows for form lining to help blend into the natural surroundings therefore the PCC would be the preferred alternate.

Riprap Inlet

The riprap inlet structure is sloped riprap drops with flat landscape terraces. The inlet is similar to the inlet concept recommended by the ADMP. The riprap drop slopes are sloped four to one at 20-feet long for a five-foot drop. The drop slopes are lined with 12-inch riprap that is three feet deep. At the bottom of each slope is 10 feet of flat area. Five feet is riprap lined and the other five feet will be landscaped. Each step of the structure is longer than the prior step.

Riprap was sized using the recommendation given in Simplified Design Guidelines for Riprap Subjected to Overtopping Flow by Frizell, Ruff and Mishra. The article provides test data and formulas to design riprap for erosion control on spillways. The design procedure selects a starting riprap diameter based on the unit discharge of the incoming flow. Then it calculates the flow through the rock layer. Flows deeper than the rock layer are assumed to flow over the top of the rock. Calculations are given to predict the depth of flow over to rock that induces riprap failure. Then the maximum flow over the rock is calculated, the remaining flow is assumed to flow through the rock and the depth of flow through the rock is predicted. Final check is the flow depth through the rock versus four times D50 of the rock. See Appendix P inlet riprap sizing calculations and the design article. During final design the inlet structure should be designed with HEC-RAS to verify and/or revise riprap diameter to actual modeled shear stress in the channel bottom. The riprap sizing calculations predicted a flow depth of 2 feet within the rock, a factor of safety of one foot of thickness was provided. Due to the high sediment load expected, it is possible the riprap inlet becomes plugged with sediment and all the water travels across the top of the rock. Therefore during final design if rip rap is the selected inlet material, the design should take into consideration all flow going over the top of the rock.

The riprap drops are lined with riprap with a D50 of 12-inches and a thickness of three feet. The first step of the riprap inlet requires a cutoff wall of riprap to prevent scour from undermining the inlet. The riprap cutoff wall is 12 feet deep by two feet thick with a D50 of 12-inches. Skyline Wash scour was calculated near the inlet location at approximately 10-feet deep, see **Appendix L** for scour calculations.

The flat bases at the bottoms of the slopes are both riprap and landscaping. The riprap portions slow the water down and encourage the flow to spread across the entire structure. The landscape portions provide a means to mask the structure and break up the long stretches of rock. The riprap will fill with sediment and smaller grasses and weeds will grow. The vegetation has the potential to be washed away, however the new deposits will be full of seeds from the upstream water shed and new growth will appear.

The inlet structure spans the entire Skyline Wash width plus an extension to the west. The portion of the inlet spanning the wash is the "active" inlet area. The area to the west has been provided as additional protection from lateral migration of Skyline Wash. If Skyline Wash begins migration to the west the water will still be directed down the inlet spillway. Final design could review solutions to control Skyline Wash lateral migration to reduce or eliminate the additional inlet structure area at the cost of installing lateral migration improvements.

The basin is situated where Skyline Wash widens out. This has the benefit of lowered incoming unit flow rate and reduced riprap diameter and thickness. The inlet flow step widening further reduces the unit flow rate and flow velocities.

A stilling basin, riprap energy dissipater and cut-off wall have been provided at the bottom of the inlet that will induce a hydraulic jump to dissipate the water velocity. The stilling basin length has been estimated at 30-feet with another 20-feet of riprap for additional erosion protection. The stilling basin length was estimated using a simplified HEC-RAS model. The model was a wide steep sloped channel, with a elevated downstream floor. See the CD for the HEC-RAS model files.

Grading revisions were made to the basin to accommodate the inlet design. The revisions resulted in the basin having excess capacity but less earthwork. This is due to the change in overall slope on the inlet side. The inlet slope was 8:1 is now an overall 6:1.

Maintenance of the riprap inlet would typically be removal of larger growth that would inhibit flow and occasional repair of displaced rocks. It's anticipated that the sediment will settle in the rock and lock it into place. It is possible that large debris from a big event could knock some riprap in the structure out of place. Repair and maintenance would have to be done by hand or tracked machine as the rock would make traverse by wheeled vehicle difficult. Also it would be impossible to clean out sediment without removing all the rock and replacing. This could be a likely scenario if low flow sediment loads drop sediment in the rock without moving some downstream. Eventually in the low flow scenario the riprap could fill to the top of the rock, creating a smooth surface that will not reduce high velocities.

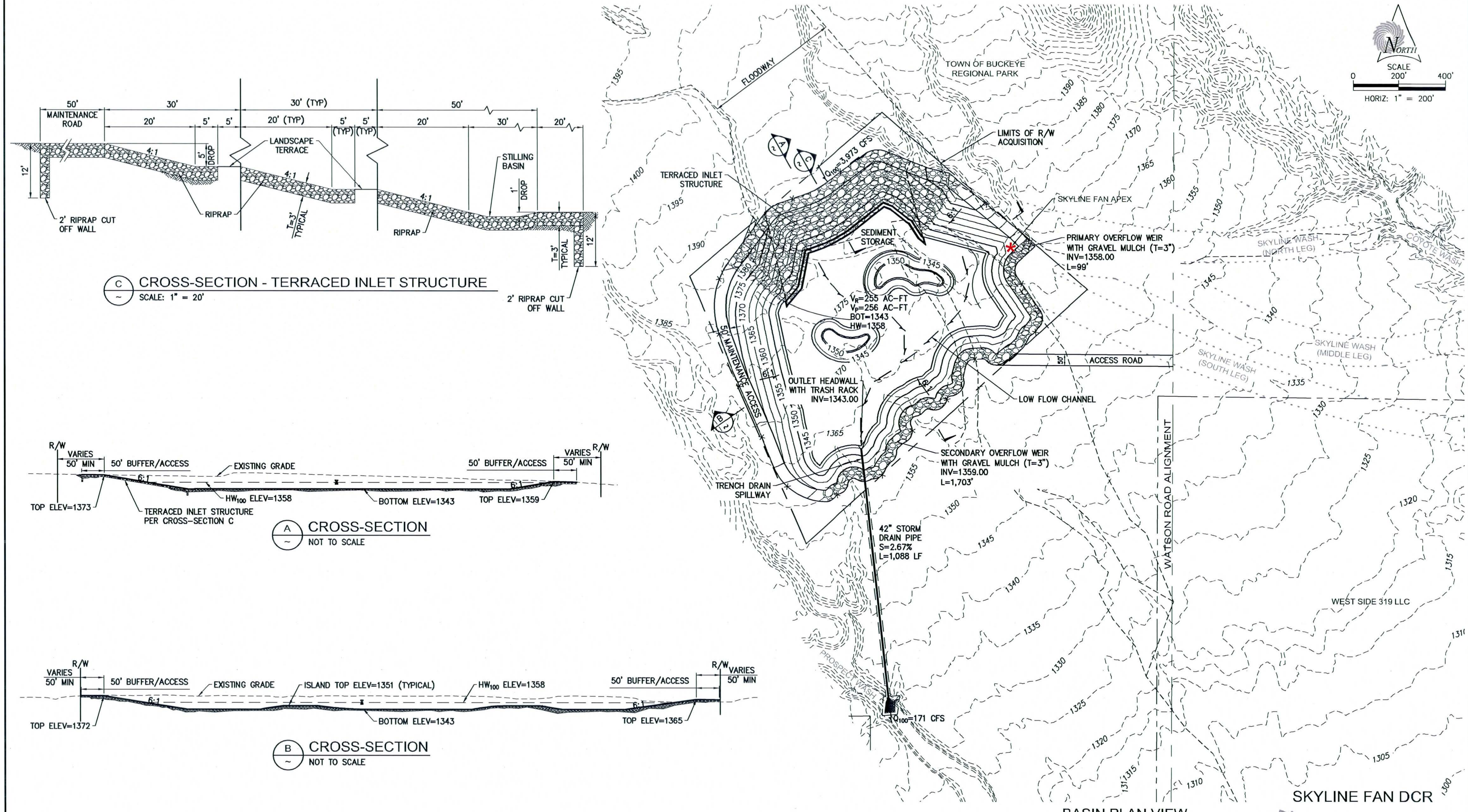
RCC & PCC

RCC and PCC inlets were developed as a more robust option to the riprap inlet. The RCC and PCC inlets are stepped drops with a low flow line in the middle.

The RCC inlet has been estimated to be 2-feet thick. The Districts New River project used a RCC inlet with a bottom slab thickness of 6-feet thick. It's unknown why such a heavy section was used. 2-feet thick will provide more than enough weight to prevent the structure from floating and/or being lifted. RCC would be preferred over PCC because it does not have to be formed, and does not use steel. However a thicker section is required to compensate for the lack of steel. See **Alternate Inlets Concept Plan Figure 9.1.1** for RCC inlet cross section.

The PCC inlet has been estimated to be 10-inches thick with steel reinforcement. PCC would be preferred over RCC because it uses less material. See **Alternate Inlets Concept Plan Figure 9.1.1** for PCC inlet cross section.

The inlets can be masked into the surrounding terrain with a few features. One masking feature is colored concrete, a simple tan will match the surround soil and the structure will blend right in. Another masking feature is form liner molds. The form liners can be simple lines to flag stone shapes. Lastly the steps will be meandering with randomly placed boulders. The boulders will increase the natural look.



SKYLINE FAN DCR

FIGURE 9.1 - RECOMMENDED ALTERNATIVE CONCEPT PLAN

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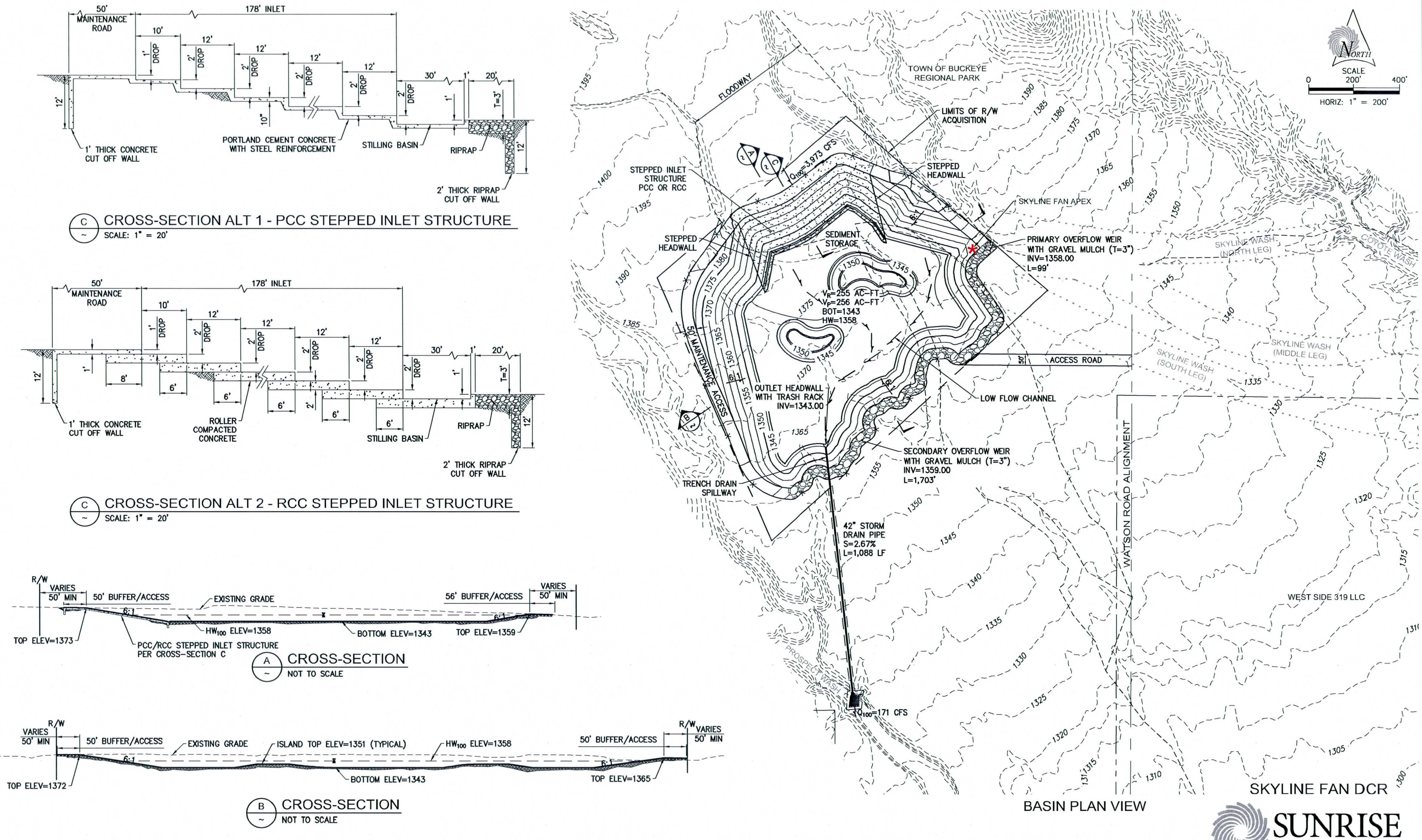

FIGURE 9.1.1 - ALTERNATE INLET STRUCTURES CONCEPT PLAN

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Maintenance of the concrete inlets can be accomplished with standard wheeled vehicles. The hard concrete surface is also stable enough to be scrapped by loader buckets.

A stilling basin, riprap energy dissipater and cut-off wall have been provided at the bottom of the inlet that will induce a hydraulic jump to dissipate the water velocity. The stilling basin length has been estimated at 30-feet with another 20-feet of riprap for additional erosion protection. The stilling basin length was estimated using a simplified HEC-RAS model. The model was a wide steep sloped channel, with a elevated downstream floor. See the CD for the HEC-RAS model files.

9.2 Outlet Structure

The basin outlet structure is a headwall with trash rack and trench drain which connects to the 42-inch low flow drain pipe. The trench drain provides a secondary way to drain the basin should the headwall trash rack become plugged with debris.

The headwall and apron will be cast in place concrete. The trash rack will be fastened to the floor of the apron and angle up to the top of the headwall above the pipe and the trench drain.

The trench drain is two feet deep by 4 feet wide cast in place concrete. Grates shall be installed with the main bars running parallel with the slope. The trench drain will be installed above the pipe on the slope. It will convey water down the slope to the face of the headwall above the pipe, below the trash rack, where the water can enter the pipe.

If the trash rack becomes plugged, water can still reach the headwall via the trench drain. The trench drain will convey water from above the plugged section down the trench drain below the plugged trash rack to the low flow inlet. If the trench drain gets plugged also, maintenance crews can walk down the trench drain and push debris away from the grates or remove the grates to get flow into the drain. The trench drain system is a simple system that does not need bypass valves, cat walks or other large concrete structures normally seen on outlet structures.

During final design the connection location with Prospect Wash should be reviewed. Another location up a Prospect Wash tributary could significantly shorten the pipe.

Maintenance will be required to clear the basin of deposited sediment. It has been estimated that a total of 17.7 cubic yards of sediment from large storm events will be removed every three years. Approximately six acres has been allocated for a sediment pool area where excess sediment will be relocated. Maintenance also includes hydroseed of the disturbed maintenance area in order to re-establish plant material.

9.3 Overflow Weir

The basin volume has been sized for the 100-year storm event plus sediment storage. If two back to back storm events should occur or a greater than 100-year event the basin needs a way to safely pass the flows to their historic path. The overflow for the basin is the downstream maintenance road and the invert of Skyline Wash. The maintenance road will act as a long weir and spread the flow out across the fan as sheet flow. The invert of Skyline Wash matches the high water of the basin and is one-foot below the maintenance road elevation.

The overflow water depth over the maintenance road will be less than one-foot and less than two feet in Skyline Wash. The water depth was estimated with broad crested weir calculations as presented in CulvertMaster, see Appendix P for calculations. Average velocity of the flow across the weir was solved for by the continuity, the flow rate divided by the area of flow. The resultant velocity is less than three feet per second.

Gravel mulch will be installed on the maintenance road for erosion protection. Gravel mulch is considered ¾-inch minus rip rap.

9.4 Cost Estimate

The Recommended Alternative cost estimate has been updated to reflect the current inlet, outlet, overflow structures, and landscape. Riprap unit costs for the inlet and overflow are previous bid items from District projects. The District provided approximate costs for the outlet structure headwall, trench drain, trash rack, and safety railing.

Landscape costs were provided by the District. The Districts cost-ceiling guidelines limits for rural setting were calculated for the project as 4% of land and construction cost plus $12,000/ac. The total came out to approximately $672,000. Unit costs are as follows:
Hydroseeding - $3,000/ac
Tall Pot Tree Installation - 20 trees/acre @ $100 each
Erosion/Dust Control and Soil Stabilization - ($3,500/ac)
Mixed Cacti Salvage - $2,000/ac
Gravity-Fed Irrigation System (select, limited area) - $75,000
Native Tree Salvage - $12,500/ac
Boulder Salvage and Soil Berming – To be determined at final
Project-Related Costs - $260,000
Landscape Treatment Costs - $392,000.00 ($88,000.00 or 18.3% under cost-ceiling limit)
Restoration Contingency - (10%)
Structural Aesthetics (staining, paint, formliner, etc.) - $196,000.00

Three options have been given for the cost estimate.
Option 1, place fill on-site and purchase material from ASLD. This option assumes that fill is placed within the project site such that no additional scraper haul fee will be incurred. Material will be compacted requiring additional effort for the compaction and construction water. Also a royalty will be paid to ASLD for the material.

Option 2, place fill on-site, ASLD retains ownership. This option assumes that fill is placed on-site, within or very near to the project site on ASLD land such that no additional scraper haul fee will be incurred. Material will be compacted requiring additional effort for the compaction and construction water. Material shall be retained by ASLD, therefore no royalty required.

Option 3, place fill off-site, no compaction. This option assumes that fill is hauled within a 2 mile round trip by the scrapers and stockpiled without compaction. A royalty will be paid to ASLD for the material.

RECOMMENDED ALTERNATIVE
ALTERNATE INLET #1 RIP-RAP

Engineer's Opinion of Probable Cost *

FOR CONCEPTUAL USE ONLY

Project: Sky Wash Apex Improvments 11/27/13
Prepared By: RMH, JV

Rec. Alt-basin 256 ac-ft, 15-ft water depth, single low flow pipe to Prospect Wash

Item Description	Total	Unit	Unit Price	Total
Sky Wash Detention Basin				
State Land Acquisition (Basin, Perimeter Rd, Access Rd)	40	AC	$25,000	$1,000,000
Rip Rap (D_{50} = 12") Inlet, Cutoff Wall & Stilling Basin	35,900	CY	$40	$1,436,000
4 Strand Smooth Wire Fencing	4,800	LF	$5.00	$24,000
Maintenance Entry Gates	2	EA	$2,000.00	$4,000
Earthwork - Excavation Only	865,000	CY	$1.75	$1,513,750
Earthwork - Ripping (Below initial 5' of top soil)	540,000	CY	$0.20	$108,000
Construction Water and Dust Control - Excavation	865,000	CY	$0.29	$250,850
Detention Basin Outlet Pipe				
State Land Acquisition (Outlet Pipes)	0.5	AC	$25,000	$12,500
Rip Rap (Overflow Protection- D_{50} = 3/4")	850	CY	$40	$34,000
42-inch Low Flow Outlet Pipes	1,088	LF	$90	$97,920
Outlet Trench Drain Structure (Headwall, Wingwall, Apron, Etc.) (T	1	EA	$31,000	$31,000
42-inch CMP (Watson Road & Roosevelt Street)	600	LF	$90	$54,000
Head Walls (Prospect Wash Culverts)	6	EA	$5,000	$30,000
Rip Rap (Pipe Outlets and Culverts- D_{50} = 12")	40	CY	$40	$1,600
Landscaping				
Hydroseeding	40	AC	$3,000.00	$120,000
Tall Pot Tree Installation (20 Trees/AC)	40	AC	$2,000.00	$80,000
Erosion/Dust Control & Soil Stabilization	40	AC	$3,500.00	$140,000
Mixed Cacti Salvage	25	AC	$2,000.00	$50,000
Gravity-Fed Irrigation Sysytem	1	LS	$75,000.00	$75,000
Native Tree Salvage	15	AC	$12,500.00	$187,500
Boulder Salvage and Soil Berming (TBD @ Final Design)	-	-	-	
Structural Asthetics	1	LS	$196,000.00	$196,000
ASLD Fees				
Stumpage Fee	1	LS	$20,000	$20,000
Option 1 - Place Fill On-site (Acquire from ASLD)				
Compaction of Fill Material	865,020	CY	$0.40	$346,008
Construction Water and Dust Control - Compaction	865,020	CY	$0.20	$173,004
ASLD Excavated Material - Royalties	1,124,526	TN	$0.03	$33,736
			Construction Cost	**$5,150,368**
			Landscaping	**$868,500**
			Contingency (15%)	**$900,000**
			Engineering & Administration (15%)	**$900,000**
			OPTION 1 - BASIN AND OUTLET TOTAL	**$7,820,000**
Option 2 - Place Fill On-site (ASLD Retains Ownership)				
Compaction of Fill Material	865,020	CY	$0.40	$346,008
Construction Water and Dust Control - Compaction	865,020	CY	$0.20	$173,004
			Construction Cost	**$5,116,632**
			Landscaping	**$868,500**
			Contingency (15%)	**$898,000**
			Engineering & Administration (15%)	**$898,000**
			OPTION 2 - BASIN AND OUTLET TOTAL	**$7,780,000**
Option 3 - Place Fill Off-site (Haul ≤ 2 Miles, No Compaction)				
Earthwork - Haul Only	865,020	CY	$0.65	$562,263
ASLD Excavated Material - Royalties	1,124,526	TN	$0.03	$33,736
			Construction Cost	**$5,193,619**
			Landscaping	**$868,500**
			Contingency (15%)	**$909,000**
			Engineering & Administration (15%)	**$909,000**
			OPTION 3 - BASIN AND OUTLET TOTAL	**$7,880,000**
Maintenance (3 Year Cycle)				
Mosquito Control	3	YR	$40,000.00	$120,000
Sediment Removal	30,000	CY	$6.00	$180,000
Hydroseed	6	AC	$3,000.00	$18,000
			Total Maintenance Cost	**$318,000**

*In providing opinions of probable construction cost the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as the accuracy if such opinions compared to bid or actual mile round trip up to $7.56 per CY for 15 mile round trip. Compaction of hauled soil is $0.30 per CY.

RECOMMENDED ALTERNATIVE
ALTERNATE INLET #2 RCC

Engineer's Opinion of Probable Cost *

FOR CONCEPTUAL USE ONLY

Project: Sky Wash Apex Improvments 11/27/13
Prepared By: RMH, JV

Rec. Alt-basin 256 ac-ft, 15-ft water depth, single low flow pipe to Prospect Wash

Item Description	Total	Unit	Unit Price	Total
Sky Wash Detention Basin				
State Land Acquisition (Basin, Perimeter Rd, Access Rd)	40	AC	$25,000	$1,000,000
Roller Compacted Concrete, Cut-Off Wall, Header Walls & Still Basin	18,000	CY	$90	$1,620,000
Rip Rap (D_{50} = 12")	4,600	CY	$40	$184,000
4 Strand Smooth Wire Fencing	4,800	LF	$5.00	$24,000
Maintenance Entry Gates	2	EA	$2,000.00	$4,000
Earthwork - Excavation Only	865,000	CY	$1.75	$1,513,750
Earthwork - Ripping (Below initial 5' of top soil)	540,000	CY	$0.20	$108,000
Construction Water and Dust Control - Excavation	865,000	CY	$0.29	$250,850
Detention Basin Outlet Pipe				
State Land Acquisition (Outlet Pipes)	0.5	AC	$25,000	$12,500
Rip Rap (Overflow Protection- D_{50} = 3/4")	850	CY	$40	$34,000
42-inch Low Flow Outlet Pipes	1,088	LF	$90	$97,920
Outlet Trench Drain Structure (Headwall, Wingwall, Apron, Etc.) (Trench Drain, Trash Rack w/ Hatch, Safety Rail)	1	EA	$31,000	$31,000
42-inch CMP (Watson Road & Roosevelt Street)	600	LF	$90	$54,000
Head Walls (Prospect Wash Culverts)	6	EA	$5,000	$30,000
Rip Rap (Pipe Outlets and Culverts- D_{50} = 12")	40	CY	$40	$1,600
Landscaping				
Hydroseeding	40	AC	$3,000.00	$120,000
Tall Pot Tree Installation (20 Trees/AC)	40	AC	$2,000.00	$80,000
Erosion/Dust Control & Soil Stabilization	40	AC	$3,500.00	$140,000
Mixed Cacti Salvage	25	AC	$2,000.00	$50,000
Gravity-Fed Irrigation Sysytem	1	LS	$75,000.00	$75,000
Native Tree Salvage	15	AC	$12,500.00	$187,500
Boulder Salvage and Soil Berming (TBD @ Final Design)	-	-		-
Structural Asthetics	1	LS	$196,000.00	$196,000
ASLD Fees				
Stumpage Fee	1	LS	$20,000	$20,000

Option 1 - Place Fill On-site (Acquire from ASLD)				
Compaction of Fill Material	865,020	CY	$0.40	$346,008
Construction Water and Dust Control - Compaction	865,020	CY	$0.20	$173,004
ASLD Excavated Material - Royalties	1,124,526	TN	$0.03	$33,736
			Construction Cost	**$5,518,368**
			Landscaping	**$868,500**
			Contingency (15%)	**$960,000**
			Engineering & Administration (15%)	**$960,000**
			OPTION 1 - BASIN AND OUTLET TOTAL	**$8,310,000**
Option 2 - Place Fill On-site (ASLD Retains Ownership)				
Compaction of Fill Material	865,020	CY	$0.40	$346,008
Construction Water and Dust Control - Compaction	865,020	CY	$0.20	$173,004
			Construction Cost	**$5,484,632**
			Landscaping	**$868,500**
			Contingency (15%)	**$953,000**
			Engineering & Administration (15%)	**$953,000**
			OPTION 2 - BASIN AND OUTLET TOTAL	**$8,260,000**
Option 3 - Place Fill Off-site (Haul ≤ 2 Miles, No Compaction)				
Earthwork - Haul Only	865,020	CY	$0.65	$562,263
ASLD Excavated Material - Royalties	1,124,526	TN	$0.03	$33,736
			Construction Cost	**$5,561,619**
			Landscaping	**$868,500**
			Contingency (15%)	**$965,000**
			Engineering & Administration (15%)	**$965,000**
			OPTION 3 - BASIN AND OUTLET TOTAL	**$8,360,000**
Maintenance (3 Year Cycle)				
Mosquito Control	3	YR	$40,000.00	$120,000
Sediment Removal	30,000	CY	$6.00	$180,000
Hydroseed	6	AC	$3,000.00	$18,000
			Total Maintenance Cost	**$318,000**

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to $7.56 per CY for 15 mile round trip. Compaction of hauled soil is $0.30 per CY.

SUNRISE ENGINEERING

RECOMMENDED ALTERNATIVE
ALTERNATE INLET #3 PCC

Engineer's Opinion of Probable Cost *

FOR CONCEPTUAL USE ONLY

Project: Sky Wash Apex Improvments — 11/27/13

Prepared By: RMH, JV

Rec. Alt-basin 256 ac-ft, 15-ft water depth, single low flow pipe to Prospect Wash

Item Description	Total	Unit	Unit Price	Total
Sky Wash Detention Basin				
State Land Acquisition (Basin, Perimeter Rd, Access Rd	40	AC	$25,000	$1,000,000
Concrete Inlet, Cut-Off Wall, Header Walls & Still Basi	6,150	CY	$180	$1,107,000
Rip Rap (D_{50} = 12")	4,500	CY	$40	$180,000
4 Strand Smooth Wire Fencing	4,800	LF	$5.00	$24,000
Maintenance Entry Gates	2	EA	$2,000.00	$4,000
Earthwork - Excavation Only	865,000	CY	$1.75	$1,513,750
Earthwork - Ripping (Below initial 5' of top soil)	540,000	CY	$0.20	$108,000
Construction Water and Dust Control - Excavation	865,000	CY	$0.29	$250,850
Detention Basin Outlet Pipe				
State Land Acquisition (Outlet Pipes)	0.5	AC	$25,000	$12,500
Rip Rap (Overflow Protection- D_{50} = 3/4")	850	CY	$40	$34,000
42-inch Low Flow Outlet Pipes	1,088	LF	$90	$97,920
Outlet Trench Drain Structure (Headwall, Wingwall, Apron, Etc.)	1	EA	$31,000	$31,000
42-inch CMP (Watson Road & Roosevelt Street)	600	LF	$90	$54,000
Head Walls (Prospect Wash Culverts)	6	EA	$5,000	$30,000
Rip Rap (Pipe Outlets and Culverts- D_{50} = 12")	40	CY	$40	$1,600
Landscaping				
Hydroseeding	40	AC	$3,000.00	$120,000
Tall Pot Tree Installation (20 Trees/AC)	40	AC	$2,000.00	$80,000
Erosion/Dust Control & Soil Stabilization	40	AC	$3,500.00	$140,000
Mixed Cacti Salvage	25	AC	$2,000.00	$50,000
Gravity-Fed Irrigation Sysytem	1	LS	$75,000.00	$75,000
Native Tree Salvage	15	AC	$12,500.00	$187,500
Boulder Salvage and Soil Berming (TBD @ Final Design)	-	-	-	
Structural Asthetics	1	LS	$196,000.00	$196,000
ASLD Fees				
Stumpage Fee	1	LS	$20,000	$20,000

Item Description	Total	Unit	Unit Price	Total
Option 1 - Place Fill On-site (Acquire from ASLD)				
Compaction of Fill Material	865,020	CY	$0.40	$346,008
Construction Water and Dust Control - Compaction	865,020	CY	$0.20	$173,004
ASLD Excavated Material - Royalties	1,124,526	TN	$0.03	$33,736
			Construction Cost	**$5,001,368**
			Landscaping	**$868,500**
			Contingency (15%)	**$880,000**
			Engineering & Administration (15%)	**$880,000**
			OPTION 1 - BASIN AND OUTLET TOTAL	**$7,630,000**
Option 2 - Place Fill On-site (ASLD Retains Ownership)				
Compaction of Fill Material	865,020	CY	$0.40	$346,008
Construction Water and Dust Control - Compaction	865,020	CY	$0.20	$173,004
			Construction Cost	**$4,967,632**
			Landscaping	**$868,500**
			Contingency (15%)	**$875,000**
			Engineering & Administration (15%)	**$875,000**
			OPTION 2 - BASIN AND OUTLET TOTAL	**$7,590,000**
Option 3 - Place Fill Off-site (Haul ≤ 2 Miles, No Compaction)				
Earthwork - Haul Only	865,020	CY	$0.65	$562,263
ASLD Excavated Material - Royalties	1,124,526	TN	$0.03	$33,736
			Construction Cost	**$5,044,619**
			Landscaping	**$868,500**
			Contingency (15%)	**$887,000**
			Engineering & Administration (15%)	**$887,000**
			OPTION 3 - BASIN AND OUTLET TOTAL	**$7,690,000**
Maintenance (3 Year Cycle)				
Mosquito Control	3	YR	$40,000.00	$120,000
Sediment Removal	30,000	CY	$6.00	$180,000
Hydroseed	6	AC	$3,000.00	$18,000
			Total Maintenance Cost	**$318,000**

*In providing opinions of probable construction cost the Client understands that the Engineer has no control over costs or the price of labor, equipment or materials, or over the Contractor's method of pricing, and that the opinion of probable construction cost provided herein is made on the basis of the Engineer's qualifications and experience. The Engineer makes no warranty, expressed or implied, as the accuracy if such opinions compared to bid or actual 5 mile round trip up to $7.56 per CY for 15 mile round trip. Compaction of hauled soil is $0.30 per CY.

10 SUMMARY

The DCR analyzed four alternatives and selected a Recommended Alternative that controls the Skyline Wash apex which may result in a reduction of regulatory floodplain on the fan. Each alternative is a variation of detention basin and/or channel concept. Through the analysis process for each alternative, various design and regulatory elements were discovered that effect cost or feasibility. The ADMP recommended three detention basins on the fan along with floodwalls lining Skyline Wash to keep the flow contained. While the solution benefited the whole fan, it was costly.

10.1 Alternatives and Recommended Alternative

Alternative 1A, estimated cost $6.5 to $6.6 million, is a 15-foot deep basin with single low flow pipe to Prospect Wash. This Alternative is the lowest cost and least complex with respect to number of pipes, structures, and channel improvements. The 15-foot basin depth allows a smaller basin foot print and land take, which saves earthwork and land costs. Costs for export of material could be an issue with this Alternative if a stock pile location cannot be found locally. In addition, maintenance could require the removal of 17.7 acre-feet of sediment every three years. The amount of sediment removal in a three-year span will most likely be less. The 100-year storm event could produce 11.15 acre-feet of sediment and the annual yield could produce 2.18 acre-feet of sediment. The 100-year storm plus three annual storms equates to 17.7 acre-feet of sediment. This has a very low probability that this will occur every three years. This may occur once or twice in a lifetime. There most likely will be six to seven acre-feet of removal every three years provided that it rains every year.

Alternative 1B, estimated cost $7.9 to $8.0 million, is a 10-foot deep basin with dual low flow pipes to Prospect and Skyline Washes. This Alternative is the second lowest cost and little more complex with the addition of the extra pipe and outlet structure. The 10-foot basin depth has a larger basin foot print than Alternative 1 which increase earthwork and land take costs. Like Alternative 1A export costs could get very large very quickly if a stock pile location cannot be found locally. In addition, maintenance could require the removal of 17.7 acre-feet of sediment every three years. The amount of sediment removal in a three-year span will most likely be less. The 100-year storm event could produce 11.15 acre-feet of sediment and the annual yield could produce 2.18 acre-feet of sediment. The 100-year storm plus three annual storms equates to 17.7 acre-feet of sediment. This has a very low probability that this will occur every three years. This may occur once or twice in a lifetime. There most likely will be six to seven acre-feet of removal every three years provided that it rains every year.

Alternative 2, estimated cost $29.0 to $62.6 million, is a channel that routes full apex flow to Prospect Wash. Prospect Wash requires rip rap revetment and this drives the cost. Other concerns for this Alternative are the ability to control the apex. Because the upper wash can still migrate it would be difficult to construct an inlet structure that would allow migration and still direct flow to the channel. Maintenance of this option would be less considering the channel would be self-cleaning. The channel at Prospect Wash is undersized south of Roosevelt and would require full channel improvements to the FRS in order to convey the full after flow.

Alternative 3, estimated cost $12.8 to $17.1 Million, is a combination basin and channel that routes approximately 900 cubic feet per second to Prospect Wash. Prospect Wash requires rip rap revetment and this drives the cost which the lower cost basin does not offset. This Alternative can save money by not requiring improvements to Prospect Wash. The basin could be designed deeper which would save earthwork and land costs. Maintenance of this option would be less than Alternative 1A or 1B but more than Alternative 2. This is due to the fact that the larger outlet culvert can convey some sediment downstream.

Sunrise's Recommended Alternative is Alternative 1A with PCC inlet with an estimated cost $7.6 to $7.7 Million. This alternative has the least cost, lowest earthwork, and least complex outflow. The lower cost of this alternative is within the budget supplied in the CIP submittal to the District. The amount of export of the alternatives could be a problem to find a location for stockpile or placement within the project area. This alternative has the least amount of export so as to minimize the issues of export placement. Single outflow is the least complex of the alternatives. Dual outflow alternatives are more costly due to double the amount of pipes and structures. This alternative minimizes the pipes and structures. The PCC inlet is the least expensive of riprap and RCC. The inlet will be more robust than riprap and include features to help it blend in with the natural landscape.

10.2 ADMP Comparison

A large detention basin is proposed at the fan apex as part of this project's recommended alternative (1A) which is consistent with the original ADMP's whole-fan solution. Alternative 1A's large detention basin will detain the 100-year flood and sediment, therefore eliminating avulsion and flooding uncertainty on alluvial fan area. However, the original ADMP proposed two additional smaller detention basins for two smaller washes on the east side (Coyote Wash and Rattler Wash). A second phase to this project could address the flooding issues due to these two smaller washes.

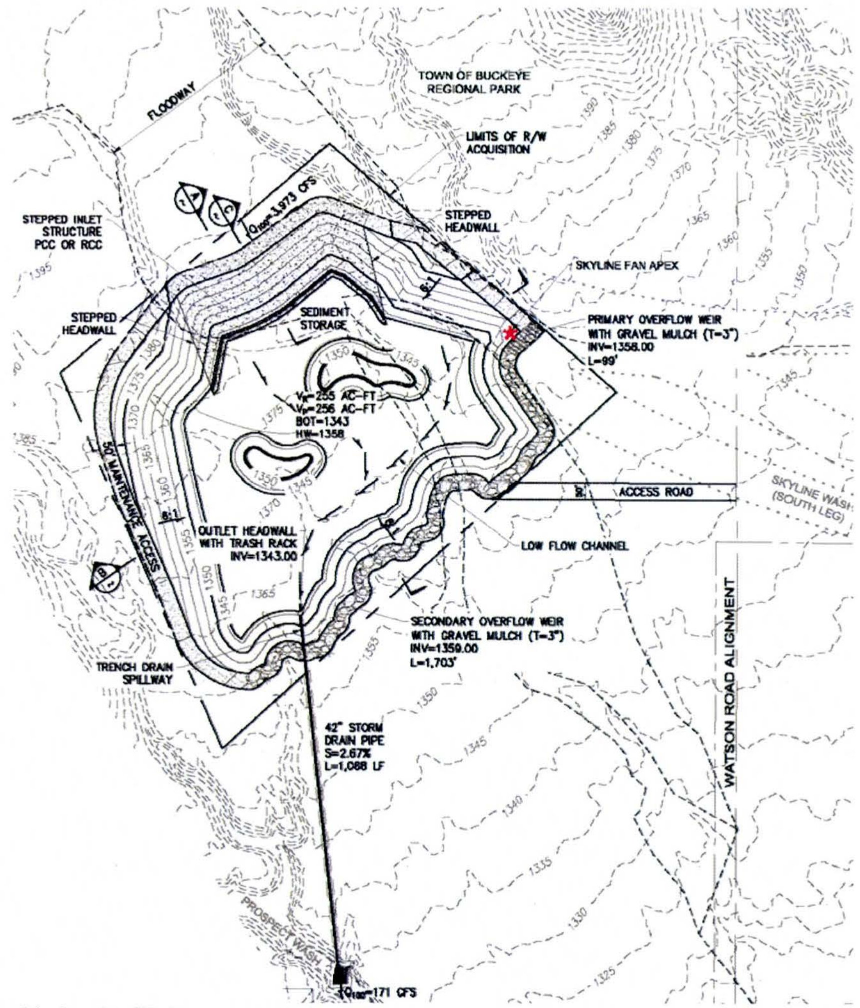
10.3 Future Considerations

As the project progresses a downstream flooding analysis study will need to be conducted. This study will notify downstream residents of the possible flooding hazards should a larger storm event pass through the basin.

A CLOMR is anticipated to be prepared in conjunction with the final design of the Recommended Alternative.

Final design could review solutions to control Skyline Wash lateral migration to reduce or eliminate the additional inlet structure area at the cost of installing lateral migration improvements.

During final design the connection location with Prospect Wash should be reviewed. Another location up a Prospect Wash tributary could significantly shorten the pipe.



Skyline DCR Recommended Alternative

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APPENDICES

APPENDIX A

Skyline Wash Proposed Basin, Impacts on Buckeye FRS No. 3

INTEROFFICE MEMORANDUM

Date: June 25, 2012

To: Amir Motamedi, Manager, Hydrology & Hydraulics Branch 6/26/12

From: Ken Rakestraw, Hydrology & Hydraulics Branch

Subject: Skyline Wash Proposed Basin, Impacts on Buckeye FRS No. 3

Skyline Wash is located in the drainage area contributing to Buckeye Flood Retarding Structure No. 3 (Buckeye FRS 3). A detention basin is under consideration to manage floodwaters for the 100-year storm at a location along the wash immediately upstream from an alluvial fan. The plan concept for the basin is to divert flows approaching the basin from the northwest to the south, thus directing those flows away from the fan and toward the west end of Buckeye FRS 3. Figure 1 shows a layout of the conceptual basin with the diversion toward the west end of Buckeye FRS 3.

HEC-1 hydrology models from two different studies were modified to simulate the diversion which would be affected at the proposed basin location. Existing conditions hydrology models from the Buckeye/Sun Valley ADMS (2005), 100-yr 24hr and from the Skyline Wash Floodplain Delineation Study (FDS-1997) (Contract 96-08), 100-yr 24hr and 100-yr 6hr were modified to divert the flows at the proposed basin location to the west. The hydrology for the ADMS model was the most recent hydrology study available and was available for the 24-hr storm duration only. The hydrology for the FDS study was more detailed with much smaller sub-basins and was available for both the 6-hr and 24-hr storm durations. The watershed maps showing sub-basin delineations for the two studies are attached as Figure 2 and Figure 3.

The unsteady flow HECRAS model developed for the Buckeye/Sun Valley ADMS was used to assess the hydraulics along Buckeye FRS 3. Figure 4 shows the approximate location of the HECRAS cross section stationing.

Probable Maximum Flood (PMF)/Precipitation was not modeled. It is assumed that a basin designed for a 100-year storm would be overwhelmed by inflows from a PMF and would have little impact on the PMF flow patterns.

For the simulation of diversion due to the conceptual basin, storage effects of the basin on reduction of inflow peaks and volumes were not considered. As a result, the peak flows and volumes reaching the Buckeye FRS 3 are considered to be conservative. For the Buckeye / Sun Valley ADMS Model, all flow for sub-basin W1 was diverted from sub-basin W2 to Sub-Basin V. Routing parameters were not modified. Table 1 shows the resulting change in peak flows reaching Buckeye FRS 3.

TABLE 1

Buckeye/Sun Valley ADMS, 100yr, 24hr

Concentration Point	Peak Flow Without Diversion(cfs)	Peak Flow With Diversion(cfs)	Unsteady Flow HECRAS Model Inflow Station
VCP	526	2846	1382.00
WCP	3648	2042	5698.20
XCP	645	645	12889.70
YCP	837	837	14443.5

For the effective model study (Skyline Wash FDS), all flow departing from Concentration Point HC13 was diverted to the west. Those flows were then routed to Sub-Basin S27 and combined with S27 flows at a new concentration point (CP27). Routing parameters were not modified. These flows were then routed through Sub-Basin 28 and sub-Basin 29 to the extreme west end of Buckeye FRS 3. Tables 2 and 3 show the resulting change in peak flows reaching Buckeye FRS 3 for the 6-hr and 24-hr storms, respectively.

TABLE 2

Skyline Wash FDS, 100yr, 6hr

Concentration Point	Peak Flow Without Diversion (cfs)	Peak Flow With Diversion (cfs)	Unsteady Flow HECRAS Model Inflow Station
S21	1547	1547	14000
HC20	1394	1394	12500
HC17	1311	752	10000
CP22	1474	1229	8000
S23	1003	1003	6000
CP24/S24	2082	423	3000
HC26	500	500	2000
HC29	1267	4115	1000

TABLE 3

Skyline Wash FDS, 100yr, 24hr

Concentration Point	Peak Flow Without Diversion (cfs)	Peak Flow With Diversion (cfs)	Unsteady Flow HECRAS Model Inflow Station
S21	1152	1152	14000
HC20	1001	1001	12500
HC17	1338	805	10000
CP22	876	876	8000
S23	683	683	6000
CP24/S24	2225	296	3000
HC26	352	352	2000
HC29	956	3838	1000

The hydraulic modeling of the diverted flow scenario shows very little change in maximum water surface profile along Buckeye FRS 3. Tables 4, 5, and 6 show comparisons of the maximum water surface at locations along the FRS.

TABLE 4

Buckeye/Sun Valley ADMS, 100yr, 24hr

Unsteady Flow HECRAS Model Station	Max WS Elevation-Ft WITHOUT Diversion	Max WS Elevation-Ft WITH Diversion	Difference-Ft
1000	1159.42	1159.42	0.00
3000	1159.42	1159.42	0.00
6000	1159.42	1159.42	0.00
8000	1159.42	1159.42	0.00
10000	1159.42	1159.42	0.00
12000	1159.42	1159.43	0.01
14000	1159.43	1159.43	0.00

TABLE 5

Skyline Wash FDS, 100yr, 6hr

Unsteady Flow HECRAS Model Station	Max WS Elevation-Ft WITHOUT Diversion	Max WS Elevation-Ft WITH Diversion	Difference-Ft
1000	1160.57	1160.32	-0.25
3000	1160.57	1160.31	-0.26
6000	1160.56	1160.30	-0.26
8000	1160.56	1160.30	-0.26
10000	1160.57	1160.31	-0.26
12000	1160.57	1160.33	-0.24
14000	1160.58	1160.34	-0.24

TABLE 6

Skyline Wash FDS, 100yr, 24hr

Unsteady Flow HECRAS Model Station	Max WS Elevation-Ft WITHOUT Diversion	Max WS Elevation-Ft WITH Diversion	Difference-Ft
1000	1159.48	1159.47	-0.01
3000	1159.48	1159.47	-0.01
6000	1159.48	1159.46	-0.02
8000	1159.48	1159.46	-0.02
10000	1159.48	1158.47	-0.01
12000	1159.49	1158.48	-0.01
14000	1159.49	1159.48	-0.01

Each of the modeling runs show that the maximum water surface profiles for the "with diversion" analysis results in virtually the same or slightly lower elevations than the "without diversion" runs. It is notable that at time intervals near the peaks of the inflow hydrographs and during the rise in storage in Buckeye FRS 3, the "with diversion" water surfaces are higher along the western portion of the FRS when compared to the "without diversion" runs (Note: HECRAS station 1000 is near the extreme western end of the FRS). Results at selected locations for each of the modeled storms are shown in Table 7.

TABLE 7

Unsteady Flow HECRAS Model Station	Buckeye Sun Valley 100yr, 24hr		Skyline Wash FDS 100yr, 6hr		Skyline Wash FDS 100yr, 24hr	
	Without Diversion	With Diversion	Without Diversion	With Diversion	Without Diversion	With Diversion
Time Interval (hrs)	1250		0430		1250	
1000	1155.78	1156.91	1157.31	1158.39	1158.11	1158.62
3000	1155.92	1156.78	1157.37	1158.27	1158.12	1158.48
6000	1157.54	1156.67	1157.49	1158.19	1158.11	1158.15
8000	1157.40	1156.65	1158.22	1158.29	1158.19	1157.98
10000	1157.31	1156.68	1158.44	1158.38	1158.21	1157.82
12000	1157.25	1156.89	1158.46	1158.44	1158.16	1157.64
14000	1157.21	1157.08	1158.51	1158.51	1158.09	1157.52

The resultant water surface rise on the western portion of Buckeye FRS 3 due to the westward diversion of flow varies from about 0.5 foot to about 1.1 foot at time intervals near the peak inflows to the Structure. At and near these peak inflow time intervals, these higher water surface elevations contribute to increased flows out of the Principal Spillway on the west end of the Structure, resulting in less maximum storage volume in Buckeye FRS 3 and lower maximum water surface elevations for the "with diversion" scenario.

The hydrology and hydraulics models used in the analysis are included on the attached CD.

Notes: Please note that this is a planning level analysis. Sediment basins and hydraulic structures will have to be designed at the inflow point of the proposed diversion into Buckeye FRS 3 which may affect the water surface elevation.

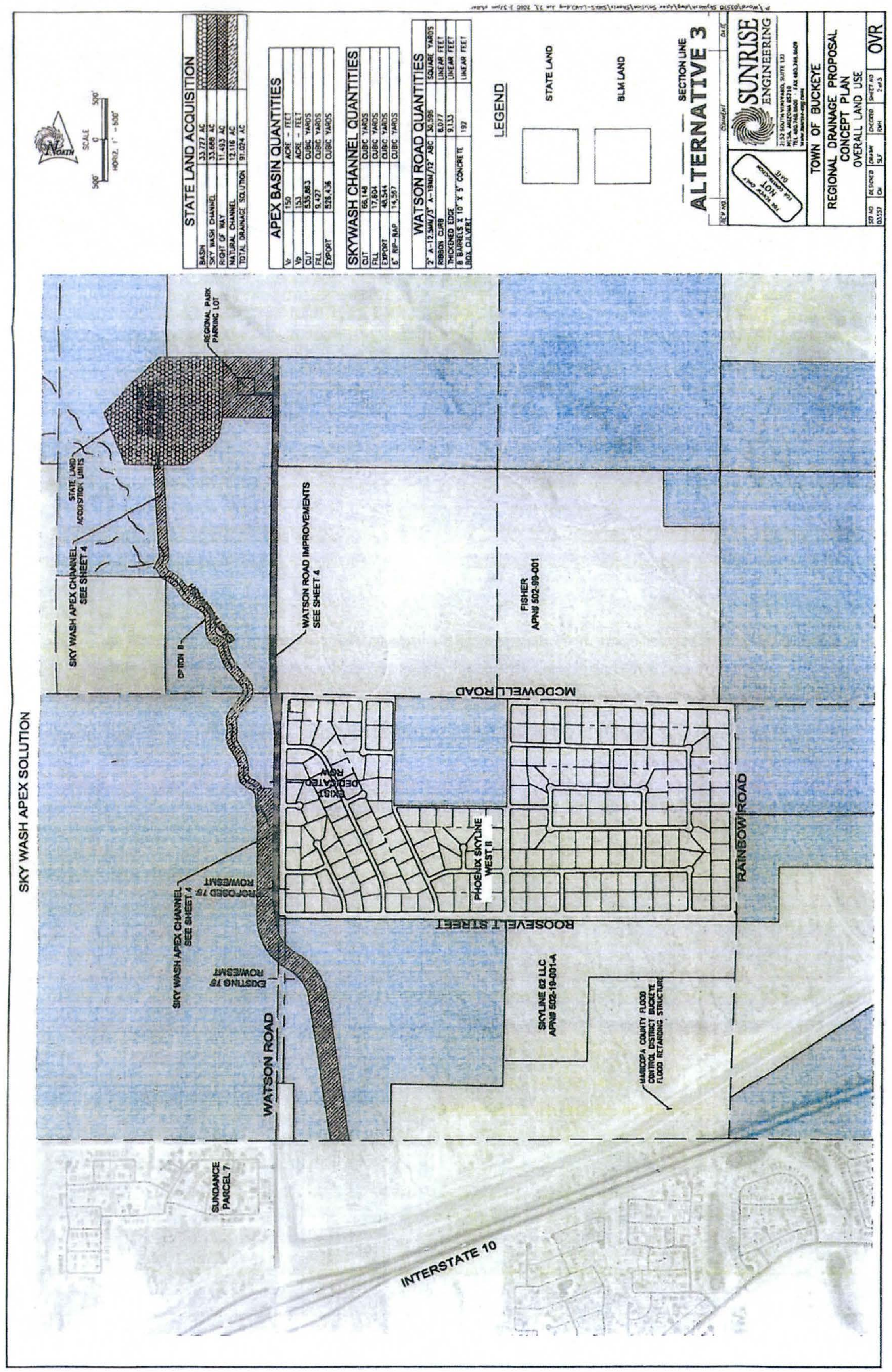


FIGURE 1

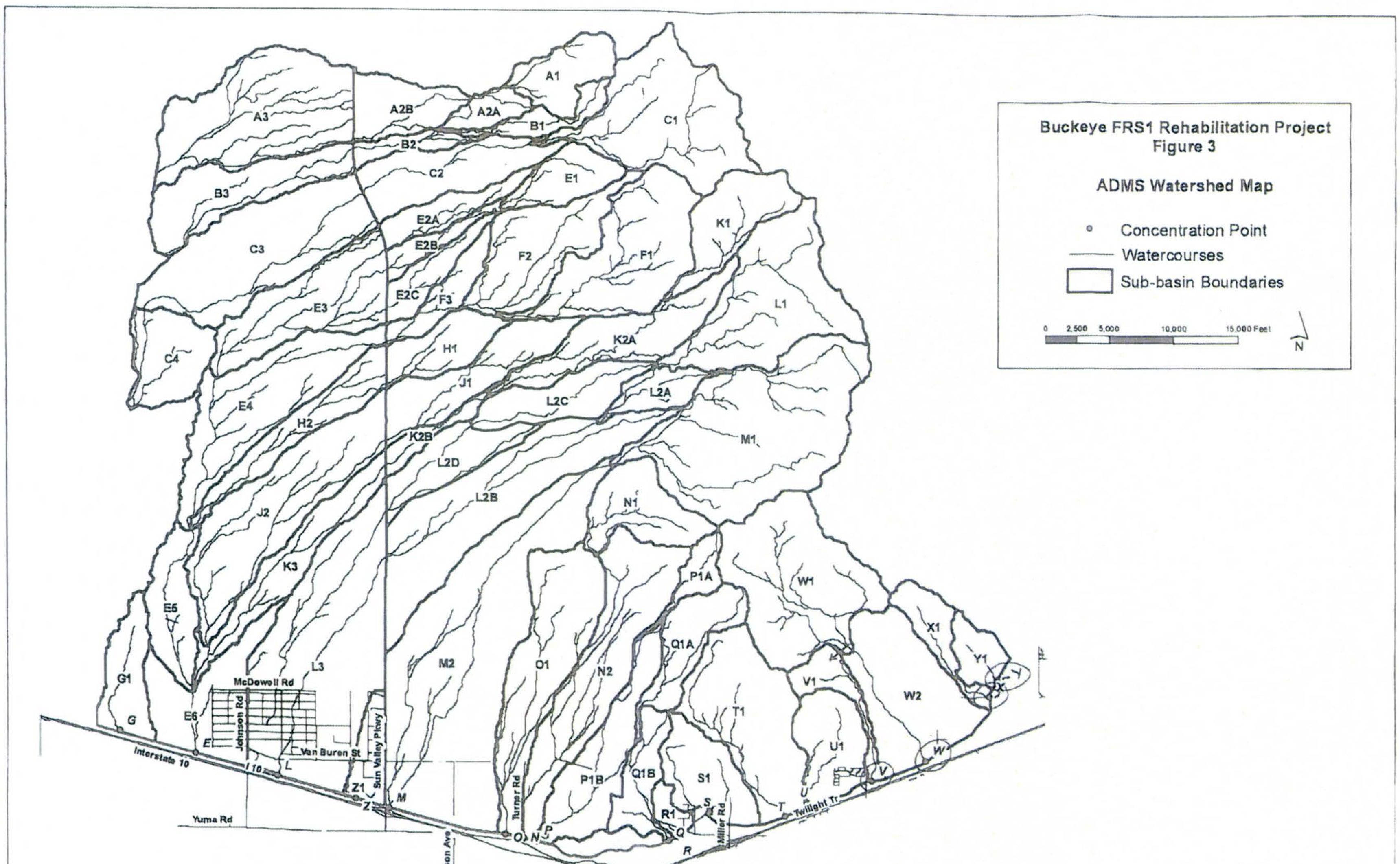


FIGURE 2

FIGURE 3

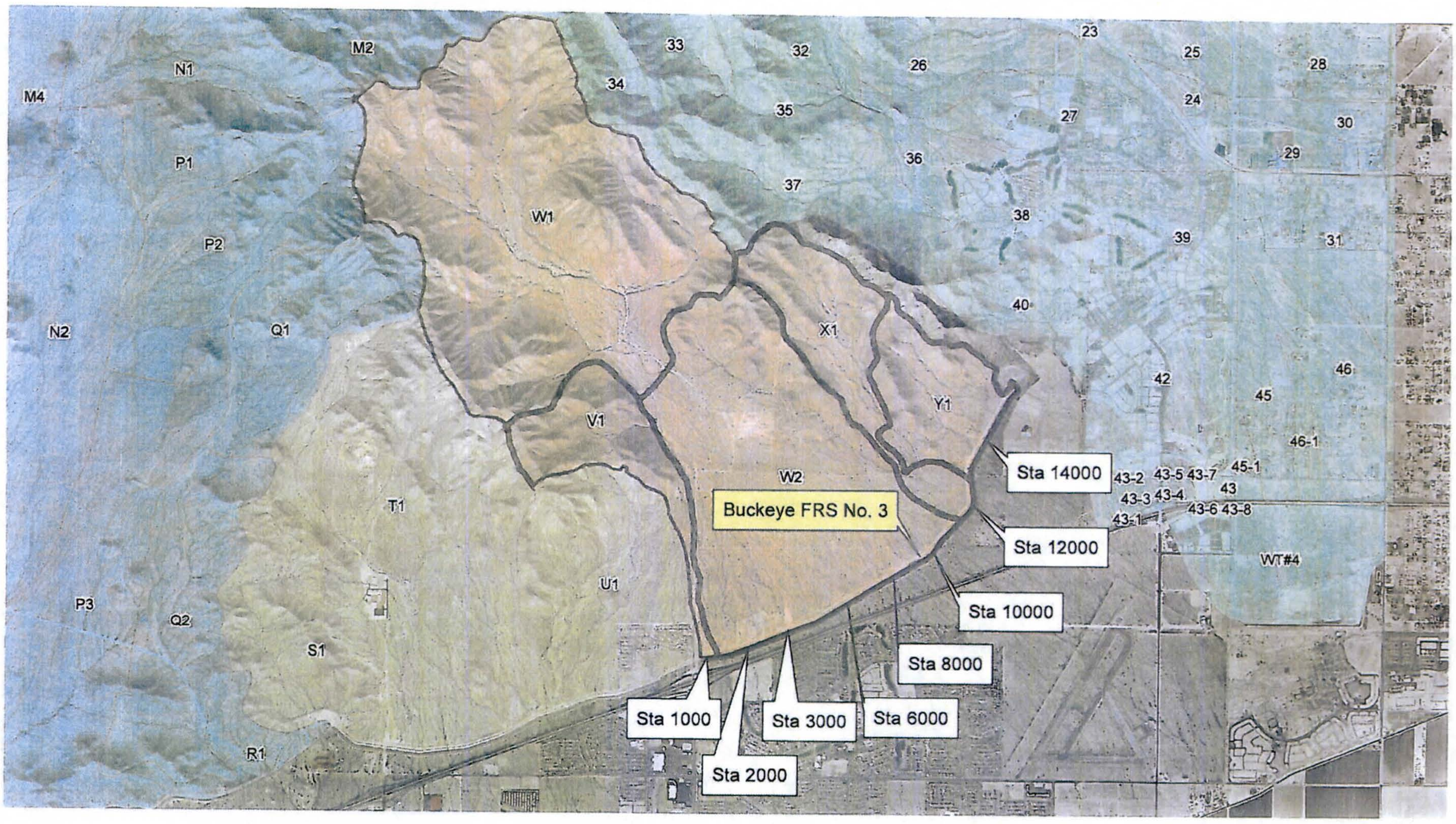
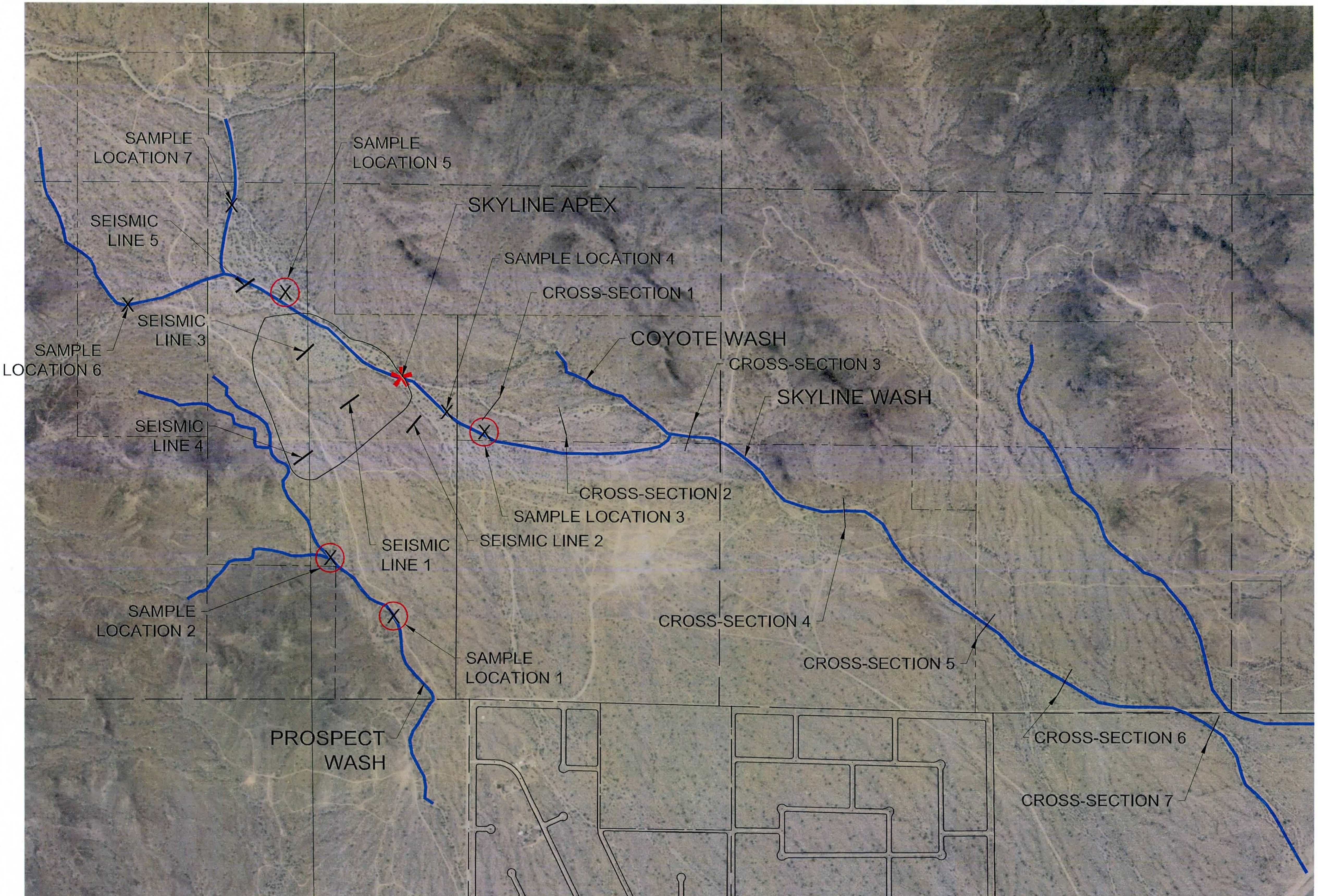

M4
N1
M2
33
32
26
23
25
28
34
35
27
24
30
P1
36
29
37
W1
38
P2
39
31
40
N2
Q1
X1
V1
Y1
42
46
45
46-1
Sta 14000
W2
43-2
43-5
43-7
45-1
43
43-3
43-4
43-6
43-8
43-1
T1
Buckeye FRS No. 3
Sta 12000
U1
WT#4
P3
Sta 10000
Q2
S1
Sta 8000
Sta 1000
Sta 3000
Sta 6000
R1
Sta 2000

Figure 4

APPENDIX B

Seismic Refraction Report

SAMPLING LOCATIONS



LEGEND

- X SAMPLE LOCATION @ SURFACE
- (X) SAMPLE LOCATION @ SURFACE AND −5'
- SEISMIC REFRACTION LINE
- CROSS−SECTION LINE

NORTH

SCALE 0 500' 1000'
HORIZ: 1" = 1000'

SUNRISE ENGINEERING
2152 SOUTH VINEYARD, SUITE 123
MESA, ARIZONA 85210
TEL 480.768.8600 · FAX 480.768.8609
www.sunrise-eng.com

P:\Buckeye\04234Skyline Wash DCR\Dwg\Exhibits\Locations.dwg Feb 19, 2013 9:21am sfuller

Seismic Refraction Survey Report

Skyline Fan Design Concept Review

Buckeye, Arizona

January 24, 2013

Terracon Project No. 65125286

Prepared for:
Sunrise Engineering
Mesa, Arizona

Prepared by:
Terracon Consultants, Inc.
Tempe, Arizona
P: 480.897.8200
F: 480-897-1133

Registered Professional Engineer CERTIFICATE NO. 51975 ADERSON M. VIEIRA (Civil) Date Signed 2/1/13 ARIZONA, U.S.A.
EXPIRES 3/31/2014

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Geotechnical ■ Environmental ■ Construction Materials ■ Facilities

---

January 24, 2013

Terracon

Sunrise Engineering, Inc.
2152 S. Vineyard, Suite 123
Mesa, Arizona 85210

Attn: Mr. Ricky M. Holston, P.E.

Re: **Seismic Refraction Survey Report**
Skyline Fan Design Concept Review
Vicinity of Watson and McDowell Roads
Buckeye, Arizona
Terracon Project No. 65125286

Dear Mr. Holston:

Terracon Consultants, Inc. (Terracon) has completed seismic refraction surveys, surface sampling and testing of designated areas for the Skyline Fan located in Buckeye, Arizona. These services were performed in general accordance with our proposal number P65110353, dated February 3, 2012. This report presents the results of the seismic refraction surveys conducted on five predetermined line locations within the proposed drainage basin of the project and provides geotechnical engineering recommendations concerning the rippability of the existing surface and subsurface soil or rock interpreted from the refraction data at the selected survey locations. This report also provides the results of laboratory tests for surface soil samples collected at seven different locations on the project as designated by Sunrise Engineering.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.

Aderson M. Vieira, Ph.D., P.E.
Project Manager

Registered Professional Engineer CERTIFICATE NO. 51975 ADERSON M. VIEIRA (Civil) Date Signed 2/1/13 ARIZONA, U.S.A.
EXPIRES 3/31/2014

Donald R. Clark, P.E.
Senior Principal

N:\Projects\2012\65125286\Working Files\DRAFTS (Proposal-Reports-Communications)\65125286.Skyline Fan DCR REVISED.rpt.doc

Copies to: Addressee (1 via email)

SEISMIC REFRACTION SURVEY REPORT
SKYLINE FAN DESIGN CONCEPT REVIEW
VICINITY OF WATSON AND MCDOWELL ROADS
BUCKEYE, ARIZONA

Terracon Project No. 65125286
January 24, 2013

INTRODUCTION

This report presents the results of our seismic refraction surveys performed for the planned improvements that are being considered for the Skyline Fan Design Concept Review located in Buckeye, Arizona. The purpose of these services is to provide a seismic refraction study in order to assess the excavation conditions of existing subsurface materials within the proposed drainage basin and wash areas of the project and to provide a basis of determining the necessity of additional geotechnical exploration at the site. Additionally, surface samples of soils within the wash were obtained and subjected to laboratory testing to determine engineering characteristics of the soils for use in sediment transport analyses.

Our scope of engineering services for this project included performing five (5) seismic refraction survey lines to assess the upper 28 to 65 feet of the subsurface profile located at the project site. The seismic refraction line locations where determined by Sunrise Engineering and were staked in the field prior to performing the refraction surveys. All seismic lines were located within 30 feet of the proposed staked locations. Additionally, surface sampling was conducted at seven (7) locations, as determined by the Sunrise Engineering representative, for further laboratory testing including sieve analyses and Atterberg Limit determinations.

This report contains our interpretation of the subsurface conditions at each of the survey locations based on the compression wave (p-wave) velocities obtained from each of the seismic refraction lines. This report also contains the description of the expected rippability of the subsurface materials based on correlations with p-wave velocity as referenced in the Caterpillar (CAT) Performance Handbook, Edition 31.

A site plan with the seismic refraction line locations and the results of seismic refraction testing are included in Appendix A of this report. The locations of surface sampling and the results of the laboratory testing of these samples are included in Appendix B of this report.

PROJECT INFORMATION

Site Location and Description

ITEM	DESCRIPTION
Location	The site is located in the White Tank Mountains Skyline Fan area north of Buckeye, Arizona (as shown on Exhibit A-1)
Existing site features	The entire site is native desert along the Skyline Fan in the White Tank Mountains. Various amounts of trash and debris were noted on the surface at different locations within the project limits.
Surrounding developments	North, East, West and South: Native desert and mountains.
Current ground cover	Typically sand, silt, cobbles and gravels with a sparse growth of small trees, bushes and grasses.
Existing topography	The topography within the project area varies from flat within the confines of the channels and basins with sloping surfaces outside of the channel and basin areas. The overall topography at the location of the seismic refraction line locations was relatively flat with elevation differences of 3 feet or less

Site Geology

The project site is located to the north of Buckeye, in the White Tank Mountains in Arizona. Specifically, the study area is a alluvial fan located at the base of the White Tank Mountains. The White Tank Mountains are one of many mountain ranges in the Basin and Range physiographic province of Arizona. The Basin and Range province in the vicinity of the study area is characterized by relatively small mountain ranges of modest topographic relief separated by wide, gently sloping piedmonts and basin bottom river drainages. The geomorphic surfaces and associated deposits were formed during discrete time intervals ranging from the late Tertiary to the late Holocene ([1]Field and Pearthree, 1991).

In accordance with [2]Field (1994), downwearing and reduction of stream gradients, since that time in the White Tank Mountains, has led to the permanent entrenchment of Pliocene and Pleistocene alluvial fans containing debris-flow deposits. The White Tank Fan is an active secondary fan forming at the termini of fan head trenches passing through the older deposits. Sediments on the White Tank Mountain Fan are predominately composed of sand and are derived from similar source-area lithologies. Granite, granodiorite, and felsic gneiss found in the White Tank Fan drainage basins weather to sand-, silt-, and clay-sized particles. Large boulders and cobbles are rare on the fan and are derived from Pleistocene debris-flow deposits near the fan apex and along

[1]Field, J.J. and Pearthree, P.A., 1991, **Surficial Geology Around the White Tank Mountains, Central Arizona**, Arizona Geological Society.

[2]Field J.J., 1994, **Surficial Processes on Two Fluvially Dominated Alluvial Fans in Arizona**, Arizona Geological Society.

the fan margins. The thickness of late Holocene deposits is less than nine feet on the White Tank Fan (Field, 1994).

Based on an Arizona Geological Survey map ([1]Field and Pearthree, 1991), a portion of which is shown in Exhibit A-2, the seismic survey lines, marked "Line 3" and "Line 5", were located within zone "Y2" on the map. In accordance with Field and Pearthree, 1991, this zone is characterized as late Holocene alluvial fans, low terraces, and active stream channels areas, less than 3,000 years in age. Alluvial fan deposits on the lower piedmont are fine silts and sands. Middle piedmont surfaces and active channels extending into the White Tank Mountains are very gravelly sands and silts. Surfaces are typically undissected and display distributary drainage patterns, although 5 foot arroyo cuts occur locally on the lower piedmont. Surfaces are typically smooth, but bar and swale topography is present on the middle piedmont. Desert pavement and desert varnish are absent. These areas are subject to occasional to frequent flooding.

The seismic survey lines marked "Line 1", "Line 2" and "Line 4" were located in zone "M1b" which is characterized as a middle to late Pleistocene alluvial fan area. This zone is less than 150,000 to 300,000 years in age. Deposits are a poorly sorted, angular to subangular admixture of silt, sand, and gravel. The surfaces are moderately dissected on the upper piedmont with 3-20 feet of relief above active channels. On the lower and middle piedmont, relief may be less than 3 feet. Interfluve areas are broad and flat with original gravel bar and swale topography poorly preserved. A moderately to well developed cobble to pebble desert pavement is found over 50 to 75 percent of the surface. Underlying soils are characterized by weakly developed argillic horizons, typically above a stage II calcic horizon. Most areas are isolated from flooding except in entrenched channels, but areas of low relief on the middle and lower piedmont could become susceptible to flooding with relatively minor shifts in depositional patterns.

Site Exploration

The seismic refraction surveys were conducted on January 3 and 4, 2013, with a two-man crew equipped with a twenty four (24) channel seismograph, twenty four (24) geophones and a computer to record and store field data. The spacing between geophones was set at ten (10) feet with a total line length of 240 feet. Six (6) forward, intermediate and reverse seismic traverses were performed along each of the five (5) lines located on the site. All field data obtained was reduced with the SeisImager software program to generate appropriate time-distance curves. The seismograph equipment used for the seismic refraction survey was an ES-3000 manufactured by Geometrics, Inc..

The seismic refraction method of field exploration consists of measuring (at known points along the surface of the ground) the travel time of compressional waves (p-waves) generated by an impulsive energy source, recorded by a detector (geophone). The field data recorded consists of the time it takes the compressional wave to travel from the source to the detectors, and the distance between the detector and the source. Depending upon the hardness and depth of

subsurface materials, the travel time of the compressional waves are shortened and refracted quicker as the material becomes harder with depth.

The data obtained from our field exploration was evaluated and interpreted using Snell's law to determine the compressional wave velocities of each subsurface stratum. From these interpretations, the depth to various strata was determined along the alignment of each of the traverses.

In addition to the seismic lines, seven bulk samples were collected during the site visit at locations determined by Sunrise Engineering. The samples were taken to the laboratory for soil characterization (sieve analyses and Atterberg limits). The locations of these shallow surface samples are summarized on Exhibit B-1 in Appendix B. The results of the laboratory testing performed on these soil samples obtained from the site during the field exploration are also included in Appendix B of this report. Laboratory test results indicate that the surface soils are mostly poorly graded sand, and well-graded sand with silt and gravel.

Results and Recommendations

The seismic refraction survey data was reduced using Snell's law. The data developed includes the compressional or p-wave velocity and thickness of each distinct material layer encountered. P-wave velocities are an indication of the material's hardness, (i.e., the faster the velocity, the harder the material). Results of each seismic survey line are presented in Appendix A, on Exhibits A-3 through A-7. Each section line represents a corresponding line on the Site Plan, as shown on Exhibits A-1 and A-2 in Appendix A. The compressional seismic wave-velocities are indicated on the cross section of each layer. Please note the compressional seismic wave-velocities obtained are an average value for certain depth; localized variances of the velocities may be encountered and should be expected.

Based upon the compressional wave velocities measured at each of the seismic survey lines, the data suggest a three layer profile of subsurface materials. In general, findings of the seismic refraction surveys were consistent with an upper soil layer overlying a more dense/harder soil, cemented soil or weathered rock layer. A surficial loose soil layer profile was found at all five (5) survey locations. Below this surficial layer, a denser/harder soil layer was determined as a result of the seismic data analyses. In some cases (at Lines 1, Line 3 and Line 5), a third subsurface layer was encountered. Based on our review of the geologic conditions at the site and the p-wave velocities, the following table presents our interpretation of inferred subsurface conditions at each survey line:

Description	Approximate Depth to Bottom of Stratum (feet)	Inferred Subsurface Material*	Approximate P-Wave Velocity (ft/s)				
			Line 1	Line 2	Line 3	Line 4	Line 5
Stratum 1	3 to 10	Sand with silt and gravel	1,063	1,116	1,094	1,210	1,211
Stratum 2	7 to 47	Medium dense to dense or hard soil/cemented soil	3,164	--	2,408	--	2,216
Stratum 3	8 to 77	Medium dense to dense or hard soil/cemented soil or weathered rock	6,984	4,632	3,336	4,425	2,896

*The inferred subsurface materials were interpreted on the basis of the anticipated geologic conditions at the site and published correlations of subsurface materials and compression wave velocities.

It should also be noted that the velocities summarized above and as shown on each of the cross-sections in Appendix A provide the average velocity of a layer based upon the twenty four (24) geophone readings. Some variation of velocity and hardness could exist within a given strata. The strata lines in Appendix A are an interpretation of the data; in-situ, the transitions, particularly in bedrock, could be more gradual.

Caterpillar, Inc. has published performance criteria for excavation of subsurface materials using various construction equipment and based on correlations with compressional wave velocities. These data are contained in the Caterpillar Performance Handbook, Edition 31(2000). The caterpillar performance criteria includes three categories of excavation including Rippable, Marginal (i.e. marginally rippable) and Non-Rippable. These ranges vary by compression wave velocity and size of equipment. Based upon the Caterpillar data and our interpretation of the subsurface conditions as previously discussed, we have assigned the following excavation conditions (rippability) based on the use of a Caterpillar D10R Ripper:

Description	Approximate Depth to Bottom of Stratum (feet)	Approximate P-(Compressional) Wave Velocity (feet/s)	Rippability Based on Caterpillar D10R Ripper and Seismic Velocity*
Stratum 1	3 to 10	1,063 to 1,211	Rippable to 7,000 ft/s
Stratum 2	7 to 47	2,216 to 3,164	
Stratum 3	8 to 77	2,896 to 6,984	

*Source: Caterpillar Caterpillar Performance Handbook, Edition 31(2000).

Based upon the results of the seismic data and published correlations of material rippability, it appears that the materials identified within the depth of the seismic refraction surveys should be rippable with a Caterpillar D10R ripper equipped with a ripping attachment or a similar piece of excavation equipment. However, the Stratum 3 bedrock at the location of seismic line 1 has a p-wave velocity close to the marginal limit and may present more difficulty in excavation. It should be emphasized the rippability of the material is highly dependent upon the excavation equipment. The above guidelines are based upon a Caterpillar D10R with a multi- or single-shank ripper. Rippability is also dependent upon bedding and fracturing of the material. Should different

equipment be anticipated for use in the actual construction, excavation characteristics of the materials should be expected to change.

GENERAL COMMENTS

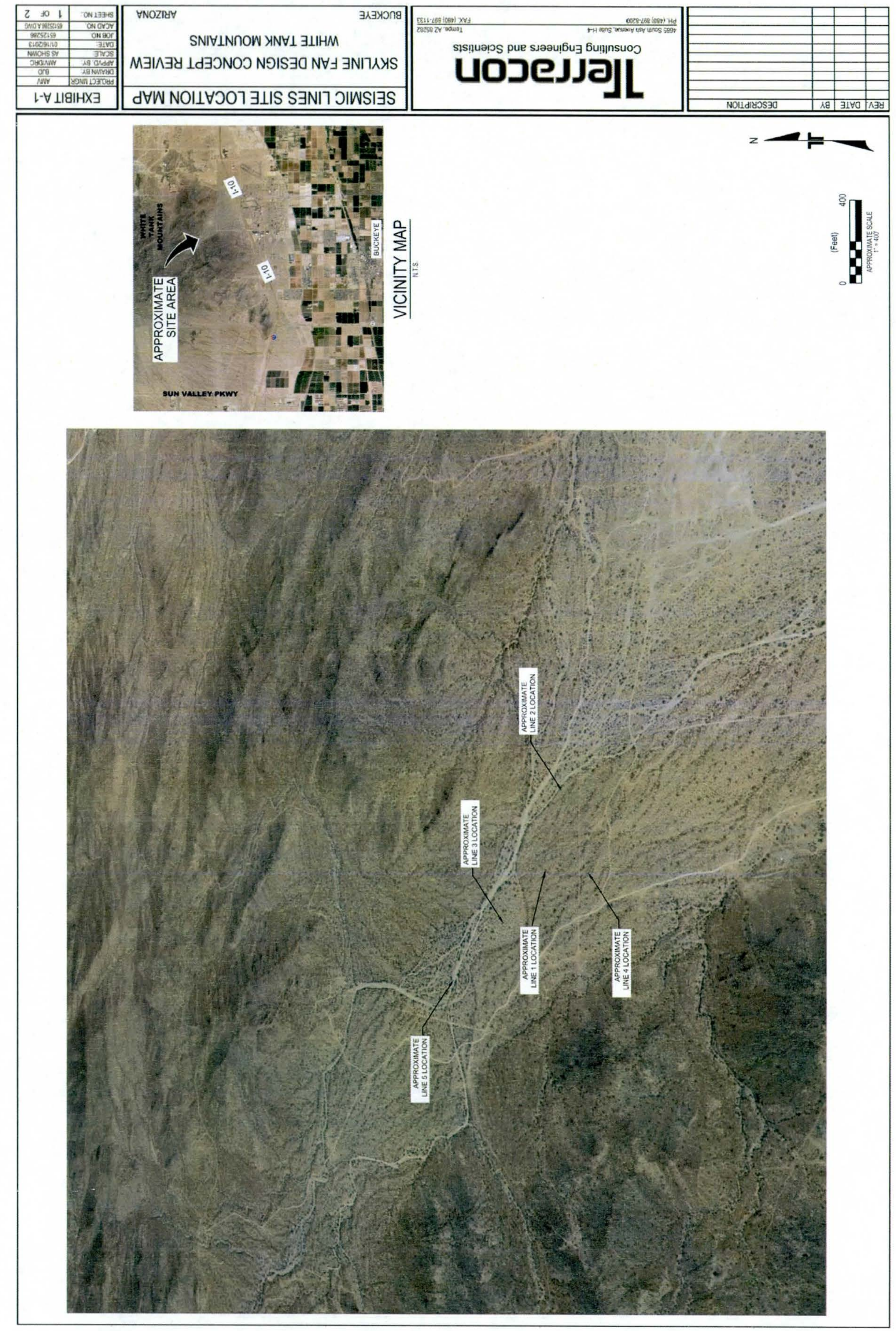
The analysis and engineering interpretation and recommendations presented in this report are based upon the data obtained from the seismic refraction lines performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between areas, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

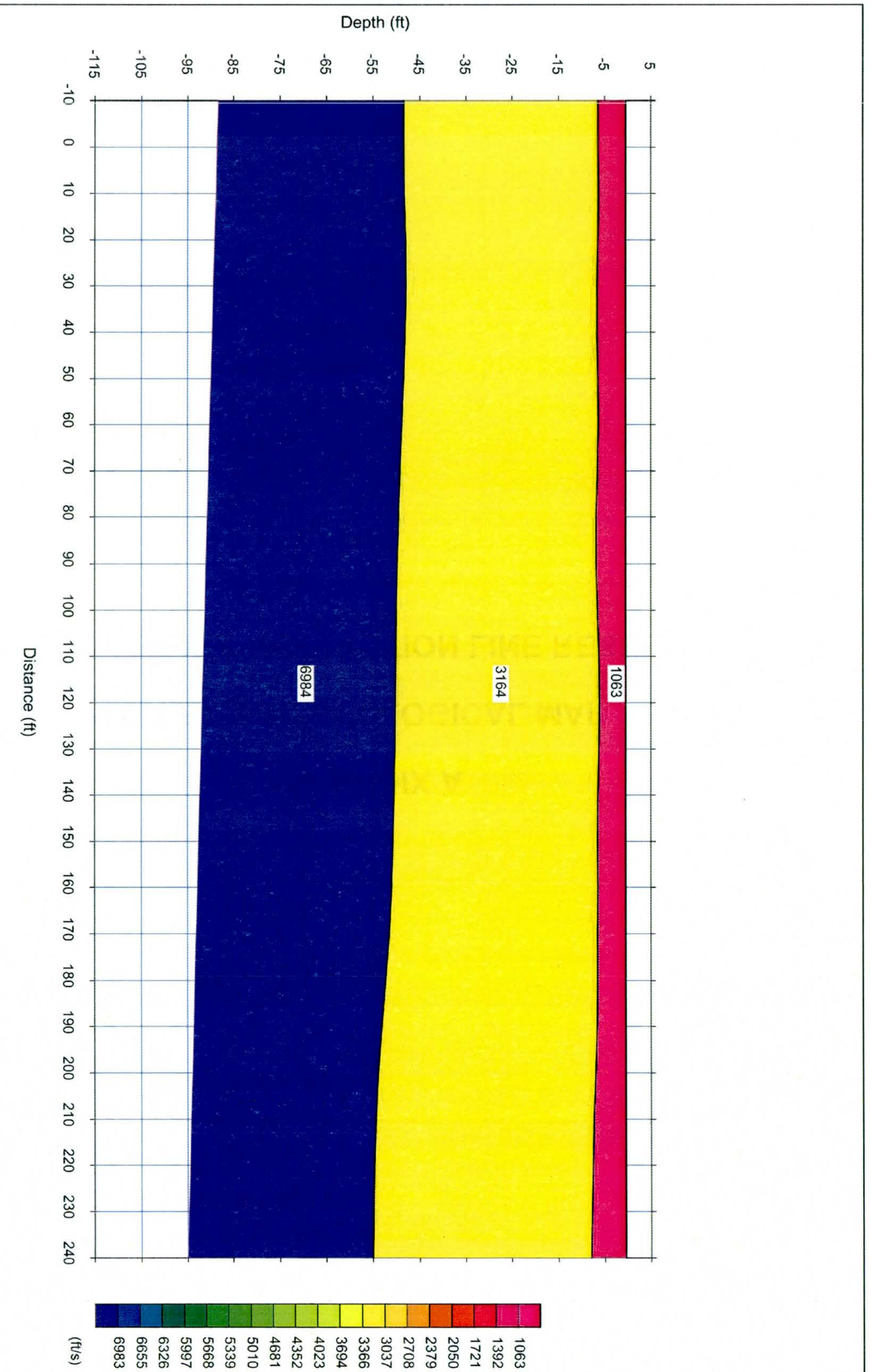
This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either express or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A

SITE PLAN, GEOLOGICAL MAP

AND SEISMIC REFRACTION LINE RESULTS





REV	DATE	BY	DESCRIPTION

Terracon
Consulting Engineers and Scientists

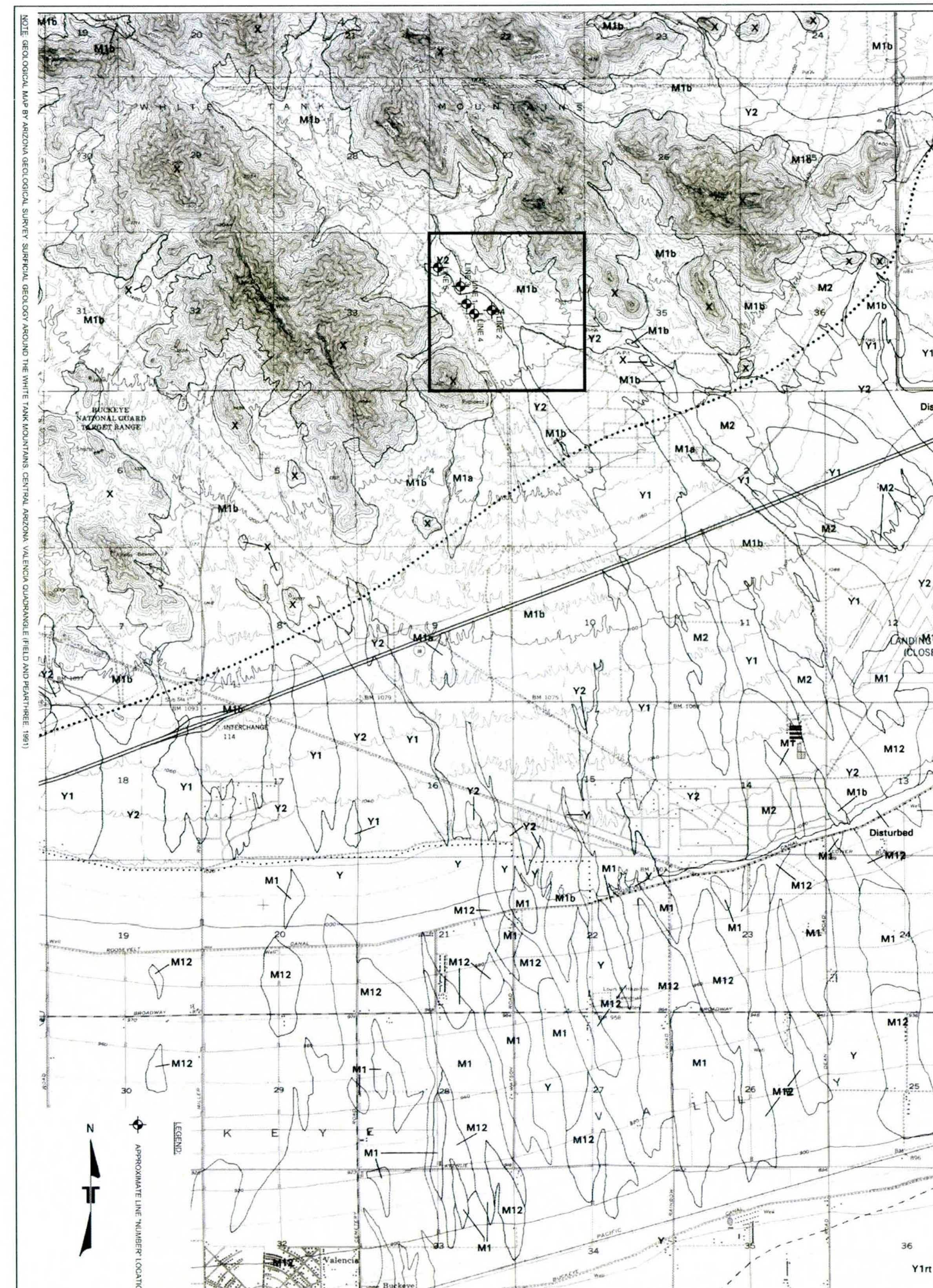
4685 South Ash Avenue, Suite H-4 Tempe, AZ 85282
PH. (480) 897-8200 FAX. (480) 897-1133

SEISMIC LINE SURVEY FOR LINE 1

SKYLINE FAN DESIGN CONCEPT REVIEW
WHITE TANK MOUNTAINS
BUCKEYE ARIZONA

EXHIBIT A-3

PROJECT MNGR:	AMV
DRAWN BY:	BJD
APPVD. BY:	AMV/DRC
SCALE:	AS SHOWN
DATE:	01/16/2013
JOB NO.	65125286
ACAD NO.	65125286.B.DWG
SHEET NO.	1 OF 5



REV	DATE	BY	DESCRIPTION

Terracon
Consulting Engineers and Scientists

4685 South Ash Avenue, Suite H-4 Tempe, AZ 85282
PH. (480) 897-8200 FAX. (480) 897-1133

GEOLOGICAL MAP

SKYLINE FAN DESIGN CONCEPT REVIEW
WHITE TANK MOUNTAINS
BUCKEYE ARIZONA

EXHIBIT A-2

PROJECT MNGR:	AMV
DRAWN BY:	BJD
APPVD. BY:	AMV/DRC
SCALE:	AS SHOWN
DATE:	01/16/2013
JOB NO.	65125286
ACAD NO.	65125286.A.DWG
SHEET NO.	2 OF 2

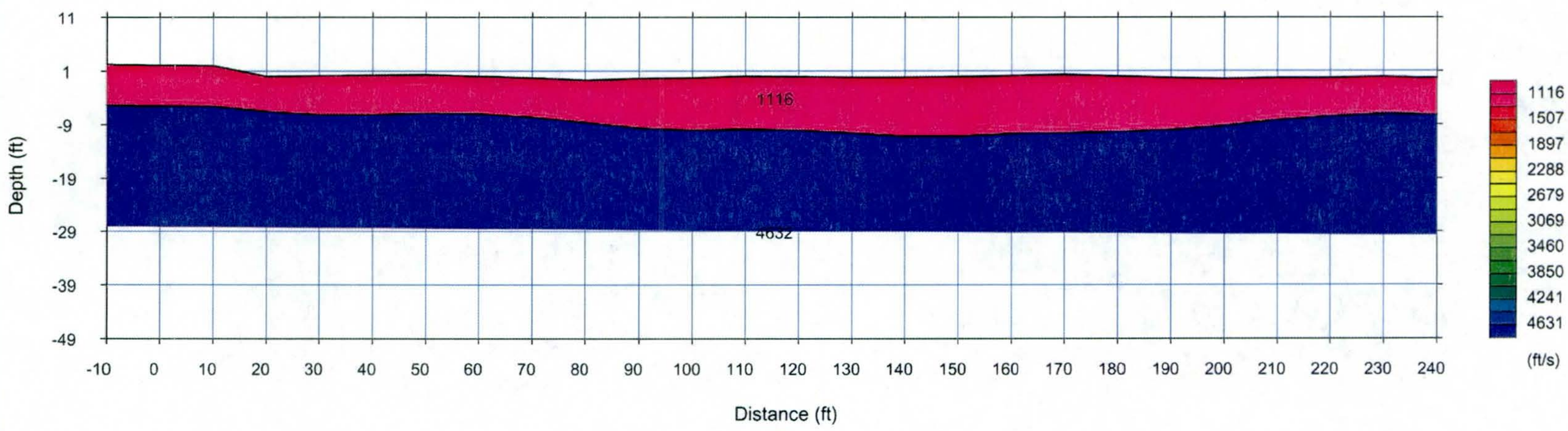


EXHIBIT A-4

SEISMIC LINE SURVEY FOR LINE 2

SKYLINE FAN DESIGN CONCEPT REVIEW

WHITE TANK MOUNTAINS

BUCKEYE ARIZONA

Terracon

Consulting Engineers and Scientists

SHEET NO. 2 OF 5

REV.	DATE	BY	DESCRIPTION

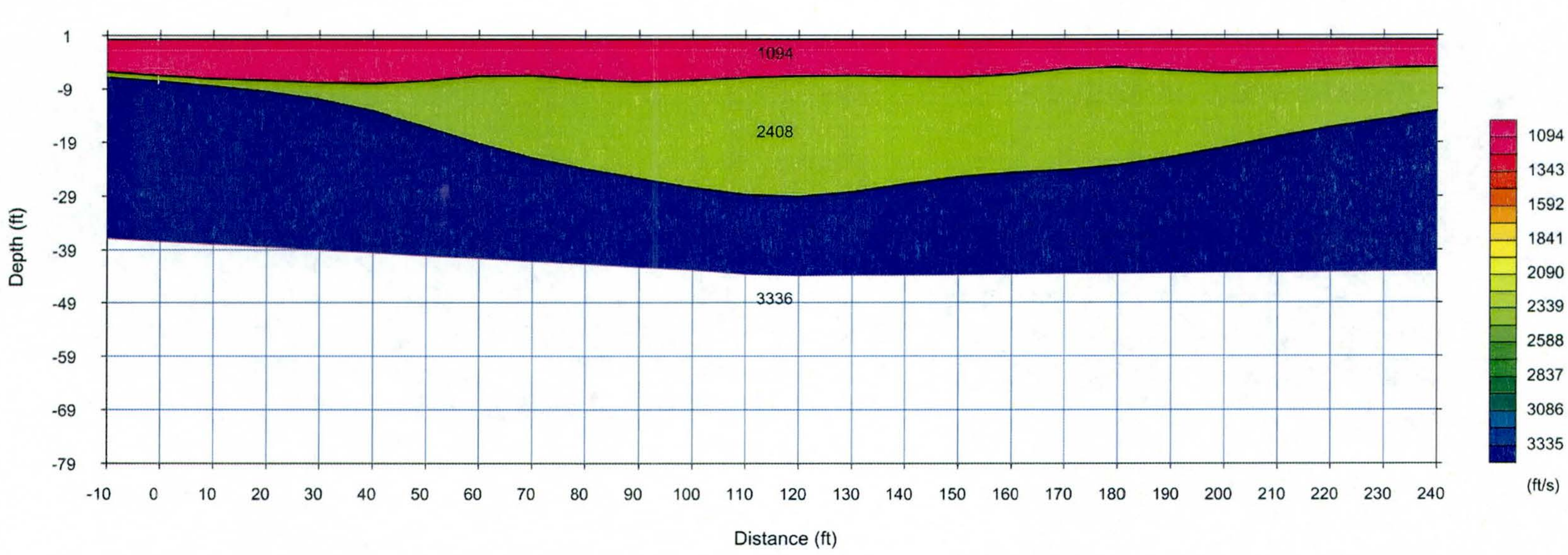


EXHIBIT A-5

SEISMIC LINE SURVEY FOR LINE 3

SKYLINE FAN DESIGN CONCEPT REVIEW

WHITE TANK MOUNTAINS

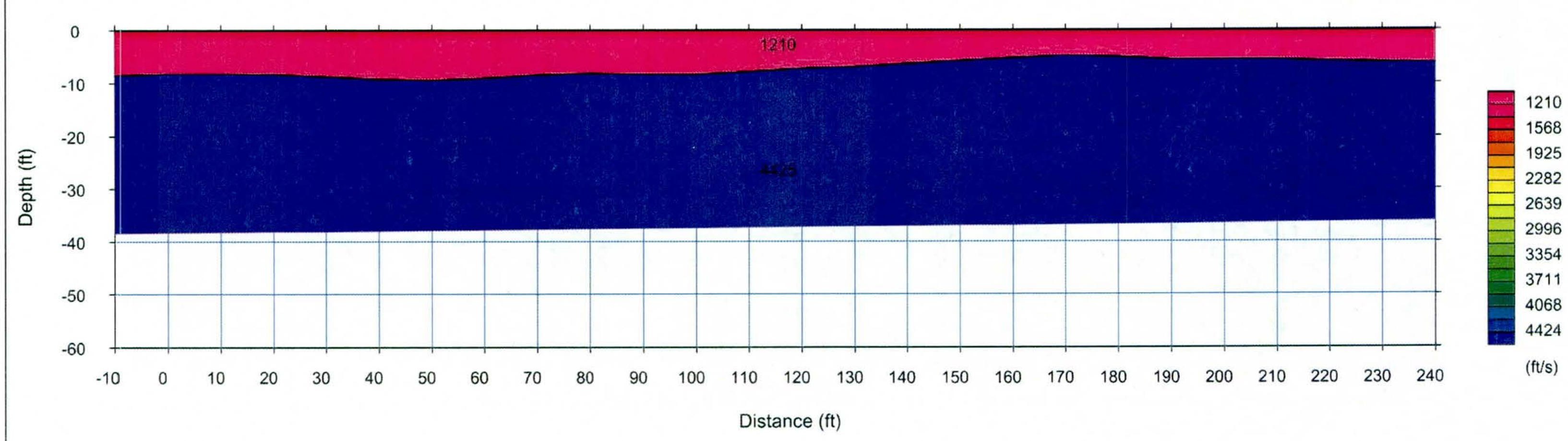
BUCKEYE ARIZONA

Terracon

Consulting Engineers and Scientists

SHEET NO. 3 OF 5

REV.	DATE	BY	DESCRIPTION



SEISMIC LINE SURVEY FOR LINE 4

SKYLINE FAN DESIGN CONCEPT REVIEW

WHITE TANK MOUNTAINS

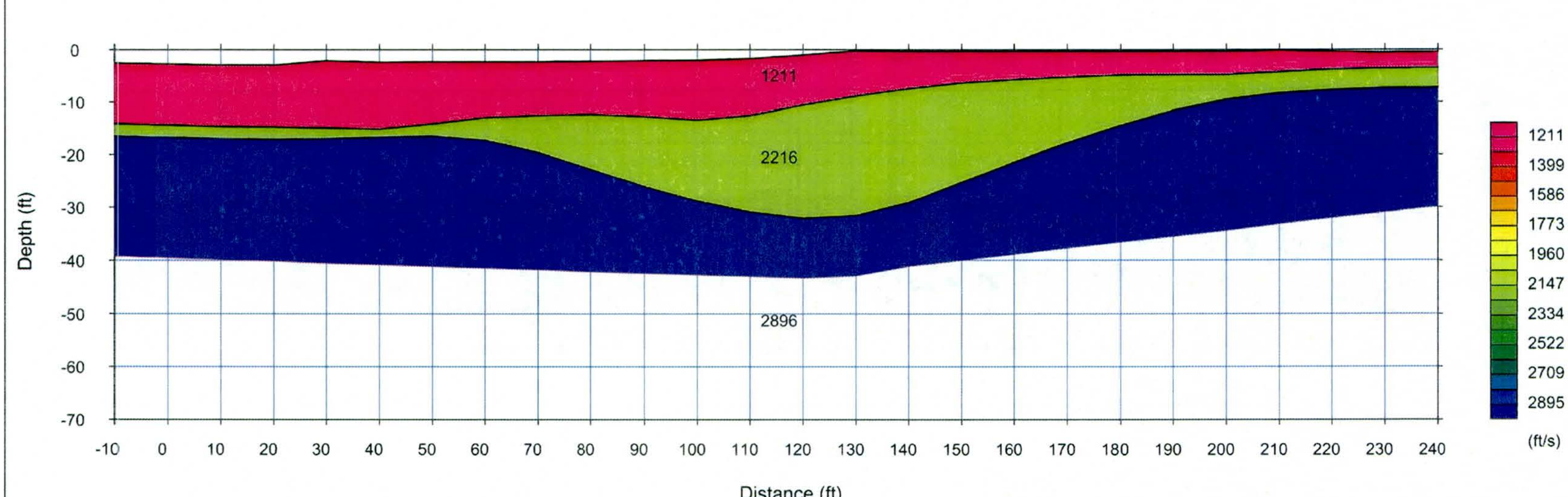
BUCKEYE ARIZONA

EXHIBIT A-6

Terracon

Consulting Engineers and Scientists

REV	DATE	BY	DESCRIPTION



SEISMIC LINE SURVEY FOR LINE 5

SKYLINE FAN DESIGN CONCEPT REVIEW

WHITE TANK MOUNTAINS

BUCKEYE ARIZONA

EXHIBIT A-7

Terracon

Consulting Engineers and Scientists

REV	DATE	BY	DESCRIPTION

APPENDIX B

SOIL SAMPLING
AND LABORATORY TEST RESULTS

A total of seven surface soil samples were obtained from the area of the project at locations designated by Sunrise Engineering. Initially, test borings by hand augering were planned to a depth of five (5) feet at each sampling location. However, the cemented and/or dense, or loose (caving soils) conditions of the near surface soils caused refusal to hand augering at approximately one foot below the surface. Accordingly, surface samples were obtained to a depth of only one foot at each of these locations. The samples were obtained from the site on January 3 and 4, 2013. The sample locations were as follows:

Sample	Approximate Coordinates		Depth (feet)
S-1	33° 28' 01.25322"N	112° 33' 33.86625"W	0-1
S-2	33° 28' 07.53809"N	112° 33' 40.61166"W	0-1
S-3	33° 28' 20.19279"N	112° 33' 22.14765"W	0-1
S-4	33° 28' 22.20937"N	112° 33' 26.71686"W	0-1
S-5	33° 28' 33.63281"N	112° 33' 46.96861"W	0-1
S-6N and S-6S	33° 28' 32.94932"N	112° 34' 05.47953"W	0-1
S-7	33° 28' 43.20498"N	112° 33' 52.90620"W	0-1

The coordinates of the sample locations outlined in the table were provided by Sunrise Engineering.

Laboratory Testing

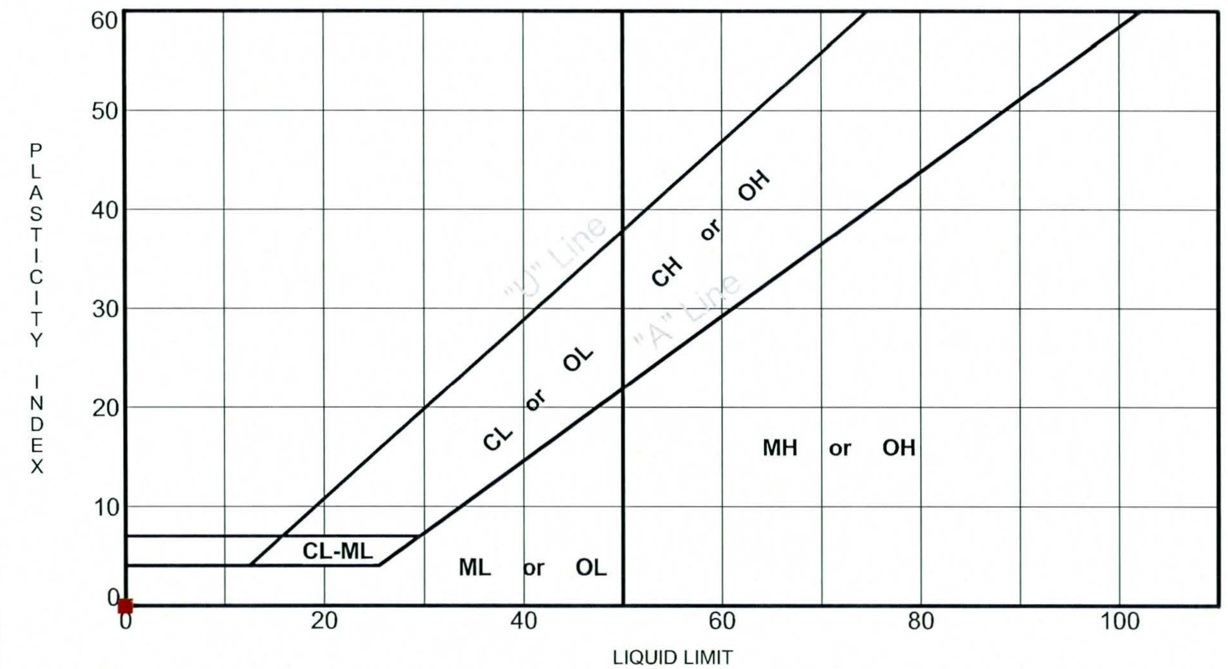
Laboratory tests were conducted on the shallow surface soil samples and the test results are presented in this appendix. Laboratory tests were performed in general accordance with the applicable ASTM, local or other accepted standards.

Soil samples obtained from the site were tested for the following engineering properties:

- Sieve Analysis
- Atterberg Limits

ATTERBERG LIMITS RESULTS

ASTM D4318



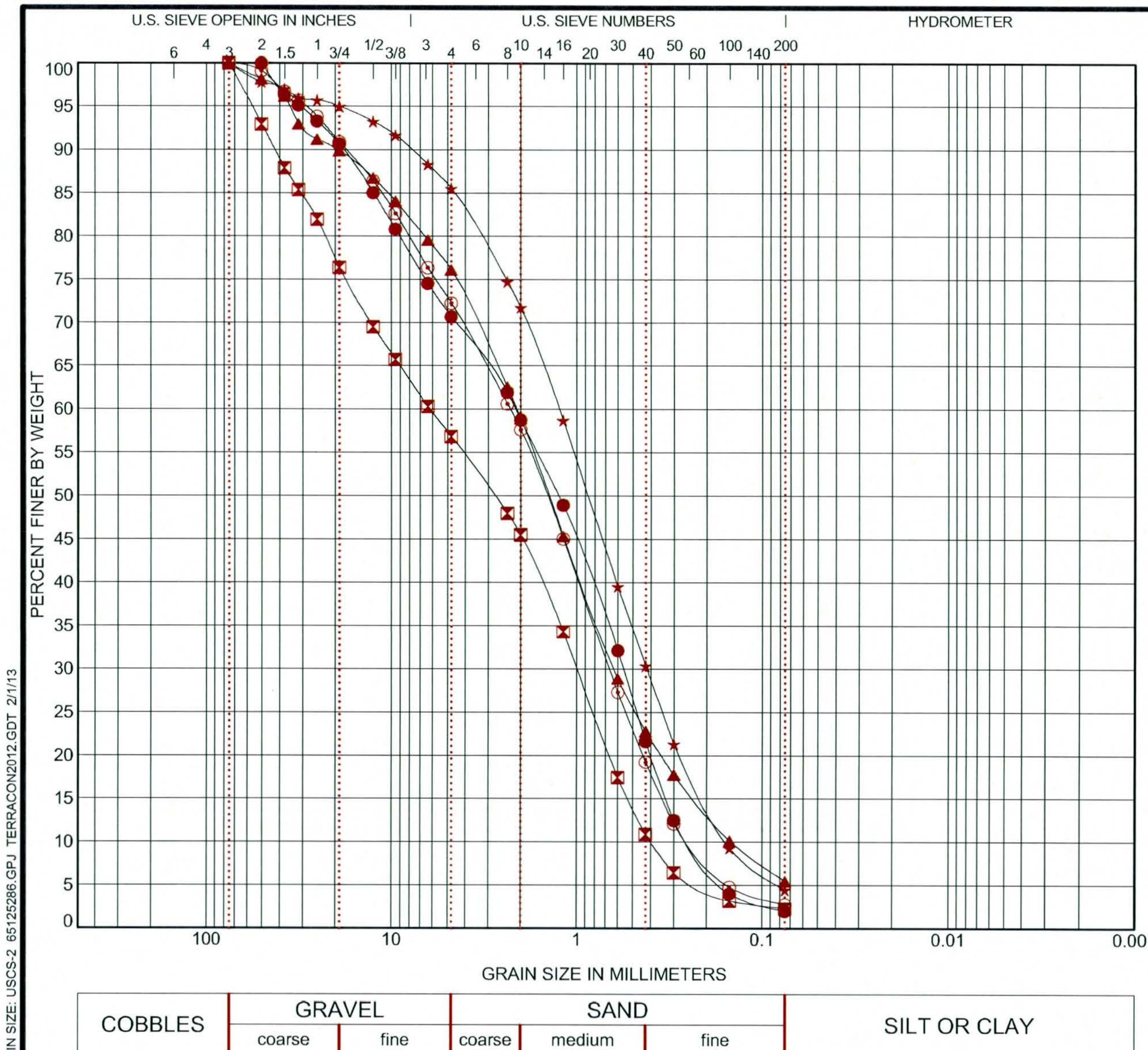
	Boring ID	Depth	LL	PL	PI	Fines	USCS	Description
●	S-1	0.0	NP	NP	NP	2	SP	POORLY GRADED SAND with GRAVEL
⧗	S-2	0.0	NP	NP	NP	2	SP	POORLY GRADED SAND with GRAVEL
▲	S-3	0.0	NP	NP	NP	5	SW-SM	WELL-GRADED SAND with SILT and GRAVEL
★	S-4	0.0	NP	NP	NP	4	SP	POORLY GRADED SAND
⊙	S-5	0.0	NP	NP	NP	3	SP	POORLY GRADED SAND with GRAVEL
✪	S-6-N	0.0	NP	NP	NP	3	SP	POORLY GRADED SAND with GRAVEL
○	S-6-S	0.0	NP	NP	NP	3	SP	POORLY GRADED SAND
△	S-7	0.0	NP	NP	NP	2	SP	POORLY GRADED SAND with GRAVEL

PROJECT: Skyline Fan Design Concept Review	Terracon 4685 S. Ash Ave., Suite H-4 Tempe, Arizona	PROJECT NUMBER: 65125286
SITE: Buckeye, AZ		CLIENT: Sunrise Engineering
		EXHIBIT: B-2

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. ATTERBERG LIMITS 65125286.GPJ TERRACON2012.GDT 2/1/13

GRAIN SIZE DISTRIBUTION

ASTM D422



	Boring ID	Depth	USCS Classification	LL	PL	PI	Cc	Cu
●	S-1	0.0	POORLY GRADED SAND with GRAVEL(SP)	NP	NP	NP	0.60	8.73
⧗	S-2	0.0	POORLY GRADED SAND with GRAVEL(SP)	NP	NP	NP	0.40	15.64
▲	S-3	0.0	WELL-GRADED SAND with SILT and GRAVEL(SW-SM)	NP	NP	NP	1.28	14.31
★	S-4	0.0	POORLY GRADED SAND(SP)	NP	NP	NP	0.90	7.95
⊙	S-5	0.0	POORLY GRADED SAND with GRAVEL(SP)	NP	NP	NP	0.79	9.29

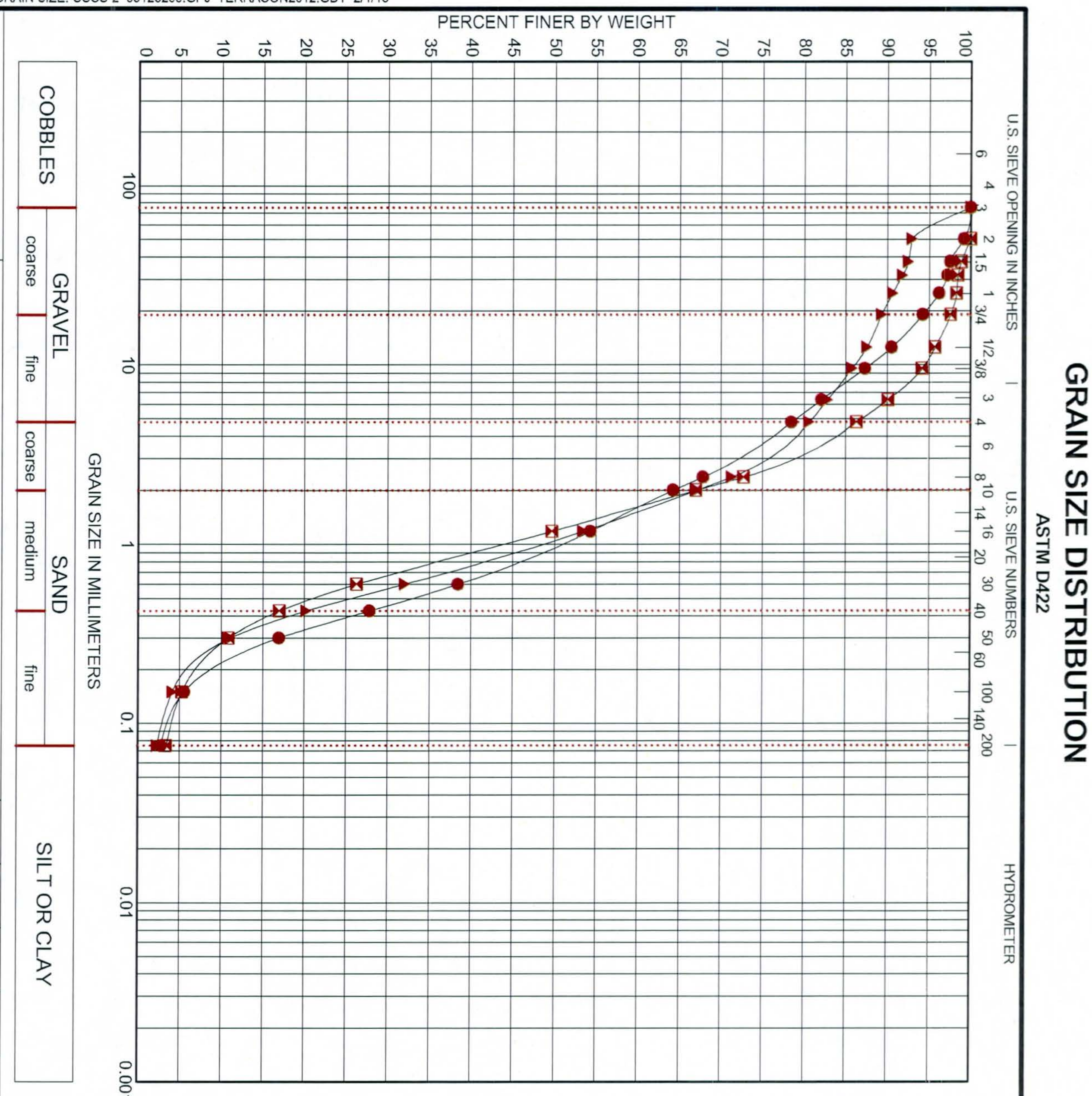
	Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
●	S-1	0.0	50	2.133	0.559	0.244	29.3	68.7	2.0	
⧗	S-2	0.0	75	6.187	0.992	0.396	43.1	54.6	2.3	
▲	S-3	0.0	75	2.101	0.628	0.147	23.9	70.7	5.5	
★	S-4	0.0	75	1.243	0.419	0.156	14.5	81.1	4.5	
⊙	S-5	0.0	75	2.279	0.664	0.245	27.7	69.5	2.8	

PROJECT: Skyline Fan Design Concept Review	Terracon 4685 S. Ash Ave., Suite H-4 Tempe, Arizona	PROJECT NUMBER: 65125286
SITE: Buckeye, AZ		CLIENT: Sunrise Engineering
		EXHIBIT: B-3

LABORATORY TESTS ARE NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GRAIN SIZE: USCS-2 65125286.GPJ TERRACON2012.GDT 2/1/13

GRAIN SIZE DISTRIBUTION

ASTM D422



Boring ID	Depth	USCS Classification	LL	PL	PI	Cc	Cu
● S-6-N	0.0	POORLY GRADED SAND with GRAVEL(SP)	NP	NP	NP	0.66	8.12
⧗ S-6-S	0.0	POORLY GRADED SAND(SP)	NP	NP	NP	1.03	6.00
▲ S-7	0.0	POORLY GRADED SAND with GRAVEL(SP)	NP	NP	NP	0.78	5.66

Boring ID	Depth	D_{100}	D_{60}	D_{30}	D_{10}	%Gravel	%Sand	%Silt	%Clay
● S-6-N	0.0	75	1.595	0.456	0.196	21.5	75.7	2.7	
⧗ S-6-S	0.0	50	1.615	0.668	0.269	13.7	82.9	3.4	
▲ S-7	0.0	75	1.52	0.566	0.269	19.4	78.3	2.3	

PROJECT: Skyline Fan Design Concept Review

SITE: Buckeye, AZ

Terracon

4685 S. Ash Ave., Suite H-4
Tempe, Arizona

PROJECT NUMBER: 65125286

CLIENT: Sunrise Engineering

EXHIBIT: B-4

SUMMARY OF LABORATORY RESULTS

Borehole No.	Depth (ft.)	USCS Soil Class.	In-Situ Properties		Classification				Expansion Testing					Corrosivity				Remarks
			Dry Density (pcf)	Water Content (%)	Passing #200 Sieve (%)	Atterberg Limits LL	PL	PI	Dry Density (pcf)	Water Content (%)	Surcharge (psf)	Expansion (%)	Expansion Index EI50	pH	Resistivity (ohm-cm)	Sulfates (ppm)	Chlorides (ppm)	
S-1	0	SP			2	NP	NP	NP										
S-2	0	SP			2	NP	NP	NP										
S-3	0	SW-SM			5	NP	NP	NP										
S-4	0	SP			4	NP	NP	NP										
S-5	0	SP			3	NP	NP	NP										
S-6-N	0	SP			3	NP	NP	NP										
S-6-S	0	SP			3	NP	NP	NP										
S-7	0	SP			2	NP	NP	NP										

REMARKS
1. Dry Density and/or moisture determined from one or more rings of a multi-ring sample.
2. Visual Classification.
3. Submerged to approximate saturation.
4. Expansion Index in accordance with ASTM D4829-95.
5. Air-Dried Sample

PROJECT: Skyline Fan Design Concept Review

SITE: Buckeye, AZ

Terracon

4685 S. Ash Ave., Suite H-4
Tempe, Arizona

PH. 480-897-8200 FAX. 480-897-1133

PROJECT NUMBER: 65125286

CLIENT: Sunrise Engineering

EXHIBIT: B-5

APPENDIX C

Base Conditions Hydrology Models

```
1****************************************                               ****************************************
 *                                       *                              *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                              *   U.S. ARMY CORPS OF ENGINEERS       *
 *             JUN   1998                *                              *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1                 *                              *         609 SECOND STREET            *
 *                                       *                              *     DAVIS, CALIFORNIA 95616          *
 * RUN DATE   16JUL12  TIME  12:27:54    *                              *          (916) 756-1104              *
 *                                       *                              *                                      *
 ****************************************                               ****************************************


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


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

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


1                                                    HEC-1 INPUT                                                    PAGE  1

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

            1            ID        SKYLINE WASH AND TRIBUTARIES
            2            ID        FLOODPLAIN DELINEATION STUDY
            3            ID        FCD 96-08
            4            ID
            5            ID        HEC-1
            6            ID
            7            ID        DATE:   8-19-98
            8            ID        STORM:  100-YR 6-HOUR STORM
            9            ID        FILE NAME:  SKYLINE6.DAT
           10            ID
           11            ID
           12            ID   DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA
                         *DIAGRAM
                         *
                         * REPERFORMED WITH FOLLOWING MODIFICATIONS - JULY 2012, SEI
                         * NOAA ATLAS 14 POINT RAINFALL DEPTH USED
                         * DEPTH-AREA REDUCTION FACTOR UPDATED
                         * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
                         * OTHER MINOR MODIFICATIONS MADE
                         *
           13            IT       3                   300
           14            IN      15
           15            IO       5
           16            JD    2.80    0.01
           17            PC    .000    .008    .016    .025    .033    .041    .050    .058    .066    .074
           18            PC    .087    .099    .118    .138    .216    .377    .834    .911    .931    .950
           19            PC    .962    .972    .983    .991   1.000
           20            JD    2.78    0.50
           21            JD    2.73    2.80
           22            PC    .000    .009    .016    .025    .034    .042    .051    .059    .067    .076
           23            PC    .087    .100    .120    .163    .252    .451    .694    .837    .900    .938
           24            PC    .950    .963    .975    .988   1.000
           25            JD    2.58    16.0
           26            PC    .000    .015    .020    .030    .048    .063    .076    .090    .105    .119
           27            PC    .135    .152    .175    .222    .304    .472    .670    .796    .868    .912
           28            PC    .946    .960    .973    .987   1.000
           29            JD    2.27    90.0
           30            PC    .000    .021    .035    .051    .071    .087    .105    .125    .143    .160
           31            PC    .179    .201    .232    .281    .364    .500    .658    .773    .841    .888
           32            PC    .927    .945    .964    .982   1.000
           33            JD    2.24   100.0
           34            PC    .000    .024    .043    .059    .078    .098    .119    .141    .162    .186
           35            PC    .212    .239    .271    .321    .408    .515    .627    .735    .814    .864
           36            PC    .907    .930    .954    .977   1.000
                         *  BASIN S1 - BEGINNING OF SKYLINE WASH
                         * DDM   ***** Updated *****

           37            KK      S1
           38            KM   BASIN S1
           39            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           40            KM    L=      1.2  Lca=      .6   S= 1102.5  Kn= .050  LAG=  16.6
           41            KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           42            BA     .51
           43            LG     .25     .25    3.95     .53   18.00
           44            UI    103.    273.    577.    783.   1122.    746.    585.    489.    400.    306.
1                                                    HEC-1 INPUT                                                    PAGE  2

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

           45            UI    248.    206.    151.    123.    102.     79.     60.     51.     48.     20.
           46            UI     20.     20.     20.     20.     20.      0.      0.      0.      0.      0.
           47            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                         *  BASIN S2 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
                         * DDM   ***** Updated *****

           48            KK      S2
           49            KM   BASIN S2
           50            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           51            KM    L=       .9  Lca=      .6   S=  916.1  Kn= .050  LAG=  16.0
           52            KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
```

```
53          BA     .22
54          LG     .25      .25     3.95      .53    18.00
55          UI     46.     130.     269.     364.     496.     310.     251.     207.     166.     124.
56          UI    105.      82.      60.      51.      38.      32.      23.      23.      12.       9.
57          UI      9.       9.       9.       9.       0.       0.       0.       0.       0.       0.
58          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
            * DDM   ***** Preserved *****

59          KK     HC2
60          KM        COMBINE HYDROGRAPHS FROM S1 AND S2 - UPSTREAM PORTION OF SKYLINE WASH
61          HC       2  0.7296
            * DDM   ***** Preserved *****

62          KK    R2-3
63          KM        ROUTE HYDROGRAPH HC2 THROUGH S3 - SKYLINE WASH
64          RS       1     FLOW      -1
65          RC     .07     .036      .07     2930     .029
66          RX    1000     1030     1100     1120     1130     1190     1220     1250
67          RY    1626     1624     1594     1594     1596     1624     1626     1625
            *  BASIN S3 - MAIN SUBBASIN FOR GRANITE FALLS WASH
            * DDM   ***** Updated *****

68          KK      S3
69          KM   BASIN S3
70          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
71          KM    L=       1.5  Lca=       1.0   S=  481.0  Kn= .040  LAG=  21.0
72          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
73          BA     .65
74          LG     .20      .25     4.00      .52    13.00
75          UI    104.     180.     422.     652.     797.    1088.     945.     652.     567.     492.
76          UI    420.     348.     274.     245.     212.     164.     133.     115.      99.      80.
77          UI     70.      51.      51.      49.      20.      20.      20.      20.      20.      20.
78          UI     20.      20.       0.       0.       0.       0.       0.       0.       0.       0.
79          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
            * DDM   ***** Preserved *****

80          KK     HC3
81          KM        COMBINE HYDROGRAPH R2-3 WITH HYDROGRAPH FROM S3 - CONFLUENCE OF SKYLINE
82          KM        WASH AND GRANITE FALLS WASH
83          HC       2  1.3787
            * DDM   ***** Preserved *****
```



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

84          KK    R3-4
85          KM        ROUTE COMBINED HYDROGRAPHS HC3 THROUGH S4 - SKYLINE WASH
86          RS       1     FLOW      -1
87          RC     .07     .036      .07     2927     .032
88          RX    1000     1030     1085     1160     1200     1240     1250     1275
89          RY    1520     1518     1496     1496     1498     1516     1518     1520
            *  BASIN S4 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
            * DDM   ***** Updated *****

90          KK      S4
91          KM   BASIN S4
92          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
93          KM    L=       1.3  Lca=        .6   S=  503.9  Kn= .040  LAG=  16.2
94          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
95          BA     .41
96          LG     .20      .25     4.00      .52    13.00
97          UI     85.     231.     486.     656.     913.     579.     465.     386.     312.     234.
98          UI    196.     156.     114.      95.      73.      63.      41.      41.      28.      16.
99          UI     16.      16.      16.      16.       0.       0.       0.       0.       0.       0.
100         UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
            * DDM   ***** Preserved *****

101         KK     HC4
102         KM        COMBINE HYDROGRAPH R3-4 WITH HYDROGRAPH FROM S4 - CONCENTRATION POINT
103         KM        ON SKYLINE WASH.
104         HC       2  1.7864
            * DDM   ***** Preserved *****

105         KK    R4-7
106         KM        ROUTE COMBINED HYDROGRAPHS HC4 THROUGH S7 - SKYLINE WASH
107         RS       1     FLOW      -1
108         RC     .07     .036      .07     2211     .022
109         RX    1000     1025     1055     1120     1145     1180     1240     1370
110         RY    1462     1460     1462     1462     1432     1432     1456     1462
            *  BASIN S7 - TRIBUTARY BASIN TO MOUNTAIN WASH NEAR AT CONFLUENCE WITH SKYLINE
            *   WASH
            * DDM   ***** Updated *****

111         KK      S7
112         KM   BASIN S7
113         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
114         KM    L=        .9  Lca=        .6   S=  955.3  Kn= .040  LAG=  12.7
115         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
116         BA     .13
117         LG     .20      .25     4.00      .52    12.00
118         UI     37.     147.     254.     365.     229.     178.     137.      97.      78.      53.
119         UI     41.      30.      22.      17.      12.       7.       7.       7.       7.       0.
120         UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
121         UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
            * DDM   ***** Preserved *****
```



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

122         KK    IHC7
123         KM        COMBINE HYDROGRAPHS R4-7 AND S7 - UPSTREAM OF CONFLUENCE WITH MOUNTAIN
124         KM        WASH
125         HC       2  1.9208
            *  BASIN S5 - BEGINNING OF MOUNTAIN WASH
            * DDM   ***** Updated *****
```

```
 126          KK      S5
 127          KM   BASIN S5
 128          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 129          KM    L=      1.4  Lca=       .7   S=  654.8  Kn= .050  LAG=  20.2
 130          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 131          BA     .53
 132          LG     .25     .25    3.95     .53   20.00
 133          UI     89.    164.    385.    573.    705.    988.    689.    532.    459.    396.
 134          UI    334.    265.    219.    195.    157.    120.    104.     93.     68.     65.
 135          UI     43.     43.     43.     18.     17.     17.     17.     17.     17.     17.
 136          UI     17.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 137          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 138          KK    R5-6
 139          KM        ROUTE HYDROGRAPH S5 THROUGH S6 - MOUNTAIN WASH
 140          RS       1    FLOW      -1
 141          RC     .07    .036     .07    2494    .030
 142          RX    1000    1025    1075    1105    1150    1170    1220    1240
 143          RY    1480    1476    1476    1460    1454    1454    1478    1480
              *  BASIN S6 - SUBBASIN TRIBUTARY TO MOUNTAIN WASH
              * DDM   ***** Updated *****

 144          KK      S6
 145          KM   BASIN S6
 146          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 147          KM    L=       .8  Lca=       .4   S=  491.4  Kn= .042  LAG=  12.3
 148          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 149          BA     .25
 150          LG     .21     .25    4.00     .52   15.00
 151          UI     75.    289.    495.    680.    415.    323.    244.    172.    135.     93.
 152          UI     71.     52.     35.     33.     13.     13.     13.     13.      0.      0.
 153          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 154          KK     HC6
 155          KM        COMBINE HYDROGRAPHS R5-6 WITH SUBBASIN S6 - UPSTREAM OF CONFLUENCE WITH
 156          KM        SKYLINE WASH
 157          HC       2  0.7787
              * DDM   ***** Preserved *****

 158          KK     HC7
 159          KM        COMBINE HYDROGRAPHS IHC7 WITH HC6 - CONFLUENCE OF MOUNTAIN WASH WITH
 160          KM        SKYLINE WASH
 161          HC       2  2.6995
              * DDM   ***** Preserved *****
1                                     HEC-1 INPUT                                            PAGE  5

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


 162          KK  R7-12E
 163          KM        ROUTE COMBINED HYDROGRAPHS AT HC7 THROUGH S12E - SKYLINE WASH
 164          RS       1    FLOW      -1
 165          RC     .07    .036     .07    1930   .0166
 166          RX    1000    1085    1170    1240    1255    1265    1310    1350
 167          RY    1430    1424    1422    1420    1422    1424    1428    1430
              *
              *   BASIN S12E - SUBBASIN TRIBUTARY TO PYRITE WASH AND SKYLINE WASH CONFLUENCE
              * DDM   ***** Updated *****

 168          KK    S12E
 169          KM   BASIN S12E
 170          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 171          KM    L=       .6  Lca=       .2   S=  142.9  Kn= .030  LAG=   7.8
 172          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 173          BA     .05
 174          LG     .15     .25    3.91     .55   18.00
 175          UI     47.    167.    200.    114.     70.     44.     27.     16.     11.      5.
 176          UI      5.      5.      0.      0.      0.      0.      0.      0.      0.      0.
 177          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 178          KK   HC12E
 179          KM        COMBINE HYDROGRAPHS S12E WITH R7-12E - CONFLUENCE OF PYRITE WASH WITH
 180          KM        SKYLINE WASH
 181          HC       2  2.7544
              *  BASIN S8 - BEGINNING OF PYRITE WASH
              * DDM   ***** Updated *****

 182          KK      S8
 183          KM   BASIN S8
 184          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 185          KM    L=       .8  Lca=       .4   S=  692.1  Kn= .050  LAG=  13.0
 186          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 187          BA     .34
 188          LG     .25     .25    3.95     .53   20.00
 189          UI     88.    352.    614.    906.    585.    452.    354.    254.    200.    145.
 190          UI    105.     81.     62.     43.     38.     17.     17.     17.     17.     17.
 191          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 192          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 193          KK    R8-9
 194          KM        ROUTE HYDROGRAPH S8 THROUGH S9 - PYRITE WASH
 195          RS       1    FLOW      -1
 196          RC     .07    .036     .07     911    .013
 197          RX    1000    1020    1050    1065    1080    1125    1185    1190
 198          RY    1518    1518    1494    1492    1494    1494    1520    1524
              *  BASIN S9 - SUBBASIN TRIBUTARY TO PYRITE WASH
              * DDM   ***** Updated *****
1                                     HEC-1 INPUT                                            PAGE  6

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


 199          KK      S9
 200          KM   BASIN S9
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201          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
202          KM    L=       1.0  Lca=        .7   S=  415.7  Kn= .040  LAG=  15.9
203          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
204          BA     .21
205          LG     .20      .25    3.95      .53   17.00
206          UI     44.     126.    259.     351.    471.    293.    238.    196.    157.    117.
207          UI     99.      77.     56.      48.     35.     29.     22.     22.     10.      8.
208          UI      8.       8.      8.       8.      0.      0.      0.      0.      0.      0.
209          UI      0.       0.      0.       0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

210          KK     HC9
211          KM        COMBINE ROUTED HYDROGRAPH R8-9 WITH HYDROGRAPH S9 - CONCENTRATION POINT
212          KM        ON PYRITE WASH
213          HC       2  0.5472
             * DDM   ***** Preserved *****

214          KK   R9-11
215          KM        ROUTE COMBINED HYDROGRAPHS HC9 THROUGH S11 - PYRITE WASH
216          RS       3    FLOW      -1
217          RC     .07    .036     .07    3462    .023
218          RX    1000    1080    1090    1120    1140    1290    1340    1375
219          RY    1496    1494    1492    1472    1471    1472    1490    1494
             *  BASIN S11 -PYRITE WASH UPSTREAM OF CONFLUENCE WITH WAGON WASH
             * DDM   ***** Updated *****

220          KK     S11
221          KM   BASIN S11
222          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
223          KM    L=        .7  Lca=        .3   S=  797.1  Kn= .040  LAG=   9.3
224          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
225          BA     .17
226          LG     .20      .25    4.00      .52   11.00
227          UI     96.     360.    590.     366.    262.    169.    119.     73.     51.     32.
228          UI     23.      12.     12.      12.      0.      0.      0.      0.      0.      0.
229          UI      0.       0.      0.       0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

230          KK   IHC11
231          KM        COMBINE ROUTED HYDROGRAPH R9-11 WITH HYDROGRAPHS S11 - UPSTREAM OF
232          KM        CONFLUENCE WITH WAGON WASH
233          HC       2  0.7154
             *  BASIN S10 - BEGINNING OF WAGON WASH
             * DDM   ***** Updated *****

234          KK     S10
235          KM   BASIN S10
236          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
237          KM    L=       1.0  Lca=        .5   S=  896.9  Kn= .048  LAG=  14.2
238          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
239          BA     .19
240          LG     .24      .25    3.95      .53   18.00
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

241          UI     46.     157.    302.     430.    397.    263.    213.    167.    122.    101.
242          UI     71.      55.     43.      35.     23.     23.     11.      9.      9.      9.
243          UI      9.       0.      0.       0.      0.      0.      0.      0.      0.      0.
244          UI      0.       0.      0.       0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

245          KK    HC11
246          KM        COMBINE HYDROGRAPH IHC11 WITH HYDROGRAPH S10 - CONFLUENCE OF WAGON WASH
247          KM        WITH PYRITE WASH
248          HC       2  0.9089
             * DDM   ***** Preserved *****

249          KK  R1112W
250          KM        ROUTE COMBINED HYDROGRAPHS HC11 THROUGH S12W - CONTINUATION OF PYRITE
251          KM        WASH DOWNSTREAM OF CONFLUENCE WITH WAGON WASH
252          RS       1    FLOW      -1
253          RC     .07    .036     .07    1501    .019
254          RX    1000    1030    1065    1150    1240    1330    1375    1410
255          RY    1422    1420    1410    1410    1410    1412    1414    1428
             *  BASIN S12W - SUBBASIN TRIBUTARY FOR PYRITE WASH AND SKYLINE WASH
             * DDM   ***** Updated *****

256          KK    S12W
257          KM   BASIN S12W
258          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
259          KM    L=        .7  Lca=        .2   S=  153.6  Kn= .030  LAG=   8.2
260          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
261          BA     .09
262          LG     .15      .25    3.91      .55   18.00
263          UI     68.     246.    330.     189.    123.     79.     47.     31.     19.     11.
264          UI      7.       7.      0.       0.      0.      0.      0.      0.      0.      0.
265          UI      0.       0.      0.       0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

266          KK   HC12W
267          KM        COMBINE HYDROGRAPH R1112W WITH HYDROGRAPH S12W - CONFLUENCE OF SKYLINE
268          KM        WASH WITH PYRITE WASH
269          HC       2  0.9994
             * DDM   ***** Preserved *****

270          KK    HC12
271          KM        COMBINE ROUTED HYDROGRAPH HC12W AND HC12E
272          KM        CONFLUENCE OF SKYLINE WASH AND PYRITE WASH
273          HC       2  3.7538
             * DDM   ***** Preserved *****

274          KK  R12-13
275          KM        ROUTE COMBINED HYDROGRAPHS HC12 THROUGH S13 - SKYLINE WASH
276          RS       1    FLOW      -1
277          RC     .07    .036     .07    1854    .017
278          RX    1000    1080    1110    1320    1370    1420    1500    1550
279          RY    1400    1392    1384    1382    1382    1380    1380    1400
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             *  BASIN S13 - SKYLINE WASH DOWNSTREAM OF CONFLUENCE OF PYRITE WASH
             * DDM   ***** Updated *****
1                                      HEC-1 INPUT                                        PAGE  8

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

       280   KK     S13
       281   KM   BASIN S13
       282   KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
       283   KM    L=        .9  Lca=        .3   S=  174.2  Kn= .030  LAG=  10.1
       284   KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
       285   BA     .17
       286   LG     .15     .25    3.88     .56    4.00
       287   UI     82.    312.    550.    397.    278.    195.    135.     90.     64.     43.
       288   UI     28.     20.     11.     11.     11.      0.      0.      0.      0.      0.
       289   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

       290   KK    HC13
       291   KM          COMBINE ROUTED HYDROGRAPH R12-13 WITH HYDROGRAPH S13 - SKYLINE WASH
       292   HC        2  3.9274
             * DDM   ***** Preserved *****

       293   KK    DI13
       294   KM          SPLIT FLOW AT HC13; MAIN FLOW TO S24 AND MINOR FLOW TO S14
       295   DT    DI24
       296   DI       0     201     556    1353    2595    4157
       297   DQ       0     201     461     879    1427  2078.5
             * DDM   ***** Preserved *****

       298   KK   RDI13
       299   KM          ROUTE HYDROGRAPH DI13 THROUGH S14 -SKYLINE WASH DOWNSTREAM OF SPLIT
       300   RS       1    FLOW      -1
       301   RC     .07    .036     .07    4353    .021
       302   RX    1000    1025    1270    1280    1320    1330    1370    1385
       303   RY    1360    1354    1354    1356    1356    1358    1358    1360
             *  BASIN S14 - BEGINNING OF COYOTE WASH
             * DDM   ***** Updated *****

       304   KK     S14
       305   KM   BASIN S14
       306   KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
       307   KM    L=       1.2  Lca=        .6   S=  340.7  Kn= .030  LAG=  12.4
       308   KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
       309   BA     .49
       310   LG     .15     .25    3.91     .55   11.00
       311   UI    144.    562.    962.   1341.    822.    640.    487.    343.    270.    185.
       312   UI    145.    101.     72.     65.     31.     25.     25.     25.     25.      0.
       313   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
       314   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

       315   KK    HC14
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       316   KM          COMBINE ROUTED HYDROGRAPH R13-14 WITH HYDROGRAPH S14 - SPLIT FLOW FROM
       317   KM          SKYLINE WASH AND COYOTE WASH SUBBASIN
       318   HC        2  4.4139
             * DDM   ***** Preserved *****
1                                      HEC-1 INPUT                                        PAGE  9

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

       319   KK  R1416S
       320   KM          ROUTE COMBINED HYDROGRAPHS HC14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
       321   KM          OF CONFLUENCE WITH COYOTE WASH
       322   RS       2    FLOW      -1
       323   RC     .07    .036     .07    3140    .017
       324   RX    1000    1035    1150    1180    1320    1360    1480    1481
       325   RY    1236    1234    1234    1232    1232    1234    1236    1236
             *  BASIN S15 - SUBBASIN IN AREA OF EXISTING A.D.O.T. BORROW PITS
             * DDM   ***** Updated *****

       326   KK     S15
       327   KM   BASIN S15
       328   KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
       329   KM    L=        .8  Lca=        .3   S=  105.0  Kn= .030  LAG=   9.8
       330   KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
       331   BA     .11
       332   LG     .15     .27    3.40     .77     .00
       333   UI     56.    213.    370.    246.    176.    120.     84.     54.     37.     25.
       334   UI     19.      9.      7.      7.      7.      0.      0.      0.      0.      0.
       335   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

       336   KK  R1516S
       337   KM          ROUTE HYDROGRAPH HC15 THROUGH S16S - SKYLINE WASH DOWNSTREAM OF
       338   KM          CONFLUENCE WITH COYOTE WASH
       339   RS       3    FLOW      -1
       340   RC     .07    .036     .07    2218    .018
       341   RX    1000    1035    1150    1180    1320    1360    1480    1481
       342   RY    1236    1234    1234    1232    1232    1234    1236    1236
             *  BASIN S16S - SUBBASIN AT SKYLINE WASH DOWNSTREAM OF CONFLUENCE WITH COYOTE W.
             * DDM   ***** Updated *****

       343   KK    S16S
       344   KM   BASIN S16S
       345   KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
       346   KM    L=        .6  Lca=        .3   S=  116.4  Kn= .030  LAG=   9.3
       347   KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
       348   BA     .17
       349   LG     .15     .25    3.95     .53    6.00
       350   UI    100.    373.    611.    379.    271.    175.    123.     76.     53.     34.
       351   UI     23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
       352   UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

       353   KK  IHC16S
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 354          KM        COMBINE ROUTED HYDROGRAPH R14-16S AND R15-16S WITH HYDROGRAPH S16S
 355          KM        DOWNSTREAM OF CONFLUENCE OF SKYLINE WASH WITH COYOTE WASH
 356          HC       3  4.6952
              *  BASIN S16N - SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****
1                                              HEC-1 INPUT                                          PAGE 10

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

 357          KK    S16N
 358          KM   BASIN S16N
 359          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 360          KM    L=         .9  Lca=        .6   S=  653.2  Kn= .050  LAG=  16.5
 361          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 362          BA     .17
 363          LG     .25     .25    3.95     .53   18.00
 364          UI     34.     90.    189.    256.    366.    238.    189.    158.    129.     98.
 365          UI     80.     66.     48.     39.     32.     26.     19.     16.     15.      6.
 366          UI      6.      6.      6.      6.      6.      0.      0.      0.      0.      0.
 367          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 368          KK  R16N-S
 369          KM        ROUTE HYDROGRAPH S16N THROUGH S16S
 370          RS       4    FLOW      -1
 371          RC     .07    .036     .07    3230    .022
 372          RX    1000    1035    1150    1180    1320    1360    1480    1481
 373          RY    1236    1234    1234    1232    1232    1234    1236    1236
              * DDM   ***** Preserved *****

 374          KK   HC16S
 375          KM        COMBINE ROUTED HYDROGRAPH R16N-S AND IHC16S
 376          KM        SKYLINE WASH DOWNSTREAM OF COYOTE WASH
 377          HC       2  4.8652
              * DDM   ***** Preserved *****

 378          KK   DI16S
 379          KM        SPLIT FLOW AT HC16S; MAIN FLOW TO S17 AND MINOR FLOW TO S22
 380          DT    DI22
 381          DI       0      46     144     344   708.5    1223
 382          DQ       0       0       8      52     153     329
              * DDM   ***** Preserved *****

 383          KK  R16-17
 384          KM        ROUTE HYDROGRAPH DI16S THROUGH S17
 385          RS       4    FLOW      -1
 386          RC     .07    .036     .07    4341    .015
 387          RX    1000    1060    1090    1120    1145    1180    1200    1320
 388          RY    1202    1200  1199.5    1200    1199    1199    1200    1202
              *  BASIN S17 - SUBBASIN OF SKYLINE WASH SOUTH OF MCDOWELL ROAD ON EAST SIDE
              *  OF WATERSHED
              * DDM   ***** Updated *****
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 389          KK     S17
 390          KM   BASIN S17
 391          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 392          KM    L=         .9  Lca=        .5   S=  117.9  Kn= .030  LAG=  12.8
 393          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 394          BA     .29
 395          LG     .15     .26    3.60     .67     .00
 396          UI     79.    311.    540.    784.    495.    385.    298.    212.    170.    117.
 397          UI     89.     66.     50.     37.     28.     15.     15.     15.     15.      0.
 398          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1                                              HEC-1 INPUT                                          PAGE 11

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

 399          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 400          KK    HC17
 401          KM        COMBINE ROUTED HYDROGRAPH R16-17 WITH HYDROGRAPH S17 AT EAST SIDE OF
 402          KM        BUCKEYE F.R.S. NO. 3
 403          HC       2  5.1537
              *  BASIN S18 - BEGINNING OF RATTLER WASH
              * DDM   ***** Updated *****

 404          KK     S18
 405          KM   BASIN S18
 406          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 407          KM    L=         .8  Lca=        .4   S=  292.7  Kn= .040  LAG=  12.9
 408          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 409          BA     .36
 410          LG     .20     .25    3.95     .53   17.00
 411          UI     96.    380.    662.    968.    618.    479.    373.    267.    211.    149.
 412          UI    111.     84.     64.     46.     38.     18.     18.     18.     18.      0.
 413          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 414          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 415          KK  R18-19
 416          KM        ROUTE HYDROGRAPH HC18 THROUGH S19
 417          RS       2    FLOW      -1
 418          RC     .07    .036     .07    4253     .02
 419          RX    1000    1050    1100    1125    1140    1180    1240    1241
 420          RY    1266    1264    1242    1240    1242    1264    1266    1266
              *  BASIN S19 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****

 421          KK     S19
 422          KM   BASIN S19
 423          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 424          KM    L=        1.2  Lca=        .8   S=  824.8  Kn= .030  LAG=  11.6
 425          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 426          BA     .29
 427          LG     .15     .25    4.00     .52   12.00
 428          UI    102.    389.    662.    802.    483.    372.    266.    195.    138.     99.
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 429          UI     72.     51.     41.     22.     16.     16.     16.      0.      0.      0.
 430          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 431          KK    HC19
 432          KM         COMBINE ROUTED HYDROGRAPH R18-19 WITH HYDROGRAPH S19 - RATTLER WASH
 433          HC       2  0.6498
              * DDM   ***** Preserved *****

 434          KK  R19-20
 435          KM         ROUTE COMBINED HYDROGRAPHS HC19 THROUGH S20 - RATTLER WASH
 436          RS       2    FLOW      -1
 437          RC     .07    .036     .07    3740    .022
 438          RX     999    1000    1030    1095    1130    1150    1220    1221
 439          RY    1208    1208    1206    1204    1204    1206    1208    1208
              *  BASIN S20 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 440          KK     S20
 441          KM   BASIN S20
 442          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 443          KM    L=        .9  Lca=        .4   S=   84.1  Kn= .030  LAG=  13.0
 444          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 445          BA     .09
 446          LG     .15     .26    3.60     .67    4.00
 447          UI     22.     88.    155.    228.    147.    114.     89.     64.     50.     36.
 448          UI     26.     20.     16.     11.     10.      4.      4.      4.      4.      4.
 449          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 450          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 451          KK    HC20
 452          KM         COMBINE ROUTED HYDROGRAPH R19-20 WITH HYDROGRAPH S20 AT FAR EAST SIDE
 453          KM         OF STUDY AREA NORTH OF BUCKEYE F.R.S. NO. 3
 454          HC       2  0.7344
              *  BASIN S21 - SUBBASIN NORTH OF BUCKEYE F.R.S. NO 3 SPILLWAY
              * DDM   ***** Updated *****

 455          KK     S21
 456          KM   BASIN S21
 457          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 458          KM    L=       1.2  Lca=        .6   S=  780.6  Kn= .030  LAG=  11.0
 459          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 460          BA     .62
 461          LG     .15     .25    4.10     .51   10.00
 462          UI    245.    927.   1593.   1636.   1019.    766.    522.    392.    260.    190.
 463          UI    136.     93.     67.     36.     36.     36.      0.      0.      0.      0.
 464          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *  BASIN S22 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
              * DDM   ***** Updated *****

 465          KK     S22
 466          KM   BASIN S22
 467          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 468          KM    L=       1.3  Lca=        .4   S=  110.1  Kn= .029  LAG=  13.7
 469          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 470          BA     .55
 471          LG     .16     .25    3.91     .53    1.00
 472          UI    135.    496.    909.   1351.   1029.    742.    594.    451.    332.    268.
 473          UI    188.    151.    108.     84.     66.     51.     26.     26.     26.     26.
 474          UI     26.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 475          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 476          KK    DI22
 477          KM         RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S22
 478          DR    DI22
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 479          KK   RDI22
 480          KM         ROUTE HYDROGRAPH DI22 THROUGH S22 - PORTION OF DIVERT OF SKYLINE WASH
 481          RS       6    FLOW      -1
 482          RC     .07    .036     .07    4253    .015
 483          RX     997     998     999    1000    1060    1210    1300    1300
 484          RY    1217    1216    1216    1215    1215    1216    1216    1217
              * DDM   ***** Preserved *****

 485          KK    HC22
 486          KM         COMBINE HYDROGRAPHS AT HC22
 487          HC       2  5.4141
              *  BASIN S23 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
              * DDM   ***** Updated *****

 488          KK     S23
 489          KM   BASIN S23
 490          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 491          KM    L=       1.6  Lca=        .5   S=  112.1  Kn= .028  LAG=  15.2
 492          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 493          BA     .49
 494          LG     .17     .26    3.50     .70    2.00
 495          UI    108.    331.    660.    901.   1086.    670.    547.    446.    338.    263.
 496          UI    217.    155.    125.     98.     81.     53.     53.     31.     21.     21.
 497          UI     21.     21.     21.      0.      0.      0.      0.      0.      0.      0.
 498          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *  BASIN S24 - SUBBASIN DOWNSTREAM OF SKYLINE WASH SPLIT FLOW
              * DDM   ***** Updated *****

 499          KK     S24
 500          KM   BASIN S24
 501          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
```

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 502          KM    L=      2.4  Lca=      1.2   S=  113.8  Kn= .037  LAG=  32.2
 503          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 504          BA     .32
 505          LG     .20      .25    4.00      .51    1.00
 506          UI     33.      33.      66.     117.     171.     211.     242.     273.     350.     361.
 507          UI    241.     206.     189.     172.     157.     142.     129.     111.      96.      84.
 508          UI     78.      73.      65.      54.      45.      42.      37.      36.      30.      25.
 509          UI     25.      22.      16.      16.      16.      16.      13.       6.       6.       6.
 510          UI      6.       6.       6.       6.       6.       6.       6.       6.       6.       0.
 511          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 512          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 513          KK    DI24
 514          KM        RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S24
 515          DR    DI24
              * DDM   ***** Preserved *****
1                                      HEC-1 INPUT                                                PAGE 14

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

 516          KK   RDI24
 517          KM        ROUTE HYDROGRAPH DI24 THROUGH S24
 518          RS       5    FLOW      -1
 519          RC     .07     .036     .07    9929     .02
 520          RX    1000     1045    1060    1080    1100     1120    1155    1220
 521          RY    1222     1220    1218    1218    1216     1216    1220    1220
              * DDM   ***** Preserved *****

 522          KK    HC24
 523          KM        COMBINE HYDROGRAPHS AT HC24
 524          HC       2  4.2443
              *  BASIN S25 - UPSTREAM END OF SMALL WATERSHED EAST OF PROSPECT WASH
              * DDM   ***** Updated *****

 525          KK     S25
 526          KM   BASIN S25
 527          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 528          KM    L=       .7  Lca=       .3   S=  103.0  Kn= .030  LAG=  10.0
 529          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 530          BA     .03
 531          LG     .15      .25    4.15      .49     .00
 532          UI     13.      50.      87.      61.      43.      30.      21.      14.      10.       7.
 533          UI      4.       3.       2.       2.       2.       0.       0.       0.       0.       0.
 534          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 535          KK   R25-26
 536          KM        ROUTE HYDROGRAPH S25 THROUGH S26 CROSSING NEAR THE INTERSECTION OF
 537          KM        WATSON ROAD AND MCDOWELL ROAD
 538          RS       8    FLOW      -1
 539          RC     .07     .036     .07    6571     .02
 540          RX    1000     1045    1060    1080    1100     1120    1155    1220

 541          RY    1222     1220    1218    1218    1216     1216    1220    1220
              *  BASIN S26 - SUBBASIN ON THE LOWER WEST SIDE OF STUDY AREA
              * DDM   ***** Updated *****

 542          KK     S26
 543          KM   BASIN S26
 544          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 545          KM    L=      1.2  Lca=       .5   S=  119.7  Kn= .029  LAG=  13.8
 546          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 547          BA     .21
 548          LG     .16      .25    4.20      .47    1.00
 549          UI     52.     187.     347.     513.     403.     286.     230.     177.     129.     105.
 550          UI     74.      59.      43.      33.      25.      21.      10.      10.      10.      10.
 551          UI     10.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 552          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****
1                                      HEC-1 INPUT                                                PAGE 15

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

 553          KK    HC26
 554          KM        COMBINE ROUTED HYDROGRAPH R25-26 WITH HYDROGRAPH S26
 555          KM        AT WEST SIDE OF WATERSHED NORTH OF BUCKEYE F.R.S. NO. 3
 556          HC       2  0.2377
              *  BASIN S27 - BEGINNING OF PROSPECT WASH
              * DDM   ***** Updated *****

 557          KK     S27
 558          KM   BASIN S27
 559          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 560          KM    L=      1.4  Lca=       .5   S=  345.2  Kn= .030  LAG=  12.6
 561          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 562          BA     .51
 563          LG     .15      .25    4.00      .52   16.00
 564          UI    146.     575.     989.    1411.     878.     682.     524.     370.     295.     201.
 565          UI    157.     111.      82.      67.      41.      26.      26.      26.      26.       0.
 566          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 567          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 568          KK   R27-28
 569          KM        ROUTE HYDROGRAPH S27 THROUGH S28
 570          RS       1    FLOW      -1
 571          RC     .07     .036     .07    2482    .022
 572          RX    1000     1060    1090    1100    1120     1130    1160    1230
 573          RY    1250     1248    1240    1238    1238     1240    1242    1250
              *  BASIN S28 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****

 574          KK     S28
 575          KM   BASIN S28
 576          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 577          KM    L=       .4  Lca=       .2   S=  120.0  Kn= .028  LAG=   6.2
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 578          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 579          BA     .04
 580          LG     .17     .25    4.15     .48    2.00
 581          UI     55.    180.    114.     65.     36.     19.     11.      4.      4.      0.
 582          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 583          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 584          KK    HC28
 585          KM         COMBINE ROUTED HYDROGRAPH R27-28 WITH HYDROGRAPH S28 - PROSPECT WASH
 586          KM         AT WATSON ROAD CROSSING
 587          HC        2  0.5526
              * DDM   ***** Preserved *****

 588          KK  R28-29
 589          KM         ROUTE COMBINED HYDROGRAPHS HC28 THROUGH S29
 590          RS        2    FLOW      -1
 591          RC     .07    .036     .07    3804   .0184
 592          RX    1000    1000    1110    1125    1165    1170    1250    1251
 593          RY    1192    1192    1190    1188    1188    1190    1192    1192
              *  BASIN S29 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****
1                                          HEC-1 INPUT                                         PAGE 16

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


 594          KK     S29
 595          KM   BASIN S29
 596          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 597          KM    L=        .7  Lca=        .3   S=  102.9  Kn= .030  LAG=   9.4
 598          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 599          BA     .10
 600          LG     .15     .25    4.15     .49     .00
 601          UI     55.    207.    343.    215.    154.    101.     71.     44.     31.     20.
 602          UI     14.      7.      7.      7.      0.      0.      0.      0.      0.      0.
 603          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 604          KK    HC29
 605          KM         COMBINE ROUTED HYDROGRAPH R28-29 WITH HYDROGRAPH S29 - PROSPECT WASH
 606          KM         AT BUCKEYE F.R.S. NO 3
 607          HC        2  0.6515
              *
              * DDM   ***** Preserved *****

 608          KK  HCBES3
 609          KM         COMBINE ALL HYDROGRAPHS AT BUCKEYE FRS-3
 610          HC        8  8.7485
 611          ZZ
1
           SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

  37          S1
               .
               .
  48           .          S2
               .           .
               .           .
  59          HC2...........
               V
               V
  62         R2-3
               .
               .
  68           .          S3
               .           .
               .           .
  80          HC3...........
               V
               V
  84         R3-4
               .
               .
  90           .          S4
               .           .
               .           .
 101          HC4...........
               V
               V
 105         R4-7
               .
               .
 111           .          S7
               .           .
               .           .
 122         IHC7...........
               .
               .
 126           .          S5
               .           V
               .           V
 138           .         R5-6
               .           .
               .           .
 144           .           .          S6
               .           .           .
               .           .           .
 154           .          HC6...........
               .           .
               .           .
 158          HC7...........
               V
               V
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162        R7-12E
                .
                .
168             .        S12E
                .           .
                .           .
178         HC12E............
                .
                .
182             .          S8
                .           V
                .           V
193             .        R8-9
                .           .
                .           .
199             .           .          S9
                .           .           .
                .           .           .
210             .         HC9............
                .           V
                .           V
214             .       R9-11
                .           .
                .           .
220             .           .         S11
                .           .           .
                .           .           .
230             .       IHC11............
                .           .
                .           .
234             .           .         S10
                .           .           .
                .           .           .
245             .        HC11............
                .           V
                .           V
249             .      R1112W
                .           .
                .           .
256             .           .        S12W
                .           .           .
                .           .           .
266             .       HC12W............
                .           .
                .           .
270          HC12............
                V
                V
274        R12-13
                .
                .
280             .         S13
                .           .
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290          HC13............
                .
                .
295             .------->    DI24
293          DI13
                V
                V
298         RDI13
                .
                .
304             .         S14
                .           .
                .           .
315          HC14............
                V
                V
319        R1416S
                .
                .
326             .         S15
                .           V
                .           V
336             .      R1516S
                .           .
                .           .
343             .           .        S16S
                .           .           .
                .           .           .
353        IHC16S........................
                .
                .
357             .        S16N
                .           V
                .           V
368             .      R16N-S
                .           .
                .           .
374         HC16S............
                .
                .
380             .------->    DI22
378         DI16S
                V
                V
383        R16-17
                .
                .
389             .         S17
                .           .
                .           .
400          HC17............
                .
                .
404             .         S18
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            .         V
            .         V
415         .    R18-19
            .         .
            .         .
421         .         .       S19
            .         .         .
            .         .         .
431         .      HC19..........
            .         V
            .         V
434         .    R19-20
            .         .
            .         .
440         .         .       S20
            .         .         .
            .         .         .
451         .      HC20..........
            .         .
            .         .
455         .         .       S21
            .         .         .
            .         .         .
465         .         .         .       S22
            .         .         .         .
            .         .         .         .
478         .         .         .         .         .<-------    DI22
476         .         .         .         .       DI22
            .         .         .         .         V
            .         .         .         .         V
479         .         .         .         .      RDI22
            .         .         .         .         .
            .         .         .         .         .
485         .         .         .      HC22..........
            .         .         .         .
            .         .         .         .
488         .         .         .         .       S23
            .         .         .         .         .
            .         .         .         .         .
499         .         .         .         .         .       S24
            .         .         .         .         .         .
            .         .         .         .         .         .
515         .         .         .         .         .         .         .<-------    DI24
513         .         .         .         .         .         .       DI24
            .         .         .         .         .         .         V
            .         .         .         .         .         .         V
516         .         .         .         .         .         .      RDI24
            .         .         .         .         .         .         .
            .         .         .         .         .         .         .
522         .         .         .         .         .      HC24..........
            .         .         .         .         .         .
            .         .         .         .         .         .
525         .         .         .         .         .         .       S25
            .         .         .         .         .         .         V

            .         .         .         .         .         .         V
535         .         .         .         .         .         .    R25-26
            .         .         .         .         .         .         .
            .         .         .         .         .         .         .
542         .         .         .         .         .         .         .       S26
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .
553         .         .         .         .         .         .      HC26..........
            .         .         .         .         .         .         .
            .         .         .         .         .         .         .
557         .         .         .         .         .         .         .       S27
            .         .         .         .         .         .         .         V
            .         .         .         .         .         .         .         V
568         .         .         .         .         .         .         .    R27-28
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .
574         .         .         .         .         .         .         .         .       S28
            .         .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .         .
584         .         .         .         .         .         .         .      HC28..........
            .         .         .         .         .         .         .         V
            .         .         .         .         .         .         .         V
588         .         .         .         .         .         .         .    R28-29
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .
594         .         .         .         .         .         .         .         .       S29
            .         .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .         .
604         .         .         .         .         .         .         .      HC29..........
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .
608     HCBES3....................................................................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
 *                                      *
 *  FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *             JUN   1998               *
 *           VERSION 4.1                *
 *                                      *
 * RUN DATE   16JUL12  TIME  12:27:54   *
 *                                      *
 ****************************************

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

SKYLINE WASH AND TRIBUTARIES
FLOODPLAIN DELINEATION STUDY
FCD 96-08

HEC-1

DATE: 8-19-98
STORM: 100-YR 6-HOUR STORM
FILE NAME: SKYLINE6.DAT

DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA

15 IO OUTPUT CONTROL VARIABLES

IPRNT	5	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

IT HYDROGRAPH TIME DATA

NMIN	3	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	1457	ENDING TIME
ICENT	19	CENTURY MARK

COMPUTATION INTERVAL .05 HOURS
TOTAL TIME BASE 14.95 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

16 JD INDEX STORM NO. 1

STRM	2.80	PRECIPITATION DEPTH
TRDA	.01	TRANSPOSITION DRAINAGE AREA

17 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.02	.02	.02	.02	.02
.03	.03	.03	.03	.03	.09	.09	.09	.09	.09
.02	.02	.02	.02	.02	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

20 JD INDEX STORM NO. 2

STRM	2.78	PRECIPITATION DEPTH
TRDA	.50	TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.02	.02	.02	.02	.02
.03	.03	.03	.03	.03	.09	.09	.09	.09	.09
.02	.02	.02	.02	.02	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

21 JD INDEX STORM NO. 3

STRM	2.73	PRECIPITATION DEPTH
TRDA	2.80	TRANSPOSITION DRAINAGE AREA

22 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.01	.01	.01	.01	.01	.02	.02	.02	.02	.02
.04	.04	.04	.04	.04	.05	.05	.05	.05	.05
.03	.03	.03	.03	.03	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

25 JD INDEX STORM NO. 4

STRM	2.58	PRECIPITATION DEPTH
TRDA	16.00	TRANSPOSITION DRAINAGE AREA

26 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.01	.01	.01	.01	.01	.02	.02	.02	.02	.02
.03	.03	.03	.03	.03	.04	.04	.04	.04	.04
.03	.03	.03	.03	.03	.01	.01	.01	.01	.01
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

29 JD INDEX STORM NO. 5

STRM	2.27	PRECIPITATION DEPTH
TRDA	90.00	TRANSPOSITION DRAINAGE AREA

```
30 PI           PRECIPITATION PATTERN
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .02      .02      .02      .02      .02
                    .03      .03      .03      .03      .03      .03      .03      .03      .03      .03
                    .02      .02      .02      .02      .02      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00

33 JD          INDEX STORM NO. 6
                  STRM       2.24  PRECIPITATION DEPTH
                  TRDA     100.00  TRANSPOSITION DRAINAGE AREA

34 PI           PRECIPITATION PATTERN
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .01      .01      .01      .01      .01      .02      .02      .02      .02      .02
                    .02      .02      .02      .02      .02      .02      .02      .02      .02      .02
                    .02      .02      .02      .02      .02      .02      .02      .02      .02      .02
                    .01      .01      .01      .01      .01      .01      .01      .01      .01      .01
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                    .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
1
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RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S1	844.	4.10	75.	30.	30.	.51		
+	HYDROGRAPH AT	S2	376.	4.10	32.	13.	13.	.22		
+	2 COMBINED AT	HC2	1094.	4.10	102.	41.	41.	.73		
+	ROUTED TO	R2-3	1047.	4.15	102.	41.	41.	.73		
+	HYDROGRAPH AT	S3	858.	4.15	88.	35.	35.	.65		
+	2 COMBINED AT	HC3	1517.	4.15	173.	70.	70.	1.38		
+	ROUTED TO	R3-4	1448.	4.20	173.	70.	70.	1.38		
+	HYDROGRAPH AT	S4	681.	4.10	57.	23.	23.	.41		
+	2 COMBINED AT	HC4	1703.	4.20	214.	86.	86.	1.79		
+	ROUTED TO	R4-7	1664.	4.25	214.	86.	86.	1.79		
+	HYDROGRAPH AT	S7	255.	4.05	19.	7.	7.	.13		
+	2 COMBINED AT	IHC7	1714.	4.25	227.	91.	91.	1.92		
+	HYDROGRAPH AT	S5	780.	4.15	80.	32.	32.	.53		
+	ROUTED TO	R5-6	750.	4.20	79.	32.	32.	.53		
+	HYDROGRAPH AT	S6	481.	4.05	35.	14.	14.	.25		
+	2 COMBINED AT	HC6	999.	4.15	109.	44.	44.	.78		
+	2 COMBINED AT	HC7	2088.	4.25	308.	124.	124.	2.70		
+	ROUTED TO	R7-12E	2048.	4.30	308.	124.	124.	2.70		
+	HYDROGRAPH AT	S12E	129.	4.00	8.	3.	3.	.05		
+	2 COMBINED AT	HC12E	2060.	4.30	314.	126.	126.	2.75		
+	HYDROGRAPH AT	S8	645.	4.05	51.	20.	20.	.34		
+	ROUTED TO	R8-9	634.	4.10	51.	20.	20.	.34		
	HYDROGRAPH AT									

+		S9	359.	4.10	31.	12.	12.	.21
+	2 COMBINED AT	HC9	967.	4.10	81.	32.	32.	.55
+	ROUTED TO	R9-11	874.	4.20	81.	32.	32.	.55
+	HYDROGRAPH AT	S11	370.	4.05	23.	9.	9.	.17
+	2 COMBINED AT	IHC11	945.	4.20	100.	40.	40.	.72
+	HYDROGRAPH AT	S10	354.	4.10	29.	11.	11.	.19
+	2 COMBINED AT	HC11	1100.	4.20	124.	50.	50.	.91
+	ROUTED TO	R1112W	1049.	4.25	123.	50.	50.	.91
+	HYDROGRAPH AT	S12W	207.	4.05	13.	5.	5.	.09
+	2 COMBINED AT	HC12W	1083.	4.20	134.	54.	54.	1.00
+	2 COMBINED AT	HC12	2624.	4.30	411.	166.	166.	3.75
+	ROUTED TO	R12-13	2556.	4.35	411.	166.	166.	3.75
+	HYDROGRAPH AT	S13	357.	4.05	21.	9.	9.	.17
+	2 COMBINED AT	HC13	2597.	4.35	422.	170.	170.	3.93
+	DIVERSION TO	DI24	1424.	4.35	282.	114.	114.	3.93
+	HYDROGRAPH AT	DI13	1173.	4.35	140.	56.	56.	3.93
+	ROUTED TO	RDI13	872.	4.55	140.	56.	56.	3.93
+	HYDROGRAPH AT	S14	927.	4.05	66.	27.	27.	.49
+	2 COMBINED AT	HC14	935.	4.50	181.	73.	73.	4.41
+	ROUTED TO	R1416S	912.	4.60	181.	73.	73.	4.41
+	HYDROGRAPH AT	S15	208.	4.05	11.	4.	4.	.11
+	ROUTED TO	R1516S	163.	4.20	11.	4.	4.	.11
+	HYDROGRAPH AT	S16S	378.	4.05	23.	9.	9.	.17
+	3 COMBINED AT	IHC16S	933.	4.60	198.	80.	80.	4.70
+	HYDROGRAPH AT	S16N	276.	4.10	24.	10.	10.	.17
+	ROUTED TO	R16N-S	240.	4.30	24.	10.	10.	.17
+	2 COMBINED AT	HC16S	1007.	4.55	213.	87.	87.	4.87
+	DIVERSION TO	DI22	257.	4.55	41.	17.	17.	4.87
+	HYDROGRAPH AT	DI16S	750.	4.55	172.	70.	70.	4.87
+	ROUTED TO	R16-17	728.	4.80	172.	70.	70.	4.87
+	HYDROGRAPH AT	S17	488.	4.05	31.	12.	12.	.29
+	2 COMBINED AT	HC17	725.	4.75	186.	76.	76.	5.15
+	HYDROGRAPH AT	S18	685.	4.05	53.	21.	21.	.36
+	ROUTED TO	R18-19	604.	4.15	53.	21.	21.	.36
+	HYDROGRAPH AT	S19	586.	4.05	41.	16.	16.	.29
+	2 COMBINED AT	HC19	1008.	4.10	90.	36.	36.	.65
	ROUTED TO							

+		R19-20	896.	4.20	90.	36.	36.	.65
+	HYDROGRAPH AT	S20	145.	4.05	10.	4.	4.	.09
+	2 COMBINED AT	HC20	948.	4.20	98.	39.	39.	.73
+	HYDROGRAPH AT	S21	1188.	4.05	82.	33.	33.	.62
+	HYDROGRAPH AT	S22	932.	4.10	65.	26.	26.	.55
+	HYDROGRAPH AT	DI22	257.	4.55	41.	17.	17.	4.87
+	ROUTED TO	RDI22	244.	4.85	41.	17.	17.	4.87
+	2 COMBINED AT	HC22	932.	4.10	223.	89.	89.	5.41
+	HYDROGRAPH AT	S23	746.	4.10	53.	21.	21.	.49
+	HYDROGRAPH AT	S24	313.	4.30	38.	15.	15.	.32
+	HYDROGRAPH AT	DI24	1424.	4.35	282.	114.	114.	3.93
+	ROUTED TO	RDI24	1358.	4.60	281.	114.	114.	3.93
+	2 COMBINED AT	HC24	1460.	4.55	303.	123.	123.	4.24
+	HYDROGRAPH AT	S25	57.	4.05	3.	1.	1.	.03
+	ROUTED TO	R25-26	33.	4.45	3.	1.	1.	.03
+	HYDROGRAPH AT	S26	379.	4.10	26.	11.	11.	.21
+	2 COMBINED AT	HC26	380.	4.10	30.	12.	12.	.24
+	HYDROGRAPH AT	S27	997.	4.05	76.	30.	30.	.51
+	ROUTED TO	R27-28	944.	4.10	76.	30.	30.	.51
+	HYDROGRAPH AT	S28	93.	4.00	5.	2.	2.	.04
+	2 COMBINED AT	HC28	971.	4.10	80.	32.	32.	.55
+	ROUTED TO	R28-29	892.	4.20	79.	32.	32.	.55
+	HYDROGRAPH AT	S29	212.	4.05	12.	5.	5.	.10
+	2 COMBINED AT	HC29	932.	4.15	89.	36.	36.	.65
+	8 COMBINED AT	HCBES3	2864.	4.40	723.	295.	295.	8.75

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

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1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *  U.S. ARMY CORPS OF ENGINEERS        *
 *           JUN  1998                  *                    *  HYDROLOGIC ENGINEERING CENTER       *
 *         VERSION 4.1                  *                    *       609 SECOND STREET              *
 *                                      *                    *    DAVIS, CALIFORNIA 95616           *
 * RUN DATE   16JUL12  TIME  12:17:46   *                    *       (916) 756-1104                 *
 *                                      *                    *                                      *
 ****************************************                    ****************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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


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

   1         ID         SKYLINE WASH AND TRIBUTARIES
   2         ID         FLOODPLAIN DELINEATION STUDY
   3         ID         FCD 96-08
   4         ID
   5         ID         HEC-1
   6         ID
   7         ID         DATE:   8-19-98
   8         ID         STORM:  100-YR 24-HOUR STORM
   9         ID         FILE NAME:  SKYLINE.DAT
  10         ID
  11         ID
  12         ID   DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA
             *DIAGRAM
             *
             * REPERFORMED WITH FOLLOWING MODIFICATIONS - JULY 2012, SEI
             * NOAA ATLAS 14 POINT RAINFALL DEPTH USED
             * DEPTH-AREA REDUCTION FACTOR UPDATED
             * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
             * OTHER MINOR MODIFICATIONS MADE
             *
  13         IT       3                    500
  14         IN      15
  15         IO       5
  16         JD    3.97    0.01
  17         PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
  18         PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
  19         PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
  20         PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
  21         PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
  22         PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
  23         PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
  24         PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
  25         PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
  26         PC    .983    .986    .989    .992    .995    .998   1.000
  27         JD    3.77   10.00
  28         JD    3.57   30.00
  29         JD    3.45   60.00
  30         JD    3.38   90.00
  31         JD    3.34  120.00
  32         JD    3.30  150.00
  33         JD    3.20  300.00
  34         JD    3.11  500.00
             *  BASIN S1 - BEGINNING OF SKYLINE WASH
             * DDM   ***** Updated *****

  35         KK      S1
  36         KM   BASIN S1
  37         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  38         KM    L=      1.2  Lca=       .6   S= 1102.5  Kn= .050  LAG=  16.6
  39         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  40         BA     .51
  41         LG     .25     .25    3.95     .53   18.00
  42         UI    103.    273.    577.    783.   1122.    746.    585.    489.    400.    306.
  43         UI    248.    206.    151.    123.    102.     79.     60.     51.     48.     20.
  44         UI     20.     20.     20.     20.     20.      0.      0.      0.      0.      0.
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 LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  45         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *  BASIN S2 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
             * DDM   ***** Updated *****

  46         KK      S2
  47         KM   BASIN S2
  48         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  49         KM    L=       .9  Lca=       .6   S=  916.1  Kn= .050  LAG=  16.0
  50         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  51         BA     .22
  52         LG     .25     .25    3.95     .53   18.00
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 53          UI     46.    130.    269.    364.    496.    310.    251.    207.    166.    124.
 54          UI    105.     82.     60.     51.     38.     32.     23.     23.     12.      9.
 55          UI      9.      9.      9.      9.      0.      0.      0.      0.      0.      0.
 56          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

 57          KK     HC2
 58          KM        COMBINE HYDROGRAPHS FROM S1 AND S2 - UPSTREAM PORTION OF SKYLINE WASH
 59          HC       2  0.7296
             * DDM   ***** Preserved *****

 60          KK    R2-3
 61          KM        ROUTE HYDROGRAPH HC2 THROUGH S3 - SKYLINE WASH
 62          RS       1    FLOW      -1
 63          RC     .07    .036     .07    2930    .029
 64          RX    1000    1030    1100    1120    1130    1190    1220    1250
 65          RY    1626    1624    1594    1594    1596    1624    1626    1625
             *  BASIN S3 - MAIN SUBBASIN FOR GRANITE FALLS WASH
             * DDM   ***** Updated *****

 66          KK      S3
 67          KM   BASIN S3
 68          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 69          KM    L=       1.5  Lca=      1.0   S=  481.0  Kn= .040  LAG=  21.0
 70          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 71          BA     .65
 72          LG     .20     .25    4.00     .52   13.00
 73          UI    104.    180.    422.    652.    797.   1088.    945.    652.    567.    492.
 74          UI    420.    348.    274.    245.    212.    164.    133.    115.     99.     80.
 75          UI     70.     51.     51.     49.     20.     20.     20.     20.     20.     20.
 76          UI     20.     20.      0.      0.      0.      0.      0.      0.      0.      0.
 77          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

 78          KK     HC3
 79          KM        COMBINE HYDROGRAPH R2-3 WITH HYDROGRAPH FROM S3 - CONFLUENCE OF SKYLINE
 80          KM        WASH AND GRANITE FALLS WASH
 81          HC       2  1.3787
             * DDM   ***** Preserved *****
1                                       HEC-1 INPUT                                        PAGE  3

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

 82          KK    R3-4
 83          KM        ROUTE COMBINED HYDROGRAPHS HC3 THROUGH S4 - SKYLINE WASH
 84          RS       1    FLOW      -1
 85          RC     .07    .036     .07    2927    .032
 86          RX    1000    1030    1085    1160    1200    1240    1250    1275
 87          RY    1520    1518    1496    1496    1498    1516    1518    1520
             *  BASIN S4 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
             * DDM   ***** Updated *****

 88          KK      S4
 89          KM   BASIN S4
 90          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 91          KM    L=       1.3  Lca=       .6   S=  503.9  Kn= .040  LAG=  16.2
 92          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 93          BA     .41
 94          LG     .20     .25    4.00     .52   13.00
 95          UI     85.    231.    486.    656.    913.    579.    465.    386.    312.    234.
 96          UI    196.    156.    114.     95.     73.     63.     41.     41.     28.     16.
 97          UI     16.     16.     16.     16.      0.      0.      0.      0.      0.      0.
 98          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

 99          KK     HC4
100          KM        COMBINE HYDROGRAPH R3-4 WITH HYDROGRAPH FROM S4 - CONCENTRATION POINT
101          KM        ON SKYLINE WASH.
102          HC       2  1.7864
             * DDM   ***** Preserved *****

103          KK    R4-7
104          KM        ROUTE COMBINED HYDROGRAPHS HC4 THROUGH S7 - SKYLINE WASH
105          RS       1    FLOW      -1
106          RC     .07    .036     .07    2211    .022
107          RX    1000    1025    1055    1120    1145    1180    1240    1370
108          RY    1462    1460    1462    1462    1432    1432    1456    1462
             *  BASIN S7 - TRIBUTARY BASIN TO MOUNTAIN WASH NEAR AT CONFLUENCE WITH SKYLINE
             *   WASH
             * DDM   ***** Updated *****

109          KK      S7
110          KM   BASIN S7
111          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
112          KM    L=        .9  Lca=       .6   S=  955.3  Kn= .040  LAG=  12.7
113          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
114          BA     .13
115          LG     .20     .25    4.00     .52   12.00
116          UI     37.    147.    254.    365.    229.    178.    137.     97.     78.     53.
117          UI     41.     30.     22.     17.     12.      7.      7.      7.      7.      0.
118          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
119          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****
1                                       HEC-1 INPUT                                        PAGE  4

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

120          KK    IHC7
121          KM        COMBINE HYDROGRAPHS R4-7 AND S7 - UPSTREAM OF CONFLUENCE WITH MOUNTAIN
122          KM        WASH
123          HC       2  1.9208
             *  BASIN S5 - BEGINNING OF MOUNTAIN WASH
             * DDM   ***** Updated *****

124          KK      S5
125          KM   BASIN S5
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 126          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 127          KM    L=       1.4  Lca=       .7   S=  654.8  Kn= .050  LAG=  20.2
 128          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 129          BA     .53
 130          LG     .25     .25    3.95     .53   20.00
 131          UI     89.    164.    385.    573.    705.    988.    689.    532.    459.    396.
 132          UI    334.    265.    219.    195.    157.    120.    104.     93.     68.     65.
 133          UI     43.     43.     43.     18.     17.     17.     17.     17.     17.     17.
 134          UI     17.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 135          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 136          KK    R5-6
 137          KM         ROUTE HYDROGRAPH S5 THROUGH S6 - MOUNTAIN WASH
 138          RS       1    FLOW      -1
 139          RC     .07    .036     .07    2494    .030
 140          RX    1000    1025    1075    1105    1150    1170    1220    1240
 141          RY    1480    1476    1476    1460    1454    1454    1478    1480
              *  BASIN S6 - SUBBASIN TRIBUTARY TO MOUNTAIN WASH
              * DDM   ***** Updated *****

 142          KK      S6
 143          KM   BASIN S6
 144          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 145          KM    L=        .8  Lca=       .4   S=  491.4  Kn= .042  LAG=  12.3
 146          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 147          BA     .25
 148          LG     .21     .25    4.00     .52   15.00
 149          UI     75.    289.    495.    680.    415.    323.    244.    172.    135.     93.
 150          UI     71.     52.     35.     33.     13.     13.     13.     13.      0.      0.
 151          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 152          KK     HC6
 153          KM         COMBINE HYDROGRAPHS R5-6 WITH SUBBASIN S6 - UPSTREAM OF CONFLUENCE WITH
 154          KM         SKYLINE WASH
 155          HC       2  0.7787
              * DDM   ***** Preserved *****

 156          KK     HC7
 157          KM         COMBINE HYDROGRAPHS IHC7 WITH HC6 - CONFLUENCE OF MOUNTAIN WASH WITH
 158          KM         SKYLINE WASH
 159          HC       2  2.6995
              * DDM   ***** Preserved *****
1                                   HEC-1 INPUT                                          PAGE  5

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


 160          KK  R7-12E
 161          KM         ROUTE COMBINED HYDROGRAPHS AT HC7 THROUGH S12E - SKYLINE WASH
 162          RS       1    FLOW      -1
 163          RC     .07    .036     .07    1930   .0166
 164          RX    1000    1085    1170    1240    1255    1265    1310    1350
 165          RY    1430    1424    1422    1420    1422    1424    1428    1430
              *
              *   BASIN S12E - SUBBASIN TRIBUTARY TO PYRITE WASH AND SKYLINE WASH CONFLUENCE
              * DDM   ***** Updated *****

 166          KK    S12E
 167          KM   BASIN S12E
 168          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 169          KM    L=        .6  Lca=       .2   S=  142.9  Kn= .030  LAG=   7.8
 170          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 171          BA     .05
 172          LG     .15     .25    3.91     .55   18.00
 173          UI     47.    167.    200.    114.     70.     44.     27.     16.     11.      5.
 174          UI      5.      5.      0.      0.      0.      0.      0.      0.      0.      0.
 175          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 176          KK   HC12E
 177          KM         COMBINE HYDROGRAPHS S12E WITH R7-12E - CONFLUENCE OF PYRITE WASH WITH
 178          KM         SKYLINE WASH
 179          HC       2  2.7544
              *  BASIN S8 - BEGINNING OF PYRITE WASH
              * DDM   ***** Updated *****

 180          KK      S8
 181          KM   BASIN S8
 182          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 183          KM    L=        .8  Lca=       .4   S=  692.1  Kn= .050  LAG=  13.0
 184          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 185          BA     .34
 186          LG     .25     .25    3.95     .53   20.00
 187          UI     88.    352.    614.    906.    585.    452.    354.    254.    200.    145.
 188          UI    105.     81.     62.     43.     38.     17.     17.     17.     17.     17.
 189          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 190          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 191          KK    R8-9
 192          KM         ROUTE HYDROGRAPH S8 THROUGH S9 - PYRITE WASH
 193          RS       1    FLOW      -1
 194          RC     .07    .036     .07     911    .013
 195          RX    1000    1020    1050    1065    1080    1125    1185    1190
 196          RY    1518    1518    1494    1492    1494    1494    1520    1524
              *  BASIN S9 - SUBBASIN TRIBUTARY TO PYRITE WASH
              * DDM   ***** Updated *****
1                                   HEC-1 INPUT                                          PAGE  6

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


 197          KK      S9
 198          KM   BASIN S9
 199          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 200          KM    L=       1.0  Lca=       .7   S=  415.7  Kn= .040  LAG=  15.9
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201          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
202          BA     .21
203          LG     .20      .25    3.95      .53   17.00
204          UI     44.     126.    259.     351.    471.    293.    238.    196.    157.    117.
205          UI     99.      77.     56.      48.     35.     29.     22.     22.     10.      8.
206          UI      8.       8.      8.       8.      0.      0.      0.      0.      0.      0.
207          UI      0.       0.      0.       0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

208          KK     HC9
209          KM        COMBINE ROUTED HYDROGRAPH R8-9 WITH HYDROGRAPH S9 - CONCENTRATION POINT
210          KM        ON PYRITE WASH
211          HC       2  0.5472
             * DDM   ***** Preserved *****

212          KK   R9-11
213          KM        ROUTE COMBINED HYDROGRAPHS HC9 THROUGH S11 - PYRITE WASH
214          RS       3    FLOW      -1
215          RC     .07     .036     .07    3462     .023
216          RX    1000    1080    1090    1120    1140    1290    1340    1375
217          RY    1496    1494    1492    1472    1471    1472    1490    1494
             *  BASIN S11 -PYRITE WASH UPSTREAM OF CONFLUENCE WITH WAGON WASH
             * DDM   ***** Updated *****

218          KK     S11
219          KM   BASIN S11
220          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
221          KM    L=        .7  Lca=        .3   S=  797.1  Kn= .040  LAG=   9.3
222          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
223          BA     .17
224          LG     .20      .25    4.00      .52   11.00
225          UI     96.     360.    590.     366.    262.    169.    119.     73.     51.     32.
226          UI     23.      12.     12.      12.      0.      0.      0.      0.      0.      0.
227          UI      0.       0.      0.       0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

228          KK   IHC11
229          KM        COMBINE ROUTED HYDROGRAPH R9-11 WITH HYDROGRAPHS S11 - UPSTREAM OF
230          KM        CONFLUENCE WITH WAGON WASH
231          HC       2  0.7154
             *  BASIN S10 - BEGINNING OF WAGON WASH
             * DDM   ***** Updated *****

232          KK     S10
233          KM   BASIN S10
234          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
235          KM    L=       1.0  Lca=        .5   S=  896.9  Kn= .048  LAG=  14.2
236          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
237          BA     .19
238          LG     .24      .25    3.95      .53   18.00
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239          UI     46.     157.    302.     430.    397.    263.    213.    167.    122.    101.
240          UI     71.      55.     43.      35.     23.     23.     11.      9.      9.      9.
241          UI      9.       0.      0.       0.      0.      0.      0.      0.      0.      0.
242          UI      0.       0.      0.       0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

243          KK    HC11
244          KM        COMBINE HYDROGRAPH IHC11 WITH HYDROGRAPH S10 - CONFLUENCE OF WAGON WASH
245          KM        WITH PYRITE WASH
246          HC       2  0.9089
             * DDM   ***** Preserved *****

247          KK  R1112W
248          KM        ROUTE COMBINED HYDROGRAPHS HC11 THROUGH S12W - CONTINUATION OF PYRITE
249          KM        WASH DOWNSTREAM OF CONFLUENCE WITH WAGON WASH
250          RS       1    FLOW      -1
251          RC     .07     .036     .07    1501     .019
252          RX    1000    1030    1065    1150    1240    1330    1375    1410
253          RY    1422    1420    1410    1410    1410    1412    1414    1428
             *  BASIN S12W - SUBBASIN TRIBUTARY FOR PYRITE WASH AND SKYLINE WASH
             * DDM   ***** Updated *****

254          KK    S12W
255          KM   BASIN S12W
256          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
257          KM    L=        .7  Lca=        .2   S=  153.6  Kn= .030  LAG=   8.2
258          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
259          BA     .09
260          LG     .15      .25    3.91      .55   18.00
261          UI     68.     246.    330.     189.    123.     79.     47.     31.     19.     11.
262          UI      7.       7.      0.       0.      0.      0.      0.      0.      0.      0.
263          UI      0.       0.      0.       0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

264          KK   HC12W
265          KM        COMBINE HYDROGRAPH R1112W WITH HYDROGRAPH S12W - CONFLUENCE OF SKYLINE
266          KM        WASH WITH PYRITE WASH
267          HC       2  0.9994
             * DDM   ***** Preserved *****

268          KK    HC12
269          KM        COMBINE ROUTED HYDROGRAPH HC12W AND HC12E
270          KM        CONFLUENCE OF SKYLINE WASH AND PYRITE WASH
271          HC       2  3.7538
             * DDM   ***** Preserved *****

272          KK  R12-13
273          KM        ROUTE COMBINED HYDROGRAPHS HC12 THROUGH S13 - SKYLINE WASH
274          RS       1    FLOW      -1
275          RC     .07     .036     .07    1854     .017
276          RX    1000    1080    1110    1320    1370    1420    1500    1550
277          RY    1400    1392    1384    1382    1382    1380    1380    1400
             *  BASIN S13 - SKYLINE WASH DOWNSTREAM OF CONFLUENCE OF PYRITE WASH
             * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 278          KK     S13
 279          KM   BASIN S13
 280          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 281          KM    L=        .9  Lca=        .3   S=  174.2  Kn= .030  LAG=  10.1
 282          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 283          BA     .17
 284          LG     .15     .25    3.88     .56    4.00
 285          UI     82.    312.    550.    397.    278.    195.    135.     90.     64.     43.
 286          UI     28.     20.     11.     11.     11.      0.      0.      0.      0.      0.
 287          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 288          KK    HC13
 289          KM        COMBINE ROUTED HYDROGRAPH R12-13 WITH HYDROGRAPH S13 - SKYLINE WASH
 290          HC       2  3.9274
 291          KO       3
              * DDM   ***** Preserved *****

 292          KK    DI13
 293          KM        SPLIT FLOW AT HC13; MAIN FLOW TO S24 AND MINOR FLOW TO S14
 294          DT    DI24
 295          DI       0     201     556    1353    2595    4157
 296          DQ       0     201     461     879    1427  2078.5
              * DDM   ***** Preserved *****

 297          KK   RDI13
 298          KM        ROUTE HYDROGRAPH DI13 THROUGH S14 -SKYLINE WASH DOWNSTREAM OF SPLIT
 299          RS       4    FLOW      -1
 300          RC     .07    .036     .07    4353    .021
 301          RX    1000    1025    1270    1280    1320    1330    1370    1385
 302          RY    1360    1354    1354    1356    1356    1358    1358    1360
              *  BASIN S14 - BEGINNING OF COYOTE WASH
              * DDM   ***** Updated *****

 303          KK     S14
 304          KM   BASIN S14
 305          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 306          KM    L=       1.2  Lca=        .6   S=  340.7  Kn= .030  LAG=  12.4
 307          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 308          BA     .49
 309          LG     .15     .25    3.91     .55   11.00
 310          UI    144.    562.    962.   1341.    822.    640.    487.    343.    270.    185.
 311          UI    145.    101.     72.     65.     31.     25.     25.     25.     25.      0.
 312          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 313          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 314          KK    HC14
 315          KM        COMBINE ROUTED HYDROGRAPH R13-14 WITH HYDROGRAPH S14 - SPLIT FLOW FROM
 316          KM        SKYLINE WASH AND COYOTE WASH SUBBASIN
 317          HC       2  4.4139
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 318          KK  R1416S
 319          KM        ROUTE COMBINED HYDROGRAPHS HC14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
 320          KM        OF CONFLUENCE WITH COYOTE WASH
 321          RS       2    FLOW      -1
 322          RC     .07    .036     .07    3140    .017
 323          RX    1000    1035    1150    1180    1320    1360    1480    1481
 324          RY    1236    1234    1234    1232    1232    1234    1236    1236
              *  BASIN S15 - SUBBASIN IN AREA OF EXISTING A.D.O.T. BORROW PITS
              * DDM   ***** Updated *****

 325          KK     S15
 326          KM   BASIN S15
 327          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 328          KM    L=        .8  Lca=        .3   S=  105.0  Kn= .030  LAG=   9.8
 329          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 330          BA     .11
 331          LG     .15     .27    3.40     .77     .00
 332          UI     56.    213.    370.    246.    176.    120.     84.     54.     37.     25.
 333          UI     19.      9.      7.      7.      7.      0.      0.      0.      0.      0.
 334          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 335          KK  R1516S
 336          KM        ROUTE HYDROGRAPH HC15 THROUGH S16S - SKYLINE WASH DOWNSTREAM OF
 337          KM        CONFLUENCE WITH COYOTE WASH
 338          RS       3    FLOW      -1
 339          RC     .07    .036     .07    2218    .018
 340          RX    1000    1035    1150    1180    1320    1360    1480    1481
 341          RY    1236    1234    1234    1232    1232    1234    1236    1236
              *  BASIN S16S - SUBBASIN AT SKYLINE WASH DOWNSTREAM OF CONFLUENCE WITH COYOTE W.
              * DDM   ***** Updated *****

 342          KK    S16S
 343          KM   BASIN S16S
 344          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 345          KM    L=        .6  Lca=        .3   S=  116.4  Kn= .030  LAG=   9.3
 346          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 347          BA     .17
 348          LG     .15     .25    3.95     .53    6.00
 349          UI    100.    373.    611.    379.    271.    175.    123.     76.     53.     34.
 350          UI     23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
 351          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 352          KK  IHC16S
 353          KM        COMBINE ROUTED HYDROGRAPH R14-16S AND R15-16S WITH HYDROGRAPH S16S
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 354          KM        DOWNSTREAM OF CONFLUENCE OF SKYLINE WASH WITH COYOTE WASH
 355          HC       3  4.6952
              *  BASIN S16N - SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 356          KK    S16N
 357          KM   BASIN S16N
 358          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 359          KM    L=        .9  Lca=        .6   S=  653.2  Kn= .050  LAG=  16.5
 360          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 361          BA     .17
 362          LG     .25     .25    3.95     .53   18.00
 363          UI     34.     90.    189.    256.    366.    238.    189.    158.    129.     98.
 364          UI     80.     66.     48.     39.     32.     26.     19.     16.     15.      6.
 365          UI      6.      6.      6.      6.      6.      0.      0.      0.      0.      0.
 366          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 367          KK  R16N-S
 368          KM        ROUTE HYDROGRAPH S16N THROUGH S16S
 369          RS       4    FLOW      -1
 370          RC     .07    .036     .07    3230    .022
 371          RX    1000    1035    1150    1180    1320    1360    1480    1481
 372          RY    1236    1234    1234    1232    1232    1234    1236    1236
              * DDM   ***** Preserved *****

 373          KK   HC16S
 374          KM        COMBINE ROUTED HYDROGRAPH R16N-S AND IHC16S
 375          KM        SKYLINE WASH DOWNSTREAM OF COYOTE WASH
 376          HC       2  4.8652
              * DDM   ***** Preserved *****

 377          KK   DI16S
 378          KM        SPLIT FLOW AT HC16S; MAIN FLOW TO S17 AND MINOR FLOW TO S22
 379          DT    DI22
 380          DI       0      46     144     344   708.5    1223
 381          DQ       0       0       8      52     153     329
              * DDM   ***** Preserved *****

 382          KK  R16-17
 383          KM        ROUTE HYDROGRAPH DI16S THROUGH S17
 384          RS       4    FLOW      -1
 385          RC     .07    .036     .07    4341    .015
 386          RX    1000    1060    1090    1120    1145    1180    1200    1320
 387          RY    1202    1200  1199.5    1200    1199    1199    1200    1202
              *  BASIN S17 - SUBBASIN OF SKYLINE WASH SOUTH OF MCDOWELL ROAD ON EAST SIDE
              *  OF WATERSHED
              * DDM   ***** Updated *****

 388          KK     S17
 389          KM   BASIN S17
 390          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 391          KM    L=        .9  Lca=        .5   S=  117.9  Kn= .030  LAG=  12.8
 392          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 393          BA     .29
 394          LG     .15     .26    3.60     .67     .00
 395          UI     79.    311.    540.    784.    495.    385.    298.    212.    170.    117.
 396          UI     89.     66.     50.     37.     28.     15.     15.     15.     15.      0.
 397          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 398          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 399          KK    HC17
 400          KM        COMBINE ROUTED HYDROGRAPH R16-17 WITH HYDROGRAPH S17 AT EAST SIDE OF
 401          KM        BUCKEYE F.R.S. NO. 3
 402          HC       2  5.1537
              *  BASIN S18 - BEGINNING OF RATTLER WASH
              * DDM   ***** Updated *****

 403          KK     S18
 404          KM   BASIN S18
 405          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 406          KM    L=        .8  Lca=        .4   S=  292.7  Kn= .040  LAG=  12.9
 407          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 408          BA     .36
 409          LG     .20     .25    3.95     .53   17.00
 410          UI     96.    380.    662.    968.    618.    479.    373.    267.    211.    149.
 411          UI    111.     84.     64.     46.     38.     18.     18.     18.     18.      0.
 412          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 413          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 414          KK  R18-19
 415          KM        ROUTE HYDROGRAPH HC18 THROUGH S19
 416          RS       3    FLOW      -1
 417          RC     .07    .036     .07    4253     .02
 418          RX    1000    1050    1100    1125    1140    1180    1240    1241
 419          RY    1266    1264    1242    1240    1242    1264    1266    1266
              *  BASIN S19 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****

 420          KK     S19
 421          KM   BASIN S19
 422          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 423          KM    L=       1.2  Lca=        .8   S=  824.8  Kn= .030  LAG=  11.6
 424          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 425          BA     .29
 426          LG     .15     .25    4.00     .52   12.00
 427          UI    102.    389.    662.    802.    483.    372.    266.    195.    138.     99.
 428          UI     72.     51.     41.     22.     16.     16.     16.      0.      0.      0.
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 429          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 430          KK     HC19
 431          KM          COMBINE ROUTED HYDROGRAPH R18-19 WITH HYDROGRAPH S19 - RATTLER WASH
 432          HC        2  0.6498
              * DDM   ***** Preserved *****

 433          KK   R19-20
 434          KM          ROUTE COMBINED HYDROGRAPHS HC19 THROUGH S20 - RATTLER WASH
 435          RS        3     FLOW      -1
 436          RC      .07     .036      .07     3740     .022
 437          RX      999     1000     1030     1095     1130     1150     1220     1221
 438          RY     1208     1208     1206     1204     1204     1206     1208     1208
              *  BASIN S20 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 439          KK      S20
 440          KM   BASIN S20
 441          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 442          KM    L=        .9  Lca=        .4   S=   84.1  Kn= .030  LAG=  13.0
 443          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 444          BA      .09
 445          LG      .15      .26     3.60      .67     4.00
 446          UI      22.      88.     155.     228.     147.     114.      89.      64.      50.      36.
 447          UI      26.      20.      16.      11.      10.       4.       4.       4.       4.       4.
 448          UI       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 449          UI       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 450          KK     HC20
 451          KM          COMBINE ROUTED HYDROGRAPH R19-20 WITH HYDROGRAPH S20 AT FAR EAST SIDE
 452          KM          OF STUDY AREA NORTH OF BUCKEYE F.R.S. NO. 3
 453          HC        2  0.7344
              *  BASIN S21 - SUBBASIN NORTH OF BUCKEYE F.R.S. NO 3 SPILLWAY
              * DDM   ***** Updated *****

 454          KK      S21
 455          KM   BASIN S21
 456          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 457          KM    L=       1.2  Lca=        .6   S=  780.6  Kn= .030  LAG=  11.0
 458          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 459          BA      .62
 460          LG      .15      .25     4.10      .51    10.00
 461          UI     245.     927.    1593.    1636.    1019.     766.     522.     392.     260.     190.
 462          UI     136.      93.      67.      36.      36.      36.       0.       0.       0.       0.
 463          UI       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *  BASIN S22 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
              * DDM   ***** Updated *****

 464          KK      S22
 465          KM   BASIN S22
 466          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 467          KM    L=       1.3  Lca=        .4   S=  110.1  Kn= .029  LAG=  13.7
 468          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 469          BA      .55
 470          LG      .16      .25     3.91      .53     1.00
 471          UI     135.     496.     909.    1351.    1029.     742.     594.     451.     332.     268.
 472          UI     188.     151.     108.      84.      66.      51.      26.      26.      26.      26.
 473          UI      26.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 474          UI       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 475          KK     DI22
 476          KM          RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S22
 477          DR     DI22
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 478          KK    RDI22
 479          KM          ROUTE HYDROGRAPH DI22 THROUGH S22 - PORTION OF DIVERT OF SKYLINE WASH
 480          RS        5     FLOW      -1
 481          RC      .07     .036      .07     4253     .015
 482          RX      997      998      999     1000     1060     1210     1300     1300
 483          RY     1217     1216     1216     1215     1215     1216     1216     1217
              * DDM   ***** Preserved *****

 484          KK     HC22
 485          KM          COMBINE HYDROGRAPHS AT HC22
 486          HC        2  5.4141
              *  BASIN S23 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
              * DDM   ***** Updated *****

 487          KK      S23
 488          KM   BASIN S23
 489          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 490          KM    L=       1.6  Lca=        .5   S=  112.1  Kn= .028  LAG=  15.2
 491          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 492          BA      .49
 493          LG      .17      .26     3.50      .70     2.00
 494          UI     108.     331.     660.     901.    1086.     670.     547.     446.     338.     263.
 495          UI     217.     155.     125.      98.      81.      53.      53.      31.      21.      21.
 496          UI      21.      21.      21.       0.       0.       0.       0.       0.       0.       0.
 497          UI       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *  BASIN S24 - SUBBASIN DOWNSTREAM OF SKYLINE WASH SPLIT FLOW
              * DDM   ***** Updated *****

 498          KK      S24
 499          KM   BASIN S24
 500          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 501          KM    L=       2.4  Lca=       1.2   S=  113.8  Kn= .037  LAG=  32.2
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```
 502          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 503          BA     .32
 504          LG     .20      .25     4.00      .51     1.00
 505          UI     33.      33.      66.     117.     171.     211.     242.     273.     350.     361.
 506          UI    241.     206.     189.     172.     157.     142.     129.     111.      96.      84.
 507          UI     78.      73.      65.      54.      45.      42.      37.      36.      30.      25.
 508          UI     25.      22.      16.      16.      16.      13.       6.       6.       6.
 509          UI      6.       6.       6.       6.       6.       6.       6.       6.       6.       0.
 510          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 511          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 512          KK    DI24
 513          KM        RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S24
 514          DR    DI24
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 515          KK   RDI24
 516          KM        ROUTE HYDROGRAPH DI24 THROUGH S24
 517          RS       5    FLOW      -1
 518          RC     .07     .036      .07     9929      .02
 519          RX    1000     1045     1060     1080     1100     1120     1155     1220
 520          RY    1222     1220     1218     1218     1216     1216     1220     1220
              * DDM   ***** Preserved *****

 521          KK    HC24
 522          KM        COMBINE HYDROGRAPHS AT HC24
 523          HC       2  4.2443
              *  BASIN S25 - UPSTREAM END OF SMALL WATERSHED EAST OF PROSPECT WASH
              * DDM   ***** Updated *****

 524          KK     S25
 525          KM   BASIN S25
 526          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 527          KM    L=        .7  Lca=        .3   S=  103.0  Kn= .030  LAG=  10.0
 528          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 529          BA     .03
 530          LG     .15      .25     4.15      .49      .00
 531          UI     13.      50.      87.      61.      43.      30.      21.      14.      10.       7.
 532          UI      4.       3.       2.       2.       2.       0.       0.       0.       0.       0.
 533          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 534          KK  R25-26
 535          KM        ROUTE HYDROGRAPH S25 THROUGH S26 CROSSING NEAR THE INTERSECTION OF
 536          KM        WATSON ROAD AND MCDOWELL ROAD
 537          RS       8    FLOW      -1
 538          RC     .07     .036      .07     6571      .02
 539          RX    1000     1045     1060     1080     1100     1120     1155     1220
 540          RY    1222     1220     1218     1218     1216     1216     1220     1220
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              *  BASIN S26 - SUBBASIN ON THE LOWER WEST SIDE OF STUDY AREA
              * DDM   ***** Updated *****

 541          KK     S26
 542          KM   BASIN S26
 543          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 544          KM    L=       1.2  Lca=        .5   S=  119.7  Kn= .029  LAG=  13.8
 545          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 546          BA     .21
 547          LG     .16      .25     4.20      .47     1.00
 548          UI     52.     187.     347.     513.     403.     286.     230.     177.     129.     105.
 549          UI     74.      59.      43.      33.      25.      21.      10.      10.      10.      10.
 550          UI     10.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 551          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 552          KK    HC26
 553          KM        COMBINE ROUTED HYDROGRAPH R25-26 WITH HYDROGRAPH S26
 554          KM        AT WEST SIDE OF WATERSHED NORTH OF BUCKEYE F.R.S. NO. 3
 555          HC       2  0.2377
              *  BASIN S27 - BEGINNING OF PROSPECT WASH
              * DDM   ***** Updated *****

 556          KK     S27
 557          KM   BASIN S27
 558          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 559          KM    L=       1.4  Lca=        .5   S=  345.2  Kn= .030  LAG=  12.6
 560          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 561          BA     .51
 562          LG     .15      .25     4.00      .52    16.00
 563          UI    146.     575.     989.    1411.     878.     682.     524.     370.     295.     201.
 564          UI    157.     111.      82.      67.      41.      26.      26.      26.      26.       0.
 565          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 566          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 567          KK  R27-28
 568          KM        ROUTE HYDROGRAPH S27 THROUGH S28
 569          RS       1    FLOW      -1
 570          RC     .07     .036      .07     2482     .022
 571          RX    1000     1060     1090     1100     1120     1130     1160     1230
 572          RY    1250     1248     1240     1238     1238     1240     1242     1250
              *  BASIN S28 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****

 573          KK     S28
 574          KM   BASIN S28
 575          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 576          KM    L=        .4  Lca=        .2   S=  120.0  Kn= .028  LAG=   6.2
 577          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
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          578           BA     .04
          579           LG     .17      .25    4.15     .48    2.00
          580           UI     55.    180.    114.     65.     36.     19.     11.      4.      4.      0.
          581           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          582           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                        * DDM   ***** Preserved *****

          583           KK    HC28
          584           KM         COMBINE ROUTED HYDROGRAPH R27-28 WITH HYDROGRAPH S28 - PROSPECT WASH
          585           KM         AT WATSON ROAD CROSSING
          586           HC        2  0.5526
                        * DDM   ***** Preserved *****

          587           KK  R28-29
          588           KM         ROUTE COMBINED HYDROGRAPHS HC28 THROUGH S29
          589           RS        2    FLOW      -1
          590           RC     .07    .036     .07    3804   .0184
          591           RX    1000    1000    1110    1125    1165    1170    1250    1251
          592           RY    1192    1192    1190    1188    1188    1190    1192    1192
                        *  BASIN S29 - SUBBASIN OF PROSPECT WASH
                        * DDM   ***** Updated *****
1                                             HEC-1 INPUT                                               PAGE 16

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


          593           KK      S29
          594           KM   BASIN S29
          595           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
          596           KM    L=        .7  Lca=        .3   S=  102.9  Kn= .030  LAG=   9.4
          597           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
          598           BA     .10
          599           LG     .15      .25    4.15     .49     .00
          600           UI     55.    207.    343.    215.    154.    101.     71.     44.     31.     20.
          601           UI     14.      7.      7.      7.      0.      0.      0.      0.      0.      0.
          602           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                        * DDM   ***** Preserved *****

          603           KK    HC29
          604           KM         COMBINE ROUTED HYDROGRAPH R28-29 WITH HYDROGRAPH S29 - PROSPECT WASH
          605           KM         AT BUCKEYE F.R.S. NO 3
          606           HC        2  0.6515
                        *
                        * DDM   ***** Preserved *****

          607           KK  HCBES3
          608           KM         COMBINE ALL HYDROGRAPHS AT BUCKEYE FRS-3
          609           HC        8  8.7485
          610           ZZ
1
                   SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   35          S1
                .
                .
   46           .           S2
                .            .
                .            .
   57         HC2............
                V
                V
   60        R2-3
                .
                .
   66           .           S3
                .            .
                .            .
   78         HC3............
                V
                V
   82        R3-4
                .
                .
   88           .           S4
                .            .
                .            .
   99         HC4............
                V
                V
  103        R4-7
                .
                .
  109           .           S7
                .            .
                .            .
  120        IHC7............
                .
                .
  124           .           S5
                .            V
                .            V
  136           .         R5-6
                .            .
                .            .
  142           .            .          S6
                .            .           .
                .            .           .
  152           .          HC6............
                .            .
                .            .
  156         HC7............
                V
                V
  160       R7-12E
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              .
166           .         S12E
              .            .
              .            .
176       HC12E............
              .
              .
180           .           S8
              .            V
              .            V
191           .         R8-9
              .            .
              .            .
197           .            .          S9
              .            .           .
              .            .           .
208           .          HC9............
              .            V
              .            V
212           .        R9-11
              .            .
              .            .
218           .            .         S11
              .            .           .
              .            .           .
228           .        IHC11............
              .            .
              .            .
232           .            .         S10
              .            .           .
              .            .           .
243           .         HC11............
              .            V
              .            V
247           .       R1112W
              .            .
              .            .
254           .            .        S12W
              .            .           .
              .            .           .
264           .        HC12W............
              .            .
              .            .
268        HC12............
              V
              V
272      R12-13
              .
              .
278           .          S13
              .            .
              .            .
288        HC13............
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              .
294           .------->    DI24
292        DI13
              V
              V
297       RDI13
              .
              .
303           .          S14
              .            .
              .            .
314        HC14............
              V
              V
318      R1416S
              .
              .
325           .          S15
              .            V
              .            V
335           .       R1516S
              .            .
              .            .
342           .            .        S16S
              .            .           .
              .            .           .
352      IHC16S.......................
              .
              .
356           .         S16N
              .            V
              .            V
367           .       R16N-S
              .            .
              .            .
373       HC16S............
              .
              .
379           .------->    DI22
377       DI16S
              V
              V
382      R16-17
              .
              .
388           .          S17
              .            .
              .            .
399        HC17............
              .
              .
403           .          S18
              .            V
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              .           V
414           .      R18-19
              .           .
              .           .
420           .           .         S19
              .           .           .
              .           .           .
430           .        HC19............
              .           V
              .           V
433           .      R19-20
              .           .
              .           .
439           .           .         S20
              .           .           .
              .           .           .
450           .        HC20............
              .           .
              .           .
454           .           .         S21
              .           .           .
              .           .           .
464           .           .           .         S22
              .           .           .           .
              .           .           .           .
477           .           .           .           .           .<-------    DI22
475           .           .           .           .        DI22
              .           .           .           .           V
              .           .           .           .           V
478           .           .           .           .       RDI22
              .           .           .           .           .
              .           .           .           .           .
484           .           .           .        HC22............
              .           .           .           .
              .           .           .           .
487           .           .           .           .         S23
              .           .           .           .           .
              .           .           .           .           .
498           .           .           .           .           .         S24
              .           .           .           .           .           .
              .           .           .           .           .           .
514           .           .           .           .           .           .           .<-------    DI24
512           .           .           .           .           .           .        DI24
              .           .           .           .           .           .           V
              .           .           .           .           .           .           V
515           .           .           .           .           .           .       RDI24
              .           .           .           .           .           .           .
              .           .           .           .           .           .           .
521           .           .           .           .           .        HC24............
              .           .           .           .           .           .
              .           .           .           .           .           .
524           .           .           .           .           .           .         S25
              .           .           .           .           .           .           V
              .           .           .           .           .           .           V
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534           .           .           .           .           .           .      R25-26
              .           .           .           .           .           .           .
              .           .           .           .           .           .           .
541           .           .           .           .           .           .           .         S26
              .           .           .           .           .           .           .           .
              .           .           .           .           .           .           .           .
552           .           .           .           .           .           .        HC26............
              .           .           .           .           .           .           .
              .           .           .           .           .           .           .
556           .           .           .           .           .           .           .         S27
              .           .           .           .           .           .           .           V
              .           .           .           .           .           .           .           V
567           .           .           .           .           .           .           .      R27-28
              .           .           .           .           .           .           .           .
              .           .           .           .           .           .           .           .
573           .           .           .           .           .           .           .           .         S28
              .           .           .           .           .           .           .           .           .
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583           .           .           .           .           .           .           .        HC28............
              .           .           .           .           .           .           .           V
              .           .           .           .           .           .           .           V
587           .           .           .           .           .           .           .      R28-29
              .           .           .           .           .           .           .           .
              .           .           .           .           .           .           .           .
593           .           .           .           .           .           .           .           .         S29
              .           .           .           .           .           .           .           .           .
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603           .           .           .           .           .           .           .        HC29............
              .           .           .           .           .           .           .           .
              .           .           .           .           .           .           .           .
607      HCBES3....................................................................................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
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```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *             JUN   1998                *
 *           VERSION 4.1                 *
 *                                       *
 * RUN DATE   16JUL12  TIME  12:17:46    *
 *                                       *
 *****************************************
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*****************************************
*                                       *
*   U.S. ARMY CORPS OF ENGINEERS        *
*   HYDROLOGIC ENGINEERING CENTER       *
*        609 SECOND STREET              *
*     DAVIS, CALIFORNIA 95616           *
*         (916) 756-1104                *
*                                       *
*****************************************
```

SKYLINE WASH AND TRIBUTARIES
FLOODPLAIN DELINEATION STUDY
FCD 96-08

HEC-1

DATE: 8-19-98

```
                         STORM:  100-YR 24-HOUR STORM
                         FILE NAME:  SKYLINE.DAT

                   DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA

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

  IT          HYDROGRAPH TIME DATA
                     NMIN          3  MINUTES IN COMPUTATION INTERVAL
                    IDATE      1   0  STARTING DATE
                    ITIME       0000  STARTING TIME
                       NQ        500  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      2   0  ENDING DATE
                   NDTIME       0057  ENDING TIME
                    ICENT         19  CENTURY MARK

                COMPUTATION INTERVAL     .05 HOURS
                     TOTAL TIME BASE   24.95 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

16 JD         INDEX STORM NO. 1
                     STRM       3.97  PRECIPITATION DEPTH
                     TRDA        .01  TRANSPOSITION DRAINAGE AREA

17 PI           PRECIPITATION PATTERN
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
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                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                    .00     .00     .00     .00     .00     .01     .01     .01     .01     .01
                    .02     .02     .02     .02     .02     .06     .06     .06     .06     .06
                    .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
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27 JD         INDEX STORM NO. 2
                     STRM       3.77  PRECIPITATION DEPTH
                     TRDA      10.00  TRANSPOSITION DRAINAGE AREA

 0 PI           PRECIPITATION PATTERN
                    .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
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28 JD        INDEX STORM NO. 3
                STRM         3.57  PRECIPITATION DEPTH
                TRDA        30.00  TRANSPOSITION DRAINAGE AREA

 0 PI           PRECIPITATION PATTERN
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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29 JD        INDEX STORM NO. 4
                STRM         3.45  PRECIPITATION DEPTH
                TRDA        60.00  TRANSPOSITION DRAINAGE AREA

 0 PI           PRECIPITATION PATTERN
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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30 JD          INDEX STORM NO. 5
                   STRM        3.38  PRECIPITATION DEPTH
                   TRDA       90.00  TRANSPOSITION DRAINAGE AREA

 0 PI            PRECIPITATION PATTERN
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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31 JD          INDEX STORM NO. 6
                   STRM        3.34  PRECIPITATION DEPTH
                   TRDA      120.00  TRANSPOSITION DRAINAGE AREA

 0 PI            PRECIPITATION PATTERN
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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32 JD INDEX STORM NO. 7
STRM 3.30 PRECIPITATION DEPTH
TRDA 150.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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33 JD INDEX STORM NO. 8
STRM 3.20 PRECIPITATION DEPTH
TRDA 300.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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34 JD INDEX STORM NO. 9
STRM 3.11 PRECIPITATION DEPTH
TRDA 500.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
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               *            *
288 KK         *    HC13    *
               *            *
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291 KO         OUTPUT CONTROL VARIABLES
                    IPRNT          3  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

290 HC         HYDROGRAPH COMBINATION
                    ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA .0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
+ 4271.	12.30	(CFS)	547.	156.	150.	150.
		(INCHES)	1.296	1.475	1.477	1.477
		(AC-FT)	271.	309.	309.	309.

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
+ 3926.	12.30	(CFS)	507.	145.	139.	139.
		(INCHES)	1.200	1.371	1.372	1.372
		(AC-FT)	251.	287.	287.	287.

CUMULATIVE AREA = 3.93 SQ MI

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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 30.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
+ 3577.	12.30	(CFS)	466.	134.	129.	129.
		(INCHES)	1.104	1.266	1.267	1.267
		(AC-FT)	231.	265.	265.	265.

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 60.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
+ 3360.	12.30	(CFS)	442.	127.	122.	122.
		(INCHES)	1.046	1.202	1.203	1.203
		(AC-FT)	219.	252.	252.	252.

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 90.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
+ 3229.	12.30	(CFS)	427.	123.	118.	118.
		(INCHES)	1.012	1.165	1.166	1.166
		(AC-FT)	212.	244.	244.	244.

CUMULATIVE AREA = 3.93 SQ MI

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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 120.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
+ 3154.	12.30	(CFS)	419.	121.	116.	116.
		(INCHES)	.992	1.144	1.145	1.145
		(AC-FT)	208.	240.	240.	240.

CUMULATIVE AREA = 3.93 SQ MI

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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 150.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
+ 3075.	12.30	(CFS)	411.	119.	114.	114.
		(INCHES)	.973	1.122	1.123	1.123
		(AC-FT)	204.	235.	235.	235.

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 300.0 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	24.95-HR
+	(CFS)	(HR)					
			(CFS)				
+	2866.	12.30		390.	113.	109.	109.
			(INCHES)	.924	1.069	1.070	1.070
			(AC-FT)	193.	224.	224.	224.

CUMULATIVE AREA = 3.93 SQ MI

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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 500.0 SQ MI

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	24.95-HR
+	(CFS)	(HR)					
			(CFS)				
+	2717.	12.35		372.	108.	104.	104.
			(INCHES)	.879	1.020	1.021	1.021
			(AC-FT)	184.	214.	214.	214.

CUMULATIVE AREA = 3.93 SQ MI

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INTERPOLATED HYDROGRAPH AT HC13

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	24.95-HR
+	(CFS)	(HR)					
			(CFS)				
+	3973.	12.30		512.	146.	141.	141.
			(INCHES)	1.213	1.385	1.386	1.386
			(AC-FT)	254.	290.	290.	290.

CUMULATIVE AREA = 3.93 SQ MI

1

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+					6-HOUR	24-HOUR	72-HOUR			
	HYDROGRAPH AT									
+		S1	728.	12.10	70.	20.	19.	.51		
	HYDROGRAPH AT									
+		S2	324.	12.10	30.	9.	8.	.22		
	2 COMBINED AT									
+		HC2	1045.	12.10	100.	29.	28.	.73		
	ROUTED TO									
+		R2-3	998.	12.15	100.	29.	28.	.73		
	HYDROGRAPH AT									
+		S3	792.	12.15	84.	23.	23.	.65		
	2 COMBINED AT									
+		HC3	1777.	12.15	182.	52.	50.	1.38		
	ROUTED TO									
+		R3-4	1692.	12.20	182.	52.	50.	1.38		
	HYDROGRAPH AT									
+		S4	584.	12.10	53.	15.	14.	.41		
	2 COMBINED AT									
+		HC4	2175.	12.20	233.	66.	64.	1.79		
	ROUTED TO									
+		R4-7	2132.	12.20	233.	66.	64.	1.79		
	HYDROGRAPH AT									
+		S7	220.	12.05	17.	5.	5.	.13		
	2 COMBINED AT									
+		IHC7	2261.	12.20	250.	71.	68.	1.92		
	HYDROGRAPH AT									
+		S5	680.	12.15	75.	22.	21.	.53		
	ROUTED TO									
+		R5-6	655.	12.20	75.	22.	21.	.53		
	HYDROGRAPH AT									
+		S6	412.	12.05	33.	9.	9.	.25		
	2 COMBINED AT									
+		HC6	965.	12.15	107.	31.	30.	.78		
	2 COMBINED AT									

+		HC7	3133.	12.20	355.	101.	98.	2.70
+	ROUTED TO	R7-12E	3028.	12.25	355.	101.	98.	2.70
+	HYDROGRAPH AT	S12E	110.	12.00	8.	2.	2.	.05
+	2 COMBINED AT	HC12E	3049.	12.25	362.	103.	100.	2.75
+	HYDROGRAPH AT	S8	552.	12.05	48.	14.	14.	.34
+	ROUTED TO	R8-9	542.	12.10	48.	14.	14.	.34
+	HYDROGRAPH AT	S9	309.	12.10	29.	8.	8.	.21
+	2 COMBINED AT	HC9	846.	12.10	76.	22.	21.	.55
+	ROUTED TO	R9-11	720.	12.25	76.	22.	21.	.55
+	HYDROGRAPH AT	S11	314.	12.05	21.	6.	6.	.17
+	2 COMBINED AT	IHC11	803.	12.20	97.	28.	27.	.72
+	HYDROGRAPH AT	S10	303.	12.10	27.	8.	7.	.19
+	2 COMBINED AT	HC11	1036.	12.15	123.	35.	34.	.91
+	ROUTED TO	R1112W	989.	12.25	123.	35.	34.	.91
+	HYDROGRAPH AT	S12W	176.	12.00	13.	4.	4.	.09
+	2 COMBINED AT	HC12W	1045.	12.20	135.	39.	38.	1.00
+	2 COMBINED AT	HC12	4045.	12.25	494.	142.	136.	3.75
+	ROUTED TO	R12-13	3913.	12.30	494.	142.	136.	3.75
	HYDROGRAPH AT							
+		S13	303.	12.05	19.	5.	5.	.17
+	2 COMBINED AT	HC13	3973.	12.30	512.	146.	141.	3.93
+	DIVERSION TO	DI24	2002.	12.30	324.	99.	96.	3.93
+	HYDROGRAPH AT	DI13	1971.	12.30	188.	47.	45.	3.93
+	ROUTED TO	RDI13	1766.	12.50	188.	47.	45.	3.93
+	HYDROGRAPH AT	S14	787.	12.05	61.	17.	16.	.49
+	2 COMBINED AT	HC14	1852.	12.50	247.	63.	61.	4.41
+	ROUTED TO	R1416S	1756.	12.60	247.	63.	61.	4.41
+	HYDROGRAPH AT	S15	175.	12.05	10.	2.	2.	.11
+	ROUTED TO	R1516S	137.	12.20	10.	2.	2.	.11
+	HYDROGRAPH AT	S16S	321.	12.05	21.	5.	5.	.17
+	3 COMBINED AT	IHC16S	1797.	12.55	276.	71.	68.	4.70
+	HYDROGRAPH AT	S16N	239.	12.10	23.	7.	6.	.17
+	ROUTED TO	R16N-S	204.	12.30	23.	7.	6.	.17
+	2 COMBINED AT	HC16S	1906.	12.55	298.	77.	74.	4.87
+	DIVERSION TO	DI22	563.	12.55	70.	17.	17.	4.87
+	HYDROGRAPH AT	DI16S	1343.	12.55	228.	60.	58.	4.87
+	ROUTED TO	R16-17	1241.	12.75	228.	60.	58.	4.87
	HYDROGRAPH AT							

+		S17	414.	12.05	27.	7.	7.	.29
+	2 COMBINED AT	HC17	1248.	12.75	254.	66.	64.	5.15
+	HYDROGRAPH AT	S18	585.	12.05	49.	14.	14.	.36
+	ROUTED TO	R18-19	530.	12.20	49.	14.	14.	.36
+	HYDROGRAPH AT	S19	499.	12.05	37.	10.	10.	.29
+	2 COMBINED AT	HC19	928.	12.10	86.	24.	23.	.65
+	ROUTED TO	R19-20	851.	12.25	86.	24.	23.	.65
+	HYDROGRAPH AT	S20	125.	12.05	9.	2.	2.	.09
+	2 COMBINED AT	HC20	923.	12.20	94.	27.	26.	.73
+	HYDROGRAPH AT	S21	1075.	12.05	77.	21.	20.	.62
+	HYDROGRAPH AT	S22	815.	12.10	59.	15.	14.	.55
+	HYDROGRAPH AT	DI22	563.	12.55	70.	17.	17.	4.87
+	ROUTED TO	RDI22	497.	12.80	70.	17.	17.	4.87
+	2 COMBINED AT	HC22	815.	12.10	131.	33.	32.	5.41
+	HYDROGRAPH AT	S23	629.	12.10	47.	12.	11.	.49
+	HYDROGRAPH AT	S24	274.	12.30	34.	9.	8.	.32
+	HYDROGRAPH AT	DI24	2002.	12.30	324.	99.	96.	3.93
+	ROUTED TO	RDI24	1839.	12.50	324.	99.	95.	3.93
+	2 COMBINED AT	HC24	2012.	12.50	357.	107.	103.	4.24
+	HYDROGRAPH AT	S25	49.	12.05	3.	1.	1.	.03
+	ROUTED TO	R25-26	29.	12.45	3.	1.	1.	.03
+	HYDROGRAPH AT	S26	325.	12.10	24.	6.	6.	.21
+	2 COMBINED AT	HC26	326.	12.10	27.	7.	6.	.24
+	HYDROGRAPH AT	S27	852.	12.05	70.	20.	19.	.51
+	ROUTED TO	R27-28	805.	12.10	70.	20.	19.	.51
+	HYDROGRAPH AT	S28	80.	12.00	4.	1.	1.	.04
+	2 COMBINED AT	HC28	847.	12.10	74.	21.	20.	.55
+	ROUTED TO	R28-29	779.	12.20	74.	21.	20.	.55
+	HYDROGRAPH AT	S29	181.	12.05	11.	3.	3.	.10
+	2 COMBINED AT	HC29	848.	12.15	84.	24.	23.	.65
+	8 COMBINED AT	HCBES3	5135.	12.10	1050.	291.	280.	8.75

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

APPENDIX D

Alternative 1 Preliminary Hydrology Calculations

```
1*****************************************
***************************************
 *                                         *                                                  *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)     *                                                  *    U.S.
ARMY CORPS OF ENGINEERS     *
 *              JUN   1998                 *                                                  *
HYDROLOGIC ENGINEERING CENTER    *
 *            VERSION 4.1                  *                                                  *
609 SECOND STREET         *
 *                                         *                                                  *
DAVIS, CALIFORNIA 95616       *
 *  RUN DATE   08SEP12  TIME  16:37:49     *                                                  *
(916) 756-1104           *
 *                                         *                                                  *
*
 *****************************************
***************************************
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X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X       XXXXX    X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.

THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION

NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,

DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION

KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


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

            1          ID         SKYLINE WASH AND TRIBUTARIES
            2          ID         FLOODPLAIN DELINEATION STUDY
            3          ID         FCD 96-08
            4          ID
            5          ID         HEC-1
            6          ID
            7          ID         DATE:   8-19-98
            8          ID         STORM:  100-YR 24-HOUR STORM
            9          ID         FILE NAME:  SKYLINE.DAT
           10          ID
           11          ID         FILE NAME CHANGED TO SL3-1.DAT (SKYLINE DCR PHASE 3 ALTERNATIVE 1)
           12          ID
           13          ID   DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA
                       *DIAGRAM
                       *
                       * REPERFORMED WITH FOLLOWING MODIFICATIONS - JULY 2012, SEI
                       * NOAA ATLAS 14 POINT RAINFALL DEPTH USED
                       * DEPTH-AREA REDUCTION FACTOR UPDATED
                       * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
                       * OTHER MINOR MODIFICATIONS MADE
                       *
                       * REPERFORMED WITH FOLLOWING MODIFICATIONS - SEPTEMBER 2012, SEI
                       * DETENTION BASIN DB13 ADDED TO SKYLINE WASH APEX (HC13)
                       * 48" DIAMETER RCP - LOW FLOW OUTLET OF DETENTION BASIN CALCULATED USING HY8
                       * HYDROGRAPH SPLITTED AT DB13 TO DI13 AND DI27
                       * 0 HYDROGRAPH DI13 ROUTED TO S14
                       * NO HYDROGRAPH ROUTED TO S24
                       * DI24, RDI24 AND HC24 DELETED
                       * HYDROGRAPH DI27 ROUTED TO S27
                       * DI27, RDI27 AND HC27 ADDED
                       * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
                       * OTHER MINOR MODIFICATIONS MADE
                       *
           14          IT       3                    500
           15          IN      15
           16          IO       5
           17          JD    3.97    0.01
           18          PC    .000    .002    .005    .008    .011    .014    .017    .020    .023
.026
           19          PC    .029    .032    .035    .038    .041    .044    .048    .052    .056
.060
           20          PC    .064    .068    .072    .076    .080    .085    .090    .095    .100
.105
           21          PC    .110    .115    .120    .126    .133    .140    .147    .155    .163
.172
           22          PC    .181    .191    .203    .218    .236    .257    .283    .387    .663
.707
           23          PC    .735    .758    .776    .791    .804    .815    .825    .834    .842
.849
           24          PC    .856    .863    .869    .875    .881    .887    .893    .898    .903
.908
           25          PC    .913    .918    .922    .926    .930    .934    .938    .942    .946
.950
           26          PC    .953    .956    .959    .962    .965    .968    .971    .974    .977
.980
           27          PC    .983    .986    .989    .992    .995    .998   1.000
           28          JD    3.77   10.00
           29          JD    3.57   30.00
           30          JD    3.45   60.00
           31          JD    3.38   90.00
           32          JD    3.34  120.00
           33          JD    3.30  150.00
           34          JD    3.20  300.00
           35          JD    3.11  500.00
                       *  BASIN S1 - BEGINNING OF SKYLINE WASH
                       * DDM   ***** Updated *****
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      LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

       36         KK      S1
       37         KM   BASIN S1
       38         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
       39         KM    L=       1.2  Lca=       .6   S= 1102.5  Kn= .050  LAG=  16.6
       40         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
       41         BA    .51
       42         LG    .25      .25    3.95     .53   18.00
       43         UI    103.    273.    577.    783.   1122.    746.    585.    489.    400.
306.
       44         UI    248.    206.    151.    123.    102.     79.     60.     51.     48.
20.
       45         UI     20.     20.     20.     20.     20.      0.      0.      0.      0.
0.
       46         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                  *  BASIN S2 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
                  * DDM   ***** Updated *****

       47         KK      S2
       48         KM   BASIN S2
       49         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
       50         KM    L=        .9  Lca=       .6   S=  916.1  Kn= .050  LAG=  16.0
       51         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
       52         BA    .22
       53         LG    .25      .25    3.95     .53   18.00
       54         UI     46.    130.    269.    364.    496.    310.    251.    207.    166.
124.
       55         UI    105.     82.     60.     51.     38.     32.     23.     23.     12.
9.
       56         UI      9.      9.      9.      9.      0.      0.      0.      0.      0.
0.
       57         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                  * DDM   ***** Preserved *****

       58         KK     HC2
       59         KM         COMBINE HYDROGRAPHS FROM S1 AND S2 - UPSTREAM PORTION OF SKYLINE
WASH
       60         HC       2  0.7296
                  * DDM   ***** Preserved *****

       61         KK    R2-3
       62         KM         ROUTE HYDROGRAPH HC2 THROUGH S3 - SKYLINE WASH
       63         RS       1     FLOW      -1
       64         RC     .07     .036     .07    2930    .029
       65         RX    1000     1030    1100    1120    1130    1190    1220    1250
       66         RY    1626     1624    1594    1594    1596    1624    1626    1625
                  *  BASIN S3 - MAIN SUBBASIN FOR GRANITE FALLS WASH
                  * DDM   ***** Updated *****

       67         KK      S3
       68         KM   BASIN S3
       69         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
       70         KM    L=       1.5  Lca=      1.0   S=  481.0  Kn= .040  LAG=  21.0
       71         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
       72         BA    .65
       73         LG    .20      .25    4.00     .52   13.00
       74         UI    104.    180.    422.    652.    797.   1088.    945.    652.    567.
492.
       75         UI    420.    348.    274.    245.    212.    164.    133.    115.     99.
80.
       76         UI     70.     51.     51.     49.     20.     20.     20.     20.     20.
20.
       77         UI     20.     20.      0.      0.      0.      0.      0.      0.      0.
0.
       78         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                  * DDM   ***** Preserved *****
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      LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

       79         KK     HC3
       80         KM         COMBINE HYDROGRAPH R2-3 WITH HYDROGRAPH FROM S3 - CONFLUENCE OF
SKYLINE
       81         KM         WASH AND GRANITE FALLS WASH
       82         HC       2  1.3787
                  * DDM   ***** Preserved *****

       83         KK    R3-4
       84         KM         ROUTE COMBINED HYDROGRAPHS HC3 THROUGH S4 - SKYLINE WASH
       85         RS       1     FLOW      -1
       86         RC     .07     .036     .07    2927    .032
       87         RX    1000     1030    1085    1160    1200    1240    1250    1275
       88         RY    1520     1518    1496    1496    1498    1516    1518    1520
                  *  BASIN S4 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
                  * DDM   ***** Updated *****

       89         KK      S4
       90         KM   BASIN S4
       91         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
       92         KM    L=       1.3  Lca=       .6   S=  503.9  Kn= .040  LAG=  16.2
       93         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
       94         BA    .41
       95         LG    .20      .25    4.00     .52   13.00
       96         UI     85.    231.    486.    656.    913.    579.    465.    386.    312.
234.
       97         UI    196.    156.    114.     95.     73.     63.     41.     41.     28.
16.
       98         UI     16.     16.     16.     16.      0.      0.      0.      0.      0.
0.
       99         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                  * DDM   ***** Preserved *****

      100         KK     HC4
      101         KM         COMBINE HYDROGRAPH R3-4 WITH HYDROGRAPH FROM S4 - CONCENTRATION
POINT
      102         KM         ON SKYLINE WASH.
      103         HC       2  1.7864
                  * DDM   ***** Preserved *****

      104         KK    R4-7
      105         KM         ROUTE COMBINED HYDROGRAPHS HC4 THROUGH S7 - SKYLINE WASH
      106         RS       1     FLOW      -1
      107         RC     .07     .036     .07    2211    .022
      108         RX    1000     1025    1055    1120    1145    1180    1240    1370
      109         RY    1462     1460    1462    1462    1432    1432    1456    1462
                  *  BASIN S7 - TRIBUTARY BASIN TO MOUNTAIN WASH NEAR AT CONFLUENCE WITH
SKYLINE
                  *   WASH
                  * DDM   ***** Updated *****

      110         KK      S7
      111         KM   BASIN S7
      112         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
      113         KM    L=        .9  Lca=       .6   S=  955.3  Kn= .040  LAG=  12.7
      114         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
      115         BA    .13
      116         LG    .20      .25    4.00     .52   12.00
      117         UI     37.    147.    254.    365.    229.    178.    137.     97.     78.
53.
      118         UI     41.     30.     22.     17.     12.      7.      7.      7.      7.
0.
      119         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
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1                                   HEC-1 INPUT
PAGE  4

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

           120         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                       * DDM   ***** Preserved *****

           121         KK    IHC7
           122         KM         COMBINE HYDROGRAPHS R4-7 AND S7 - UPSTREAM OF CONFLUENCE WITH
MOUNTAIN
           123         KM         WASH
           124         HC       2  1.9208
                       *  BASIN S5 - BEGINNING OF MOUNTAIN WASH
                       * DDM   ***** Updated *****

           125         KK      S5
           126         KM   BASIN S5
           127         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           128         KM    L=       1.4  Lca=       .7   S=  654.8  Kn= .050  LAG=  20.2
           129         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           130         BA     .53
           131         LG     .25     .25    3.95     .53   20.00
           132         UI     89.    164.    385.    573.    705.    988.    689.    532.    459.
396.
           133         UI    334.    265.    219.    195.    157.    120.    104.     93.     68.
65.
           134         UI     43.     43.     43.     18.     17.     17.     17.     17.     17.
17.
           135         UI     17.      0.      0.      0.      0.      0.      0.      0.      0.
0.
           136         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                       * DDM   ***** Preserved *****

           137         KK    R5-6
           138         KM         ROUTE HYDROGRAPH S5 THROUGH S6 - MOUNTAIN WASH
           139         RS       1    FLOW      -1
           140         RC      .07    .036     .07    2494    .030
           141         RX    1000    1025    1075    1105    1150    1170    1220    1240
           142         RY    1480    1476    1476    1460    1454    1454    1478    1480
                       *  BASIN S6 - SUBBASIN TRIBUTARY TO MOUNTAIN WASH
                       * DDM   ***** Updated *****

           143         KK      S6
           144         KM   BASIN S6
           145         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           146         KM    L=        .8  Lca=       .4   S=  491.4  Kn= .042  LAG=  12.3
           147         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           148         BA     .25
           149         LG     .21     .25    4.00     .52   15.00
           150         UI     75.    289.    495.    680.    415.    323.    244.    172.    135.
93.
           151         UI     71.     52.     35.     33.     13.     13.     13.     13.      0.
0.
           152         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                       * DDM   ***** Preserved *****

           153         KK     HC6
           154         KM         COMBINE HYDROGRAPHS R5-6 WITH SUBBASIN S6 - UPSTREAM OF CONFLUENCE
WITH
           155         KM         SKYLINE WASH
           156         HC       2  0.7787
                       * DDM   ***** Preserved *****
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1                                   HEC-1 INPUT
PAGE  5

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

           157         KK     HC7
           158         KM         COMBINE HYDROGRAPHS IHC7 WITH HC6 - CONFLUENCE OF MOUNTAIN WASH
WITH
           159         KM         SKYLINE WASH
           160         HC       2  2.6995
                       * DDM   ***** Preserved *****

           161         KK  R7-12E
           162         KM         ROUTE COMBINED HYDROGRAPHS AT HC7 THROUGH S12E - SKYLINE WASH
           163         RS       1    FLOW      -1
           164         RC      .07    .036     .07    1930   .0166
           165         RX    1000    1085    1170    1240    1255    1265    1310    1350
           166         RY    1430    1424    1422    1420    1422    1424    1428    1430
                       *
                       *   BASIN S12E - SUBBASIN TRIBUTARY TO PYRITE WASH AND SKYLINE WASH
CONFLUENCE
                       * DDM   ***** Updated *****

           167         KK    S12E
           168         KM   BASIN S12E
           169         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           170         KM    L=        .6  Lca=       .2   S=  142.9  Kn= .030  LAG=   7.8
           171         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           172         BA     .05
           173         LG     .15     .25    3.91     .55   18.00
           174         UI     47.    167.    200.    114.     70.     44.     27.     16.     11.
5.
           175         UI      5.      5.      0.      0.      0.      0.      0.      0.      0.
0.
           176         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                       * DDM   ***** Preserved *****

           177         KK   HC12E
           178         KM         COMBINE HYDROGRAPHS S12E WITH R7-12E - CONFLUENCE OF PYRITE WASH
WITH
           179         KM         SKYLINE WASH
           180         HC       2  2.7544
                       *  BASIN S8 - BEGINNING OF PYRITE WASH
                       * DDM   ***** Updated *****

           181         KK      S8
           182         KM   BASIN S8
           183         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           184         KM    L=        .8  Lca=       .4   S=  692.1  Kn= .050  LAG=  13.0
           185         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           186         BA     .34
           187         LG     .25     .25    3.95     .53   20.00
           188         UI     88.    352.    614.    906.    585.    452.    354.    254.    200.
145.
           189         UI    105.     81.     62.     43.     38.     17.     17.     17.     17.
17.
           190         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
           191         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                       * DDM   ***** Preserved *****

           192         KK    R8-9
           193         KM         ROUTE HYDROGRAPH S8 THROUGH S9 - PYRITE WASH
           194         RS       1    FLOW      -1
           195         RC      .07    .036     .07     911    .013
           196         RX    1000    1020    1050    1065    1080    1125    1185    1190
           197         RY    1518    1518    1494    1492    1494    1494    1520    1524
                       *  BASIN S9 - SUBBASIN TRIBUTARY TO PYRITE WASH
                       * DDM   ***** Updated *****
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          LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           198           KK      S9
           199           KM   BASIN S9
           200           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           201           KM    L=       1.0  Lca=        .7   S=  415.7  Kn= .040  LAG=  15.9
           202           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           203           BA     .21
           204           LG     .20      .25     3.95      .53    17.00
           205           UI     44.     126.     259.     351.     471.     293.     238.     196.     157.
117.
           206           UI     99.      77.      56.      48.      35.      29.      22.      22.      10.
8.
           207           UI      8.       8.       8.       8.       0.       0.       0.       0.       0.
0.
           208           UI      0.       0.       0.       0.       0.       0.       0.       0.       0.
0.
                         * DDM    ***** Preserved *****

           209           KK     HC9
           210           KM          COMBINE ROUTED HYDROGRAPH R8-9 WITH HYDROGRAPH S9 - CONCENTRATION
POINT
           211           KM          ON PYRITE WASH
           212           HC        2  0.5472
                         * DDM    ***** Preserved *****

           213           KK   R9-11
           214           KM          ROUTE COMBINED HYDROGRAPHS HC9 THROUGH S11 - PYRITE WASH
           215           RS        3     FLOW      -1
           216           RC     .07     .036      .07     3462    .023
           217           RX    1000     1080     1090     1120     1140     1290     1340     1375
           218           RY    1496     1494     1492     1472     1471     1472     1490     1494
                         *  BASIN S11 -PYRITE WASH UPSTREAM OF CONFLUENCE WITH WAGON WASH
                         * DDM    ***** Updated *****

           219           KK     S11
           220           KM   BASIN S11
           221           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           222           KM    L=        .7  Lca=        .3   S=  797.1  Kn= .040  LAG=   9.3
           223           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           224           BA     .17
           225           LG     .20      .25     4.00      .52    11.00
           226           UI     96.     360.     590.     366.     262.     169.     119.      73.      51.
32.
           227           UI     23.      12.      12.      12.       0.       0.       0.       0.       0.
0.
           228           UI      0.       0.       0.       0.       0.       0.       0.       0.       0.
0.
                         * DDM    ***** Preserved *****

           229           KK   IHC11
           230           KM          COMBINE ROUTED HYDROGRAPH R9-11 WITH HYDROGRAPHS S11 - UPSTREAM OF
           231           KM          CONFLUENCE WITH WAGON WASH
           232           HC        2  0.7154
                         *  BASIN S10 - BEGINNING OF WAGON WASH
                         * DDM    ***** Updated *****

           233           KK     S10
           234           KM   BASIN S10
           235           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           236           KM    L=       1.0  Lca=        .5   S=  896.9  Kn= .048  LAG=  14.2
           237           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           238           BA     .19
           239           LG     .24      .25     3.95      .53    18.00
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          LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           240           UI     46.     157.     302.     430.     397.     263.     213.     167.     122.
101.
           241           UI     71.      55.      43.      35.      23.      23.      11.       9.       9.
9.
           242           UI      9.       0.       0.       0.       0.       0.       0.       0.       0.
0.
           243           UI      0.       0.       0.       0.       0.       0.       0.       0.       0.
0.
                         * DDM    ***** Preserved *****

           244           KK    HC11
           245           KM          COMBINE HYDROGRAPH IHC11 WITH HYDROGRAPH S10 - CONFLUENCE OF WAGON
WASH
           246           KM          WITH PYRITE WASH
           247           HC        2  0.9089
                         * DDM    ***** Preserved *****

           248           KK  R1112W
           249           KM          ROUTE COMBINED HYDROGRAPHS HC11 THROUGH S12W - CONTINUATION OF
PYRITE
           250           KM          WASH DOWNSTREAM OF CONFLUENCE WITH WAGON WASH
           251           RS        1     FLOW      -1
           252           RC     .07     .036      .07     1501     .019
           253           RX    1000     1030     1065     1150     1240     1330     1375     1410
           254           RY    1422     1420     1410     1410     1410     1412     1414     1428
                         *  BASIN S12W - SUBBASIN TRIBUTARY FOR PYRITE WASH AND SKYLINE WASH
                         * DDM    ***** Updated *****

           255           KK    S12W
           256           KM   BASIN S12W
           257           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           258           KM    L=        .7  Lca=        .2   S=  153.6  Kn= .030  LAG=   8.2
           259           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           260           BA     .09
           261           LG     .15      .25     3.91      .55    18.00
           262           UI     68.     246.     330.     189.     123.      79.      47.      31.      19.
11.
           263           UI      7.       7.       0.       0.       0.       0.       0.       0.       0.
0.
           264           UI      0.       0.       0.       0.       0.       0.       0.       0.       0.
0.
                         * DDM    ***** Preserved *****

           265           KK   HC12W
           266           KM          COMBINE HYDROGRAPH R1112W WITH HYDROGRAPH S12W - CONFLUENCE OF
SKYLINE
           267           KM          WASH WITH PYRITE WASH
           268           HC        2  0.9994
                         * DDM    ***** Preserved *****

           269           KK    HC12
           270           KM          COMBINE ROUTED HYDROGRAPH HC12W AND HC12E
           271           KM          CONFLUENCE OF SKYLINE WASH AND PYRITE WASH
           272           HC        2  3.7538
                         * DDM    ***** Preserved *****

           273           KK  R12-13
           274           KM          ROUTE COMBINED HYDROGRAPHS HC12 THROUGH S13 - SKYLINE WASH
           275           RS        1     FLOW      -1
           276           RC     .07     .036      .07     1854     .017
           277           RX    1000     1080     1110     1320     1370     1420     1500     1550
           278           RY    1400     1392     1384     1382     1382     1380     1380     1400
                         *  BASIN S13 - SKYLINE WASH DOWNSTREAM OF CONFLUENCE OF PYRITE WASH
                         * DDM    ***** Updated *****
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1                                                              HEC-1 INPUT
PAGE  8

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


           279          KK     S13
           280          KM   BASIN S13
           281          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           282          KM    L=         .9  Lca=        .3   S=  174.2  Kn= .030  LAG=  10.1
           283          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           284          BA     .17
           285          LG     .15      .25     3.88      .56     4.00
           286          UI     82.     312.     550.     397.     278.     195.     135.      90.      64.
43.
           287          UI     28.      20.      11.      11.      11.       0.       0.       0.       0.
0.
           288          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.
0.
                        * DDM   ***** Preserved *****

           289          KK    HC13
           290          KM         COMBINE ROUTED HYDROGRAPH R12-13 WITH HYDROGRAPH S13 - SKYLINE WASH
           291          HC        2  3.9274
                        * KO      3
                        *

           292          KK    DB13
           293          KM    DETENTION BASIN AT SKYLINE WASH APEX
           294          RS       1     STOR       0
           295          SV     0.0     22.0     44.0     66.0     88.0    110.0    132.0    154.0    176.0
198.0
           296          SV   223.0    245.0    267.0
                        *
           297          SE  1345.0  1346.0  1347.0  1348.0  1349.0  1350.0  1351.0  1352.0  1353.0
1354.0
           298          SE  1355.0  1356.0  1357.0
                        *
           299          SQ     0.0     11.5     25.3     47.2     72.8     96.4    115.6    131.8    146.2
159.3
           300          SQ   171.0    182.3    192.6
           301          KO       3
                        * DDM   ***** Preserved *****

           302          KK    DI13
                        * KM       SPLIT FLOW AT HC13; MAIN FLOW TO S24 AND MINOR FLOW TO S14
                        * DT  DI24
                        * DI      0      201      556     1353     2595     4157
                        * DQ      0      201      461      879     1427   2078.5
           303          KM         SPLIT FLOW AT DB13; ALL FLOW TO S27 AND NONE TO S14
           304          DT    DI27
           305          DI       0      200      500     1000     2500     4000
           306          DQ       0      200      500     1000     2500     4000
                        * DDM   ***** Preserved *****

           307          KK    RDI13
           308          KM         ROUTE HYDROGRAPH DI13 THROUGH S14 -SKYLINE WASH DOWNSTREAM OF SPLIT
           309          RS       1    FLOW       -1
           310          RC     .07     .036      .07     4353     .021
           311          RX    1000     1025     1270     1280     1320     1330     1370     1385
           312          RY    1360     1354     1354     1356     1356     1358     1358     1360
                        *  BASIN S14 - BEGINNING OF COYOTE WASH
                        * DDM   ***** Updated *****

1                                                              HEC-1 INPUT
PAGE  9

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


           313          KK     S14
           314          KM   BASIN S14
           315          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           316          KM    L=        1.2  Lca=        .6   S=  340.7  Kn= .030  LAG=  12.4
           317          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           318          BA     .49
           319          LG     .15      .25     3.91      .55    11.00
           320          UI    144.     562.     962.    1341.     822.     640.     487.     343.     270.
185.
           321          UI    145.     101.      72.      65.      31.      25.      25.      25.      25.
0.
           322          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.
0.
           323          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.
0.
                        * DDM   ***** Preserved *****

           324          KK    HC14
           325          KM         COMBINE ROUTED HYDROGRAPH R13-14 WITH HYDROGRAPH S14 - SPLIT FLOW
FROM
           326          KM         SKYLINE WASH AND COYOTE WASH SUBBASIN
           327          HC        2  4.4139
                        * DDM   ***** Preserved *****

           328          KK  R1416S
                        * KM       ROUTE COMBINED HYDROGRAPHS HC14 THROUGH S16S - SKYLINE WASH
DOWNSTREAM
           329          KM         ROUTE HYDROGRAPH S14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
           330          KM         OF CONFLUENCE WITH COYOTE WASH
           331          RS       3     FLOW      -1
           332          RC     .07     .036      .07     3140     .017
           333          RX    1000     1035     1150     1180     1320     1360     1480     1481
           334          RY    1236     1234     1234     1232     1232     1234     1236     1236
                        *  BASIN S15 - SUBBASIN IN AREA OF EXISTING A.D.O.T. BORROW PITS
                        * DDM   ***** Updated *****

           335          KK     S15
           336          KM   BASIN S15
           337          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           338          KM    L=         .8  Lca=        .3   S=  105.0  Kn= .030  LAG=   9.8
           339          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           340          BA     .11
           341          LG     .15      .27     3.40      .77      .00
           342          UI     56.     213.     370.     246.     176.     120.      84.      54.      37.
25.
           343          UI     19.       9.       7.       7.       7.       0.       0.       0.       0.
0.
           344          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.
0.
                        * DDM   ***** Preserved *****

           345          KK  R1516S
           346          KM         ROUTE HYDROGRAPH S15 THROUGH S16S - SKYLINE WASH DOWNSTREAM OF
           347          KM         CONFLUENCE WITH COYOTE WASH
           348          RS       3     FLOW      -1
           349          RC     .07     .036      .07     2218     .018
           350          RX    1000     1035     1150     1180     1320     1360     1480     1481
           351          RY    1236     1234     1234     1232     1232     1234     1236     1236
                        *  BASIN S16S - SUBBASIN AT SKYLINE WASH DOWNSTREAM OF CONFLUENCE WITH COYOTE
W.
                        * DDM   ***** Updated *****
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     LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

     352          KK    S16S
     353          KM   BASIN S16S
     354          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
     355          KM    L=       .6  Lca=       .3   S=  116.4  Kn= .030  LAG=   9.3
     356          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
     357          BA     .17
     358          LG     .15     .25    3.95     .53    6.00
     359          UI    100.    373.    611.    379.    271.    175.    123.     76.     53.
34.
     360          UI     23.     12.     12.     12.      0.      0.      0.      0.      0.
0.
     361          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                  * DDM   ***** Preserved *****

     362          KK  IHC16S
     363          KM         COMBINE ROUTED HYDROGRAPH R14-16S AND R15-16S WITH HYDROGRAPH S16S
     364          KM         DOWNSTREAM OF CONFLUENCE OF SKYLINE WASH WITH COYOTE WASH
     365          HC       3  4.6952
                  *  BASIN S16N - SUBBASIN TRIBUTARY TO SKYLINE WASH
                  * DDM   ***** Updated *****

     366          KK    S16N
     367          KM   BASIN S16N
     368          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
     369          KM    L=       .9  Lca=       .6   S=  653.2  Kn= .050  LAG=  16.5
     370          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
     371          BA     .17
     372          LG     .25     .25    3.95     .53   18.00
     373          UI     34.     90.    189.    256.    366.    238.    189.    158.    129.
98.
     374          UI     80.     66.     48.     39.     32.     26.     19.     16.     15.
6.
     375          UI      6.      6.      6.      6.      6.      0.      0.      0.      0.
0.
     376          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                  * DDM   ***** Preserved *****

     377          KK  R16N-S
     378          KM         ROUTE HYDROGRAPH S16N THROUGH S16S
     379          RS       4    FLOW      -1
     380          RC     .07    .036     .07    3230    .022
     381          RX    1000    1035    1150    1180    1320    1360    1480    1481
     382          RY    1236    1234    1234    1232    1232    1234    1236    1236
                  * DDM   ***** Preserved *****

     383          KK   HC16S
     384          KM         COMBINE ROUTED HYDROGRAPH R16N-S AND IHC16S
     385          KM         SKYLINE WASH DOWNSTREAM OF COYOTE WASH
     386          HC       2  4.8652
                  * DDM   ***** Preserved *****

     387          KK   DI16S
     388          KM         SPLIT FLOW AT HC16S; MAIN FLOW TO S17 AND MINOR FLOW TO S22
     389          DT    DI22
     390          DI       0      46     144     344   708.5    1223
     391          DQ       0       0       8      52     153     329
                  * DDM   ***** Preserved *****
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     LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

     392          KK  R16-17
     393          KM         ROUTE HYDROGRAPH DI16S THROUGH S17
     394          RS       4    FLOW      -1
     395          RC     .07    .036     .07    4341    .015
     396          RX    1000    1060    1090    1120    1145    1180    1200    1320
     397          RY    1202    1200  1199.5    1200    1199    1199    1200    1202
                  *  BASIN S17 - SUBBASIN OF SKYLINE WASH SOUTH OF MCDOWELL ROAD ON EAST SIDE
                  *  OF WATERSHED
                  * DDM   ***** Updated *****

     398          KK     S17
     399          KM   BASIN S17
     400          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
     401          KM    L=       .9  Lca=       .5   S=  117.9  Kn= .030  LAG=  12.8
     402          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
     403          BA     .29
     404          LG     .15     .26    3.60     .67     .00
     405          UI     79.    311.    540.    784.    495.    385.    298.    212.    170.
117.
     406          UI     89.     66.     50.     37.     28.     15.     15.     15.     15.
0.
     407          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
     408          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                  * DDM   ***** Preserved *****

     409          KK    HC17
     410          KM         COMBINE ROUTED HYDROGRAPH R16-17 WITH HYDROGRAPH S17 AT EAST SIDE
OF
     411          KM         BUCKEYE F.R.S. NO. 3
     412          HC       2  5.1537
                  *  BASIN S18 - BEGINNING OF RATTLER WASH
                  * DDM   ***** Updated *****

     413          KK     S18
     414          KM   BASIN S18
     415          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
     416          KM    L=       .8  Lca=       .4   S=  292.7  Kn= .040  LAG=  12.9
     417          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
     418          BA     .36
     419          LG     .20     .25    3.95     .53   17.00
     420          UI     96.    380.    662.    968.    618.    479.    373.    267.    211.
149.
     421          UI    111.     84.     64.     46.     38.     18.     18.     18.     18.
0.
     422          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
     423          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                  * DDM   ***** Preserved *****

     424          KK  R18-19
     425          KM         ROUTE HYDROGRAPH HC18 THROUGH S19
     426          RS       3    FLOW      -1
     427          RC     .07    .036     .07    4253     .02
     428          RX    1000    1050    1100    1125    1140    1180    1240    1241
     429          RY    1266    1264    1242    1240    1242    1264    1266    1266
                  *  BASIN S19 - SUBBASIN OF RATTLER WASH
                  * DDM   ***** Updated *****
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      LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


         430         KK     S19
         431         KM   BASIN S19
         432         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
         433         KM    L=      1.2  Lca=       .8  S=  824.8  Kn= .030  LAG=  11.6
         434         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
         435         BA    .29
         436         LG    .15     .25    4.00     .52   12.00
         437         UI   102.    389.    662.    802.    483.    372.    266.    195.    138.
99.
         438         UI    72.     51.     41.     22.     16.     16.     16.      0.      0.
0.
         439         UI     0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                     * DDM   ***** Preserved *****

         440         KK    HC19
         441         KM         COMBINE ROUTED HYDROGRAPH R18-19 WITH HYDROGRAPH S19 - RATTLER WASH
         442         HC       2  0.6498
                     * DDM   ***** Preserved *****

         443         KK  R19-20
         444         KM         ROUTE COMBINED HYDROGRAPHS HC19 THROUGH S20 - RATTLER WASH
         445         RS       3    FLOW      -1
         446         RC     .07    .036     .07    3740    .022
         447         RX     999    1000    1030    1095    1130    1150    1220    1221
         448         RY    1208    1208    1206    1204    1204    1206    1208    1208
                     *  BASIN S20 - SUBBASIN OF RATTLER WASH
                     * DDM   ***** Updated *****

         449         KK     S20
         450         KM   BASIN S20
         451         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
         452         KM    L=       .9  Lca=       .4  S=   84.1  Kn= .030  LAG=  13.0
         453         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
         454         BA     .09
         455         LG     .15     .26    3.60     .67    4.00
         456         UI     22.     88.    155.    228.    147.    114.     89.     64.     50.
36.
         457         UI     26.     20.     16.     11.     10.      4.      4.      4.      4.
4.
         458         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
         459         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                     * DDM   ***** Preserved *****

         460         KK    HC20
         461         KM         COMBINE ROUTED HYDROGRAPH R19-20 WITH HYDROGRAPH S20 AT FAR EAST
SIDE
         462         KM         OF STUDY AREA NORTH OF BUCKEYE F.R.S. NO. 3
         463         HC       2  0.7344
                     *  BASIN S21 - SUBBASIN NORTH OF BUCKEYE F.R.S. NO 3 SPILLWAY
                     * DDM   ***** Updated *****

         464         KK     S21
         465         KM   BASIN S21
         466         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
         467         KM    L=      1.2  Lca=       .6  S=  780.6  Kn= .030  LAG=  11.0
         468         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
         469         BA     .62
         470         LG     .15     .25    4.10     .51   10.00
         471         UI    245.    927.   1593.   1636.   1019.    766.    522.    392.    260.
190.
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      LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

         472         UI    136.     93.     67.     36.     36.     36.      0.      0.      0.
0.
         473         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                     *  BASIN S22 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
                     * DDM   ***** Updated *****

         474         KK     S22
         475         KM   BASIN S22
         476         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
         477         KM    L=      1.3  Lca=       .4  S=  110.1  Kn= .029  LAG=  13.7
         478         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
         479         BA     .55
         480         LG     .16     .25    3.91     .53    1.00
         481         UI    135.    496.    909.   1351.   1029.    742.    594.    451.    332.
268.
         482         UI    188.    151.    108.     84.     66.     51.     26.     26.     26.
26.
         483         UI     26.      0.      0.      0.      0.      0.      0.      0.      0.
0.
         484         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                     * DDM   ***** Preserved *****

         485         KK    DI22
         486         KM         RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S22
         487         DR    DI22
                     * DDM   ***** Preserved *****

         488         KK   RDI22
         489         KM         ROUTE HYDROGRAPH DI22 THROUGH S22 - PORTION OF DIVERT OF SKYLINE
WASH
         490         RS       6    FLOW      -1
         491         RC     .07    .036     .07    4253    .015
         492         RX     997     998     999    1000    1060    1210    1300    1300
         493         RY    1217    1216    1216    1215    1215    1216    1216    1217
                     * DDM   ***** Preserved *****

         494         KK    HC22
         495         KM         COMBINE HYDROGRAPHS AT HC22
         496         HC       2  5.4141
                     *  BASIN S23 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
                     * DDM   ***** Updated *****

         497         KK     S23
         498         KM   BASIN S23
         499         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
         500         KM    L=      1.6  Lca=       .5  S=  112.1  Kn= .028  LAG=  15.2
         501         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
         502         BA     .49
         503         LG     .17     .26    3.50     .70    2.00
         504         UI    108.    331.    660.    901.   1086.    670.    547.    446.    338.
263.
         505         UI    217.    155.    125.     98.     81.     53.     53.     31.     21.
21.
         506         UI     21.     21.     21.      0.      0.      0.      0.      0.      0.
0.
         507         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.

                     *  BASIN S24 - SUBBASIN DOWNSTREAM OF SKYLINE WASH SPLIT FLOW
                     * DDM   ***** Updated *****
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          LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           508          KK     S24
           509          KM   BASIN S24
           510          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           511          KM    L=       2.4  Lca=       1.2   S=  113.8  Kn= .037  LAG=  32.2
           512          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           513          BA     .32
           514          LG     .20     .25    4.00     .51    1.00
           515          UI     33.     33.     66.    117.    171.    211.    242.    273.    350.
361.
           516          UI    241.    206.    189.    172.    157.    142.    129.    111.     96.
84.
           517          UI     78.     73.     65.     54.     45.     42.     37.     36.     30.
25.
           518          UI     25.     22.     16.     16.     16.     16.     13.      6.      6.
6.
           519          UI      6.      6.      6.      6.      6.      6.      6.      6.      6.
0.
           520          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
           521          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                        * DDM   ***** Preserved *****
                        * KK  DI24
                        * KM       RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S24
                        * DR  DI24
                        * DDM   ***** Preserved *****
                        * KK RDI24
                        * KM       ROUTE HYDROGRAPH DI24 THROUGH S24
                        * RS      5    FLOW      -1
                        * RC   .07     .036     .07     9929     .02
                        * RX  1000     1045    1060     1080    1100    1120    1155    1220
                        * RY  1222     1220    1218     1218    1216    1216    1220    1220
                        * DDM   ***** Preserved *****
                        * KK  HC24
                        * KM       COMBINE HYDROGRAPHS AT HC24
                        * HC      2  4.2443
                        *  BASIN S25 - UPSTREAM END OF SMALL WATERSHED EAST OF PROSPECT WASH
                        * DDM   ***** Updated *****

           522          KK     S25
           523          KM   BASIN S25
           524          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           525          KM    L=        .7  Lca=        .3   S=  103.0  Kn= .030  LAG=  10.0
           526          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           527          BA     .03
           528          LG     .15     .25    4.15     .49     .00
           529          UI     13.     50.     87.     61.     43.     30.     21.     14.     10.
7.
           530          UI      4.      3.      2.      2.      2.      0.      0.      0.      0.
0.
           531          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                        * DDM   ***** Preserved *****

           532          KK  R25-26
           533          KM       ROUTE HYDROGRAPH S25 THROUGH S26 CROSSING NEAR THE INTERSECTION OF
           534          KM       WATSON ROAD AND MCDOWELL ROAD
           535          RS       8    FLOW      -1
           536          RC     .07     .036     .07     6571     .02
           537          RX    1000     1045    1060     1080    1100    1120    1155    1220
           538          RY    1222     1220    1218     1218    1216    1216    1220    1220
                        *  BASIN S26 - SUBBASIN ON THE LOWER WEST SIDE OF STUDY AREA
                        * DDM   ***** Updated *****
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          LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           539          KK     S26
           540          KM   BASIN S26
           541          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           542          KM    L=       1.2  Lca=        .5   S=  119.7  Kn= .029  LAG=  13.8
           543          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           544          BA     .21
           545          LG     .16     .25    4.20     .47    1.00
           546          UI     52.    187.    347.    513.    403.    286.    230.    177.    129.
105.
           547          UI     74.     59.     43.     33.     25.     21.     10.     10.     10.
10.
           548          UI     10.      0.      0.      0.      0.      0.      0.      0.      0.
0.
           549          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                        * DDM   ***** Preserved *****

           550          KK    HC26
           551          KM         COMBINE ROUTED HYDROGRAPH R25-26 WITH HYDROGRAPH S26
           552          KM         AT WEST SIDE OF WATERSHED NORTH OF BUCKEYE F.R.S. NO. 3
           553          HC       2  0.2377
                        *  BASIN S27 - BEGINNING OF PROSPECT WASH
                        * DDM   ***** Updated *****

           554          KK     S27
           555          KM   BASIN S27
           556          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           557          KM    L=       1.4  Lca=        .5   S=  345.2  Kn= .030  LAG=  12.6
           558          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           559          BA     .51
           560          LG     .15     .25    4.00     .52   16.00
           561          UI    146.    575.    989.   1411.    878.    682.    524.    370.    295.
201.
           562          UI    157.    111.     82.     67.     41.     26.     26.     26.     26.
0.
           563          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
           564          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                        * DDM   ***** Preserved *****

           565          KK    DI27
           566          KM         RETURN DIVERTED HYDROGRAPH FROM DI27 DOWNSTREAM OF DB13 TO ROUTE
           567          KM         AND COMBINE WITH S27
           568          DR    DI27
                        * DDM   ***** Preserved *****

           569          KK   RDI27
           570          KM         ROUTE HYDROGRAPH DI27 THROUGH S27
           571          RS       1    FLOW      -1
           572          RC     .07     .040     .07     1200     .02
           573          RX    1000     1050    1100     1120    1240    1260    1310    1360
           574          RY    1222     1221    1221     1216    1216    1221    1221    1222
                        * DDM   ***** Preserved *****

           575          KK    HC27
           576          KM         COMBINE HYDROGRAPHS AT HC27
           577          HC       2  4.4343
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         LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           578          KK  R27-28
           579          KM        ROUTE HYDROGRAPH S27 THROUGH S28
           580          RS      1    FLOW      -1
           581          RC     .07    .036     .07    2482    .022
           582          RX    1000    1060    1090    1100    1120    1130    1160    1230
           583          RY    1250    1248    1240    1238    1238    1240    1242    1250
                        *  BASIN S28 - SUBBASIN OF PROSPECT WASH
                        * DDM   ***** Updated *****

           584          KK     S28
           585          KM   BASIN S28
           586          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           587          KM    L=        .4  Lca=        .2   S=  120.0  Kn= .028  LAG=    6.2
           588          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           589          BA     .04
           590          LG     .17     .25    4.15     .48    2.00
           591          UI     55.    180.    114.     65.     36.     19.     11.      4.      4.
0.
           592          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
           593          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                        * DDM   ***** Preserved *****

           594          KK    HC28
           595          KM        COMBINE ROUTED HYDROGRAPH R27-28 WITH HYDROGRAPH S28 - PROSPECT
WASH
           596          KM        AT WATSON ROAD CROSSING
           597          HC      2  0.5526
                        * DDM   ***** Preserved *****

           598          KK  R28-29
           599          KM        ROUTE COMBINED HYDROGRAPHS HC28 THROUGH S29
           600          RS      2    FLOW      -1
           601          RC     .07    .036     .07    3804   .0184
           602          RX    1000    1000    1110    1125    1165    1170    1250    1251
           603          RY    1192    1192    1190    1188    1188    1190    1192    1192
                        *  BASIN S29 - SUBBASIN OF PROSPECT WASH
                        * DDM   ***** Updated *****

           604          KK     S29
           605          KM   BASIN S29
           606          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
           607          KM    L=        .7  Lca=        .3   S=  102.9  Kn= .030  LAG=    9.4
           608          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
           609          BA     .10
           610          LG     .15     .25    4.15     .49     .00
           611          UI     55.    207.    343.    215.    154.    101.     71.     44.     31.
20.
           612          UI     14.      7.      7.      7.      0.      0.      0.      0.      0.
0.
           613          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
0.
                        * DDM   ***** Preserved *****

           614          KK    HC29
           615          KM        COMBINE ROUTED HYDROGRAPH R28-29 WITH HYDROGRAPH S29 - PROSPECT
WASH
           616          KM        AT BUCKEYE F.R.S. NO 3
           617          HC      2  0.6515
                        *
                        * DDM   ***** Preserved *****
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         LINE
ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

           618          KK  HCBES3
           619          KM        COMBINE ALL HYDROGRAPHS AT BUCKEYE FRS-3
           620          HC      8  8.7485
           621          ZZ
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               SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    36          S1
                .
                .
    47          .           S2
                .           .
                .           .
    58         HC2............
                V
                V
    61       R2-3
                .
                .
    67          .           S3
                .           .
                .           .
    79         HC3............
                V
                V
    83       R3-4
                .
                .
    89          .           S4
                .           .
                .           .
   100         HC4............
                V
                V
   104       R4-7
                .
                .
   110          .           S7
                .           .
                .           .
   121        IHC7............
                .
                .
   125          .           S5
                .           V
                .           V
   137          .         R5-6
                .           .
                .           .
   143          .           .           S6
                .           .           .
                .           .           .
   153          .          HC6............
                .           .
                .           .
   157         HC7............
                V
                V
   161     R7-12E
                .
                .
   167          .         S12E
                .           .
                .           .
   177       HC12E............
                .
                .
   181          .           S8
                .           V
                .           V
   192          .         R8-9
                .           .
                .           .
   198          .           .           S9
                .           .           .
                .           .           .
   209          .          HC9............
                .           V
                .           V
   213          .       R9-11
                .           .
                .           .
   219          .           .           S11
                .           .           .
                .           .           .
   229          .        IHC11............
                .           .
                .           .
   233          .           .           S10
                .           .           .
                .           .           .
   244          .         HC11............
                .           V
                .           V
   248          .       R1112W
                .           .
                .           .
   255          .           .           S12W
                .           .           .
                .           .           .
   265          .        HC12W............
                .           .
                .           .
   269        HC12............
                V
                V
   273     R12-13
                .
                .
   279          .           S13
                .           .
                .           .
   289        HC13............
                V
                V
   292        DB13
                .
                .
   304          .------->    DI27
   302        DI13
                V
                V
   307       RDI13
                .
                .
   313          .           S14
                .           .
                .           .
   324        HC14............
                V
                V
   328     R1416S
                .
                .
   335          .           S15
                .           V
                .           V
   345          .       R1516S
                .           .
                .           .
   352          .           .           S16S
                .           .           .
                .           .           .
   362     IHC16S........................
                .
                .
   366          .          S16N
                .           V
                .           V
   377          .       R16N-S
                .           .
                .           .
   383       HC16S............
                .
                .
   389          .------->    DI22
   387       DI16S
                V
                V
   392     R16-17
                .
                .
   398          .           S17
                .           .
                .           .
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   409       HC17............
                .
                .
   413          .         S18
                .           V
                .           V
   424          .      R18-19
                .           .
                .           .
   430          .           .         S19
                .           .           .
                .           .           .
   440          .        HC19............
                .           V
                .           V
   443          .      R19-20
                .           .
                .           .
   449          .           .         S20
                .           .           .
                .           .           .
   460          .        HC20............
                .           .
                .           .
   464          .           .         S21
                .           .           .
                .           .           .
   474          .           .           .        S22
                .           .           .          .
                .           .           .          .
   487          .           .           .          .           .<-------   DI22
   485          .           .           .          .        DI22
                .           .           .          .           V
                .           .           .          .           V
   488          .           .           .          .       RDI22
                .           .           .          .           .
                .           .           .          .           .
   494          .           .           .       HC22............
                .           .           .          .
                .           .           .          .
   497          .           .           .          .         S23
                .           .           .          .           .
                .           .           .          .           .
   508          .           .           .          .           .        S24
                .           .           .          .           .          .
                .           .           .          .           .          .
   522          .           .           .          .           .          .         S25
                .           .           .          .           .          .           V
                .           .           .          .           .          .           V
   532          .           .           .          .           .          .      R25-26
                .           .           .          .           .          .           .
                .           .           .          .           .          .           .
   539          .           .           .          .           .          .           .         S26
                .           .           .          .           .          .           .           .
                .           .           .          .           .          .           .           .
   550          .           .           .          .           .          .        HC26............
                .           .           .          .           .          .           .
                .           .           .          .           .          .           .
   554          .           .           .          .           .          .           .         S27
                .           .           .          .           .          .           .           .
                .           .           .          .           .          .           .           .
   568          .           .           .          .           .          .           .           .
.<-------   DI27
   565                      .           .          .           .          .           .           .
DI27
                .           .           .          .           .          .           .           .
V
                .           .           .          .           .          .           .           .
V
   569          .           .           .          .           .          .           .           .
RDI27
                .           .           .          .           .          .           .           .
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                .           .           .          .           .          .           .           .
.
   575          .           .           .          .           .          .           .           .
HC27............
                .           .           .          .           .          .           .           V
                .           .           .          .           .          .           .           V
   578          .           .           .          .           .          .           .      R27-28
                .           .           .          .           .          .           .           .
                .           .           .          .           .          .           .           .
   584          .           .           .          .           .          .           .           .
S28

                .           .           .          .           .          .           .           .
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   594          .           .           .          .           .          .           .
HC28............
                .           .           .          .           .          .           .           V
                .           .           .          .           .          .           .           V
   598          .           .           .          .           .          .           .      R28-29
                .           .           .          .           .          .           .           .
                .           .           .          .           .          .           .           .
   604          .           .           .          .           .          .           .           .
S29
                .           .           .          .           .          .           .           .
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                .           .           .          .           .          .           .           .
.
   614          .           .           .          .           .          .           .
HC29............
                .           .           .          .           .          .           .           .
                .           .           .          .           .          .           .           .
   618      HCBES3...................................................................................

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
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1*****************************************
****************************************
 *                                       *                                                 *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                 *    U.S.
ARMY CORPS OF ENGINEERS      *
 *               JUN   1998              *                                                 *
HYDROLOGIC ENGINEERING CENTER    *
 *            VERSION 4.1                *                                                 *
609 SECOND STREET          *
 *                                       *                                                 *
DAVIS, CALIFORNIA 95616       *
 *  RUN DATE   08SEP12  TIME  16:37:49   *                                                 *
(916) 756-1104             *
 *                                       *                                                 *
*
 *****************************************
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                                  SKYLINE WASH AND TRIBUTARIES
                                  FLOODPLAIN DELINEATION STUDY
                                  FCD 96-08

                                  HEC-1

                                  DATE:   8-19-98
                                  STORM:  100-YR 24-HOUR STORM
                                  FILE NAME:  SKYLINE.DAT

                                  FILE NAME CHANGED TO SL3-1.DAT (SKYLINE DCR PHASE 3 ALTERNATIVE 1)

                            DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA

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

      IT          HYDROGRAPH TIME DATA
                         NMIN           3  MINUTES IN COMPUTATION INTERVAL
                        IDATE      1    0  STARTING DATE
                        ITIME        0000  STARTING TIME
                           NQ         500  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE      2    0  ENDING DATE
                       NDTIME        0057  ENDING TIME
                        ICENT          19  CENTURY MARK

                    COMPUTATION INTERVAL     .05 HOURS
                         TOTAL TIME BASE   24.95 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

   17 JD          INDEX STORM NO. 1
                         STRM        3.97  PRECIPITATION DEPTH
                         TRDA         .01  TRANSPOSITION DRAINAGE AREA

   18 PI            PRECIPITATION PATTERN
                         .00       .00       .00       .00       .00       .00       .00       .00
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                         .02       .02       .02       .02       .02       .06       .06       .06
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                         .01       .01       .01       .01       .01       .01       .01       .01
 .01       .01
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28 JD          INDEX STORM NO. 2
                      STRM       3.77  PRECIPITATION DEPTH
                      TRDA      10.00  TRANSPOSITION DRAINAGE AREA

  0 PI             PRECIPITATION PATTERN
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29 JD          INDEX STORM NO. 3
                      STRM       3.57  PRECIPITATION DEPTH
                      TRDA      30.00  TRANSPOSITION DRAINAGE AREA

  0 PI             PRECIPITATION PATTERN
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    30 JD         INDEX STORM NO. 4
                        STRM        3.45  PRECIPITATION DEPTH
                        TRDA       60.00  TRANSPOSITION DRAINAGE AREA

     0 PI           PRECIPITATION PATTERN
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    31 JD         INDEX STORM NO. 5
                        STRM        3.38  PRECIPITATION DEPTH
                        TRDA       90.00  TRANSPOSITION DRAINAGE AREA

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  32 JD         INDEX STORM NO. 6
                    STRM        3.34  PRECIPITATION DEPTH
                    TRDA      120.00  TRANSPOSITION DRAINAGE AREA

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  33 JD          INDEX STORM NO. 7
                     STRM        3.30  PRECIPITATION DEPTH
                     TRDA      150.00  TRANSPOSITION DRAINAGE AREA

   0 PI             PRECIPITATION PATTERN
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  34 JD          INDEX STORM NO. 8
                     STRM        3.20  PRECIPITATION DEPTH
                     TRDA      300.00  TRANSPOSITION DRAINAGE AREA

   0 PI             PRECIPITATION PATTERN
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      35 JD          INDEX STORM NO. 9
                         STRM        3.11  PRECIPITATION DEPTH
                         TRDA      500.00  TRANSPOSITION DRAINAGE AREA

       0 PI            PRECIPITATION PATTERN
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  292 KK       *     DB13   *
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  301 KO         OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

  294 RS         STORAGE ROUTING
                       NSTPS           1  NUMBER OF SUBREACHES
                        ITYP        STOR  TYPE OF INITIAL CONDITION
                      RSVRIC         .00  INITIAL CONDITION
                           X         .00 WORKING R AND D COEFFICIENT

  295 SV           STORAGE          .0       22.0      44.0      66.0      88.0     110.0     132.0
154.0      176.0   198.0
                                 223.0      245.0     267.0

  297 SE         ELEVATION     1345.00   1346.00   1347.00   1348.00   1349.00   1350.00   1351.00
1352.00   1353.00   1354.00
                               1355.00   1356.00   1357.00

  299 SQ         DISCHARGE          0.        12.       25.       47.       73.       96.      116.
132.      146.     159.
                                  171.       182.      193.
                                                                        ***

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                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA      .0 SQ MI

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      24.95-HR
+    (CFS)        (HR)
                          (CFS)
+     185.      13.65                   175.          86.          83.          83.
                        (INCHES)       .415         .815         .815         .815
                         (AC-FT)        87.         171.         171.         171.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                        6-HR        24-HR        72-HR      24.95-HR
+  (AC-FT)        (HR)
     252.       13.65                   231.         110.         106.         106.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR        24-HR        72-HR      24.95-HR
+    (FEET)       (HR)
   1356.30      13.65                1355.38      1349.98      1349.79      1349.79

                    CUMULATIVE AREA =     3.93 SQ MI

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                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA      10.0 SQ MI

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      24.95-HR
+    (CFS)        (HR)
                          (CFS)
+     176.      13.65                   166.          81.          78.          78.
                        (INCHES)       .394         .768         .768         .768
                         (AC-FT)        82.         161.         161.         161.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                        6-HR        24-HR        72-HR      24.95-HR
+  (AC-FT)        (HR)
     233.       13.65                   213.         102.          98.          98.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR        24-HR        72-HR      24.95-HR
+    (FEET)       (HR)
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   1355.45      13.65                1354.61      1349.60      1349.42      1349.42

                    CUMULATIVE AREA =     3.93 SQ MI

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                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA      30.0 SQ MI

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      24.95-HR
+    (CFS)        (HR)
                          (CFS)
+     167.      13.65                   157.          76.          73.          73.
                        (INCHES)       .372         .717         .717         .717
                         (AC-FT)        78.         150.         150.         150.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                        6-HR        24-HR        72-HR      24.95-HR
+  (AC-FT)        (HR)
     214.       13.65                   195.          93.          89.          89.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR        24-HR        72-HR      24.95-HR
+    (FEET)       (HR)
   1354.64      13.65                1353.85      1349.22      1349.05      1349.05

                    CUMULATIVE AREA =     3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA      60.0 SQ MI

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      24.95-HR
+    (CFS)        (HR)
                          (CFS)
+     161.      13.65                   151.          72.          70.          70.
                        (INCHES)       .357         .685         .685         .685
                         (AC-FT)        75.         144.         144.         144.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                        6-HR        24-HR        72-HR      24.95-HR
+  (AC-FT)        (HR)
     202.       13.65                   184.          88.          84.          84.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR        24-HR        72-HR      24.95-HR
+    (FEET)       (HR)
   1354.18      13.65                1353.38      1348.99      1348.84      1348.84

                    CUMULATIVE AREA =     3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA      90.0 SQ MI

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR      24.95-HR
+    (CFS)        (HR)
                          (CFS)
+     158.      13.65                   147.          70.          68.          68.
                        (INCHES)       .349         .666         .666         .666
                         (AC-FT)        73.         139.         139.         139.

 PEAK STORAGE   TIME                         MAXIMUM AVERAGE STORAGE
                                        6-HR        24-HR        72-HR      24.95-HR
+  (AC-FT)        (HR)
     196.       13.65                   178.          85.          82.          82.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR        24-HR        72-HR      24.95-HR
+    (FEET)       (HR)
   1353.90      13.65                1353.10      1348.85      1348.71      1348.71

                    CUMULATIVE AREA =     3.93 SQ MI

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HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 120.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 156.	13.65		145.	69.	66.	66.
		(INCHES)	.343	.654	.654	.654
		(AC-FT)	72.	137.	137.	137.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (AC-FT)	(HR)				
192.	13.65	175.	83.	80.	80.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)				
1353.73	13.65	1352.94	1348.78	1348.63	1348.63

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 150.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 153.	13.65		143.	68.	65.	65.
		(INCHES)	.338	.643	.643	.643
		(AC-FT)	71.	135.	135.	135.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (AC-FT)	(HR)				
188.	13.65	171.	81.	78.	78.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)				
1353.55	13.65	1352.78	1348.70	1348.56	1348.56

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 300.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 148.	13.65		137.	65.	62.	62.
		(INCHES)	.325	.613	.613	.613
		(AC-FT)	68.	128.	128.	128.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (AC-FT)	(HR)				
179.	13.65	162.	77.	74.	74.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)				
1353.12	13.65	1352.38	1348.51	1348.38	1348.38

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 500.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 142.	13.65		132.	62.	60.	60.
		(INCHES)	.312	.586	.586	.586
		(AC-FT)	65.	123.	123.	123.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (AC-FT)	(HR)				
170.	13.65	154.	74.	71.	71.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)				
1352.73	13.65	1352.02	1348.34	1348.22	1348.22

CUMULATIVE AREA = 3.93 SQ MI

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

INTERPOLATED HYDROGRAPH AT DB13

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 177.	13.65		167.	82.	79.	79.
		(INCHES)	.397	.774	.774	.774
		(AC-FT)	83.	162.	162.	162.

CUMULATIVE AREA = 3.93 SQ MI

1

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S1	728.	12.10	70.	20.	19.	.51		
+	HYDROGRAPH AT	S2	324.	12.10	30.	9.	8.	.22		
+	2 COMBINED AT	HC2	1045.	12.10	100.	29.	28.	.73		
+	ROUTED TO	R2-3	998.	12.15	100.	29.	28.	.73		
+	HYDROGRAPH AT	S3	792.	12.15	84.	23.	23.	.65		
+	2 COMBINED AT	HC3	1777.	12.15	182.	52.	50.	1.38		
+	ROUTED TO	R3-4	1692.	12.20	182.	52.	50.	1.38		
+	HYDROGRAPH AT	S4	584.	12.10	53.	15.	14.	.41		
+	2 COMBINED AT	HC4	2175.	12.20	233.	66.	64.	1.79		
+	ROUTED TO	R4-7	2132.	12.20	233.	66.	64.	1.79		
+	HYDROGRAPH AT	S7	220.	12.05	17.	5.	5.	.13		
+	2 COMBINED AT	IHC7	2261.	12.20	250.	71.	68.	1.92		
+	HYDROGRAPH AT	S5	680.	12.15	75.	22.	21.	.53		
+	ROUTED TO	R5-6	655.	12.20	75.	22.	21.	.53		
+	HYDROGRAPH AT	S6	412.	12.05	33.	9.	9.	.25		
+	2 COMBINED AT	HC6	965.	12.15	107.	31.	30.	.78		
+	2 COMBINED AT	HC7	3133.	12.20	355.	101.	98.	2.70		
+	ROUTED TO	R7-12E	3028.	12.25	355.	101.	98.	2.70		
+	HYDROGRAPH AT	S12E	110.	12.00	8.	2.	2.	.05		
+	2 COMBINED AT	HC12E	3049.	12.25	362.	103.	100.	2.75		
+	HYDROGRAPH AT	S8	552.	12.05	48.	14.	14.	.34		
+	ROUTED TO	R8-9	542.	12.10	48.	14.	14.	.34		
+	HYDROGRAPH AT	S9	309.	12.10	29.	8.	8.	.21		
+	2 COMBINED AT	HC9	846.	12.10	76.	22.	21.	.55		
+	ROUTED TO	R9-11	720.	12.25	76.	22.	21.	.55		
+	HYDROGRAPH AT	S11	314.	12.05	21.	6.	6.	.17		
+	2 COMBINED AT	IHC11	803.	12.20	97.	28.	27.	.72		
+	HYDROGRAPH AT	S10	303.	12.10	27.	8.	7.	.19		
+	2 COMBINED AT	HC11	1036.	12.15	123.	35.	34.	.91		
+	ROUTED TO	R1112W	989.	12.25	123.	35.	34.	.91		
+	HYDROGRAPH AT	S12W	176.	12.00	13.	4.	4.	.09		
+	2 COMBINED AT	HC12W	1045.	12.20	135.	39.	38.	1.00		
+	2 COMBINED AT	HC12	4045.	12.25	494.	142.	136.	3.75		
+	ROUTED TO	R12-13	3913.	12.30	494.	142.	136.	3.75		
+	HYDROGRAPH AT	S13	303.	12.05	19.	5.	5.	.17		
+	2 COMBINED AT	HC13	3973.	12.30	512.	146.	141.	3.93		
+	ROUTED TO	DB13	177.	13.65	167.	82.	79.	3.93		
+	DIVERSION TO	DI27	177.	13.65	167.	82.	79.	3.93		
+	HYDROGRAPH AT	DI13	0.	.00	0.	0.	0.	3.93		
+	ROUTED TO	RDI13	0.	.00	0.	0.	0.	3.93		
+	HYDROGRAPH AT	S14	787.	12.05	61.	17.	16.	.49		
+	2 COMBINED AT	HC14	769.	12.05	59.	16.	16.	4.41		
+	ROUTED TO	R1416S	685.	12.20	59.	16.	16.	4.41		
+	HYDROGRAPH AT	S15	175.	12.05	10.	2.	2.	.11		
+	ROUTED TO	R1516S	137.	12.20	10.	2.	2.	.11		
+	HYDROGRAPH AT	S16S	321.	12.05	21.	5.	5.	.17		
+	3 COMBINED AT	IHC16S	970.	12.15	88.	24.	23.	4.70		
+	HYDROGRAPH AT	S16N	239.	12.10	23.	7.	6.	.17		
+	ROUTED TO	R16N-S	204.	12.30	23.	7.	6.	.17		
+	2 COMBINED AT	HC16S	1093.	12.20	110.	30.	29.	4.87		
+	DIVERSION TO	DI22	285.	12.20	20.	5.	5.	4.87		
	HYDROGRAPH AT									

+		DI16S	809.	12.20	90.	25.	24.	4.87
+	ROUTED TO	R16-17	695.	12.40	90.	25.	24.	4.87
+	HYDROGRAPH AT	S17	414.	12.05	27.	7.	7.	.29
+	2 COMBINED AT	HC17	773.	12.35	116.	32.	31.	5.15
+	HYDROGRAPH AT	S18	585.	12.05	49.	14.	14.	.36
+	ROUTED TO	R18-19	530.	12.20	49.	14.	14.	.36
+	HYDROGRAPH AT	S19	499.	12.05	37.	10.	10.	.29
+	2 COMBINED AT	HC19	928.	12.10	86.	24.	23.	.65
+	ROUTED TO	R19-20	851.	12.25	86.	24.	23.	.65
+	HYDROGRAPH AT	S20	125.	12.05	9.	2.	2.	.09
+	2 COMBINED AT	HC20	923.	12.20	94.	27.	26.	.73
+	HYDROGRAPH AT	S21	1075.	12.05	77.	21.	20.	.62
+	HYDROGRAPH AT	S22	815.	12.10	59.	15.	14.	.55
+	HYDROGRAPH AT	DI22	285.	12.20	20.	5.	5.	4.87
+	ROUTED TO	RDI22	214.	12.50	20.	5.	5.	4.87
+	2 COMBINED AT	HC22	815.	12.10	79.	20.	19.	5.41
+	HYDROGRAPH AT	S23	629.	12.10	47.	12.	11.	.49
+	HYDROGRAPH AT	S24	274.	12.30	34.	9.	8.	.32
+	HYDROGRAPH AT	S25	49.	12.05	3.	1.	1.	.03
+	ROUTED TO	R25-26	29.	12.45	3.	1.	1.	.03
+	HYDROGRAPH AT	S26	325.	12.10	24.	6.	6.	.21
+	2 COMBINED AT	HC26	326.	12.10	27.	7.	6.	.24
+	HYDROGRAPH AT	S27	852.	12.05	70.	20.	19.	.51
+	HYDROGRAPH AT	DI27	177.	13.65	167.	82.	79.	3.93
+	ROUTED TO	RDI27	177.	13.75	167.	81.	78.	3.93
+	2 COMBINED AT	HC27	853.	12.05	216.	101.	97.	4.43
+	ROUTED TO	R27-28	808.	12.10	216.	100.	96.	4.43
+	HYDROGRAPH AT	S28	80.	12.00	4.	1.	1.	.04
+	2 COMBINED AT	HC28	869.	12.10	223.	103.	99.	.55
+	ROUTED TO	R28-29	804.	12.20	222.	102.	98.	.55
+	HYDROGRAPH AT	S29	181.	12.05	11.	3.	3.	.10
+	2 COMBINED AT	HC29	872.	12.15	231.	104.	100.	.65
+	8 COMBINED AT	HCBES3	4870.	12.10	678.	225.	216.	8.75

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

APPENDIX E

Alternative 2 Preliminary Hydrology Calculations

```
1****************************************                        **************************************
 *                                      *                        *                                    *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                        *  U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *                        *  HYDROLOGIC ENGINEERING CENTER     *
 *           VERSION 4.1                *                        *        609 SECOND STREET           *
 *                                      *                        *     DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   08SEP12  TIME  17:04:56  *                        *         (916) 756-1104             *
 *                                      *                        *                                    *
 ****************************************                        **************************************


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


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

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

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1                                        HEC-1 INPUT                                        PAGE  1

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

   1           ID        SKYLINE WASH AND TRIBUTARIES
   2           ID        FLOODPLAIN DELINEATION STUDY
   3           ID        FCD 96-08
   4           ID
   5           ID        HEC-1
   6           ID
   7           ID        DATE:   8-19-98
   8           ID        STORM:  100-YR 24-HOUR STORM
   9           ID        FILE NAME:  SKYLINE.DAT
  10           ID
  11           ID        FILE NAME CHANGED TO SL3-2.DAT (SKYLINE DCR PHASE 3 ALTERNATIVE 2)
  12           ID
  13           ID   DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA
               *DIAGRAM
               *
               * REPERFORMED WITH FOLLOWING MODIFICATIONS - JULY 2012, SEI
               * NOAA ATLAS 14 POINT RAINFALL DEPTH USED
               * DEPTH-AREA REDUCTION FACTOR UPDATED
               * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
               * OTHER MINOR MODIFICATIONS MADE
               *
               * REPERFORMED WITH FOLLOWING MODIFICATIONS - SEPTEMBER 2012, SEI
               * HYDROGRAPH SPLITTED AT HC13 TO DI13 AND DI27
               * 0 HYDROGRAPH HC13 ROUTED TO S14
               * NO HYDROGRAPH ROUTED TO S24
               * DI24, RDI24 AND HC24 DELETED
               * HYDROGRAPH DI27 ROUTED TO S27
               * DI27, RDI27 AND HC27 ADDED
               * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
               * OTHER MINOR MODIFICATIONS MADE
               *
  14           IT       3                     500
  15           IN      15
  16           IO       5
  17           JD    3.97    0.01
  18           PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
  19           PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
  20           PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
  21           PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
  22           PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
  23           PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
  24           PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
  25           PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
  26           PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
  27           PC    .983    .986    .989    .992    .995    .998   1.000
  28           JD    3.77   10.00
  29           JD    3.57   30.00
  30           JD    3.45   60.00
  31           JD    3.38   90.00
  32           JD    3.34  120.00
  33           JD    3.30  150.00
  34           JD    3.20  300.00
  35           JD    3.11  500.00
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*  BASIN S1 - BEGINNING OF SKYLINE WASH
* DDM   ***** Updated *****
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```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 36           KK      S1
 37           KM   BASIN S1
 38           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 39           KM    L=      1.2  Lca=       .6   S= 1102.5  Kn= .050  LAG=  16.6
 40           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 41           BA     .51
 42           LG     .25     .25    3.95     .53   18.00
 43           UI    103.    273.    577.    783.   1122.    746.    585.    489.    400.    306.
 44           UI    248.    206.    151.    123.    102.     79.     60.     51.     48.     20.
 45           UI     20.     20.     20.     20.     20.      0.      0.      0.      0.      0.
 46           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *  BASIN S2 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

 47           KK      S2
 48           KM   BASIN S2
 49           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 50           KM    L=       .9  Lca=       .6   S=  916.1  Kn= .050  LAG=  16.0
 51           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 52           BA     .22
 53           LG     .25     .25    3.95     .53   18.00
 54           UI     46.    130.    269.    364.    496.    310.    251.    207.    166.    124.
 55           UI    105.     82.     60.     51.     38.     32.     23.     23.     12.      9.
 56           UI      9.      9.      9.      9.      0.      0.      0.      0.      0.      0.
 57           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 58           KK     HC2
 59           KM        COMBINE HYDROGRAPHS FROM S1 AND S2 - UPSTREAM PORTION OF SKYLINE WASH
 60           HC       2  0.7296
              * DDM   ***** Preserved *****

 61           KK    R2-3
 62           KM        ROUTE HYDROGRAPH HC2 THROUGH S3 - SKYLINE WASH
 63           RS       1    FLOW      -1
 64           RC     .07    .036     .07    2930    .029
 65           RX    1000    1030    1100    1120    1130    1190    1220    1250
 66           RY    1626    1624    1594    1594    1596    1624    1626    1625
              *  BASIN S3 - MAIN SUBBASIN FOR GRANITE FALLS WASH
              * DDM   ***** Updated *****

 67           KK      S3
 68           KM   BASIN S3
 69           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 70           KM    L=      1.5  Lca=      1.0   S=  481.0  Kn= .040  LAG=  21.0
 71           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 72           BA     .65
 73           LG     .20     .25    4.00     .52   13.00
 74           UI    104.    180.    422.    652.    797.   1088.    945.    652.    567.    492.
 75           UI    420.    348.    274.    245.    212.    164.    133.    115.     99.     80.
 76           UI     70.     51.     51.     49.     20.     20.     20.     20.     20.     20.
 77           UI     20.     20.      0.      0.      0.      0.      0.      0.      0.      0.
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 78          UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****
```



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

  79          KK     HC3
  80          KM         COMBINE HYDROGRAPH R2-3 WITH HYDROGRAPH FROM S3 - CONFLUENCE OF SKYLINE
  81          KM         WASH AND GRANITE FALLS WASH
  82          HC       2  1.3787
              * DDM   ***** Preserved *****

  83          KK    R3-4
  84          KM         ROUTE COMBINED HYDROGRAPHS HC3 THROUGH S4 - SKYLINE WASH
  85          RS       1    FLOW      -1
  86          RC     .07    .036     .07    2927    .032
  87          RX    1000    1030    1085    1160    1200    1240    1250    1275
  88          RY    1520    1518    1496    1496    1498    1516    1518    1520
              *  BASIN S4 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

  89          KK      S4
  90          KM   BASIN S4
  91          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  92          KM    L=       1.3  Lca=       .6   S=  503.9  Kn= .040  LAG=  16.2
  93          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  94          BA     .41
  95          LG     .20     .25    4.00     .52   13.00
  96          UI     85.    231.    486.    656.    913.    579.    465.    386.    312.    234.
  97          UI    196.    156.    114.     95.     73.     63.     41.     41.     28.     16.
  98          UI     16.     16.     16.     16.      0.      0.      0.      0.      0.      0.
  99          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 100          KK     HC4
 101          KM         COMBINE HYDROGRAPH R3-4 WITH HYDROGRAPH FROM S4 - CONCENTRATION POINT
 102          KM         ON SKYLINE WASH.
 103          HC       2  1.7864
              * DDM   ***** Preserved *****

 104          KK    R4-7
 105          KM         ROUTE COMBINED HYDROGRAPHS HC4 THROUGH S7 - SKYLINE WASH
 106          RS       1    FLOW      -1
 107          RC     .07    .036     .07    2211    .022
 108          RX    1000    1025    1055    1120    1145    1180    1240    1370
 109          RY    1462    1460    1462    1462    1432    1432    1456    1462
              *  BASIN S7 - TRIBUTARY BASIN TO MOUNTAIN WASH NEAR AT CONFLUENCE WITH SKYLINE
              *   WASH
              * DDM   ***** Updated *****

 110          KK      S7
 111          KM   BASIN S7
 112          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 113          KM    L=        .9  Lca=       .6   S=  955.3  Kn= .040  LAG=  12.7
 114          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 115          BA     .13
 116          LG     .20     .25    4.00     .52   12.00
 117          UI     37.    147.    254.    365.    229.    178.    137.     97.     78.     53.
```

```
118          UI    41.    30.    22.    17.    12.     7.     7.     7.     7.     0.
119          UI     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
```



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

 120          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 121          KK    IHC7
 122          KM        COMBINE HYDROGRAPHS R4-7 AND S7 - UPSTREAM OF CONFLUENCE WITH MOUNTAIN
 123          KM        WASH
 124          HC       2  1.9208
              *  BASIN S5 - BEGINNING OF MOUNTAIN WASH
              * DDM   ***** Updated *****

 125          KK      S5
 126          KM   BASIN S5
 127          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 128          KM    L=       1.4  Lca=       .7   S=  654.8  Kn= .050  LAG=  20.2
 129          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 130          BA     .53
 131          LG     .25     .25    3.95     .53   20.00
 132          UI     89.    164.    385.    573.    705.    988.    689.    532.    459.    396.
 133          UI    334.    265.    219.    195.    157.    120.    104.     93.     68.     65.
 134          UI     43.     43.     43.     18.     17.     17.     17.     17.     17.     17.
 135          UI     17.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 136          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 137          KK    R5-6
 138          KM        ROUTE HYDROGRAPH S5 THROUGH S6 - MOUNTAIN WASH
 139          RS       1    FLOW      -1
 140          RC     .07    .036     .07    2494    .030
 141          RX    1000    1025    1075    1105    1150    1170    1220    1240
 142          RY    1480    1476    1476    1460    1454    1454    1478    1480
              *  BASIN S6 - SUBBASIN TRIBUTARY TO MOUNTAIN WASH
              * DDM   ***** Updated *****

 143          KK      S6
 144          KM   BASIN S6
 145          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 146          KM    L=        .8  Lca=       .4   S=  491.4  Kn= .042  LAG=  12.3
 147          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 148          BA     .25
 149          LG     .21     .25    4.00     .52   15.00
 150          UI     75.    289.    495.    680.    415.    323.    244.    172.    135.     93.
 151          UI     71.     52.     35.     33.     13.     13.     13.     13.      0.      0.
 152          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 153          KK     HC6
 154          KM        COMBINE HYDROGRAPHS R5-6 WITH SUBBASIN S6 - UPSTREAM OF CONFLUENCE WITH
 155          KM        SKYLINE WASH
 156          HC       2  0.7787
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 157          KK     HC7
 158          KM          COMBINE HYDROGRAPHS IHC7 WITH HC6 - CONFLUENCE OF MOUNTAIN WASH WITH
 159          KM          SKYLINE WASH
 160          HC       2  2.6995
              * DDM   ***** Preserved *****

 161          KK  R7-12E
 162          KM          ROUTE COMBINED HYDROGRAPHS AT HC7 THROUGH S12E - SKYLINE WASH
 163          RS       1    FLOW      -1
 164          RC     .07    .036     .07    1930   .0166
 165          RX    1000    1085    1170    1240    1255    1265    1310    1350
 166          RY    1430    1424    1422    1420    1422    1424    1428    1430
              *
              *   BASIN S12E - SUBBASIN TRIBUTARY TO PYRITE WASH AND SKYLINE WASH CONFLUENCE
              * DDM   ***** Updated *****

 167          KK    S12E
 168          KM   BASIN S12E
 169          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 170          KM    L=       .6  Lca=       .2   S=  142.9  Kn= .030  LAG=   7.8
 171          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 172          BA     .05
 173          LG     .15     .25    3.91     .55   18.00
 174          UI     47.    167.    200.    114.     70.     44.     27.     16.     11.      5.
 175          UI      5.      5.      0.      0.      0.      0.      0.      0.      0.      0.
 176          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 177          KK   HC12E
 178          KM          COMBINE HYDROGRAPHS S12E WITH R7-12E - CONFLUENCE OF PYRITE WASH WITH
 179          KM          SKYLINE WASH
 180          HC       2  2.7544
              *  BASIN S8 - BEGINNING OF PYRITE WASH
              * DDM   ***** Updated *****

 181          KK      S8
 182          KM   BASIN S8
 183          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 184          KM    L=       .8  Lca=       .4   S=  692.1  Kn= .050  LAG=  13.0
 185          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 186          BA     .34
 187          LG     .25     .25    3.95     .53   20.00
 188          UI     88.    352.    614.    906.    585.    452.    354.    254.    200.    145.
 189          UI    105.     81.     62.     43.     38.     17.     17.     17.     17.     17.
 190          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 191          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 192          KK    R8-9
 193          KM          ROUTE HYDROGRAPH S8 THROUGH S9 - PYRITE WASH
 194          RS       1    FLOW      -1
 195          RC     .07    .036     .07     911    .013
 196          RX    1000    1020    1050    1065    1080    1125    1185    1190
 197          RY    1518    1518    1494    1492    1494    1494    1520    1524
              *  BASIN S9 - SUBBASIN TRIBUTARY TO PYRITE WASH
              * DDM   ***** Updated *****
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 198         KK      S9
 199         KM   BASIN S9
 200         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 201         KM    L=      1.0  Lca=       .7   S=  415.7  Kn= .040  LAG=  15.9
 202         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 203         BA     .21
 204         LG     .20      .25    3.95     .53   17.00
 205         UI     44.     126.    259.    351.    471.    293.    238.    196.    157.    117.
 206         UI     99.      77.     56.     48.     35.     29.     22.     22.     10.      8.
 207         UI      8.       8.      8.      8.      0.      0.      0.      0.      0.      0.
 208         UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

 209         KK     HC9
 210         KM        COMBINE ROUTED HYDROGRAPH R8-9 WITH HYDROGRAPH S9 - CONCENTRATION POINT
 211         KM        ON PYRITE WASH
 212         HC       2  0.5472
             * DDM   ***** Preserved *****

 213         KK   R9-11
 214         KM        ROUTE COMBINED HYDROGRAPHS HC9 THROUGH S11 - PYRITE WASH
 215         RS       3    FLOW      -1
 216         RC     .07    .036     .07    3462    .023
 217         RX    1000    1080    1090    1120    1140    1290    1340    1375
 218         RY    1496    1494    1492    1472    1471    1472    1490    1494
             *  BASIN S11 -PYRITE WASH UPSTREAM OF CONFLUENCE WITH WAGON WASH
             * DDM   ***** Updated *****

 219         KK     S11
 220         KM   BASIN S11
 221         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 222         KM    L=       .7  Lca=       .3   S=  797.1  Kn= .040  LAG=   9.3
 223         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 224         BA     .17
 225         LG     .20      .25    4.00     .52   11.00
 226         UI     96.     360.    590.    366.    262.    169.    119.     73.     51.     32.
 227         UI     23.      12.     12.     12.      0.      0.      0.      0.      0.      0.
 228         UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

 229         KK   IHC11
 230         KM        COMBINE ROUTED HYDROGRAPH R9-11 WITH HYDROGRAPHS S11 - UPSTREAM OF
 231         KM        CONFLUENCE WITH WAGON WASH
 232         HC       2  0.7154
             *  BASIN S10 - BEGINNING OF WAGON WASH
             * DDM   ***** Updated *****

 233         KK     S10
 234         KM   BASIN S10
 235         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 236         KM    L=      1.0  Lca=       .5   S=  896.9  Kn= .048  LAG=  14.2
 237         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 238         BA     .19
 239         LG     .24      .25    3.95     .53   18.00
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 240          UI     46.    157.    302.    430.    397.    263.    213.    167.    122.    101.
 241          UI     71.     55.     43.     35.     23.     23.     11.      9.      9.      9.
 242          UI      9.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 243          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 244          KK    HC11
 245          KM          COMBINE HYDROGRAPH IHC11 WITH HYDROGRAPH S10 - CONFLUENCE OF WAGON WASH
 246          KM          WITH PYRITE WASH
 247          HC       2  0.9089
              * DDM   ***** Preserved *****

 248          KK  R1112W
 249          KM          ROUTE COMBINED HYDROGRAPHS HC11 THROUGH S12W - CONTINUATION OF PYRITE
 250          KM          WASH DOWNSTREAM OF CONFLUENCE WITH WAGON WASH
 251          RS       1    FLOW      -1
 252          RC     .07    .036     .07    1501    .019
 253          RX    1000    1030    1065    1150    1240    1330    1375    1410
 254          RY    1422    1420    1410    1410    1410    1412    1414    1428
              *  BASIN S12W - SUBBASIN TRIBUTARY FOR PYRITE WASH AND SKYLINE WASH
              * DDM   ***** Updated *****

 255          KK    S12W
 256          KM   BASIN S12W
 257          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 258          KM    L=         .7  Lca=        .2   S=  153.6  Kn= .030  LAG=   8.2
 259          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 260          BA     .09
 261          LG     .15     .25    3.91     .55   18.00
 262          UI     68.    246.    330.    189.    123.     79.     47.     31.     19.     11.
 263          UI      7.      7.      0.      0.      0.      0.      0.      0.      0.      0.
 264          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 265          KK   HC12W
 266          KM          COMBINE HYDROGRAPH R1112W WITH HYDROGRAPH S12W - CONFLUENCE OF SKYLINE
 267          KM          WASH WITH PYRITE WASH
 268          HC       2  0.9994
              * DDM   ***** Preserved *****

 269          KK    HC12
 270          KM          COMBINE ROUTED HYDROGRAPH HC12W AND HC12E
 271          KM          CONFLUENCE OF SKYLINE WASH AND PYRITE WASH
 272          HC       2  3.7538
              * DDM   ***** Preserved *****

 273          KK  R12-13
 274          KM          ROUTE COMBINED HYDROGRAPHS HC12 THROUGH S13 - SKYLINE WASH
 275          RS       1    FLOW      -1
 276          RC     .07    .036     .07    1854    .017
 277          RX    1000    1080    1110    1320    1370    1420    1500    1550
 278          RY    1400    1392    1384    1382    1382    1380    1380    1400
              *  BASIN S13 - SKYLINE WASH DOWNSTREAM OF CONFLUENCE OF PYRITE WASH
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LINE     ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

279      KK     S13
280      KM   BASIN S13
281      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
282      KM    L=       .9  Lca=        .3   S=  174.2  Kn= .030  LAG=  10.1
283      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
284      BA     .17
285      LG     .15     .25    3.88     .56    4.00
286      UI     82.    312.    550.    397.    278.    195.    135.     90.     64.     43.
287      UI     28.     20.     11.     11.     11.      0.      0.      0.      0.      0.
288      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
         * DDM   ***** Preserved *****

289      KK    HC13
290      KM         COMBINE ROUTED HYDROGRAPH R12-13 WITH HYDROGRAPH S13 - SKYLINE WASH
291      HC       2  3.9274
292      KO       3
         * DDM   ***** Preserved *****

293      KK    DI13
         * KM       SPLIT FLOW AT HC13; MAIN FLOW TO S24 AND MINOR FLOW TO S14
         * DT   DI24
         * DI      0     201     556    1353    2595    4157
         * DQ      0     201     461     879    1427  2078.5
294      KM         SPLIT FLOW AT DB13; ALL FLOW TO S27 AND NONE TO S14
295      DT    DI27
296      DI       0     200     500    1000    2500    6000
297      DQ       0     200     500    1000    2500    6000
         * DDM   ***** Preserved *****

298      KK   RDI13
299      KM         ROUTE HYDROGRAPH DI13 THROUGH S14 -SKYLINE WASH DOWNSTREAM OF SPLIT
300      RS       1    FLOW      -1
301      RC     .07    .036     .07    4353    .021
302      RX    1000    1025    1270    1280    1320    1330    1370    1385
303      RY    1360    1354    1354    1356    1356    1358    1358    1360
         *  BASIN S14 - BEGINNING OF COYOTE WASH
         * DDM   ***** Updated *****

304      KK     S14
305      KM   BASIN S14
306      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
307      KM    L=      1.2  Lca=        .6   S=  340.7  Kn= .030  LAG=  12.4
308      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
309      BA     .49
310      LG     .15     .25    3.91     .55   11.00
311      UI    144.    562.    962.   1341.    822.    640.    487.    343.    270.    185.
312      UI    145.    101.     72.     65.     31.     25.     25.     25.     25.      0.
313      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
314      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
         * DDM   ***** Preserved *****
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LINE     ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

315      KK    HC14
316      KM         COMBINE ROUTED HYDROGRAPH R13-14 WITH HYDROGRAPH S14 - SPLIT FLOW FROM
317      KM         SKYLINE WASH AND COYOTE WASH SUBBASIN
318      HC       2  4.4139
         * DDM   ***** Preserved *****

319      KK  R1416S
         * KM       ROUTE COMBINED HYDROGRAPHS HC14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
320      KM         ROUTE HYDROGRAPH S14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
321      KM         OF CONFLUENCE WITH COYOTE WASH
322      RS       3    FLOW      -1
323      RC     .07    .036     .07    3140    .017
324      RX    1000    1035    1150    1180    1320    1360    1480    1481
325      RY    1236    1234    1234    1232    1232    1234    1236    1236
         *  BASIN S15 - SUBBASIN IN AREA OF EXISTING A.D.O.T. BORROW PITS
         * DDM   ***** Updated *****

326      KK     S15
327      KM   BASIN S15
328      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
329      KM    L=       .8  Lca=        .3   S=  105.0  Kn= .030  LAG=   9.8
330      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
331      BA     .11
332      LG     .15     .27    3.40     .77     .00
333      UI     56.    213.    370.    246.    176.    120.     84.     54.     37.     25.
334      UI     19.      9.      7.      7.      7.      0.      0.      0.      0.      0.
335      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
         * DDM   ***** Preserved *****

336      KK  R1516S
337      KM         ROUTE HYDROGRAPH S15 THROUGH S16S - SKYLINE WASH DOWNSTREAM OF
338      KM         CONFLUENCE WITH COYOTE WASH
339      RS       3    FLOW      -1
340      RC     .07    .036     .07    2218    .018
341      RX    1000    1035    1150    1180    1320    1360    1480    1481
342      RY    1236    1234    1234    1232    1232    1234    1236    1236
         *  BASIN S16S - SUBBASIN AT SKYLINE WASH DOWNSTREAM OF CONFLUENCE WITH COYOTE W.
         * DDM   ***** Updated *****

343      KK    S16S
344      KM   BASIN S16S
345      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
346      KM    L=       .6  Lca=        .3   S=  116.4  Kn= .030  LAG=   9.3
347      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
348      BA     .17
349      LG     .15     .25    3.95     .53    6.00
350      UI    100.    373.    611.    379.    271.    175.    123.     76.     53.     34.
351      UI     23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
352      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
         * DDM   ***** Preserved *****
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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 353            KK  IHC16S
 354            KM        COMBINE ROUTED HYDROGRAPH R14-16S AND R15-16S WITH HYDROGRAPH S16S
 355            KM        DOWNSTREAM OF CONFLUENCE OF SKYLINE WASH WITH COYOTE WASH
 356            HC       3  4.6952
                *  BASIN S16N - SUBBASIN TRIBUTARY TO SKYLINE WASH
                * DDM   ***** Updated *****

 357            KK    S16N
 358            KM   BASIN S16N
 359            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 360            KM    L=        .9  Lca=        .6   S=  653.2  Kn= .050  LAG=  16.5
 361            KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 362            BA     .17
 363            LG     .25     .25    3.95      .53   18.00
 364            UI     34.     90.    189.    256.    366.    238.    189.    158.    129.     98.
 365            UI     80.     66.     48.     39.     32.     26.     19.     16.     15.      6.
 366            UI      6.      6.      6.      6.      6.      0.      0.      0.      0.      0.
 367            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                * DDM   ***** Preserved *****

 368            KK  R16N-S
 369            KM        ROUTE HYDROGRAPH S16N THROUGH S16S
 370            RS       4    FLOW      -1
 371            RC     .07    .036     .07    3230    .022
 372            RX    1000    1035    1150    1180    1320    1360    1480    1481
 373            RY    1236    1234    1234    1232    1232    1234    1236    1236
                * DDM   ***** Preserved *****

 374            KK   HC16S
 375            KM        COMBINE ROUTED HYDROGRAPH R16N-S AND IHC16S
 376            KM        SKYLINE WASH DOWNSTREAM OF COYOTE WASH
 377            HC       2  4.8652
                * DDM   ***** Preserved *****

 378            KK   DI16S
 379            KM        SPLIT FLOW AT HC16S; MAIN FLOW TO S17 AND MINOR FLOW TO S22
 380            DT    DI22
 381            DI       0      46     144     344   708.5    1223
 382            DQ       0       0       8      52     153     329
                * DDM   ***** Preserved *****

 383            KK  R16-17
 384            KM        ROUTE HYDROGRAPH DI16S THROUGH S17
 385            RS       4    FLOW      -1
 386            RC     .07    .036     .07    4341    .015
 387            RX    1000    1060    1090    1120    1145    1180    1200    1320
 388            RY    1202    1200  1199.5    1200    1199    1199    1200    1202
                *  BASIN S17 - SUBBASIN OF SKYLINE WASH SOUTH OF MCDOWELL ROAD ON EAST SIDE
                *  OF WATERSHED
                * DDM   ***** Updated *****
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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 389            KK     S17
 390            KM   BASIN S17
 391            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 392            KM    L=        .9  Lca=        .5   S=  117.9  Kn= .030  LAG=  12.8
 393            KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 394            BA     .29
 395            LG     .15     .26    3.60     .67     .00
 396            UI     79.    311.    540.    784.    495.    385.    298.    212.    170.    117.
 397            UI     89.     66.     50.     37.     28.     15.     15.     15.     15.      0.
 398            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 399            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                * DDM   ***** Preserved *****

 400            KK    HC17
 401            KM        COMBINE ROUTED HYDROGRAPH R16-17 WITH HYDROGRAPH S17 AT EAST SIDE OF
 402            KM        BUCKEYE F.R.S. NO. 3
 403            HC       2  5.1537
                *  BASIN S18 - BEGINNING OF RATTLER WASH
                * DDM   ***** Updated *****

 404            KK     S18
 405            KM   BASIN S18
 406            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 407            KM    L=        .8  Lca=        .4   S=  292.7  Kn= .040  LAG=  12.9
 408            KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 409            BA     .36
 410            LG     .20     .25    3.95      .53   17.00
 411            UI     96.    380.    662.    968.    618.    479.    373.    267.    211.    149.
 412            UI    111.     84.     64.     46.     38.     18.     18.     18.     18.      0.
 413            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 414            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                * DDM   ***** Preserved *****

 415            KK  R18-19
 416            KM        ROUTE HYDROGRAPH HC18 THROUGH S19
 417            RS       3    FLOW      -1
 418            RC     .07    .036     .07    4253     .02
 419            RX    1000    1050    1100    1125    1140    1180    1240    1241
 420            RY    1266    1264    1242    1240    1242    1264    1266    1266
                *  BASIN S19 - SUBBASIN OF RATTLER WASH
                * DDM   ***** Updated *****

 421            KK     S19
 422            KM   BASIN S19
 423            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 424            KM    L=       1.2  Lca=        .8   S=  824.8  Kn= .030  LAG=  11.6
 425            KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 426            BA     .29
 427            LG     .15     .25    4.00      .52   12.00
 428            UI    102.    389.    662.    802.    483.    372.    266.    195.    138.     99.
 429            UI     72.     51.     41.     22.     16.     16.     16.      0.      0.      0.
 430            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
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* DDM ***** Preserved *****


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

 431         KK    HC19
 432         KM        COMBINE ROUTED HYDROGRAPH R18-19 WITH HYDROGRAPH S19 - RATTLER WASH
 433         HC       2  0.6498
             * DDM   ***** Preserved *****

 434         KK  R19-20
 435         KM        ROUTE COMBINED HYDROGRAPHS HC19 THROUGH S20 - RATTLER WASH
 436         RS       3    FLOW      -1
 437         RC     .07    .036     .07    3740    .022
 438         RX     999    1000    1030    1095    1130    1150    1220    1221
 439         RY    1208    1208    1206    1204    1204    1206    1208    1208
             *  BASIN S20 - SUBBASIN OF RATTLER WASH
             * DDM   ***** Updated *****

 440         KK     S20
 441         KM   BASIN S20
 442         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 443         KM    L=        .9  Lca=        .4   S=   84.1  Kn= .030  LAG=  13.0
 444         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 445         BA     .09
 446         LG     .15     .26    3.60     .67    4.00
 447         UI     22.     88.    155.    228.    147.    114.     89.     64.     50.     36.
 448         UI     26.     20.     16.     11.     10.      4.      4.      4.      4.      4.
 449         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 450         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

 451         KK    HC20
 452         KM        COMBINE ROUTED HYDROGRAPH R19-20 WITH HYDROGRAPH S20 AT FAR EAST SIDE
 453         KM        OF STUDY AREA NORTH OF BUCKEYE F.R.S. NO. 3
 454         HC       2  0.7344
             *  BASIN S21 - SUBBASIN NORTH OF BUCKEYE F.R.S. NO 3 SPILLWAY
             * DDM   ***** Updated *****

 455         KK     S21
 456         KM   BASIN S21
 457         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 458         KM    L=       1.2  Lca=        .6   S=  780.6  Kn= .030  LAG=  11.0
 459         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 460         BA     .62
 461         LG     .15     .25    4.10     .51   10.00
 462         UI    245.    927.   1593.   1636.   1019.    766.    522.    392.    260.    190.
 463         UI    136.     93.     67.     36.     36.     36.      0.      0.      0.      0.
 464         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *  BASIN S22 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
             * DDM   ***** Updated *****

 465         KK     S22
 466         KM   BASIN S22
 467         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 468         KM    L=       1.3  Lca=        .4   S=  110.1  Kn= .029  LAG=  13.7
 469         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
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```
470          BA     .55
471          LG     .16      .25    3.91     .53    1.00
```



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

 472         UI    135.    496.    909.   1351.   1029.    742.    594.    451.    332.    268.
 473         UI    188.    151.    108.     84.     66.     51.     26.     26.     26.     26.
 474         UI     26.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 475         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

 476         KK    DI22
 477         KM         RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S22
 478         DR    DI22
             * DDM   ***** Preserved *****

 479         KK   RDI22
 480         KM         ROUTE HYDROGRAPH DI22 THROUGH S22 - PORTION OF DIVERT OF SKYLINE WASH
 481         RS       6    FLOW      -1
 482         RC     .07    .036     .07    4253    .015
 483         RX     997     998     999    1000    1060    1210    1300    1300
 484         RY    1217    1216    1216    1215    1215    1216    1216    1217
             * DDM   ***** Preserved *****

 485         KK    HC22
 486         KM         COMBINE HYDROGRAPHS AT HC22
 487         HC       2  5.4141
             *  BASIN S23 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
             * DDM   ***** Updated *****

 488         KK     S23
 489         KM   BASIN S23
 490         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 491         KM    L=       1.6  Lca=       .5   S=  112.1  Kn= .028  LAG=  15.2
 492         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 493         BA     .49
 494         LG     .17     .26    3.50     .70    2.00
 495         UI    108.    331.    660.    901.   1086.    670.    547.    446.    338.    263.
 496         UI    217.    155.    125.     98.     81.     53.     53.     31.     21.     21.
 497         UI     21.     21.     21.      0.      0.      0.      0.      0.      0.      0.
 498         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *  BASIN S24 - SUBBASIN DOWNSTREAM OF SKYLINE WASH SPLIT FLOW
             * DDM   ***** Updated *****

 499         KK     S24
 500         KM   BASIN S24
 501         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 502         KM    L=       2.4  Lca=      1.2   S=  113.8  Kn= .037  LAG=  32.2
 503         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 504         BA     .32
 505         LG     .20     .25    4.00     .51    1.00
 506         UI     33.     33.     66.    117.    171.    211.    242.    273.    350.    361.
 507         UI    241.    206.    189.    172.    157.    142.    129.    111.     96.     84.
 508         UI     78.     73.     65.     54.     45.     42.     37.     36.     30.     25.
 509         UI     25.     22.     16.     16.     16.     16.     13.      6.      6.      6.
 510         UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      0.
 511         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 512         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
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* DDM   ***** Preserved *****
* KK  DI24
* KM       RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S24
* DR  DI24
* DDM   ***** Preserved *****
* KK RDI24
* KM       ROUTE HYDROGRAPH DI24 THROUGH S24
* RS     5    FLOW      -1
* RC   .07     .036     .07    9929      .02
* RX  1000    1045    1060    1080    1100    1120    1155    1220
* RY  1222    1220    1218    1218    1216    1216    1220    1220
* DDM   ***** Preserved *****
* KK  HC24
* KM       COMBINE HYDROGRAPHS AT HC24
* HC     2  4.2443
*  BASIN S25 - UPSTREAM END OF SMALL WATERSHED EAST OF PROSPECT WASH
* DDM   ***** Updated *****
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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  513          KK     S25
  514          KM   BASIN S25
  515          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  516          KM    L=       .7  Lca=       .3   S=  103.0  Kn= .030  LAG=  10.0
  517          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  518          BA     .03
  519          LG     .15     .25    4.15     .49     .00
  520          UI     13.     50.     87.     61.     43.     30.     21.     14.     10.      7.
  521          UI      4.      3.      2.      2.      2.      0.      0.      0.      0.      0.
  522          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

  523          KK  R25-26
  524          KM         ROUTE HYDROGRAPH S25 THROUGH S26 CROSSING NEAR THE INTERSECTION OF
  525          KM         WATSON ROAD AND MCDOWELL ROAD
  526          RS       8    FLOW      -1
  527          RC     .07    .036     .07    6571     .02
  528          RX    1000    1045    1060    1080    1100    1120    1155    1220
  529          RY    1222    1220    1218    1218    1216    1216    1220    1220
               *  BASIN S26 - SUBBASIN ON THE LOWER WEST SIDE OF STUDY AREA
               * DDM   ***** Updated *****

  530          KK     S26
  531          KM   BASIN S26
  532          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  533          KM    L=      1.2  Lca=       .5   S=  119.7  Kn= .029  LAG=  13.8
  534          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  535          BA     .21
  536          LG     .16     .25    4.20     .47    1.00
  537          UI     52.    187.    347.    513.    403.    286.    230.    177.    129.    105.
  538          UI     74.     59.     43.     33.     25.     21.     10.     10.     10.     10.
  539          UI     10.      0.      0.      0.      0.      0.      0.      0.      0.      0.
  540          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

  541          KK    HC26
  542          KM         COMBINE ROUTED HYDROGRAPH R25-26 WITH HYDROGRAPH S26
  543          KM         AT WEST SIDE OF WATERSHED NORTH OF BUCKEYE F.R.S. NO. 3
  544          HC       2  0.2377
               *  BASIN S27 - BEGINNING OF PROSPECT WASH
               * DDM   ***** Updated *****

  545          KK     S27
  546          KM   BASIN S27
  547          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  548          KM    L=      1.4  Lca=       .5   S=  345.2  Kn= .030  LAG=  12.6
  549          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  550          BA     .51
  551          LG     .15     .25    4.00     .52   16.00
  552          UI    146.    575.    989.   1411.    878.    682.    524.    370.    295.    201.
  553          UI    157.    111.     82.     67.     41.     26.     26.     26.     26.      0.
  554          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
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555          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

556          KK    DI27
557          KM         RETURN DIVERTED HYDROGRAPH FROM DI27 DOWNSTREAM OF HC13 TO ROUTE
558          KM         AND COMBINE WITH S27
559          DR    DI27
             * DDM   ***** Preserved *****

560          KK   RDI27
561          KM         ROUTE HYDROGRAPH DI27 THROUGH S27
562          RS       1    FLOW      -1
563          RC     .07    .040     .07    1200     .02
564          RX    1000    1050    1100    1120    1240    1260    1310    1360
565          RY    1222    1221    1221    1216    1216    1221    1221    1222
             * DDM   ***** Preserved *****

566          KK    HC27
567          KM         COMBINE HYDROGRAPHS AT HC27
568          HC       2  4.4343

569          KK  R27-28
570          KM         ROUTE HYDROGRAPH S27 THROUGH S28
571          RS       1    FLOW      -1
572          RC     .07    .036     .07    2482    .022
573          RX    1000    1060    1090    1100    1120    1130    1160    1230
574          RY    1250    1248    1240    1238    1238    1240    1242    1250
             *  BASIN S28 - SUBBASIN OF PROSPECT WASH
             * DDM   ***** Updated *****

575          KK     S28
576          KM   BASIN S28
577          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
578          KM    L=        .4  Lca=        .2   S=  120.0  Kn= .028  LAG=    6.2
579          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
580          BA     .04
581          LG     .17     .25    4.15     .48    2.00
582          UI     55.    180.    114.     65.     36.     19.     11.      4.      4.      0.
583          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
584          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

585          KK    HC28
586          KM         COMBINE ROUTED HYDROGRAPH R27-28 WITH HYDROGRAPH S28 - PROSPECT WASH
587          KM         AT WATSON ROAD CROSSING
588          HC       2  0.5526
             * DDM   ***** Preserved *****

589          KK  R28-29
590          KM         ROUTE COMBINED HYDROGRAPHS HC28 THROUGH S29
591          RS       2    FLOW      -1
592          RC     .07    .036     .07    3804   .0184
593          RX    1000    1000    1110    1125    1165    1170    1250    1251
594          RY    1192    1192    1190    1188    1188    1190    1192    1192
             *  BASIN S29 - SUBBASIN OF PROSPECT WASH
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* DDM ***** Updated *****


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

 595          KK     S29
 596          KM   BASIN S29
 597          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 598          KM    L=        .7  Lca=       .3   S=  102.9  Kn= .030  LAG=   9.4
 599          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 600          BA     .10
 601          LG     .15     .25    4.15     .49     .00
 602          UI     55.    207.    343.    215.    154.    101.     71.     44.     31.     20.
 603          UI     14.      7.      7.      7.      0.      0.      0.      0.      0.      0.
 604          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 605          KK    HC29
 606          KM        COMBINE ROUTED HYDROGRAPH R28-29 WITH HYDROGRAPH S29 - PROSPECT WASH
 607          KM        AT BUCKEYE F.R.S. NO 3
 608          HC       2  0.6515
              *
              * DDM   ***** Preserved *****

 609          KK  HCBES3
 610          KM        COMBINE ALL HYDROGRAPHS AT BUCKEYE FRS-3
 611          HC       8  8.7485
 612          ZZ
```

```
1
                    SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW
   36           S1
                .
                .
   47           .         S2
                .         .
                .         .
   58         HC2..........
                V
                V
   61         R2-3
                .
                .
   67           .         S3
                .         .
                .         .
   79         HC3..........
                V
                V
   83         R3-4
                .
                .
   89           .         S4
                .         .
                .         .
  100         HC4..........
                V
                V
  104         R4-7
                .
                .
  110           .         S7
                .         .
                .         .
  121        IHC7..........
                .
                .
  125           .         S5
                .         V
                .         V
  137           .       R5-6
                .         .
                .         .
  143           .         .         S6
                .         .         .
                .         .         .
  153           .       HC6..........
                .         .
                .         .
  157         HC7..........
                V

                V
  161       R7-12E
                .
                .
  167           .         S12E
                .         .
                .         .
  177       HC12E..........
                .
                .
  181           .         S8
                .         V
                .         V
  192           .       R8-9
                .         .
                .         .
  198           .         .         S9
                .         .         .
                .         .         .
  209           .       HC9..........
                .         V
                .         V
  213           .      R9-11
                .         .
                .         .
  219           .         .         S11
                .         .         .
                .         .         .
  229           .     IHC11..........
                .         .
                .         .
  233           .         .         S10
                .         .         .
                .         .         .
  244           .      HC11..........
                .         V
                .         V
  248           .    R1112W
                .         .
                .         .
  255           .         .         S12W
                .         .         .
                .         .         .
  265           .     HC12W..........
                .         .
                .         .
  269        HC12..........
                V
                V
  273      R12-13
                .
                .
  279           .         S13
                .         .
                .         .
  289        HC13..........
                .
                .
  295           .------->   DI27
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293   DI13
         V
         V
298  RDI13
         .
         .
304      .     S14
         .       .
         .       .
315   HC14........
         V
         V
319 R1416S
         .
         .
326      .     S15
         .       V
         .       V
336      .  R1516S
         .       .
         .       .
343      .       .    S16S
         .       .       .
         .       .       .
353 IHC16S................
         .
         .
357      .    S16N
         .       V
         .       V
368      .  R16N-S
         .       .
         .       .
374  HC16S........
         .
         .
380      .------->  DI22
378  DI16S
         V
         V
383 R16-17
         .
         .
389      .     S17
         .       .
         .       .
400   HC17........
         .
         .
404      .     S18
         .       V
         .       V
415      .  R18-19
         .       .
         .       .
421      .       .     S19
         .       .       .
         .       .       .
431      .    HC19........
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```
         .       V
         .       V
434      .  R19-20
         .       .
         .       .
440      .       .     S20
         .       .       .
         .       .       .
451      .    HC20........
         .       .
         .       .
455      .       .     S21
         .       .       .
         .       .       .
465      .       .       .     S22
         .       .       .       .
         .       .       .       .
478      .       .       .       .       .<-------    DI22
476      .       .       .       .    DI22
         .       .       .       .       V
         .       .       .       .       V
479      .       .       .       .   RDI22
         .       .       .       .       .
         .       .       .       .       .
485      .       .       .    HC22........
         .       .       .       .
         .       .       .       .
488      .       .       .       .     S23
         .       .       .       .       .
         .       .       .       .       .
499      .       .       .       .       .     S24
         .       .       .       .       .       .
         .       .       .       .       .       .
513      .       .       .       .       .       .     S25
         .       .       .       .       .       .       V
         .       .       .       .       .       .       V
523      .       .       .       .       .       .  R25-26
         .       .       .       .       .       .       .
         .       .       .       .       .       .       .
530      .       .       .       .       .       .       .     S26
         .       .       .       .       .       .       .       .
         .       .       .       .       .       .       .       .
541      .       .       .       .       .       .    HC26........
         .       .       .       .       .       .       .
         .       .       .       .       .       .       .
545      .       .       .       .       .       .       .     S27
         .       .       .       .       .       .       .       .
         .       .       .       .       .       .       .       .
559      .       .       .       .       .       .       .       .       .<-------    DI27
556      .       .       .       .       .       .       .       .    DI27
         .       .       .       .       .       .       .       .       V
         .       .       .       .       .       .       .       .       V
560      .       .       .       .       .       .       .       .   RDI27
         .       .       .       .       .       .       .       .       .
         .       .       .       .       .       .       .       .       .
566      .       .       .       .       .       .       .    HC27........
         .       .       .       .       .       .       .       V
         .       .       .       .       .       .       .       V
569      .       .       .       .       .       .       .  R27-28
```

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575        .      .      .      .      .      .      .      .          S28
585        .      .      .      .      .      .      .   HC28...........
                                                            V
                                                            V
589        .      .      .      .      .      .      .  R28-29
595        .      .      .      .      .      .      .      .          S29
605        .      .      .      .      .      .      .   HC29...........
609    HCBES3.........................................................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
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1***************************************                    ***************************************
*                                      *                    *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS      *
*              JUN   1998              *                    *   HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1               *                    *        609 SECOND STREET            *
*                                      *                    *     DAVIS, CALIFORNIA 95616         *
*  RUN DATE   08SEP12  TIME  17:04:56  *                    *        (916) 756-1104               *
*                                      *                    *                                     *
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                              SKYLINE WASH AND TRIBUTARIES
                              FLOODPLAIN DELINEATION STUDY
                              FCD 96-08

                              HEC-1

                              DATE:   8-19-98
                              STORM:  100-YR 24-HOUR STORM
                              FILE NAME:  SKYLINE.DAT

                              FILE NAME CHANGED TO SL3-2.DAT (SKYLINE DCR PHASE 3 ALTERNATIVE 2)

                         DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA

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

      IT           HYDROGRAPH TIME DATA
                           NMIN           3  MINUTES IN COMPUTATION INTERVAL
                          IDATE     1     0  STARTING DATE
                          ITIME        0000  STARTING TIME
                             NQ         500  NUMBER OF HYDROGRAPH ORDINATES
                         NDDATE     2     0  ENDING DATE
                         NDTIME        0057  ENDING TIME
                          ICENT          19  CENTURY MARK

                     COMPUTATION INTERVAL     .05 HOURS
                          TOTAL TIME BASE   24.95 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

   17 JD           INDEX STORM NO. 1
                           STRM        3.97  PRECIPITATION DEPTH
                           TRDA         .01  TRANSPOSITION DRAINAGE AREA
```

18 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

28 JD INDEX STORM NO. 2

STRM 3.77 PRECIPITATION DEPTH

TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

29 JD INDEX STORM NO. 3

STRM 3.57 PRECIPITATION DEPTH

TRDA 30.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

30 JD INDEX STORM NO. 4
STRM 3.45 PRECIPITATION DEPTH
TRDA 60.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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31 JD INDEX STORM NO. 5
STRM 3.38 PRECIPITATION DEPTH
TRDA 90.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

32 JD INDEX STORM NO. 6

STRM 3.34 PRECIPITATION DEPTH

TRDA 120.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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33 JD INDEX STORM NO. 7

STRM 3.30 PRECIPITATION DEPTH

TRDA 150.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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34 JD        INDEX STORM NO. 8
                STRM       3.20  PRECIPITATION DEPTH
                TRDA     300.00  TRANSPOSITION DRAINAGE AREA

 0 PI             PRECIPITATION PATTERN
   .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
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35 JD        INDEX STORM NO. 9
                STRM       3.11  PRECIPITATION DEPTH
                TRDA     500.00  TRANSPOSITION DRAINAGE AREA

 0 PI             PRECIPITATION PATTERN
   .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
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              *            *
289 KK        *    HC13    *
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292 KO         OUTPUT CONTROL VARIABLES
                    IPRNT          3  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

291 HC         HYDROGRAPH COMBINATION
                    ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE
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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA .0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 4271.	12.30		547.	156.	150.	150.
		(INCHES)	1.296	1.475	1.477	1.477
		(AC-FT)	271.	309.	309.	309.

CUMULATIVE AREA = 3.93 SQ MI

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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3926.	12.30		507.	145.	139.	139.
		(INCHES)	1.200	1.371	1.372	1.372
		(AC-FT)	251.	287.	287.	287.

CUMULATIVE AREA = 3.93 SQ MI

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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 30.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				

+	3577.	12.30		466.	134.	129.	129.
			(INCHES)	1.104	1.266	1.267	1.267
			(AC-FT)	231.	265.	265.	265.

CUMULATIVE AREA = 3.93 SQ MI

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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 60.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3360.	12.30		442.	127.	122.	122.
		(INCHES)	1.046	1.202	1.203	1.203
		(AC-FT)	219.	252.	252.	252.

CUMULATIVE AREA = 3.93 SQ MI

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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 90.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3229.	12.30		427.	123.	118.	118.
		(INCHES)	1.012	1.165	1.166	1.166
		(AC-FT)	212.	244.	244.	244.

CUMULATIVE AREA = 3.93 SQ MI

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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 120.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3154.	12.30		419.	121.	116.	116.
		(INCHES)	.992	1.144	1.145	1.145
		(AC-FT)	208.	240.	240.	240.

CUMULATIVE AREA = 3.93 SQ MI

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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 150.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3075.	12.30		411.	119.	114.	114.
		(INCHES)	.973	1.122	1.123	1.123
		(AC-FT)	204.	235.	235.	235.

CUMULATIVE AREA = 3.93 SQ MI

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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 300.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2866.	12.30		390.	113.	109.	109.
		(INCHES)	.924	1.069	1.070	1.070
		(AC-FT)	193.	224.	224.	224.

CUMULATIVE AREA = 3.93 SQ MI

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HYDROGRAPH AT STATION HC13
TRANSPOSITION AREA 500.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 2717.	12.35		372.	108.	104.	104.
		(INCHES)	.879	1.020	1.021	1.021
		(AC-FT)	184.	214.	214.	214.

CUMULATIVE AREA = 3.93 SQ MI

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INTERPOLATED HYDROGRAPH AT HC13

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 3973.	12.30		512.	146.	141.	141.
		(INCHES)	1.213	1.385	1.386	1.386
		(AC-FT)	254.	290.	290.	290.

CUMULATIVE AREA = 3.93 SQ MI

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WARNING --- ROUTED OUTFLOW (   3744.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4108.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4328.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4373.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4251.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3998.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3662.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3570.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3931.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4165.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4247.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4179.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3984.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3702.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3709.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3933.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   4006.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3923.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3712.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3553.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3786.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3885.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3847.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3691.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3540.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3632.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3582.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3519.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (   3507.) IS GREATER THAN MAXIMUM OUTFLOW (   3469.) IN STORAGE-OUTFLOW TABLE
```

1

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S1	728.	12.10	70.	20.	19.	.51		
+	HYDROGRAPH AT	S2	324.	12.10	30.	9.	8.	.22		
+	2 COMBINED AT	HC2	1045.	12.10	100.	29.	28.	.73		
+	ROUTED TO	R2-3	998.	12.15	100.	29.	28.	.73		
+	HYDROGRAPH AT	S3	792.	12.15	84.	23.	23.	.65		
+	2 COMBINED AT	HC3	1777.	12.15	182.	52.	50.	1.38		
+	ROUTED TO	R3-4	1692.	12.20	182.	52.	50.	1.38		
+	HYDROGRAPH AT	S4	584.	12.10	53.	15.	14.	.41		
+	2 COMBINED AT	HC4	2175.	12.20	233.	66.	64.	1.79		
+	ROUTED TO	R4-7	2132.	12.20	233.	66.	64.	1.79		
+	HYDROGRAPH AT	S7	220.	12.05	17.	5.	5.	.13		
+	2 COMBINED AT	IHC7	2261.	12.20	250.	71.	68.	1.92		
+	HYDROGRAPH AT	S5	680.	12.15	75.	22.	21.	.53		
+	ROUTED TO	R5-6	655.	12.20	75.	22.	21.	.53		
+	HYDROGRAPH AT	S6	412.	12.05	33.	9.	9.	.25		
+	2 COMBINED AT	HC6	965.	12.15	107.	31.	30.	.78		

+	2 COMBINED AT	HC7	3133.	12.20	355.	101.	98.	2.70
+	ROUTED TO	R7-12E	3028.	12.25	355.	101.	98.	2.70
+	HYDROGRAPH AT	S12E	110.	12.00	8.	2.	2.	.05
+	2 COMBINED AT	HC12E	3049.	12.25	362.	103.	100.	2.75
+	HYDROGRAPH AT	S8	552.	12.05	48.	14.	14.	.34
+	ROUTED TO	R8-9	542.	12.10	48.	14.	14.	.34
+	HYDROGRAPH AT	S9	309.	12.10	29.	8.	8.	.21
+	2 COMBINED AT	HC9	846.	12.10	76.	22.	21.	.55
+	ROUTED TO	R9-11	720.	12.25	76.	22.	21.	.55
+	HYDROGRAPH AT	S11	314.	12.05	21.	6.	6.	.17
+	2 COMBINED AT	IHC11	803.	12.20	97.	28.	27.	.72
+	HYDROGRAPH AT	S10	303.	12.10	27.	8.	7.	.19
+	2 COMBINED AT	HC11	1036.	12.15	123.	35.	34.	.91
+	ROUTED TO	R1112W	989.	12.25	123.	35.	34.	.91
+	HYDROGRAPH AT	S12W	176.	12.00	13.	4.	4.	.09
+	2 COMBINED AT	HC12W	1045.	12.20	135.	39.	38.	1.00
+	2 COMBINED AT	HC12	4045.	12.25	494.	142.	136.	3.75
+	ROUTED TO	R12-13	3913.	12.30	494.	142.	136.	3.75
+	HYDROGRAPH AT	S13	303.	12.05	19.	5.	5.	.17
+	2 COMBINED AT	HC13	3973.	12.30	512.	146.	141.	3.93
+	DIVERSION TO	DI27	3973.	12.30	512.	146.	141.	3.93
+	HYDROGRAPH AT	DI13	0.	.00	0.	0.	0.	3.93
+	ROUTED TO	RDI13	0.	.00	0.	0.	0.	3.93
+	HYDROGRAPH AT	S14	787.	12.05	61.	17.	16.	.49
+	2 COMBINED AT	HC14	769.	12.05	59.	16.	16.	4.41
+	ROUTED TO	R1416S	685.	12.20	59.	16.	16.	4.41
+	HYDROGRAPH AT	S15	175.	12.05	10.	2.	2.	.11
+	ROUTED TO	R1516S	137.	12.20	10.	2.	2.	.11
+	HYDROGRAPH AT	S16S	321.	12.05	21.	5.	5.	.17
+	3 COMBINED AT	IHC16S	970.	12.15	88.	24.	23.	4.70
+	HYDROGRAPH AT	S16N	239.	12.10	23.	7.	6.	.17
+	ROUTED TO	R16N-S	204.	12.30	23.	7.	6.	.17
+	2 COMBINED AT	HC16S	1093.	12.20	110.	30.	29.	4.87
+	DIVERSION TO	DI22	285.	12.20	20.	5.	5.	4.87
+	HYDROGRAPH AT	DI16S	809.	12.20	90.	25.	24.	4.87
+	ROUTED TO	R16-17	695.	12.40	90.	25.	24.	4.87
+	HYDROGRAPH AT	S17	414.	12.05	27.	7.	7.	.29
+	2 COMBINED AT	HC17	773.	12.35	116.	32.	31.	5.15
+	HYDROGRAPH AT	S18	585.	12.05	49.	14.	14.	.36
	ROUTED TO							

+		R18-19	530.	12.20	49.	14.	14.	.36
+	HYDROGRAPH AT	S19	499.	12.05	37.	10.	10.	.29
+	2 COMBINED AT	HC19	928.	12.10	86.	24.	23.	.65
+	ROUTED TO	R19-20	851.	12.25	86.	24.	23.	.65
+	HYDROGRAPH AT	S20	125.	12.05	9.	2.	2.	.09
+	2 COMBINED AT	HC20	923.	12.20	94.	27.	26.	.73
+	HYDROGRAPH AT	S21	1075.	12.05	77.	21.	20.	.62
+	HYDROGRAPH AT	S22	815.	12.10	59.	15.	14.	.55
+	HYDROGRAPH AT	DI22	285.	12.20	20.	5.	5.	4.87
+	ROUTED TO	RDI22	214.	12.50	20.	5.	5.	4.87
+	2 COMBINED AT	HC22	815.	12.10	79.	20.	19.	5.41
+	HYDROGRAPH AT	S23	629.	12.10	47.	12.	11.	.49
+	HYDROGRAPH AT	S24	274.	12.30	34.	9.	8.	.32
+	HYDROGRAPH AT	S25	49.	12.05	3.	1.	1.	.03
+	ROUTED TO	R25-26	29.	12.45	3.	1.	1.	.03
+	HYDROGRAPH AT	S26	325.	12.10	24.	6.	6.	.21
+	2 COMBINED AT	HC26	326.	12.10	27.	7.	6.	.24
+	HYDROGRAPH AT	S27	852.	12.05	70.	20.	19.	.51
+	HYDROGRAPH AT	DI27	3973.	12.30	512.	146.	141.	3.93
+	ROUTED TO	RDI27	3958.	12.30	512.	146.	141.	3.93
+	2 COMBINED AT	HC27	4253.	12.30	580.	166.	159.	4.43
+	ROUTED TO	R27-28	4174.	12.35	580.	165.	159.	4.43
+	HYDROGRAPH AT	S28	80.	12.00	4.	1.	1.	.04
+	2 COMBINED AT	HC28	4287.	12.35	598.	170.	164.	.55
+	ROUTED TO	R28-29	4037.	12.45	598.	170.	164.	.55
+	HYDROGRAPH AT	S29	181.	12.05	11.	3.	3.	.10
+	2 COMBINED AT	HC29	4038.	12.45	607.	172.	166.	.65
+	8 COMBINED AT	HCBES3	6223.	12.35	1050.	291.	280.	8.75

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

APPENDIX F

Alternative 3 Preliminary Hydrology Calculations

SUNRISE ENGINEERING

Skyline Fan DCR - Outlet Rating - Alt 3

Culvert flow calculated using HY8
11' X 6' Box Culvert

Stage H [ft]	RCP Culvert H Head Water [ft]	Q Low Flow [cfs]
1345	0	0
1347.06	2.06	100
1348.29	3.29	200
1349.34	4.34	300
1350.29	5.29	400
1351.22	6.22	**500**
1352.22	7.22	600
1353.34	8.34	700
1354.61	9.61	800
1356.05	11.05	900
1357.69	12.69	1000

SUNRISE ENGINEERING

Skyline Fan DCR - Stage Storage - Alt 3

Elevation	Depth, FT	Storage, ACRE-FT	Comments
1345	0	0	Bottom
1346	1	15	
1347	2	30	
1348	3	45	
1349	4	60	
1350	5	75	
1351	6	90	
1352	7	105	
1353	8	120	
1354	9	135	
1355	10	**150**	Spillway Invert
1356	11	165	
1357	12	180	
1358	13	195	
1359	14	210	Top of Berm

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1*****************************************                     *****************************************
 *                                       *                     *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                     *   U.S. ARMY CORPS OF ENGINEERS        *
 *              JUN  1998                *                     *   HYDROLOGIC ENGINEERING CENTER       *
 *            VERSION 4.1                *                     *         609 SECOND STREET             *
 *                                       *                     *      DAVIS, CALIFORNIA 95616          *
 *  RUN DATE   10SEP12  TIME  11:04:05   *                     *          (916) 756-1104               *
 *                                       *                     *                                       *
 *****************************************                     *****************************************


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


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

 THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
 THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
 NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
 DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
 KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
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 LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1        ID        SKYLINE WASH AND TRIBUTARIES
   2        ID        FLOODPLAIN DELINEATION STUDY
   3        ID        FCD 96-08
   4        ID
   5        ID        HEC-1
   6        ID
   7        ID        DATE:   8-19-98
   8        ID        STORM:  100-YR 24-HOUR STORM
   9        ID        FILE NAME:  SKYLINE.DAT
  10        ID
  11        ID        FILE NAME CHANGED TO SL3-3.DAT (SKYLINE DCR PHASE 3 ALTERNATIVE 3)
  12        ID
  13        ID   DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA
            *DIAGRAM
            *
            * REPERFORMED WITH FOLLOWING MODIFICATIONS - JULY 2012, SEI
            * NOAA ATLAS 14 POINT RAINFALL DEPTH USED
            * DEPTH-AREA REDUCTION FACTOR UPDATED
            * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
            * OTHER MINOR MODIFICATIONS MADE
            *
            * REPERFORMED WITH FOLLOWING MODIFICATIONS - SEPTEMBER 2012, SEI
            * DETENTION BASIN DB13 ADDED TO SKYLINE WASH APEX (HC13)
            * 11' X 6' BOX CULVERT - OUTLET OF DETENTION BASIN CALCULATED USING HY8
            * HYDROGRAPH SPLITTED AT DB13 TO DI13 AND DI27
            * 0 HYDROGRAPH DI13 ROUTED TO S14
            * NO HYDROGRAPH ROUTED TO S24
            * DI24, RDI24 AND HC24 DELETED
            * HYDROGRAPH DI27 (PEAK ABOUT 900 CFS) ROUTED TO S27
            * DI27, RDI27 AND HC27 ADDED
            * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
            * OTHER MINOR MODIFICATIONS MADE
            *
  14        IT       3                       500
  15        IN      15
  16        IO       5
  17        JD    3.97    0.01
  18        PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
  19        PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
  20        PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
  21        PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
  22        PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
  23        PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
  24        PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
  25        PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
  26        PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
  27        PC    .983    .986    .989    .992    .995    .998   1.000
  28        JD    3.77   10.00
  29        JD    3.57   30.00
  30        JD    3.45   60.00
  31        JD    3.38   90.00
  32        JD    3.34  120.00
  33        JD    3.30  150.00
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34          JD    3.20  300.00
35          JD    3.11  500.00
            *  BASIN S1 - BEGINNING OF SKYLINE WASH
            * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 36           KK      S1
 37           KM   BASIN S1
 38           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 39           KM    L=       1.2  Lca=       .6   S= 1102.5  Kn= .050  LAG=  16.6
 40           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 41           BA     .51
 42           LG     .25      .25    3.95      .53   18.00
 43           UI    103.     273.    577.     783.   1122.     746.    585.    489.    400.    306.
 44           UI    248.     206.    151.     123.    102.      79.     60.     51.     48.     20.
 45           UI     20.      20.     20.      20.     20.       0.      0.      0.      0.      0.
 46           UI      0.       0.      0.       0.      0.       0.      0.      0.      0.      0.
              *  BASIN S2 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

 47           KK      S2
 48           KM   BASIN S2
 49           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 50           KM    L=        .9  Lca=       .6   S=  916.1  Kn= .050  LAG=  16.0
 51           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 52           BA     .22
 53           LG     .25      .25    3.95      .53   18.00
 54           UI     46.     130.    269.     364.    496.     310.    251.    207.    166.    124.
 55           UI    105.      82.     60.      51.     38.      32.     23.     23.     12.      9.
 56           UI      9.       9.      9.       9.      0.       0.      0.      0.      0.      0.
 57           UI      0.       0.      0.       0.      0.       0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 58           KK     HC2
 59           KM        COMBINE HYDROGRAPHS FROM S1 AND S2 - UPSTREAM PORTION OF SKYLINE WASH
 60           HC       2  0.7296
              * DDM   ***** Preserved *****

 61           KK    R2-3
 62           KM        ROUTE HYDROGRAPH HC2 THROUGH S3 - SKYLINE WASH
 63           RS       1    FLOW      -1
 64           RC     .07     .036     .07     2930    .029
 65           RX    1000     1030    1100     1120    1130     1190    1220    1250
 66           RY    1626     1624    1594     1594    1596     1624    1626    1625
              *  BASIN S3 - MAIN SUBBASIN FOR GRANITE FALLS WASH
              * DDM   ***** Updated *****

 67           KK      S3
 68           KM   BASIN S3
 69           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 70           KM    L=       1.5  Lca=      1.0   S=  481.0  Kn= .040  LAG=  21.0
 71           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 72           BA     .65
 73           LG     .20      .25    4.00      .52   13.00
 74           UI    104.     180.    422.     652.    797.    1088.    945.    652.    567.    492.
 75           UI    420.     348.    274.     245.    212.     164.    133.    115.     99.     80.
 76           UI     70.      51.     51.      49.     20.      20.     20.     20.     20.     20.
 77           UI     20.      20.      0.       0.      0.       0.      0.      0.      0.      0.
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78          UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                   * DDM   ***** Preserved *****
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 79            KK     HC3
 80            KM         COMBINE HYDROGRAPH R2-3 WITH HYDROGRAPH FROM S3 - CONFLUENCE OF SKYLINE
 81            KM         WASH AND GRANITE FALLS WASH
 82            HC       2  1.3787
               * DDM   ***** Preserved *****

 83            KK    R3-4
 84            KM         ROUTE COMBINED HYDROGRAPHS HC3 THROUGH S4 - SKYLINE WASH
 85            RS       1    FLOW      -1
 86            RC     .07    .036     .07    2927    .032
 87            RX    1000    1030    1085    1160    1200    1240    1250    1275
 88            RY    1520    1518    1496    1496    1498    1516    1518    1520
               *  BASIN S4 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
               * DDM   ***** Updated *****

 89            KK      S4
 90            KM   BASIN S4
 91            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 92            KM    L=      1.3  Lca=       .6   S=  503.9  Kn= .040  LAG=  16.2
 93            KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 94            BA     .41
 95            LG     .20     .25    4.00     .52   13.00
 96            UI     85.    231.    486.    656.    913.    579.    465.    386.    312.    234.
 97            UI    196.    156.    114.     95.     73.     63.     41.     41.     28.     16.
 98            UI     16.     16.     16.     16.      0.      0.      0.      0.      0.      0.
 99            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

100            KK     HC4
101            KM         COMBINE HYDROGRAPH R3-4 WITH HYDROGRAPH FROM S4 - CONCENTRATION POINT
102            KM         ON SKYLINE WASH.
103            HC       2  1.7864
               * DDM   ***** Preserved *****

104            KK    R4-7
105            KM         ROUTE COMBINED HYDROGRAPHS HC4 THROUGH S7 - SKYLINE WASH
106            RS       1    FLOW      -1
107            RC     .07    .036     .07    2211    .022
108            RX    1000    1025    1055    1120    1145    1180    1240    1370
109            RY    1462    1460    1462    1462    1432    1432    1456    1462
               *  BASIN S7 - TRIBUTARY BASIN TO MOUNTAIN WASH NEAR AT CONFLUENCE WITH SKYLINE
               *   WASH
               * DDM   ***** Updated *****

110            KK      S7
111            KM   BASIN S7
112            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
113            KM    L=       .9  Lca=       .6   S=  955.3  Kn= .040  LAG=  12.7
114            KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
115            BA     .13
116            LG     .20     .25    4.00     .52   12.00
117            UI     37.    147.    254.    365.    229.    178.    137.     97.     78.     53.
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118          UI    41.    30.    22.    17.    12.     7.     7.     7.     7.     0.
119          UI     0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 120         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

 121         KK    IHC7
 122         KM        COMBINE HYDROGRAPHS R4-7 AND S7 - UPSTREAM OF CONFLUENCE WITH MOUNTAIN
 123         KM        WASH
 124         HC       2  1.9208
             *  BASIN S5 - BEGINNING OF MOUNTAIN WASH
             * DDM   ***** Updated *****

 125         KK      S5
 126         KM   BASIN S5
 127         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 128         KM    L=       1.4  Lca=       .7   S=  654.8  Kn= .050  LAG=  20.2
 129         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 130         BA     .53
 131         LG     .25     .25    3.95     .53   20.00
 132         UI     89.    164.    385.    573.    705.    988.    689.    532.    459.    396.
 133         UI    334.    265.    219.    195.    157.    120.    104.     93.     68.     65.
 134         UI     43.     43.     43.     18.     17.     17.     17.     17.     17.     17.
 135         UI     17.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 136         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

 137         KK    R5-6
 138         KM        ROUTE HYDROGRAPH S5 THROUGH S6 - MOUNTAIN WASH
 139         RS       1    FLOW      -1
 140         RC     .07    .036     .07    2494    .030
 141         RX    1000    1025    1075    1105    1150    1170    1220    1240
 142         RY    1480    1476    1476    1460    1454    1454    1478    1480
             *  BASIN S6 - SUBBASIN TRIBUTARY TO MOUNTAIN WASH
             * DDM   ***** Updated *****

 143         KK      S6
 144         KM   BASIN S6
 145         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 146         KM    L=        .8  Lca=       .4   S=  491.4  Kn= .042  LAG=  12.3
 147         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 148         BA     .25
 149         LG     .21     .25    4.00     .52   15.00
 150         UI     75.    289.    495.    680.    415.    323.    244.    172.    135.     93.
 151         UI     71.     52.     35.     33.     13.     13.     13.     13.      0.      0.
 152         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

 153         KK     HC6
 154         KM        COMBINE HYDROGRAPHS R5-6 WITH SUBBASIN S6 - UPSTREAM OF CONFLUENCE WITH
 155         KM        SKYLINE WASH
 156         HC       2  0.7787
             * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

              KK     HC7
              KM        COMBINE HYDROGRAPHS IHC7 WITH HC6 - CONFLUENCE OF MOUNTAIN WASH WITH
              KM        SKYLINE WASH
              HC       2  2.6995
              * DDM   ***** Preserved *****

              KK  R7-12E
              KM        ROUTE COMBINED HYDROGRAPHS AT HC7 THROUGH S12E - SKYLINE WASH
              RS       1    FLOW      -1
              RC     .07    .036     .07    1930   .0166
              RX    1000    1085    1170    1240    1255    1265    1310    1350
              RY    1430    1424    1422    1420    1422    1424    1428    1430
              *
              *   BASIN S12E - SUBBASIN TRIBUTARY TO PYRITE WASH AND SKYLINE WASH CONFLUENCE
              * DDM   ***** Updated *****

              KK    S12E
              KM   BASIN S12E
              KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              KM    L=        .6  Lca=        .2   S=  142.9  Kn= .030  LAG=   7.8
              KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
              BA     .05
              LG     .15     .25    3.91     .55   18.00
              UI     47.    167.    200.    114.     70.     44.     27.     16.     11.      5.
              UI      5.      5.      0.      0.      0.      0.      0.      0.      0.      0.
              UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

              KK   HC12E
              KM        COMBINE HYDROGRAPHS S12E WITH R7-12E - CONFLUENCE OF PYRITE WASH WITH
              KM        SKYLINE WASH
              HC       2  2.7544
              *  BASIN S8 - BEGINNING OF PYRITE WASH
              * DDM   ***** Updated *****

              KK      S8
              KM   BASIN S8
              KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              KM    L=        .8  Lca=        .4   S=  692.1  Kn= .050  LAG=  13.0
              KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
              BA     .34
              LG     .25     .25    3.95     .53   20.00
              UI     88.    352.    614.    906.    585.    452.    354.    254.    200.    145.
              UI    105.     81.     62.     43.     38.     17.     17.     17.     17.     17.
              UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

              KK    R8-9
              KM        ROUTE HYDROGRAPH S8 THROUGH S9 - PYRITE WASH
              RS       1    FLOW      -1
              RC     .07    .036     .07     911    .013
              RX    1000    1020    1050    1065    1080    1125    1185    1190
              RY    1518    1518    1494    1492    1494    1494    1520    1524
              *  BASIN S9 - SUBBASIN TRIBUTARY TO PYRITE WASH
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 198          KK      S9
 199          KM   BASIN S9
 200          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 201          KM    L=      1.0  Lca=       .7   S=  415.7  Kn= .040  LAG=  15.9
 202          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 203          BA     .21
 204          LG     .20     .25    3.95     .53   17.00
 205          UI     44.    126.    259.    351.    471.    293.    238.    196.    157.    117.
 206          UI     99.     77.     56.     48.     35.     29.     22.     22.     10.      8.
 207          UI      8.      8.      8.      8.      0.      0.      0.      0.      0.      0.
 208          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 209          KK     HC9
 210          KM         COMBINE ROUTED HYDROGRAPH R8-9 WITH HYDROGRAPH S9 - CONCENTRATION POINT
 211          KM         ON PYRITE WASH
 212          HC       2  0.5472
              * DDM   ***** Preserved *****

 213          KK   R9-11
 214          KM         ROUTE COMBINED HYDROGRAPHS HC9 THROUGH S11 - PYRITE WASH
 215          RS       3    FLOW      -1
 216          RC     .07    .036     .07    3462    .023
 217          RX    1000    1080    1090    1120    1140    1290    1340    1375
 218          RY    1496    1494    1492    1472    1471    1472    1490    1494
              *  BASIN S11 -PYRITE WASH UPSTREAM OF CONFLUENCE WITH WAGON WASH
              * DDM   ***** Updated *****

 219          KK     S11
 220          KM   BASIN S11
 221          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 222          KM    L=       .7  Lca=       .3   S=  797.1  Kn= .040  LAG=   9.3
 223          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 224          BA     .17
 225          LG     .20     .25    4.00     .52   11.00
 226          UI     96.    360.    590.    366.    262.    169.    119.     73.     51.     32.
 227          UI     23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
 228          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 229          KK   IHC11
 230          KM         COMBINE ROUTED HYDROGRAPH R9-11 WITH HYDROGRAPHS S11 - UPSTREAM OF
 231          KM         CONFLUENCE WITH WAGON WASH
 232          HC       2  0.7154
              *  BASIN S10 - BEGINNING OF WAGON WASH
              * DDM   ***** Updated *****

 233          KK     S10
 234          KM   BASIN S10
 235          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 236          KM    L=      1.0  Lca=       .5   S=  896.9  Kn= .048  LAG=  14.2
 237          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 238          BA     .19
 239          LG     .24     .25    3.95     .53   18.00
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 240         UI     46.    157.    302.    430.    397.    263.    213.    167.    122.    101.
 241         UI     71.     55.     43.     35.     23.     23.     11.      9.      9.      9.
 242         UI      9.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 243         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

 244         KK    HC11
 245         KM         COMBINE HYDROGRAPH IHC11 WITH HYDROGRAPH S10 - CONFLUENCE OF WAGON WASH
 246         KM         WITH PYRITE WASH
 247         HC       2  0.9089
             * DDM   ***** Preserved *****

 248         KK  R1112W
 249         KM         ROUTE COMBINED HYDROGRAPHS HC11 THROUGH S12W - CONTINUATION OF PYRITE
 250         KM         WASH DOWNSTREAM OF CONFLUENCE WITH WAGON WASH
 251         RS       1    FLOW      -1
 252         RC     .07    .036     .07    1501    .019
 253         RX    1000    1030    1065    1150    1240    1330    1375    1410
 254         RY    1422    1420    1410    1410    1410    1412    1414    1428
             *  BASIN S12W - SUBBASIN TRIBUTARY FOR PYRITE WASH AND SKYLINE WASH
             * DDM   ***** Updated *****

 255         KK    S12W
 256         KM   BASIN S12W
 257         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 258         KM    L=         .7  Lca=        .2   S=  153.6  Kn= .030  LAG=   8.2
 259         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 260         BA     .09
 261         LG     .15     .25    3.91     .55   18.00
 262         UI     68.    246.    330.    189.    123.     79.     47.     31.     19.     11.
 263         UI      7.      7.      0.      0.      0.      0.      0.      0.      0.      0.
 264         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

 265         KK   HC12W
 266         KM         COMBINE HYDROGRAPH R1112W WITH HYDROGRAPH S12W - CONFLUENCE OF SKYLINE
 267         KM         WASH WITH PYRITE WASH
 268         HC       2  0.9994
             * DDM   ***** Preserved *****

 269         KK    HC12
 270         KM         COMBINE ROUTED HYDROGRAPH HC12W AND HC12E
 271         KM         CONFLUENCE OF SKYLINE WASH AND PYRITE WASH
 272         HC       2  3.7538
             * DDM   ***** Preserved *****

 273         KK  R12-13
 274         KM         ROUTE COMBINED HYDROGRAPHS HC12 THROUGH S13 - SKYLINE WASH
 275         RS       1    FLOW      -1
 276         RC     .07    .036     .07    1854    .017
 277         RX    1000    1080    1110    1320    1370    1420    1500    1550
 278         RY    1400    1392    1384    1382    1382    1380    1380    1400
             *  BASIN S13 - SKYLINE WASH DOWNSTREAM OF CONFLUENCE OF PYRITE WASH
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 279           KK     S13
 280           KM   BASIN S13
 281           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 282           KM    L=        .9  Lca=        .3   S=  174.2  Kn= .030  LAG=  10.1
 283           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 284           BA     .17
 285           LG     .15     .25    3.88     .56    4.00
 286           UI     82.    312.    550.    397.    278.    195.    135.     90.     64.     43.
 287           UI     28.     20.     11.     11.     11.      0.      0.      0.      0.      0.
 288           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

 289           KK    HC13
 290           KM         COMBINE ROUTED HYDROGRAPH R12-13 WITH HYDROGRAPH S13 - SKYLINE WASH
 291           HC       2  3.9274
               * KO       3
               *

 292           KK    DB13
 293           KM   DETENTION BASIN AT SKYLINE WASH APEX
 294           RS       1    STOR       0
 295           SV     0.0    15.0    30.0    45.0    60.0    75.0    90.0   105.0   120.0   135.0
 296           SV   150.0   165.0   180.0   195.0
               *
 297           SE  1345.0  1346.0  1347.0  1348.0  1349.0  1350.0  1351.0  1352.0  1353.0  1354.0
 298           SE  1355.0  1356.0  1357.0  1358.0
               *
 299           SQ     0.0    48.5    97.1   176.4   267.6   369.5   476.3   578.0   669.6   752.0
 300           SQ   827.1   896.5   957.9  1018.9
 301           KO       3
               * DDM   ***** Preserved *****

 302           KK    DI13
               * KM       SPLIT FLOW AT HC13; MAIN FLOW TO S24 AND MINOR FLOW TO S14
               * DT  DI24
               * DI       0     201     556    1353    2595    4157
               * DQ       0     201     461     879    1427  2078.5
 303           KM         SPLIT FLOW AT DB13; ALL FLOW TO S27 AND NONE TO S14
 304           DT    DI27
 305           DI       0     200     500    1000    2500    4000
 306           DQ       0     200     500    1000    2500    4000
               * DDM   ***** Preserved *****

 307           KK   RDI13
 308           KM         ROUTE HYDROGRAPH DI13 THROUGH S14 -SKYLINE WASH DOWNSTREAM OF SPLIT
 309           RS       1    FLOW      -1
 310           RC     .07    .036     .07    4353    .021
 311           RX    1000    1025    1270    1280    1320    1330    1370    1385
 312           RY    1360    1354    1354    1356    1356    1358    1358    1360
               *  BASIN S14 - BEGINNING OF COYOTE WASH
               * DDM   ***** Updated *****
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 313           KK     S14
 314           KM   BASIN S14
 315           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 316           KM    L=       1.2  Lca=        .6   S=  340.7  Kn= .030  LAG=  12.4
 317           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 318           BA     .49
 319           LG     .15     .25    3.91     .55   11.00
 320           UI    144.    562.    962.   1341.    822.    640.    487.    343.    270.    185.
 321           UI    145.    101.     72.     65.     31.     25.     25.     25.     25.      0.
 322           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 323           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

 324           KK    HC14
 325           KM         COMBINE ROUTED HYDROGRAPH R13-14 WITH HYDROGRAPH S14 - SPLIT FLOW FROM
 326           KM         SKYLINE WASH AND COYOTE WASH SUBBASIN
 327           HC       2  4.4139
               * DDM   ***** Preserved *****

 328           KK  R1416S
               * KM       ROUTE COMBINED HYDROGRAPHS HC14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
 329           KM         ROUTE HYDROGRAPH S14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
 330           KM         OF CONFLUENCE WITH COYOTE WASH
 331           RS       3    FLOW      -1
 332           RC     .07    .036     .07    3140    .017
 333           RX    1000    1035    1150    1180    1320    1360    1480    1481
 334           RY    1236    1234    1234    1232    1232    1234    1236    1236
               *  BASIN S15 - SUBBASIN IN AREA OF EXISTING A.D.O.T. BORROW PITS
               * DDM   ***** Updated *****

 335           KK     S15
 336           KM   BASIN S15
 337           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 338           KM    L=        .8  Lca=        .3   S=  105.0  Kn= .030  LAG=   9.8
 339           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 340           BA     .11
 341           LG     .15     .27    3.40     .77     .00
 342           UI     56.    213.    370.    246.    176.    120.     84.     54.     37.     25.
 343           UI     19.      9.      7.      7.      7.      0.      0.      0.      0.      0.
 344           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

 345           KK  R1516S
 346           KM         ROUTE HYDROGRAPH S15 THROUGH S16S - SKYLINE WASH DOWNSTREAM OF
 347           KM         CONFLUENCE WITH COYOTE WASH
 348           RS       3    FLOW      -1
 349           RC     .07    .036     .07    2218    .018
 350           RX    1000    1035    1150    1180    1320    1360    1480    1481
 351           RY    1236    1234    1234    1232    1232    1234    1236    1236
               *  BASIN S16S - SUBBASIN AT SKYLINE WASH DOWNSTREAM OF CONFLUENCE WITH COYOTE W.
               * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 352          KK    S16S
 353          KM   BASIN S16S
 354          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 355          KM    L=       .6  Lca=       .3   S=  116.4  Kn= .030  LAG=    9.3
 356          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 357          BA     .17
 358          LG     .15      .25     3.95      .53     6.00
 359          UI    100.     373.     611.     379.     271.     175.     123.      76.      53.      34.
 360          UI     23.      12.      12.      12.       0.       0.       0.       0.       0.       0.
 361          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 362          KK  IHC16S
 363          KM        COMBINE ROUTED HYDROGRAPH R14-16S AND R15-16S WITH HYDROGRAPH S16S
 364          KM        DOWNSTREAM OF CONFLUENCE OF SKYLINE WASH WITH COYOTE WASH
 365          HC        3  4.6952
              *  BASIN S16N - SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

 366          KK    S16N
 367          KM   BASIN S16N
 368          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 369          KM    L=       .9  Lca=       .6   S=  653.2  Kn= .050  LAG=  16.5
 370          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 371          BA     .17
 372          LG     .25      .25     3.95      .53    18.00
 373          UI     34.      90.     189.     256.     366.     238.     189.     158.     129.      98.
 374          UI     80.      66.      48.      39.      32.      26.      19.      16.      15.       6.
 375          UI      6.       6.       6.       6.       6.       0.       0.       0.       0.       0.
 376          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 377          KK  R16N-S
 378          KM        ROUTE HYDROGRAPH S16N THROUGH S16S
 379          RS       4     FLOW      -1
 380          RC     .07     .036      .07     3230     .022
 381          RX    1000     1035     1150     1180     1320     1360     1480     1481
 382          RY    1236     1234     1234     1232     1232     1234     1236     1236
              * DDM   ***** Preserved *****

 383          KK   HC16S
 384          KM        COMBINE ROUTED HYDROGRAPH R16N-S AND IHC16S
 385          KM        SKYLINE WASH DOWNSTREAM OF COYOTE WASH
 386          HC        2  4.8652
              * DDM   ***** Preserved *****

 387          KK   DI16S
 388          KM        SPLIT FLOW AT HC16S; MAIN FLOW TO S17 AND MINOR FLOW TO S22
 389          DT    DI22
 390          DI       0       46      144      344    708.5     1223
 391          DQ       0        0        8       52      153      329
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 392          KK  R16-17
 393          KM       ROUTE HYDROGRAPH DI16S THROUGH S17
 394          RS      4    FLOW      -1
 395          RC     .07    .036     .07    4341    .015
 396          RX    1000    1060    1090    1120    1145    1180    1200    1320
 397          RY    1202    1200  1199.5    1200    1199    1199    1200    1202
              *  BASIN S17 - SUBBASIN OF SKYLINE WASH SOUTH OF MCDOWELL ROAD ON EAST SIDE
              *  OF WATERSHED
              * DDM   ***** Updated *****

 398          KK     S17
 399          KM   BASIN S17
 400          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 401          KM    L=       .9  Lca=       .5   S=  117.9  Kn= .030  LAG=  12.8
 402          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 403          BA     .29
 404          LG     .15     .26    3.60     .67     .00
 405          UI     79.    311.    540.    784.    495.    385.    298.    212.    170.    117.
 406          UI     89.     66.     50.     37.     28.     15.     15.     15.     15.      0.
 407          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 408          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 409          KK    HC17
 410          KM        COMBINE ROUTED HYDROGRAPH R16-17 WITH HYDROGRAPH S17 AT EAST SIDE OF
 411          KM        BUCKEYE F.R.S. NO. 3
 412          HC       2  5.1537
              *  BASIN S18 - BEGINNING OF RATTLER WASH
              * DDM   ***** Updated *****

 413          KK     S18
 414          KM   BASIN S18
 415          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 416          KM    L=       .8  Lca=       .4   S=  292.7  Kn= .040  LAG=  12.9
 417          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 418          BA     .36
 419          LG     .20     .25    3.95     .53   17.00
 420          UI     96.    380.    662.    968.    618.    479.    373.    267.    211.    149.
 421          UI    111.     84.     64.     46.     38.     18.     18.     18.     18.      0.
 422          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 423          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 424          KK  R18-19
 425          KM       ROUTE HYDROGRAPH HC18 THROUGH S19
 426          RS      3    FLOW      -1
 427          RC     .07    .036     .07    4253     .02
 428          RX    1000    1050    1100    1125    1140    1180    1240    1241
 429          RY    1266    1264    1242    1240    1242    1264    1266    1266
              *  BASIN S19 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 430          KK     S19
 431          KM   BASIN S19
 432          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 433          KM    L=      1.2  Lca=       .8   S=  824.8  Kn= .030  LAG=  11.6
 434          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 435          BA     .29
 436          LG     .15     .25    4.00     .52   12.00
 437          UI    102.    389.    662.    802.    483.    372.    266.    195.    138.     99.
 438          UI     72.     51.     41.     22.     16.     16.     16.      0.      0.      0.
 439          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 440          KK    HC19
 441          KM        COMBINE ROUTED HYDROGRAPH R18-19 WITH HYDROGRAPH S19 - RATTLER WASH
 442          HC       2  0.6498
              * DDM   ***** Preserved *****

 443          KK  R19-20
 444          KM        ROUTE COMBINED HYDROGRAPHS HC19 THROUGH S20 - RATTLER WASH
 445          RS      3    FLOW      -1
 446          RC     .07    .036     .07    3740    .022
 447          RX     999    1000    1030    1095    1130    1150    1220    1221
 448          RY    1208    1208    1206    1204    1204    1206    1208    1208
              *  BASIN S20 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****

 449          KK     S20
 450          KM   BASIN S20
 451          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 452          KM    L=       .9  Lca=       .4   S=   84.1  Kn= .030  LAG=  13.0
 453          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 454          BA     .09
 455          LG     .15     .26    3.60     .67    4.00
 456          UI     22.     88.    155.    228.    147.    114.     89.     64.     50.     36.
 457          UI     26.     20.     16.     11.     10.      4.      4.      4.      4.      4.
 458          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 459          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 460          KK    HC20
 461          KM        COMBINE ROUTED HYDROGRAPH R19-20 WITH HYDROGRAPH S20 AT FAR EAST SIDE
 462          KM        OF STUDY AREA NORTH OF BUCKEYE F.R.S. NO. 3
 463          HC       2  0.7344
              *  BASIN S21 - SUBBASIN NORTH OF BUCKEYE F.R.S NO 3 SPILLWAY
              * DDM   ***** Updated *****

 464          KK     S21
 465          KM   BASIN S21
 466          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 467          KM    L=      1.2  Lca=       .6   S=  780.6  Kn= .030  LAG=  11.0
 468          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 469          BA     .62
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470           LG     .15      .25     4.10       .51    10.00
471           UI    245.     927.    1593.     1636.    1019.     766.     522.     392.     260.     190.
```



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

 472          UI    136.      93.      67.      36.      36.      36.       0.       0.       0.       0.
 473          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *  BASIN S22 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
              * DDM   ***** Updated *****

 474          KK     S22
 475          KM   BASIN S22
 476          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 477          KM    L=       1.3  Lca=       .4   S=  110.1  Kn= .029  LAG=  13.7
 478          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 479          BA     .55
 480          LG     .16      .25     3.91      .53     1.00
 481          UI    135.     496.     909.    1351.    1029.     742.     594.     451.     332.     268.
 482          UI    188.     151.     108.      84.      66.      51.      26.      26.      26.      26.
 483          UI     26.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 484          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 485          KK    DI22
 486          KM          RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S22
 487          DR    DI22
              * DDM   ***** Preserved *****

 488          KK   RDI22
 489          KM          ROUTE HYDROGRAPH DI22 THROUGH S22 - PORTION OF DIVERT OF SKYLINE WASH
 490          RS       6     FLOW       -1
 491          RC     .07     .036      .07     4253     .015
 492          RX     997      998      999     1000     1060     1210     1300     1300
 493          RY    1217     1216     1216     1215     1215     1216     1216     1217
              * DDM   ***** Preserved *****

 494          KK    HC22
 495          KM          COMBINE HYDROGRAPHS AT HC22
 496          HC       2  5.4141
              *  BASIN S23 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
              * DDM   ***** Updated *****

 497          KK     S23
 498          KM   BASIN S23
 499          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 500          KM    L=       1.6  Lca=       .5   S=  112.1  Kn= .028  LAG=  15.2
 501          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 502          BA     .49
 503          LG     .17      .26     3.50      .70     2.00
 504          UI    108.     331.     660.     901.    1086.     670.     547.     446.     338.     263.
 505          UI    217.     155.     125.      98.      81.      53.      53.      31.      21.      21.
 506          UI     21.      21.      21.       0.       0.       0.       0.       0.       0.       0.
 507          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *  BASIN S24 - SUBBASIN DOWNSTREAM OF SKYLINE WASH SPLIT FLOW
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 508          KK     S24
 509          KM   BASIN S24
 510          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 511          KM    L=      2.4  Lca=      1.2   S=  113.8  Kn= .037  LAG=  32.2
 512          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 513          BA     .32
 514          LG     .20     .25    4.00     .51    1.00
 515          UI     33.     33.     66.    117.    171.    211.    242.    273.    350.    361.
 516          UI    241.    206.    189.    172.    157.    142.    129.    111.     96.     84.
 517          UI     78.     73.     65.     54.     45.     42.     37.     36.     30.     25.
 518          UI     25.     22.     16.     16.     16.     16.     13.      6.      6.      6.
 519          UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      0.
 520          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 521          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
              * KK  DI24
              * KM       RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S24
              * DR  DI24
              * DDM   ***** Preserved *****
              * KK RDI24
              * KM       ROUTE HYDROGRAPH DI24 THROUGH S24
              * RS     5    FLOW      -1
              * RC   .07    .036     .07    9929     .02
              * RX  1000    1045    1060    1080    1100    1120    1155    1220
              * RY  1222    1220    1218    1218    1216    1216    1220    1220
              * DDM   ***** Preserved *****
              * KK  HC24
              * KM       COMBINE HYDROGRAPHS AT HC24
              * HC     2  4.2443
              *  BASIN S25 - UPSTREAM END OF SMALL WATERSHED EAST OF PROSPECT WASH
              * DDM   ***** Updated *****

 522          KK     S25
 523          KM   BASIN S25
 524          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 525          KM    L=       .7  Lca=       .3   S=  103.0  Kn= .030  LAG=  10.0
 526          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 527          BA     .03
 528          LG     .15     .25    4.15     .49     .00
 529          UI     13.     50.     87.     61.     43.     30.     21.     14.     10.      7.
 530          UI      4.      3.      2.      2.      2.      0.      0.      0.      0.      0.
 531          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 532          KK  R25-26
 533          KM         ROUTE HYDROGRAPH S25 THROUGH S26 CROSSING NEAR THE INTERSECTION OF
 534          KM         WATSON ROAD AND MCDOWELL ROAD
 535          RS      8    FLOW      -1
 536          RC     .07    .036     .07    6571     .02
 537          RX    1000    1045    1060    1080    1100    1120    1155    1220
 538          RY    1222    1220    1218    1218    1216    1216    1220    1220
              *  BASIN S26 - SUBBASIN ON THE LOWER WEST SIDE OF STUDY AREA
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 539          KK     S26
 540          KM   BASIN S26
 541          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 542          KM    L=      1.2  Lca=        .5   S=  119.7  Kn= .029  LAG=  13.8
 543          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 544          BA     .21
 545          LG     .16     .25    4.20     .47    1.00
 546          UI     52.    187.    347.    513.    403.    286.    230.    177.    129.    105.
 547          UI     74.     59.     43.     33.     25.     21.     10.     10.     10.     10.
 548          UI     10.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 549          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 550          KK    HC26
 551          KM          COMBINE ROUTED HYDROGRAPH R25-26 WITH HYDROGRAPH S26
 552          KM          AT WEST SIDE OF WATERSHED NORTH OF BUCKEYE F.R.S. NO. 3
 553          HC        2  0.2377
              *  BASIN S27 - BEGINNING OF PROSPECT WASH
              * DDM   ***** Updated *****

 554          KK     S27
 555          KM   BASIN S27
 556          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 557          KM    L=      1.4  Lca=        .5   S=  345.2  Kn= .030  LAG=  12.6
 558          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 559          BA     .51
 560          LG     .15     .25    4.00     .52   16.00
 561          UI    146.    575.    989.   1411.    878.    682.    524.    370.    295.    201.
 562          UI    157.    111.     82.     67.     41.     26.     26.     26.     26.      0.
 563          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 564          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 565          KK    DI27
 566          KM          RETURN DIVERTED HYDROGRAPH FROM DI27 DOWNSTREAM OF DB13 TO ROUTE
 567          KM          AND COMBINE WITH S27
 568          DR    DI27
              * DDM   ***** Preserved *****

 569          KK   RDI27
 570          KM          ROUTE HYDROGRAPH DI27 THROUGH S27
 571          RS       1    FLOW      -1
 572          RC     .07    .040     .07    1200     .02
 573          RX    1000    1050    1100    1120    1145    1165    1215    1265
 574          RY    1222    1221    1221    1216    1216    1221    1221    1222
              * DDM   ***** Preserved *****

 575          KK    HC27
 576          KM          COMBINE HYDROGRAPHS AT HC27
 577          HC        2  4.4343
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 578          KK  R27-28
 579          KM          ROUTE HYDROGRAPH S27 THROUGH S28
 580          RS       1    FLOW      -1
 581          RC     .07    .036     .07    2482    .022
 582          RX    1000    1060    1090    1100    1120    1130    1160    1230
 583          RY    1250    1248    1240    1238    1238    1240    1242    1250
              *  BASIN S28 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****

 584          KK     S28
 585          KM   BASIN S28
 586          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 587          KM    L=       .4  Lca=        .2   S=  120.0  Kn= .028  LAG=   6.2
 588          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 589          BA     .04
 590          LG     .17     .25    4.15     .48    2.00
 591          UI     55.    180.    114.     65.     36.     19.     11.      4.      4.      0.
 592          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 593          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 594          KK    HC28
 595          KM          COMBINE ROUTED HYDROGRAPH R27-28 WITH HYDROGRAPH S28 - PROSPECT WASH
 596          KM          AT WATSON ROAD CROSSING
 597          HC        2  0.5526
              * DDM   ***** Preserved *****

 598          KK  R28-29
 599          KM          ROUTE COMBINED HYDROGRAPHS HC28 THROUGH S29
 600          RS       2    FLOW      -1
 601          RC     .07    .036     .07    3804   .0184
 602          RX    1000    1000    1110    1125    1165    1170    1250    1251
 603          RY    1192    1192    1190    1188    1188    1190    1192    1192
              *  BASIN S29 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****

 604          KK     S29
 605          KM   BASIN S29
 606          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 607          KM    L=       .7  Lca=        .3   S=  102.9  Kn= .030  LAG=   9.4
 608          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 609          BA     .10
 610          LG     .15     .25    4.15     .49     .00
 611          UI     55.    207.    343.    215.    154.    101.     71.     44.     31.     20.
 612          UI     14.      7.      7.      7.      0.      0.      0.      0.      0.      0.
 613          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 614          KK    HC29
 615          KM          COMBINE ROUTED HYDROGRAPH R28-29 WITH HYDROGRAPH S29 - PROSPECT WASH
 616          KM          AT BUCKEYE F.R.S. NO 3
 617          HC        2  0.6515
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* DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 618          KK  HCBES3
 619          KM        COMBINE ALL HYDROGRAPHS AT BUCKEYE FRS-3
 620          HC       8  8.7485
 621          ZZ
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1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING         (--->) DIVERSION OR PUMP FLOW

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

   36      S1
            .
            .
   47       .          S2
            .           .
            .           .
   58     HC2............
            V
            V
   61     R2-3
            .
            .
   67       .          S3
            .           .
            .           .
   79     HC3............
            V
            V
   83     R3-4
            .
            .
   89       .          S4
            .           .
            .           .
  100     HC4............
            V
            V
  104     R4-7
            .
            .
  110       .          S7
            .           .
            .           .
  121    IHC7............
            .
            .
  125       .          S5
            .           V
            .           V
  137       .         R5-6
            .           .
            .           .
  143       .           .          S6
            .           .           .
            .           .           .
  153       .          HC6............
            .           .
            .           .
  157     HC7............
            V

            V
  161    R7-12E
            .
            .
  167       .          S12E
            .           .
            .           .
  177   HC12E............
            .
            .
  181       .           S8
            .           V
            .           V
  192       .          R8-9
            .           .
            .           .
  198       .           .          S9
            .           .           .
            .           .           .
  209       .          HC9............
            .           V
            .           V
  213       .         R9-11
            .           .
            .           .
  219       .           .          S11
            .           .           .
            .           .           .
  229       .        IHC11............
            .           .
            .           .
  233       .           .          S10
            .           .           .
            .           .           .
  244       .         HC11............
            .           V
            .           V
  248       .        R1112W
            .           .
            .           .
  255       .           .          S12W
            .           .           .
            .           .           .
  265       .        HC12W............
            .           .
            .           .
  269    HC12............
            V
            V
  273    R12-13
            .
            .
  279       .          S13
            .           .
            .           .
  289    HC13............
            V
            V
  292    DB13
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            .
            .
304         .------->  DI27
302      DI13
            V
            V
307     RDI13
            .
            .
313         .       S14
            .         .
            .         .
324      HC14..........
            V
            V
328    R1416S
            .
            .
335         .       S15
            .         V
            .         V
345         .    R1516S
            .         .
            .         .
352         .         .      S16S
            .         .         .
            .         .         .
362    IHC16S....................
            .
            .
366         .      S16N
            .         V
            .         V
377         .    R16N-S
            .         .
            .         .
383     HC16S..........
            .
            .
389         .------->  DI22
387     DI16S
            V
            V
392    R16-17
            .
            .
398         .       S17
            .         .
            .         .
409      HC17..........
            .
            .
413         .       S18
            .         V
            .         V
424         .    R18-19
            .         .
            .         .
430         .         .       S19
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            .         .         .
            .         .         .
440         .      HC19..........
            .         V
            .         V
443         .    R19-20
            .         .
            .         .
449         .         .       S20
            .         .         .
            .         .         .
460         .      HC20..........
            .         .
            .         .
464         .         .       S21
            .         .         .
            .         .         .
474         .         .         .       S22
            .         .         .         .
            .         .         .         .
487         .         .         .         .         .<-------  DI22
485         .         .         .         .      DI22
            .         .         .         .         V
            .         .         .         .         V
488         .         .         .         .     RDI22
            .         .         .         .         .
            .         .         .         .         .
494         .         .         .      HC22..........
            .         .         .         .
            .         .         .         .
497         .         .         .         .       S23
            .         .         .         .         .
            .         .         .         .         .
508         .         .         .         .         .       S24
            .         .         .         .         .         .
            .         .         .         .         .         .
522         .         .         .         .         .         .       S25
            .         .         .         .         .         .         V
            .         .         .         .         .         .         V
532         .         .         .         .         .         .    R25-26
            .         .         .         .         .         .         .
            .         .         .         .         .         .         .
539         .         .         .         .         .         .         .       S26
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .
550         .         .         .         .         .         .      HC26..........
            .         .         .         .         .         .         .
            .         .         .         .         .         .         .
554         .         .         .         .         .         .         .       S27
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .
568         .         .         .         .         .         .         .         .         .<-------  DI27
565         .         .         .         .         .         .         .         .      DI27
            .         .         .         .         .         .         .         .         V
            .         .         .         .         .         .         .         .         V
569         .         .         .         .         .         .         .         .     RDI27
            .         .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .         .
575         .         .         .         .         .         .         .      HC27..........
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                 .          .          .          .          .          .          .          V
                                                                                               V
578              .          .          .          .          .          .          .      R27-28
                 .          .          .          .          .          .          .          .
584              .          .          .          .          .          .          .          .         S28
                 .          .          .          .          .          .          .          .           .
594              .          .          .          .          .          .          .       HC28............
                 .          .          .          .          .          .          .          V
                                                                                               V
598              .          .          .          .          .          .          .      R28-29
                 .          .          .          .          .          .          .          .
604              .          .          .          .          .          .          .          .         S29
                 .          .          .          .          .          .          .          .           .
614              .          .          .          .          .          .          .       HC29............
                 .          .          .          .          .          .          .          .
618          HCBES3...............................................................................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
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1***************************************                      ***************************************
*                                      *                      *                                     *
*  FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                      *   U.S. ARMY CORPS OF ENGINEERS      *
*             JUN   1998               *                      *   HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1                *                      *         609 SECOND STREET           *
*                                      *                      *      DAVIS, CALIFORNIA 95616        *
* RUN DATE   10SEP12  TIME  11:04:05   *                      *          (916) 756-1104             *
*                                      *                      *                                     *
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                                    SKYLINE WASH AND TRIBUTARIES
                                    FLOODPLAIN DELINEATION STUDY
                                    FCD 96-08

                                    HEC-1

                                    DATE:   8-19-98
                                    STORM:  100-YR 24-HOUR STORM
                                    FILE NAME:  SKYLINE.DAT

                                    FILE NAME CHANGED TO SL3-3.DAT (SKYLINE DCR PHASE 3 ALTERNATIVE 3)

                               DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA

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

     IT         HYDROGRAPH TIME DATA
                       NMIN           3  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         500  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2    0  ENDING DATE
                     NDTIME        0057  ENDING TIME
                      ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL      .05 HOURS
                       TOTAL TIME BASE    24.95 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

  17 JD         INDEX STORM NO. 1
                       STRM        3.97  PRECIPITATION DEPTH
                       TRDA         .01  TRANSPOSITION DRAINAGE AREA
```

18 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

28 JD INDEX STORM NO. 2

STRM 3.77 PRECIPITATION DEPTH

TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

29 JD INDEX STORM NO. 3

STRM 3.57 PRECIPITATION DEPTH

TRDA 30.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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30 JD INDEX STORM NO. 4
STRM 3.45 PRECIPITATION DEPTH
TRDA 60.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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31 JD INDEX STORM NO. 5
STRM 3.38 PRECIPITATION DEPTH
TRDA 90.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

32 JD INDEX STORM NO. 6

STRM 3.34 PRECIPITATION DEPTH

TRDA 120.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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33 JD INDEX STORM NO. 7

STRM 3.30 PRECIPITATION DEPTH

TRDA 150.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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34 JD INDEX STORM NO. 8

STRM 3.20 PRECIPITATION DEPTH

TRDA 300.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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35 JD INDEX STORM NO. 9

STRM 3.11 PRECIPITATION DEPTH

TRDA 500.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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              *            *
292 KK        *    DB13    *
              *            *
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301 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

294 RS          STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                      ITYP        STOR  TYPE OF INITIAL CONDITION
                     RSVRIC        .00  INITIAL CONDITION
                          X        .00 WORKING R AND D COEFFICIENT

295 SV            STORAGE         .0      15.0      30.0      45.0      60.0      75.0      90.0     105.0     120.0     135.0
                               150.0     165.0     180.0     195.0

297 SE          ELEVATION    1345.00   1346.00   1347.00   1348.00   1349.00   1350.00   1351.00   1352.00   1353.00   1354.00
                             1355.00   1356.00   1357.00   1358.00

299 SQ          DISCHARGE         0.       49.       97.      176.      268.      370.      476.      578.      670.      752.
                                827.      897.      958.     1019.

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

                      HYDROGRAPH AT STATION     DB13
                    TRANSPOSITION AREA       .0 SQ MI

 PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR      24.95-HR
+  (CFS)       (HR)
                         (CFS)
+    966.     12.90                   490.         151.        145.         145.
                      (INCHES)       1.160        1.427       1.427        1.427
                       (AC-FT)        243.         299.        299.         299.

PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR       72-HR      24.95-HR
+ (AC-FT)      (HR)
     182.     12.90                    96.          33.         31.          31.

 PEAK STAGE    TIME                         MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR       72-HR      24.95-HR
+  (FEET)      (HR)
  1357.13     12.90                1351.37      1347.17     1347.08      1347.08

                        CUMULATIVE AREA =     3.93 SQ MI

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HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 10.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 908.	12.90		452.	140.	135.	135.
		(INCHES)	1.071	1.324	1.324	1.324
		(AC-FT)	224.	277.	277.	277.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (AC-FT)	(HR)				
168.	12.90	89.	30.	29.	29.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)				
1356.19	12.90	1350.91	1347.03	1346.95	1346.95

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 30.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 845.	12.90		414.	129.	124.	124.
		(INCHES)	.981	1.221	1.221	1.221
		(AC-FT)	205.	256.	256.	256.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (AC-FT)	(HR)				
154.	12.90	82.	28.	27.	27.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)				
1355.26	12.90	1350.46	1346.89	1346.82	1346.82

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 60.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 805.	12.90		391.	122.	118.	118.
		(INCHES)	.926	1.159	1.159	1.159
		(AC-FT)	194.	243.	243.	243.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (AC-FT)	(HR)				
146.	12.90	78.	27.	26.	26.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)				
1354.70	12.90	1350.20	1346.81	1346.74	1346.74

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 90.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 780.	12.90		378.	119.	114.	114.
		(INCHES)	.894	1.122	1.123	1.123
		(AC-FT)	187.	235.	235.	235.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (AC-FT)	(HR)				
141.	12.90	76.	26.	25.	25.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)				
1354.38	12.90	1350.05	1346.76	1346.69	1346.69

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 120.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 766.	12.90		370.	116.	112.	112.
		(INCHES)	.876	1.102	1.102	1.102
		(AC-FT)	183.	231.	231.	231.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	24.95-HR

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+  (AC-FT)     (HR)
     138.      12.90                74.         26.         25.          25.

   PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                  6-HR       24-HR       72-HR      24.95-HR
+   (FEET)      (HR)
   1354.19      12.90             1349.96     1346.73     1346.67     1346.67

                        CUMULATIVE AREA =    3.93 SQ MI

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

                         HYDROGRAPH AT STATION      DB13
                       TRANSPOSITION AREA    150.0 SQ MI

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR      24.95-HR
+   (CFS)       (HR)
                         (CFS)
+     753.      12.95             362.        114.        110.         110.
                       (INCHES)    .857       1.081       1.081        1.081
                        (AC-FT)    180.        226.        226.         226.

  PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                  6-HR       24-HR       72-HR      24.95-HR
+  (AC-FT)     (HR)
     135.      12.95                73.         26.         25.          25.

   PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                  6-HR       24-HR       72-HR      24.95-HR
+   (FEET)      (HR)
   1354.01      12.95             1349.88     1346.70     1346.64     1346.64

                        CUMULATIVE AREA =    3.93 SQ MI

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

                         HYDROGRAPH AT STATION      DB13
                       TRANSPOSITION AREA    300.0 SQ MI

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR      24.95-HR
+   (CFS)       (HR)
                         (CFS)
+     715.      12.95             343.        109.        104.         104.
                       (INCHES)    .811       1.028       1.028        1.028
                        (AC-FT)    170.        215.        215.         215.

  PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                  6-HR       24-HR       72-HR      24.95-HR
+  (AC-FT)     (HR)
     128.      12.95                70.         25.         24.          24.

   PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                  6-HR       24-HR       72-HR      24.95-HR
+   (FEET)      (HR)
   1353.55      12.95             1349.67     1346.64     1346.58     1346.58
```

```
                        CUMULATIVE AREA =    3.93 SQ MI

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

                         HYDROGRAPH AT STATION      DB13
                       TRANSPOSITION AREA    500.0 SQ MI

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR      24.95-HR
+   (CFS)       (HR)
                         (CFS)
+     681.      12.95             325.        104.        100.         100.
                       (INCHES)    .770        .981        .981         .981
                        (AC-FT)    161.        205.        205.         205.

  PEAK STORAGE   TIME                          MAXIMUM AVERAGE STORAGE
                                  6-HR       24-HR       72-HR      24.95-HR
+  (AC-FT)     (HR)
     122.      12.95                67.         24.         23.          23.

   PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                  6-HR       24-HR       72-HR      24.95-HR
+   (FEET)      (HR)
   1353.14      12.95             1349.47     1346.58     1346.52     1346.52

                        CUMULATIVE AREA =    3.93 SQ MI

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

                     INTERPOLATED HYDROGRAPH AT      DB13

   PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                  6-HR       24-HR       72-HR      24.95-HR
+   (CFS)       (HR)
                         (CFS)
+     916.      12.90             458.        141.        136.         136.
                       (INCHES)   1.083       1.338       1.338        1.338
                        (AC-FT)    227.        280.        280.         280.

                        CUMULATIVE AREA =    3.93 SQ MI
```

1

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S1	728.	12.10	70.	20.	19.	.51		
+	HYDROGRAPH AT	S2	324.	12.10	30.	9.	8.	.22		
+	2 COMBINED AT	HC2	1045.	12.10	100.	29.	28.	.73		
+	ROUTED TO	R2-3	998.	12.15	100.	29.	28.	.73		
+	HYDROGRAPH AT	S3	792.	12.15	84.	23.	23.	.65		
+	2 COMBINED AT	HC3	1777.	12.15	182.	52.	50.	1.38		
+	ROUTED TO	R3-4	1692.	12.20	182.	52.	50.	1.38		
+	HYDROGRAPH AT	S4	584.	12.10	53.	15.	14.	.41		
+	2 COMBINED AT	HC4	2175.	12.20	233.	66.	64.	1.79		
+	ROUTED TO	R4-7	2132.	12.20	233.	66.	64.	1.79		
+	HYDROGRAPH AT	S7	220.	12.05	17.	5.	5.	.13		
+	2 COMBINED AT	IHC7	2261.	12.20	250.	71.	68.	1.92		
+	HYDROGRAPH AT	S5	680.	12.15	75.	22.	21.	.53		
+	ROUTED TO	R5-6	655.	12.20	75.	22.	21.	.53		
+	HYDROGRAPH AT	S6	412.	12.05	33.	9.	9.	.25		
+	2 COMBINED AT	HC6	965.	12.15	107.	31.	30.	.78		
+	2 COMBINED AT	HC7	3133.	12.20	355.	101.	98.	2.70		
+	ROUTED TO	R7-12E	3028.	12.25	355.	101.	98.	2.70		
+	HYDROGRAPH AT	S12E	110.	12.00	8.	2.	2.	.05		
+	2 COMBINED AT	HC12E	3049.	12.25	362.	103.	100.	2.75		
+	HYDROGRAPH AT	S8	552.	12.05	48.	14.	14.	.34		
+	ROUTED TO	R8-9	542.	12.10	48.	14.	14.	.34		
+	HYDROGRAPH AT	S9	309.	12.10	29.	8.	8.	.21		
+	2 COMBINED AT	HC9	846.	12.10	76.	22.	21.	.55		
+	ROUTED TO	R9-11	720.	12.25	76.	22.	21.	.55		
+	HYDROGRAPH AT	S11	314.	12.05	21.	6.	6.	.17		
+	2 COMBINED AT	IHC11	803.	12.20	97.	28.	27.	.72		
+	HYDROGRAPH AT	S10	303.	12.10	27.	8.	7.	.19		
+	2 COMBINED AT	HC11	1036.	12.15	123.	35.	34.	.91		
+	ROUTED TO	R1112W	989.	12.25	123.	35.	34.	.91		
+	HYDROGRAPH AT	S12W	176.	12.00	13.	4.	4.	.09		
+	2 COMBINED AT	HC12W	1045.	12.20	135.	39.	38.	1.00		
+	2 COMBINED AT	HC12	4045.	12.25	494.	142.	136.	3.75		
+	ROUTED TO	R12-13	3913.	12.30	494.	142.	136.	3.75		
+	HYDROGRAPH AT	S13	303.	12.05	19.	5.	5.	.17		
+	2 COMBINED AT	HC13	3973.	12.30	512.	146.	141.	3.93		

	ROUTED TO							
+		DB13	916.	12.90	458.	141.	136.	3.93
	DIVERSION TO							
+		DI27	916.	12.90	458.	141.	136.	3.93
	HYDROGRAPH AT							
+		DI13	0.	.00	0.	0.	0.	3.93
	ROUTED TO							
+		RDI13	0.	.00	0.	0.	0.	3.93
	HYDROGRAPH AT							
+		S14	787.	12.05	61.	17.	16.	.49
	2 COMBINED AT							
+		HC14	769.	12.05	59.	16.	16.	4.41
	ROUTED TO							
+		R1416S	685.	12.20	59.	16.	16.	4.41
	HYDROGRAPH AT							
+		S15	175.	12.05	10.	2.	2.	.11
	ROUTED TO							
+		R1516S	137.	12.20	10.	2.	2.	.11
	HYDROGRAPH AT							
+		S16S	321.	12.05	21.	5.	5.	.17
	3 COMBINED AT							
+		IHC16S	970.	12.15	88.	24.	23.	4.70
	HYDROGRAPH AT							
+		S16N	239.	12.10	23.	7.	6.	.17
	ROUTED TO							
+		R16N-S	204.	12.30	23.	7.	6.	.17
	2 COMBINED AT							
+		HC16S	1093.	12.20	110.	30.	29.	4.87
	DIVERSION TO							
+		DI22	285.	12.20	20.	5.	5.	4.87
	HYDROGRAPH AT							
+		DI16S	809.	12.20	90.	25.	24.	4.87
	ROUTED TO							
+		R16-17	695.	12.40	90.	25.	24.	4.87
	HYDROGRAPH AT							
+		S17	414.	12.05	27.	7.	7.	.29
	2 COMBINED AT							
+		HC17	773.	12.35	116.	32.	31.	5.15
	HYDROGRAPH AT							
+		S18	585.	12.05	49.	14.	14.	.36
	ROUTED TO							
+		R18-19	530.	12.20	49.	14.	14.	.36
	HYDROGRAPH AT							
+		S19	499.	12.05	37.	10.	10.	.29
	2 COMBINED AT							
+		HC19	928.	12.10	86.	24.	23.	.65
	ROUTED TO							
+		R19-20	851.	12.25	86.	24.	23.	.65
	HYDROGRAPH AT							
+		S20	125.	12.05	9.	2.	2.	.09
	2 COMBINED AT							
+		HC20	923.	12.20	94.	27.	26.	.73
	HYDROGRAPH AT							
+		S21	1075.	12.05	77.	21.	20.	.62
	HYDROGRAPH AT							
+		S22	815.	12.10	59.	15.	14.	.55
	HYDROGRAPH AT							
+		DI22	285.	12.20	20.	5.	5.	4.87
	ROUTED TO							
+		RDI22	214.	12.50	20.	5.	5.	4.87
	2 COMBINED AT							
+		HC22	815.	12.10	79.	20.	19.	5.41
	HYDROGRAPH AT							
+		S23	629.	12.10	47.	12.	11.	.49
	HYDROGRAPH AT							
+		S24	274.	12.30	34.	9.	8.	.32
	HYDROGRAPH AT							
+		S25	49.	12.05	3.	1.	1.	.03
	ROUTED TO							
+		R25-26	29.	12.45	3.	1.	1.	.03
	HYDROGRAPH AT							
+		S26	325.	12.10	24.	6.	6.	.21
	2 COMBINED AT							
+		HC26	326.	12.10	27.	7.	6.	.24
	HYDROGRAPH AT							
+		S27	852.	12.05	70.	20.	19.	.51
	HYDROGRAPH AT							
+		DI27	916.	12.90	458.	141.	136.	3.93

+	ROUTED TO	RDI27	916.	12.95	457.	141.	136.	3.93
+	2 COMBINED AT	HC27	941.	12.10	517.	160.	154.	4.43
+	ROUTED TO	R27-28	939.	12.90	517.	160.	154.	4.43
+	HYDROGRAPH AT	S28	80.	12.00	4.	1.	1.	.04
+	2 COMBINED AT	HC28	957.	12.90	533.	165.	159.	.55
+	ROUTED TO	R28-29	954.	13.00	532.	164.	158.	.55
+	HYDROGRAPH AT	S29	181.	12.05	11.	3.	3.	.10
+	2 COMBINED AT	HC29	971.	12.20	541.	167.	160.	.65
+	8 COMBINED AT	HCBES3	4937.	12.10	979.	285.	274.	8.75

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

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*             VERSION 4.1               *
*                                       *
* RUN DATE   10SEP12  TIME  11:04:05    *
*                                       *
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***************************************
*                                     *
*   U.S. ARMY CORPS OF ENGINEERS      *
*   HYDROLOGIC ENGINEERING CENTER     *
*        609 SECOND STREET            *
*     DAVIS, CALIFORNIA 95616         *
*        (916) 756-1104               *
*                                     *
***************************************
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X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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


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

   1       ID          SKYLINE WASH AND TRIBUTARIES
   2       ID          FLOODPLAIN DELINEATION STUDY
   3       ID          FCD 96-08
   4       ID
   5       ID          HEC-1
   6       ID
   7       ID          DATE:   8-19-98
   8       ID          STORM:  100-YR 24-HOUR STORM
   9       ID          FILE NAME:  SKYLINE.DAT
  10       ID
  11       ID          FILE NAME CHANGED TO SL3-3.DAT (SKYLINE DCR PHASE 3 ALTERNATIVE 3)
  12       ID
  13       ID   DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA
          *DIAGRAM
           *
           * REPERFORMED WITH FOLLOWING MODIFICATIONS - JULY 2012, SEI
           * NOAA ATLAS 14 POINT RAINFALL DEPTH USED
           * DEPTH-AREA REDUCTION FACTOR UPDATED
           * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
           * OTHER MINOR MODIFICATIONS MADE
           *
           * REPERFORMED WITH FOLLOWING MODIFICATIONS - SEPTEMBER 2012, SEI
           * DETENTION BASIN DB13 ADDED TO SKYLINE WASH APEX (HC13)
           * 11' X 6' BOX CULVERT - OUTLET OF DETENTION BASIN CALCULATED USING HY8
           * HYDROGRAPH SPLITTED AT DB13 TO DI13 AND DI27
           * 0 HYDROGRAPH DI13 ROUTED TO S14
           * NO HYDROGRAPH ROUTED TO S24
           * DI24, RDI24 AND HC24 DELETED
           * HYDROGRAPH DI27 (PEAK ABOUT 900 CFS) ROUTED TO S27
           * DI27, RDI27 AND HC27 ADDED
           * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
           * OTHER MINOR MODIFICATIONS MADE
           *
  14       IT      3                    500
  15       IN     15
  16       IO      5
  17       JD   3.97    0.01
  18       PC   .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
  19       PC   .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
  20       PC   .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
  21       PC   .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
  22       PC   .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
  23       PC   .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
  24       PC   .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
  25       PC   .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
  26       PC   .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
  27       PC   .983    .986    .989    .992    .995    .998   1.000
  28       JD   3.77   10.00
  29       JD   3.57   30.00
  30       JD   3.45   60.00
  31       JD   3.38   90.00
  32       JD   3.34  120.00
  33       JD   3.30  150.00
```

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JD    3.20  300.00
JD    3.11  500.00
*  BASIN S1 - BEGINNING OF SKYLINE WASH
* DDM   ***** Updated *****
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ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

KK       S1
KM   BASIN S1
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=        1.2  Lca=        .6   S= 1102.5  Kn= .050  LAG=  16.6
KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
BA      .51
LG      .25      .25     3.95      .53    18.00
UI     103.     273.     577.     783.    1122.     746.     585.     489.     400.     306.
UI     248.     206.     151.     123.     102.      79.      60.      51.      48.      20.
UI      20.      20.      20.      20.      20.       0.       0.       0.       0.       0.
UI       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
*  BASIN S2 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
* DDM   ***** Updated *****

KK       S2
KM   BASIN S2
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=         .9  Lca=        .6   S=  916.1  Kn= .050  LAG=  16.0
KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
BA      .22
LG      .25      .25     3.95      .53    18.00
UI      46.     130.     269.     364.     496.     310.     251.     207.     166.     124.
UI     105.      82.      60.      51.      38.      32.      23.      23.      12.       9.
UI       9.       9.       9.       9.       0.       0.       0.       0.       0.       0.
UI       0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
* DDM   ***** Preserved *****

KK      HC2
KM         COMBINE HYDROGRAPHS FROM S1 AND S2 - UPSTREAM PORTION OF SKYLINE WASH
HC        2  0.7296
* DDM   ***** Preserved *****

KK     R2-3
KM         ROUTE HYDROGRAPH HC2 THROUGH S3 - SKYLINE WASH
RS        1     FLOW       -1
RC      .07     .036      .07     2930     .029
RX     1000     1030     1100     1120     1130     1190     1220     1250
RY     1626     1624     1594     1594     1596     1624     1626     1625
*  BASIN S3 - MAIN SUBBASIN FOR GRANITE FALLS WASH
* DDM   ***** Updated *****

KK       S3
KM   BASIN S3
KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
KM    L=        1.5  Lca=       1.0   S=  481.0  Kn= .040  LAG=  21.0
KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
BA      .65
LG      .20      .25     4.00      .52    13.00
UI     104.     180.     422.     652.     797.    1088.     945.     652.     567.     492.
UI     420.     348.     274.     245.     212.     164.     133.     115.      99.      80.
UI      70.      51.      51.      49.      20.      20.      20.      20.      20.      20.
UI      20.      20.       0.       0.       0.       0.       0.       0.       0.       0.
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 78         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 79         KK     HC3
 80         KM        COMBINE HYDROGRAPH R2-3 WITH HYDROGRAPH FROM S3 - CONFLUENCE OF SKYLINE
 81         KM        WASH AND GRANITE FALLS WASH
 82         HC       2  1.3787
            * DDM   ***** Preserved *****

 83         KK    R3-4
 84         KM        ROUTE COMBINED HYDROGRAPHS HC3 THROUGH S4 - SKYLINE WASH
 85         RS       1    FLOW      -1
 86         RC     .07    .036     .07    2927    .032
 87         RX    1000    1030    1085    1160    1200    1240    1250    1275
 88         RY    1520    1518    1496    1496    1498    1516    1518    1520
            *  BASIN S4 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
            * DDM   ***** Updated *****

 89         KK      S4
 90         KM   BASIN S4
 91         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 92         KM    L=       1.3  Lca=       .6   S=  503.9  Kn= .040  LAG=  16.2
 93         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 94         BA     .41
 95         LG     .20     .25    4.00     .52   13.00
 96         UI     85.    231.    486.    656.    913.    579.    465.    386.    312.    234.
 97         UI    196.    156.    114.     95.     73.     63.     41.     41.     28.     16.
 98         UI     16.     16.     16.     16.      0.      0.      0.      0.      0.      0.
 99         UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

100         KK     HC4
101         KM        COMBINE HYDROGRAPH R3-4 WITH HYDROGRAPH FROM S4 - CONCENTRATION POINT
102         KM        ON SKYLINE WASH.
103         HC       2  1.7864
            * DDM   ***** Preserved *****

104         KK    R4-7
105         KM        ROUTE COMBINED HYDROGRAPHS HC4 THROUGH S7 - SKYLINE WASH
106         RS       1    FLOW      -1
107         RC     .07    .036     .07    2211    .022
108         RX    1000    1025    1055    1120    1145    1180    1240    1370
109         RY    1462    1460    1462    1462    1432    1432    1456    1462
            *  BASIN S7 - TRIBUTARY BASIN TO MOUNTAIN WASH NEAR AT CONFLUENCE WITH SKYLINE
            *   WASH
            * DDM   ***** Updated *****

110         KK      S7
111         KM   BASIN S7
112         KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
113         KM    L=        .9  Lca=       .6   S=  955.3  Kn= .040  LAG=  12.7
114         KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
115         BA     .13
116         LG     .20     .25    4.00     .52   12.00
117         UI     37.    147.    254.    365.    229.    178.    137.     97.     78.     53.
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118          UI     41.     30.     22.     17.     12.      7.      7.      7.      7.      0.
119          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

120          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

121          KK    IHC7
122          KM        COMBINE HYDROGRAPHS R4-7 AND S7 - UPSTREAM OF CONFLUENCE WITH MOUNTAIN
123          KM        WASH
124          HC       2  1.9208
             *  BASIN S5 - BEGINNING OF MOUNTAIN WASH
             * DDM   ***** Updated *****

125          KK      S5
126          KM   BASIN S5
127          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
128          KM    L=       1.4  Lca=        .7   S=  654.8  Kn= .050  LAG=  20.2
129          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
130          BA     .53
131          LG     .25     .25    3.95     .53   20.00
132          UI     89.    164.    385.    573.    705.    988.    689.    532.    459.    396.
133          UI    334.    265.    219.    195.    157.    120.    104.     93.     68.     65.
134          UI     43.     43.     43.     18.     17.     17.     17.     17.     17.     17.
135          UI     17.      0.      0.      0.      0.      0.      0.      0.      0.      0.
136          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

137          KK    R5-6
138          KM        ROUTE HYDROGRAPH S5 THROUGH S6 - MOUNTAIN WASH
139          RS       1    FLOW      -1
140          RC     .07    .036     .07    2494    .030
141          RX    1000    1025    1075    1105    1150    1170    1220    1240
142          RY    1480    1476    1476    1460    1454    1454    1478    1480
             *  BASIN S6 - SUBBASIN TRIBUTARY TO MOUNTAIN WASH
             * DDM   ***** Updated *****

143          KK      S6
144          KM   BASIN S6
145          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
146          KM    L=        .8  Lca=        .4   S=  491.4  Kn= .042  LAG=  12.3
147          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
148          BA     .25
149          LG     .21     .25    4.00     .52   15.00
150          UI     75.    289.    495.    680.    415.    323.    244.    172.    135.     93.
151          UI     71.     52.     35.     33.     13.     13.     13.     13.      0.      0.
152          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

153          KK     HC6
154          KM        COMBINE HYDROGRAPHS R5-6 WITH SUBBASIN S6 - UPSTREAM OF CONFLUENCE WITH
155          KM        SKYLINE WASH
156          HC       2  0.7787
             * DDM   ***** Preserved *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 157        KK     HC7
 158        KM         COMBINE HYDROGRAPHS IHC7 WITH HC6 - CONFLUENCE OF MOUNTAIN WASH WITH
 159        KM         SKYLINE WASH
 160        HC       2  2.6995
            * DDM   ***** Preserved *****

 161        KK  R7-12E
 162        KM         ROUTE COMBINED HYDROGRAPHS AT HC7 THROUGH S12E - SKYLINE WASH
 163        RS       1    FLOW      -1
 164        RC     .07    .036     .07    1930   .0166
 165        RX    1000    1085    1170    1240    1255    1265    1310    1350
 166        RY    1430    1424    1422    1420    1422    1424    1428    1430
            *
            *   BASIN S12E - SUBBASIN TRIBUTARY TO PYRITE WASH AND SKYLINE WASH CONFLUENCE
            * DDM   ***** Updated *****

 167        KK    S12E
 168        KM   BASIN S12E
 169        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 170        KM    L=        .6  Lca=        .2   S=  142.9  Kn= .030  LAG=   7.8
 171        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 172        BA     .05
 173        LG     .15     .25    3.91     .55   18.00
 174        UI     47.    167.    200.    114.     70.     44.     27.     16.     11.      5.
 175        UI      5.      5.      0.      0.      0.      0.      0.      0.      0.      0.
 176        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 177        KK   HC12E
 178        KM         COMBINE HYDROGRAPHS S12E WITH R7-12E - CONFLUENCE OF PYRITE WASH WITH
 179        KM         SKYLINE WASH
 180        HC       2  2.7544
            *  BASIN S8 - BEGINNING OF PYRITE WASH
            * DDM   ***** Updated *****

 181        KK      S8
 182        KM   BASIN S8
 183        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 184        KM    L=        .8  Lca=        .4   S=  692.1  Kn= .050  LAG=  13.0
 185        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 186        BA     .34
 187        LG     .25     .25    3.95     .53   20.00
 188        UI     88.    352.    614.    906.    585.    452.    354.    254.    200.    145.
 189        UI    105.     81.     62.     43.     38.     17.     17.     17.     17.     17.
 190        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 191        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 192        KK    R8-9
 193        KM         ROUTE HYDROGRAPH S8 THROUGH S9 - PYRITE WASH
 194        RS       1    FLOW      -1
 195        RC     .07    .036     .07     911    .013
 196        RX    1000    1020    1050    1065    1080    1125    1185    1190
 197        RY    1518    1518    1494    1492    1494    1494    1520    1524
            *  BASIN S9 - SUBBASIN TRIBUTARY TO PYRITE WASH
            * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 198          KK      S9
 199          KM   BASIN S9
 200          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 201          KM    L=      1.0  Lca=       .7   S=  415.7  Kn= .040  LAG=  15.9
 202          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 203          BA     .21
 204          LG     .20      .25    3.95      .53   17.00
 205          UI     44.     126.     259.     351.     471.     293.     238.     196.     157.     117.
 206          UI     99.      77.      56.      48.      35.      29.      22.      22.      10.       8.
 207          UI      8.       8.       8.       8.       0.       0.       0.       0.       0.       0.
 208          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 209          KK     HC9
 210          KM         COMBINE ROUTED HYDROGRAPH R8-9 WITH HYDROGRAPH S9 - CONCENTRATION POINT
 211          KM         ON PYRITE WASH
 212          HC       2  0.5472
              * DDM   ***** Preserved *****

 213          KK   R9-11
 214          KM         ROUTE COMBINED HYDROGRAPHS HC9 THROUGH S11 - PYRITE WASH
 215          RS       3    FLOW      -1
 216          RC     .07     .036      .07    3462     .023
 217          RX    1000     1080     1090     1120     1140     1290     1340     1375
 218          RY    1496     1494     1492     1472     1471     1472     1490     1494
              *  BASIN S11 -PYRITE WASH UPSTREAM OF CONFLUENCE WITH WAGON WASH
              * DDM   ***** Updated *****

 219          KK     S11
 220          KM   BASIN S11
 221          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 222          KM    L=       .7  Lca=       .3   S=  797.1  Kn= .040  LAG=   9.3
 223          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 224          BA     .17
 225          LG     .20      .25     4.00      .52   11.00
 226          UI     96.     360.     590.     366.     262.     169.     119.      73.      51.      32.
 227          UI     23.      12.      12.      12.       0.       0.       0.       0.       0.       0.
 228          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 229          KK   IHC11
 230          KM         COMBINE ROUTED HYDROGRAPH R9-11 WITH HYDROGRAPHS S11 - UPSTREAM OF
 231          KM         CONFLUENCE WITH WAGON WASH
 232          HC       2  0.7154
              *  BASIN S10 - BEGINNING OF WAGON WASH
              * DDM   ***** Updated *****

 233          KK     S10
 234          KM   BASIN S10
 235          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 236          KM    L=      1.0  Lca=       .5   S=  896.9  Kn= .048  LAG=  14.2
 237          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 238          BA     .19
 239          LG     .24      .25     3.95      .53   18.00
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 LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  240        UI     46.    157.    302.    430.    397.    263.    213.    167.    122.    101.
  241        UI     71.     55.     43.     35.     23.     23.     11.      9.      9.      9.
  242        UI      9.      0.      0.      0.      0.      0.      0.      0.      0.      0.
  243        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

  244        KK    HC11
  245        KM          COMBINE HYDROGRAPH IHC11 WITH HYDROGRAPH S10 - CONFLUENCE OF WAGON WASH
  246        KM          WITH PYRITE WASH
  247        HC       2  0.9089
             * DDM   ***** Preserved *****

  248        KK  R1112W
  249        KM          ROUTE COMBINED HYDROGRAPHS HC11 THROUGH S12W - CONTINUATION OF PYRITE
  250        KM          WASH DOWNSTREAM OF CONFLUENCE WITH WAGON WASH
  251        RS       1    FLOW      -1
  252        RC     .07    .036     .07    1501    .019
  253        RX    1000    1030    1065    1150    1240    1330    1375    1410
  254        RY    1422    1420    1410    1410    1410    1412    1414    1428
             *  BASIN S12W - SUBBASIN TRIBUTARY FOR PYRITE WASH AND SKYLINE WASH
             * DDM   ***** Updated *****

  255        KK    S12W
  256        KM   BASIN S12W
  257        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  258        KM    L=        .7  Lca=        .2   S=  153.6  Kn= .030  LAG=   8.2
  259        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  260        BA     .09
  261        LG     .15     .25    3.91     .55   18.00
  262        UI     68.    246.    330.    189.    123.     79.     47.     31.     19.     11.
  263        UI      7.      7.      0.      0.      0.      0.      0.      0.      0.      0.
  264        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             * DDM   ***** Preserved *****

  265        KK   HC12W
  266        KM          COMBINE HYDROGRAPH R1112W WITH HYDROGRAPH S12W - CONFLUENCE OF SKYLINE
  267        KM          WASH WITH PYRITE WASH
  268        HC       2  0.9994
             * DDM   ***** Preserved *****

  269        KK    HC12
  270        KM          COMBINE ROUTED HYDROGRAPH HC12W AND HC12E
  271        KM          CONFLUENCE OF SKYLINE WASH AND PYRITE WASH
  272        HC       2  3.7538
             * DDM   ***** Preserved *****

  273        KK  R12-13
  274        KM          ROUTE COMBINED HYDROGRAPHS HC12 THROUGH S13 - SKYLINE WASH
  275        RS       1    FLOW      -1
  276        RC     .07    .036     .07    1854    .017
  277        RX    1000    1080    1110    1320    1370    1420    1500    1550
  278        RY    1400    1392    1384    1382    1382    1380    1380    1400
             *  BASIN S13 - SKYLINE WASH DOWNSTREAM OF CONFLUENCE OF PYRITE WASH
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 279          KK     S13
 280          KM   BASIN S13
 281          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 282          KM    L=        .9  Lca=        .3   S=  174.2  Kn= .030  LAG=  10.1
 283          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 284          BA     .17
 285          LG     .15     .25    3.88     .56    4.00
 286          UI     82.    312.    550.    397.    278.    195.    135.     90.     64.     43.
 287          UI     28.     20.     11.     11.     11.      0.      0.      0.      0.      0.
 288          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 289          KK    HC13
 290          KM         COMBINE ROUTED HYDROGRAPH R12-13 WITH HYDROGRAPH S13 - SKYLINE WASH
 291          HC       2  3.9274
              * KO     3
              *

 292          KK    DB13
 293          KM   DETENTION BASIN AT SKYLINE WASH APEX
 294          RS       1    STOR       0
 295          SV     0.0    15.0    30.0    45.0    60.0    75.0    90.0   105.0   120.0   135.0
 296          SV   150.0   165.0   180.0   195.0
              *
 297          SE  1345.0  1346.0  1347.0  1348.0  1349.0  1350.0  1351.0  1352.0  1353.0  1354.0
 298          SE  1355.0  1356.0  1357.0  1358.0
              *
 299          SQ     0.0    48.5    97.1   176.4   267.6   369.5   476.3   578.0   669.6   752.0
 300          SQ   827.1   896.5   957.9  1018.9
 301          KO       3
              * DDM   ***** Preserved *****

 302          KK    DI13
              * KM       SPLIT FLOW AT HC13; MAIN FLOW TO S24 AND MINOR FLOW TO S14
              * DT  DI24
              * DI       0     201     556    1353    2595    4157
              * DQ       0     201     461     879    1427  2078.5
 303          KM         SPLIT FLOW AT DB13; ALL FLOW TO S27 AND NONE TO S14
 304          DT    DI27
 305          DI       0     200     500    1000    2500    4000
 306          DQ       0     200     500    1000    2500    4000
              * DDM   ***** Preserved *****

 307          KK   RDI13
 308          KM         ROUTE HYDROGRAPH DI13 THROUGH S14 -SKYLINE WASH DOWNSTREAM OF SPLIT
 309          RS       1    FLOW      -1
 310          RC     .07    .036     .07    4353    .021
 311          RX    1000    1025    1270    1280    1320    1330    1370    1385
 312          RY    1360    1354    1354    1356    1356    1358    1358    1360
              *  BASIN S14 - BEGINNING OF COYOTE WASH
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 313          KK     S14
 314          KM   BASIN S14
 315          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 316          KM    L=       1.2  Lca=        .6   S=  340.7  Kn= .030  LAG=  12.4
 317          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 318          BA     .49
 319          LG     .15     .25    3.91     .55   11.00
 320          UI    144.    562.    962.   1341.    822.    640.    487.    343.    270.    185.
 321          UI    145.    101.     72.     65.     31.     25.     25.     25.     25.      0.
 322          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 323          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 324          KK    HC14
 325          KM         COMBINE ROUTED HYDROGRAPH R13-14 WITH HYDROGRAPH S14 - SPLIT FLOW FROM
 326          KM         SKYLINE WASH AND COYOTE WASH SUBBASIN
 327          HC       2  4.4139
              * DDM   ***** Preserved *****

 328          KK  R1416S
              * KM       ROUTE COMBINED HYDROGRAPHS HC14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
 329          KM         ROUTE HYDROGRAPH S14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
 330          KM         OF CONFLUENCE WITH COYOTE WASH
 331          RS       3    FLOW      -1
 332          RC     .07    .036     .07    3140    .017
 333          RX    1000    1035    1150    1180    1320    1360    1480    1481
 334          RY    1236    1234    1234    1232    1232    1234    1236    1236
              *  BASIN S15 - SUBBASIN IN AREA OF EXISTING A.D.O.T. BORROW PITS
              * DDM   ***** Updated *****

 335          KK     S15
 336          KM   BASIN S15
 337          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 338          KM    L=        .8  Lca=        .3   S=  105.0  Kn= .030  LAG=   9.8
 339          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 340          BA     .11
 341          LG     .15     .27    3.40     .77     .00
 342          UI     56.    213.    370.    246.    176.    120.     84.     54.     37.     25.
 343          UI     19.      9.      7.      7.      7.      0.      0.      0.      0.      0.
 344          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 345          KK  R1516S
 346          KM         ROUTE HYDROGRAPH S15 THROUGH S16S - SKYLINE WASH DOWNSTREAM OF
 347          KM         CONFLUENCE WITH COYOTE WASH
 348          RS       3    FLOW      -1
 349          RC     .07    .036     .07    2218    .018
 350          RX    1000    1035    1150    1180    1320    1360    1480    1481
 351          RY    1236    1234    1234    1232    1232    1234    1236    1236
              *  BASIN S16S - SUBBASIN AT SKYLINE WASH DOWNSTREAM OF CONFLUENCE WITH COYOTE W.
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 352          KK    S16S
 353          KM   BASIN S16S
 354          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 355          KM    L=        .6  Lca=        .3   S=  116.4  Kn= .030  LAG=   9.3
 356          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 357          BA     .17
 358          LG     .15     .25    3.95     .53    6.00
 359          UI    100.    373.    611.    379.    271.    175.    123.     76.     53.     34.
 360          UI     23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
 361          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 362          KK  IHC16S
 363          KM        COMBINE ROUTED HYDROGRAPH R14-16S AND R15-16S WITH HYDROGRAPH S16S
 364          KM        DOWNSTREAM OF CONFLUENCE OF SKYLINE WASH WITH COYOTE WASH
 365          HC       3  4.6952
              *  BASIN S16N - SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

 366          KK    S16N
 367          KM   BASIN S16N
 368          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 369          KM    L=        .9  Lca=        .6   S=  653.2  Kn= .050  LAG=  16.5
 370          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 371          BA     .17
 372          LG     .25     .25    3.95     .53   18.00
 373          UI     34.     90.    189.    256.    366.    238.    189.    158.    129.     98.
 374          UI     80.     66.     48.     39.     32.     26.     19.     16.     15.      6.
 375          UI      6.      6.      6.      6.      6.      0.      0.      0.      0.      0.
 376          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 377          KK  R16N-S
 378          KM        ROUTE HYDROGRAPH S16N THROUGH S16S
 379          RS       4    FLOW      -1
 380          RC     .07    .036     .07    3230    .022
 381          RX    1000    1035    1150    1180    1320    1360    1480    1481
 382          RY    1236    1234    1234    1232    1232    1234    1236    1236
              * DDM   ***** Preserved *****

 383          KK   HC16S
 384          KM        COMBINE ROUTED HYDROGRAPH R16N-S AND IHC16S
 385          KM        SKYLINE WASH DOWNSTREAM OF COYOTE WASH
 386          HC       2  4.8652
              * DDM   ***** Preserved *****

 387          KK   DI16S
 388          KM        SPLIT FLOW AT HC16S; MAIN FLOW TO S17 AND MINOR FLOW TO S22
 389          DT    DI22
 390          DI       0      46     144     344   708.5    1223
 391          DQ       0       0       8      52     153     329
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 392          KK  R16-17
 393          KM        ROUTE HYDROGRAPH DI16S THROUGH S17
 394          RS       4    FLOW      -1
 395          RC     .07    .036     .07    4341    .015
 396          RX    1000    1060    1090    1120    1145    1180    1200    1320
 397          RY    1202    1200  1199.5    1200    1199    1199    1200    1202
              *  BASIN S17 - SUBBASIN OF SKYLINE WASH SOUTH OF MCDOWELL ROAD ON EAST SIDE
              *  OF WATERSHED
              * DDM   ***** Updated *****

 398          KK     S17
 399          KM   BASIN S17
 400          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 401          KM    L=        .9  Lca=        .5   S=  117.9  Kn= .030  LAG=  12.8
 402          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 403          BA     .29
 404          LG     .15     .26    3.60     .67     .00
 405          UI     79.    311.    540.    784.    495.    385.    298.    212.    170.    117.
 406          UI     89.     66.     50.     37.     28.     15.     15.     15.     15.      0.
 407          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 408          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 409          KK    HC17
 410          KM        COMBINE ROUTED HYDROGRAPH R16-17 WITH HYDROGRAPH S17 AT EAST SIDE OF
 411          KM        BUCKEYE F.R.S. NO. 3
 412          HC       2  5.1537
              *  BASIN S18 - BEGINNING OF RATTLER WASH
              * DDM   ***** Updated *****

 413          KK     S18
 414          KM   BASIN S18
 415          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 416          KM    L=        .8  Lca=        .4   S=  292.7  Kn= .040  LAG=  12.9
 417          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 418          BA     .36
 419          LG     .20     .25    3.95     .53   17.00
 420          UI     96.    380.    662.    968.    618.    479.    373.    267.    211.    149.
 421          UI    111.     84.     64.     46.     38.     18.     18.     18.     18.      0.
 422          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 423          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 424          KK  R18-19
 425          KM        ROUTE HYDROGRAPH HC18 THROUGH S19
 426          RS       3    FLOW      -1
 427          RC     .07    .036     .07    4253     .02
 428          RX    1000    1050    1100    1125    1140    1180    1240    1241
 429          RY    1266    1264    1242    1240    1242    1264    1266    1266
              *  BASIN S19 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 430          KK     S19
 431          KM   BASIN S19
 432          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 433          KM    L=       1.2  Lca=        .8   S=  824.8  Kn= .030  LAG=  11.6
 434          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 435          BA     .29
 436          LG     .15     .25    4.00     .52   12.00
 437          UI    102.    389.    662.    802.    483.    372.    266.    195.    138.     99.
 438          UI     72.     51.     41.     22.     16.     16.     16.      0.      0.      0.
 439          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 440          KK    HC19
 441          KM        COMBINE ROUTED HYDROGRAPH R18-19 WITH HYDROGRAPH S19 - RATTLER WASH
 442          HC       2  0.6498
              * DDM   ***** Preserved *****

 443          KK  R19-20
 444          KM        ROUTE COMBINED HYDROGRAPHS HC19 THROUGH S20 - RATTLER WASH
 445          RS       3    FLOW      -1
 446          RC     .07    .036     .07    3740    .022
 447          RX     999    1000    1030    1095    1130    1150    1220    1221
 448          RY    1208    1208    1206    1204    1204    1206    1208    1208
              *  BASIN S20 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****

 449          KK     S20
 450          KM   BASIN S20
 451          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 452          KM    L=        .9  Lca=        .4   S=   84.1  Kn= .030  LAG=  13.0
 453          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 454          BA     .09
 455          LG     .15     .26    3.60     .67    4.00
 456          UI     22.     88.    155.    228.    147.    114.     89.     64.     50.     36.
 457          UI     26.     20.     16.     11.     10.      4.      4.      4.      4.      4.
 458          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 459          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 460          KK    HC20
 461          KM        COMBINE ROUTED HYDROGRAPH R19-20 WITH HYDROGRAPH S20 AT FAR EAST SIDE
 462          KM        OF STUDY AREA NORTH OF BUCKEYE F.R.S. NO. 3
 463          HC       2  0.7344
              *  BASIN S21 - SUBBASIN NORTH OF BUCKEYE F.R.S NO 3 SPILLWAY
              * DDM   ***** Updated *****

 464          KK     S21
 465          KM   BASIN S21
 466          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 467          KM    L=       1.2  Lca=        .6   S=  780.6  Kn= .030  LAG=  11.0
 468          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 469          BA     .62
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470           LG     .15      .25     4.10      .51    10.00
471           UI    245.     927.    1593.    1636.    1019.     766.     522.     392.     260.     190.
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

472           UI    136.      93.      67.      36.      36.      36.       0.       0.       0.       0.
473           UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *  BASIN S22 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
              * DDM   ***** Updated *****

474           KK      S22
475           KM    BASIN S22
476           KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
477           KM     L=       1.3  Lca=        .4   S=  110.1  Kn= .029  LAG=  13.7
478           KM     PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
479           BA     .55
480           LG     .16      .25     3.91      .53     1.00
481           UI    135.     496.     909.    1351.    1029.     742.     594.     451.     332.     268.
482           UI    188.     151.     108.      84.      66.      51.      26.      26.      26.      26.
483           UI     26.       0.       0.       0.       0.       0.       0.       0.       0.       0.
484           UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

485           KK     DI22
486           KM          RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S22
487           DR     DI22
              * DDM   ***** Preserved *****

488           KK    RDI22
489           KM          ROUTE HYDROGRAPH DI22 THROUGH S22 - PORTION OF DIVERT OF SKYLINE WASH
490           RS       6     FLOW       -1
491           RC     .07     .036      .07     4253     .015
492           RX     997      998      999     1000     1060     1210     1300     1300
493           RY    1217     1216     1216     1215     1215     1216     1216     1217
              * DDM   ***** Preserved *****

494           KK     HC22
495           KM          COMBINE HYDROGRAPHS AT HC22
496           HC       2   5.4141
              *  BASIN S23 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
              * DDM   ***** Updated *****

497           KK      S23
498           KM    BASIN S23
499           KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
500           KM     L=       1.6  Lca=        .5   S=  112.1  Kn= .028  LAG=  15.2
501           KM     PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
502           BA     .49
503           LG     .17      .26     3.50      .70     2.00
504           UI    108.     331.     660.     901.    1086.     670.     547.     446.     338.     263.
505           UI    217.     155.     125.      98.      81.      53.      53.      31.      21.      21.
506           UI     21.      21.      21.       0.       0.       0.       0.       0.       0.       0.
507           UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              *  BASIN S24 - SUBBASIN DOWNSTREAM OF SKYLINE WASH SPLIT FLOW
              * DDM   ***** Updated *****
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* DDM   ***** Updated *****


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

  508           KK     S24
  509           KM   BASIN S24
  510           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  511           KM    L=      2.4  Lca=      1.2   S=  113.8  Kn= .037  LAG=  32.2
  512           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  513           BA     .32
  514           LG     .20     .25    4.00     .51    1.00
  515           UI     33.     33.     66.    117.    171.    211.    242.    273.    350.    361.
  516           UI    241.    206.    189.    172.    157.    142.    129.    111.     96.     84.
  517           UI     78.     73.     65.     54.     45.     42.     37.     36.     30.     25.
  518           UI     25.     22.     16.     16.     16.     16.     13.      6.      6.      6.
  519           UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      0.
  520           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
  521           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                * DDM   ***** Preserved *****
                * KK  DI24
                * KM      RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S24
                * DR  DI24
                * DDM   ***** Preserved *****
                * KK RDI24
                * KM      ROUTE HYDROGRAPH DI24 THROUGH S24
                * RS     5    FLOW      -1
                * RC   .07    .036     .07    9929     .02
                * RX  1000    1045    1060    1080    1100    1120    1155    1220
                * RY  1222    1220    1218    1218    1216    1216    1220    1220
                * DDM   ***** Preserved *****
                * KK  HC24
                * KM      COMBINE HYDROGRAPHS AT HC24
                * HC     2  4.2443
                *  BASIN S25 - UPSTREAM END OF SMALL WATERSHED EAST OF PROSPECT WASH
                * DDM   ***** Updated *****

  522           KK     S25
  523           KM   BASIN S25
  524           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  525           KM    L=       .7  Lca=       .3   S=  103.0  Kn= .030  LAG=  10.0
  526           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  527           BA     .03
  528           LG     .15     .25    4.15     .49     .00
  529           UI     13.     50.     87.     61.     43.     30.     21.     14.     10.      7.
  530           UI      4.      3.      2.      2.      2.      0.      0.      0.      0.      0.
  531           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                * DDM   ***** Preserved *****

  532           KK  R25-26
  533           KM        ROUTE HYDROGRAPH S25 THROUGH S26 CROSSING NEAR THE INTERSECTION OF
  534           KM        WATSON ROAD AND MCDOWELL ROAD
  535           RS       8    FLOW      -1
  536           RC     .07    .036     .07    6571     .02
  537           RX    1000    1045    1060    1080    1100    1120    1155    1220
  538           RY    1222    1220    1218    1218    1216    1216    1220    1220
                *  BASIN S26 - SUBBASIN ON THE LOWER WEST SIDE OF STUDY AREA
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LINE     ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 539     KK    S26
 540     KM   BASIN S26
 541     KM   THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 542     KM   L=      1.2  Lca=       .5   S=  119.7  Kn= .029  LAG=  13.8
 543     KM   PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 544     BA    .21
 545     LG    .16     .25    4.20     .47    1.00
 546     UI    52.    187.    347.    513.    403.    286.    230.    177.    129.    105.
 547     UI    74.     59.     43.     33.     25.     21.     10.     10.     10.     10.
 548     UI    10.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 549     UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
         * DDM   ***** Preserved *****

 550     KK    HC26
 551     KM         COMBINE ROUTED HYDROGRAPH R25-26 WITH HYDROGRAPH S26
 552     KM         AT WEST SIDE OF WATERSHED NORTH OF BUCKEYE F.R.S. NO. 3
 553     HC       2  0.2377
         *  BASIN S27 - BEGINNING OF PROSPECT WASH
         * DDM   ***** Updated *****

 554     KK    S27
 555     KM   BASIN S27
 556     KM   THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 557     KM   L=      1.4  Lca=       .5   S=  345.2  Kn= .030  LAG=  12.6
 558     KM   PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 559     BA    .51
 560     LG    .15     .25    4.00     .52   16.00
 561     UI   146.    575.    989.   1411.    878.    682.    524.    370.    295.    201.
 562     UI   157.    111.     82.     67.     41.     26.     26.     26.     26.      0.
 563     UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 564     UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
         * DDM   ***** Preserved *****

 565     KK    DI27
 566     KM         RETURN DIVERTED HYDROGRAPH FROM DI27 DOWNSTREAM OF DB13 TO ROUTE
 567     KM         AND COMBINE WITH S27
 568     DR    DI27
         * DDM   ***** Preserved *****

 569     KK   RDI27
 570     KM         ROUTE HYDROGRAPH DI27 THROUGH S27
 571     RS       1    FLOW      -1
 572     RC     .07    .040     .07    1200     .02
 573     RX    1000    1050    1100    1120    1145    1165    1215    1265
 574     RY    1222    1221    1221    1216    1216    1221    1221    1222
         * DDM   ***** Preserved *****

 575     KK    HC27
 576     KM         COMBINE HYDROGRAPHS AT HC27
 577     HC       2  4.4343
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LINE     ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 578     KK  R27-28
 579     KM         ROUTE HYDROGRAPH S27 THROUGH S28
 580     RS       1    FLOW      -1
 581     RC     .07    .036     .07    2482    .022
 582     RX    1000    1060    1090    1100    1120    1130    1160    1230
 583     RY    1250    1248    1240    1238    1238    1240    1242    1250
         *  BASIN S28 - SUBBASIN OF PROSPECT WASH
         * DDM   ***** Updated *****

 584     KK    S28
 585     KM   BASIN S28
 586     KM   THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 587     KM   L=       .4  Lca=       .2   S=  120.0  Kn= .028  LAG=   6.2
 588     KM   PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 589     BA    .04
 590     LG    .17     .25    4.15     .48    2.00
 591     UI    55.    180.    114.     65.     36.     19.     11.      4.      4.      0.
 592     UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 593     UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
         * DDM   ***** Preserved *****

 594     KK    HC28
 595     KM         COMBINE ROUTED HYDROGRAPH R27-28 WITH HYDROGRAPH S28 - PROSPECT WASH
 596     KM         AT WATSON ROAD CROSSING
 597     HC       2  0.5526
         * DDM   ***** Preserved *****

 598     KK  R28-29
 599     KM         ROUTE COMBINED HYDROGRAPHS HC28 THROUGH S29
 600     RS       2    FLOW      -1
 601     RC     .07    .036     .07    3804   .0184
 602     RX    1000    1000    1110    1125    1165    1170    1250    1251
 603     RY    1192    1192    1190    1188    1188    1190    1192    1192
         *  BASIN S29 - SUBBASIN OF PROSPECT WASH
         * DDM   ***** Updated *****

 604     KK    S29
 605     KM   BASIN S29
 606     KM   THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 607     KM   L=       .7  Lca=       .3   S=  102.9  Kn= .030  LAG=   9.4
 608     KM   PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 609     BA    .10
 610     LG    .15     .25    4.15     .49     .00
 611     UI    55.    207.    343.    215.    154.    101.     71.     44.     31.     20.
 612     UI    14.      7.      7.      7.      0.      0.      0.      0.      0.      0.
 613     UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
         * DDM   ***** Preserved *****

 614     KK    HC29
 615     KM         COMBINE ROUTED HYDROGRAPH R28-29 WITH HYDROGRAPH S29 - PROSPECT WASH
 616     KM         AT BUCKEYE F.R.S. NO 3
 617     HC       2  0.6515
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*
* DDM   ***** Preserved *****


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

 618      KK  HCBES3
 619      KM         COMBINE ALL HYDROGRAPHS AT BUCKEYE FRS-3
 620      HC       8  8.7485
 621      ZZ
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1
               SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   36        S1
             .
   47        .          S2
             .          .
   58       HC2..........
             V
             V
   61       R2-3
             .
   67        .          S3
             .          .
   79       HC3..........
             V
             V
   83       R3-4
             .
   89        .          S4
             .          .
  100       HC4..........
             V
             V
  104       R4-7
             .
  110        .          S7
             .          .
  121       IHC7.........
             .
  125        .          S5
             .          V
             .          V
  137        .         R5-6
             .          .
  143        .          .          S6
             .          .          .
  153        .         HC6..........
             .          .
  157       HC7..........
             V

             V
  161     R7-12E
             .
  167        .         S12E
             .          .
  177     HC12E..........
             .
  181        .          S8
             .          V
             .          V
  192        .         R8-9
             .          .
  198        .          .          S9
             .          .          .
  209        .         HC9..........
             .          V
             .          V
  213        .         R9-11
             .          .
  219        .          .          S11
             .          .          .
  229        .        IHC11.........
             .          .
  233        .          .          S10
             .          .          .
  244        .         HC11.........
             .          V
             .          V
  248        .        R1112W
             .          .
  255        .          .          S12W
             .          .          .
  265        .        HC12W.........
             .          .
  269       HC12.........
             V
             V
  273     R12-13
             .
  279        .          S13
             .          .
  289       HC13.........
             V
             V
  292       DB13
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            .
            .
304         .------->    DI27
302      DI13
            V
            V
307     RDI13
            .
            .
313         .       S14
            .         .
            .         .
324      HC14..........
            V
            V
328    R1416S
            .
            .
335         .       S15
            .         V
            .         V
345         .    R1516S
            .         .
            .         .
352         .         .      S16S
            .         .         .
            .         .         .
362    IHC16S....................
            .
            .
366         .      S16N
            .         V
            .         V
377         .    R16N-S
            .         .
            .         .
383     HC16S..........
            .
            .
389         .------->    DI22
387     DI16S
            V
            V
392    R16-17
            .
            .
398         .       S17
            .         .
            .         .
409      HC17..........
            .
            .
413         .       S18
            .         V
            .         V
424         .    R18-19
            .         .
            .         .
430         .         .       S19
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            .         .         .
            .         .         .
440         .      HC19..........
            .         V
            .         V
443         .    R19-20
            .         .
            .         .
449         .         .       S20
            .         .         .
            .         .         .
460         .      HC20..........
            .         .
            .         .
464         .         .       S21
            .         .         .
            .         .         .
474         .         .         .       S22
            .         .         .         .
            .         .         .         .
487         .         .         .         .         .<-------    DI22
485         .         .         .         .      DI22
            .         .         .         .         V
            .         .         .         .         V
488         .         .         .         .     RDI22
            .         .         .         .         .
            .         .         .         .         .
494         .         .         .      HC22..........
            .         .         .         .
            .         .         .         .
497         .         .         .         .       S23
            .         .         .         .         .
            .         .         .         .         .
508         .         .         .         .         .       S24
            .         .         .         .         .         .
            .         .         .         .         .         .
522         .         .         .         .         .         .       S25
            .         .         .         .         .         .         V
            .         .         .         .         .         .         V
532         .         .         .         .         .         .    R25-26
            .         .         .         .         .         .         .
            .         .         .         .         .         .         .
539         .         .         .         .         .         .         .       S26
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .
550         .         .         .         .         .         .      HC26..........
            .         .         .         .         .         .         .
            .         .         .         .         .         .         .
554         .         .         .         .         .         .         .       S27
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .
568         .         .         .         .         .         .         .         .         .<-------    DI27
565         .         .         .         .         .         .         .         .      DI27
            .         .         .         .         .         .         .         .         V
            .         .         .         .         .         .         .         .         V
569         .         .         .         .         .         .         .         .     RDI27
            .         .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .         .
575         .         .         .         .         .         .         .      HC27..........
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                .         .         .         .         .         .         .         V
                .         .         .         .         .         .         .         V
 578            .         .         .         .         .         .         .     R27-28
                .         .         .         .         .         .         .         .
 584            .         .         .         .         .         .         .         .         S28
                .         .         .         .         .         .         .         .          .
                .         .         .         .         .         .         .         .          .
 594            .         .         .         .         .         .         .       HC28............
                .         .         .         .         .         .         .         V
                .         .         .         .         .         .         .         V
 598            .         .         .         .         .         .         .     R28-29
                .         .         .         .         .         .         .         .
 604            .         .         .         .         .         .         .         .         S29
                .         .         .         .         .         .         .         .          .
                .         .         .         .         .         .         .         .          .
 614            .         .         .         .         .         .         .       HC29............
                .         .         .         .         .         .         .         .
                .         .         .         .         .         .         .         .
 618        HCBES3.........................................................................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
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1***************************************                         **************************************
*                                      *                         *                                    *
*  FLOOD HYDROGRAPH PACKAGE   (HEC-1)  *                         *   U.S. ARMY CORPS OF ENGINEERS     *
*           JUN   1998                 *                         *   HYDROLOGIC ENGINEERING CENTER    *
*         VERSION 4.1                  *                         *         609 SECOND STREET          *
*                                      *                         *      DAVIS, CALIFORNIA 95616       *
*  RUN DATE   10SEP12  TIME  11:04:05  *                         *          (916) 756-1104            *
*                                      *                         *                                    *
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                                   SKYLINE WASH AND TRIBUTARIES
                                   FLOODPLAIN DELINEATION STUDY
                                   FCD 96-08

                                   HEC-1

                                   DATE:   8-19-98
                                   STORM:  100-YR 24-HOUR STORM
                                   FILE NAME:  SKYLINE.DAT

                                   FILE NAME CHANGED TO SL3-3.DAT (SKYLINE DCR PHASE 3 ALTERNATIVE 3)

                              DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA

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

     IT          HYDROGRAPH TIME DATA
                        NMIN            3  MINUTES IN COMPUTATION INTERVAL
                       IDATE      1     0  STARTING DATE
                       ITIME         0000  STARTING TIME
                          NQ          500  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE      2     0  ENDING DATE
                      NDTIME         0057  ENDING TIME
                       ICENT           19  CENTURY MARK

                   COMPUTATION INTERVAL     .05 HOURS
                        TOTAL TIME BASE   24.95 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

  17 JD           INDEX STORM NO. 1
                        STRM         3.97  PRECIPITATION DEPTH
                        TRDA          .01  TRANSPOSITION DRAINAGE AREA
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18 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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28 JD INDEX STORM NO. 2

STRM 3.77 PRECIPITATION DEPTH

TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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29 JD INDEX STORM NO. 3

STRM 3.57 PRECIPITATION DEPTH

TRDA 30.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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30 JD INDEX STORM NO. 4
STRM 3.45 PRECIPITATION DEPTH
TRDA 60.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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31 JD INDEX STORM NO. 5
STRM 3.38 PRECIPITATION DEPTH
TRDA 90.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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32 JD INDEX STORM NO. 6

STRM 3.34 PRECIPITATION DEPTH

TRDA 120.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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33 JD INDEX STORM NO. 7

STRM 3.30 PRECIPITATION DEPTH

TRDA 150.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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34 JD        INDEX STORM NO. 8
                   STRM        3.20  PRECIPITATION DEPTH
                   TRDA      300.00  TRANSPOSITION DRAINAGE AREA

 0 PI            PRECIPITATION PATTERN
          .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
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          .02     .02     .02     .02     .02     .06     .06     .06     .06     .06
          .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
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35 JD        INDEX STORM NO. 9
                   STRM        3.11  PRECIPITATION DEPTH
                   TRDA      500.00  TRANSPOSITION DRAINAGE AREA

 0 PI            PRECIPITATION PATTERN
          .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
          .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
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          .02     .02     .02     .02     .02     .06     .06     .06     .06     .06
          .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
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             *            *
292 KK       *    DB13    *
             *            *
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301 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

294 RS          STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC        .00  INITIAL CONDITION
                          X        .00 WORKING R AND D COEFFICIENT

295 SV            STORAGE          .0      15.0     30.0     45.0     60.0     75.0     90.0    105.0    120.0    135.0
                                150.0     165.0    180.0    195.0

297 SE          ELEVATION     1345.00   1346.00  1347.00  1348.00  1349.00  1350.00  1351.00  1352.00  1353.00  1354.00
                              1355.00   1356.00  1357.00  1358.00

299 SQ          DISCHARGE          0.       49.      97.     176.     268.     370.     476.     578.     670.     752.
                                 827.      897.     958.    1019.

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

                      HYDROGRAPH AT STATION     DB13
                    TRANSPOSITION AREA        .0 SQ MI

 PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                       6-HR       24-HR       72-HR     24.95-HR
+   (CFS)       (HR)
                           (CFS)
+     966.     12.90                   490.        151.        145.        145.
                        (INCHES)      1.160       1.427       1.427       1.427
                         (AC-FT)       243.        299.        299.        299.

 PEAK STORAGE  TIME                         MAXIMUM AVERAGE STORAGE
                                       6-HR       24-HR       72-HR     24.95-HR
+  (AC-FT)      (HR)
      182.     12.90                    96.         33.         31.         31.

 PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                       6-HR       24-HR       72-HR     24.95-HR
+   (FEET)      (HR)
   1357.13     12.90                1351.37     1347.17     1347.08     1347.08

                        CUMULATIVE AREA =     3.93 SQ MI

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                    HYDROGRAPH AT STATION     DB13
                  TRANSPOSITION AREA     10.0 SQ MI

   PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR      24.95-HR
 +   (CFS)       (HR)
                             (CFS)
 +     908.     12.90                452.        140.         135.         135.
                          (INCHES)  1.071       1.324        1.324        1.324
                           (AC-FT)   224.        277.         277.         277.

  PEAK STORAGE   TIME                       MAXIMUM AVERAGE STORAGE
                                    6-HR        24-HR        72-HR      24.95-HR
 +  (AC-FT)      (HR)
      168.      12.90                 89.         30.          29.          29.

   PEAK STAGE    TIME                         MAXIMUM AVERAGE STAGE
                                    6-HR        24-HR        72-HR      24.95-HR
 +   (FEET)      (HR)
   1356.19      12.90             1350.91     1347.03      1346.95      1346.95

                         CUMULATIVE AREA =    3.93 SQ MI


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

                    HYDROGRAPH AT STATION     DB13
                  TRANSPOSITION AREA     30.0 SQ MI

   PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR      24.95-HR
 +   (CFS)       (HR)
                             (CFS)
 +     845.     12.90                414.        129.         124.         124.
                          (INCHES)   .981       1.221        1.221        1.221
                           (AC-FT)   205.        256.         256.         256.

  PEAK STORAGE   TIME                       MAXIMUM AVERAGE STORAGE
                                    6-HR        24-HR        72-HR      24.95-HR
 +  (AC-FT)      (HR)
      154.      12.90                 82.         28.          27.          27.

   PEAK STAGE    TIME                         MAXIMUM AVERAGE STAGE
                                    6-HR        24-HR        72-HR      24.95-HR
 +   (FEET)      (HR)
   1355.26      12.90             1350.46     1346.89      1346.82      1346.82

                         CUMULATIVE AREA =    3.93 SQ MI


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

                    HYDROGRAPH AT STATION     DB13
                  TRANSPOSITION AREA     60.0 SQ MI

   PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR      24.95-HR
 +   (CFS)       (HR)
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                             (CFS)
 +     805.     12.90                391.        122.         118.         118.
                          (INCHES)   .926       1.159        1.159        1.159
                           (AC-FT)   194.        243.         243.         243.

  PEAK STORAGE   TIME                       MAXIMUM AVERAGE STORAGE
                                    6-HR        24-HR        72-HR      24.95-HR
 +  (AC-FT)      (HR)
      146.      12.90                 78.         27.          26.          26.

   PEAK STAGE    TIME                         MAXIMUM AVERAGE STAGE
                                    6-HR        24-HR        72-HR      24.95-HR
 +   (FEET)      (HR)
   1354.70      12.90             1350.20     1346.81      1346.74      1346.74

                         CUMULATIVE AREA =    3.93 SQ MI


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

                    HYDROGRAPH AT STATION     DB13
                  TRANSPOSITION AREA     90.0 SQ MI

   PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR      24.95-HR
 +   (CFS)       (HR)
                             (CFS)
 +     780.     12.90                378.        119.         114.         114.
                          (INCHES)   .894       1.122        1.123        1.123
                           (AC-FT)   187.        235.         235.         235.

  PEAK STORAGE   TIME                       MAXIMUM AVERAGE STORAGE
                                    6-HR        24-HR        72-HR      24.95-HR
 +  (AC-FT)      (HR)
      141.      12.90                 76.         26.          25.          25.

   PEAK STAGE    TIME                         MAXIMUM AVERAGE STAGE
                                    6-HR        24-HR        72-HR      24.95-HR
 +   (FEET)      (HR)
   1354.38      12.90             1350.05     1346.76      1346.69      1346.69

                         CUMULATIVE AREA =    3.93 SQ MI


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

                    HYDROGRAPH AT STATION     DB13
                  TRANSPOSITION AREA    120.0 SQ MI

   PEAK FLOW     TIME                         MAXIMUM AVERAGE FLOW
                                    6-HR        24-HR        72-HR      24.95-HR
 +   (CFS)       (HR)
                             (CFS)
 +     766.     12.90                370.        116.         112.         112.
                          (INCHES)   .876       1.102        1.102        1.102
                           (AC-FT)   183.        231.         231.         231.

  PEAK STORAGE   TIME                       MAXIMUM AVERAGE STORAGE
                                    6-HR        24-HR        72-HR      24.95-HR
```

			MAXIMUM AVERAGE STORAGE			
+ (AC-FT)	(HR)					
138.	12.90		74.	26.	25.	25.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)					
1354.19	12.90		1349.96	1346.73	1346.67	1346.67

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 150.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 753.	12.95		362.	114.	110.	110.
		(INCHES)	.857	1.081	1.081	1.081
		(AC-FT)	180.	226.	226.	226.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.95-HR
+ (AC-FT)	(HR)					
135.	12.95		73.	26.	25.	25.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)					
1354.01	12.95		1349.88	1346.70	1346.64	1346.64

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 300.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 715.	12.95		343.	109.	104.	104.
		(INCHES)	.811	1.028	1.028	1.028
		(AC-FT)	170.	215.	215.	215.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.95-HR
+ (AC-FT)	(HR)					
128.	12.95		70.	25.	24.	24.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)					
1353.55	12.95		1349.67	1346.64	1346.58	1346.58

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 500.0 SQ MI

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 681.	12.95		325.	104.	100.	100.
		(INCHES)	.770	.981	.981	.981
		(AC-FT)	161.	205.	205.	205.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.95-HR
+ (AC-FT)	(HR)					
122.	12.95		67.	24.	23.	23.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)					
1353.14	12.95		1349.47	1346.58	1346.52	1346.52

CUMULATIVE AREA = 3.93 SQ MI

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

INTERPOLATED HYDROGRAPH AT DB13

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	24.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 916.	12.90		458.	141.	136.	136.
		(INCHES)	1.083	1.338	1.338	1.338
		(AC-FT)	227.	280.	280.	280.

CUMULATIVE AREA = 3.93 SQ MI

1

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

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	S1	728.	12.10	70.	20.	19.	.51		
HYDROGRAPH AT	S2	324.	12.10	30.	9.	8.	.22		
2 COMBINED AT	HC2	1045.	12.10	100.	29.	28.	.73		
ROUTED TO	R2-3	998.	12.15	100.	29.	28.	.73		
HYDROGRAPH AT	S3	792.	12.15	84.	23.	23.	.65		
2 COMBINED AT	HC3	1777.	12.15	182.	52.	50.	1.38		
ROUTED TO	R3-4	1692.	12.20	182.	52.	50.	1.38		
HYDROGRAPH AT	S4	584.	12.10	53.	15.	14.	.41		
2 COMBINED AT	HC4	2175.	12.20	233.	66.	64.	1.79		
ROUTED TO	R4-7	2132.	12.20	233.	66.	64.	1.79		
HYDROGRAPH AT	S7	220.	12.05	17.	5.	5.	.13		
2 COMBINED AT	IHC7	2261.	12.20	250.	71.	68.	1.92		
HYDROGRAPH AT	S5	680.	12.15	75.	22.	21.	.53		
ROUTED TO	R5-6	655.	12.20	75.	22.	21.	.53		
HYDROGRAPH AT	S6	412.	12.05	33.	9.	9.	.25		
2 COMBINED AT	HC6	965.	12.15	107.	31.	30.	.78		
2 COMBINED AT	HC7	3133.	12.20	355.	101.	98.	2.70		
ROUTED TO	R7-12E	3028.	12.25	355.	101.	98.	2.70		
HYDROGRAPH AT	S12E	110.	12.00	8.	2.	2.	.05		
2 COMBINED AT	HC12E	3049.	12.25	362.	103.	100.	2.75		
HYDROGRAPH AT	S8	552.	12.05	48.	14.	14.	.34		
ROUTED TO	R8-9	542.	12.10	48.	14.	14.	.34		
HYDROGRAPH AT	S9	309.	12.10	29.	8.	8.	.21		
2 COMBINED AT	HC9	846.	12.10	76.	22.	21.	.55		
ROUTED TO	R9-11	720.	12.25	76.	22.	21.	.55		
HYDROGRAPH AT	S11	314.	12.05	21.	6.	6.	.17		
2 COMBINED AT	IHC11	803.	12.20	97.	28.	27.	.72		
HYDROGRAPH AT	S10	303.	12.10	27.	8.	7.	.19		
2 COMBINED AT	HC11	1036.	12.15	123.	35.	34.	.91		
ROUTED TO	R1112W	989.	12.25	123.	35.	34.	.91		
HYDROGRAPH AT	S12W	176.	12.00	13.	4.	4.	.09		
2 COMBINED AT	HC12W	1045.	12.20	135.	39.	38.	1.00		
2 COMBINED AT	HC12	4045.	12.25	494.	142.	136.	3.75		
ROUTED TO	R12-13	3913.	12.30	494.	142.	136.	3.75		
HYDROGRAPH AT	S13	303.	12.05	19.	5.	5.	.17		
2 COMBINED AT	HC13	3973.	12.30	512.	146.	141.	3.93		

ROUTED TO								
+		DB13	916.	12.90	458.	141.	136.	3.93
DIVERSION TO								
+		DI27	916.	12.90	458.	141.	136.	3.93
HYDROGRAPH AT								
+		DI13	0.	.00	0.	0.	0.	3.93
ROUTED TO								
+		RDI13	0.	.00	0.	0.	0.	3.93
HYDROGRAPH AT								
+		S14	787.	12.05	61.	17.	16.	.49
2 COMBINED AT								
+		HC14	769.	12.05	59.	16.	16.	4.41
ROUTED TO								
+		R1416S	685.	12.20	59.	16.	16.	4.41
HYDROGRAPH AT								
+		S15	175.	12.05	10.	2.	2.	.11
ROUTED TO								
+		R1516S	137.	12.20	10.	2.	2.	.11
HYDROGRAPH AT								
+		S16S	321.	12.05	21.	5.	5.	.17
3 COMBINED AT								
+		IHC16S	970.	12.15	88.	24.	23.	4.70
HYDROGRAPH AT								
+		S16N	239.	12.10	23.	7.	6.	.17
ROUTED TO								
+		R16N-S	204.	12.30	23.	7.	6.	.17
2 COMBINED AT								
+		HC16S	1093.	12.20	110.	30.	29.	4.87
DIVERSION TO								
+		DI22	285.	12.20	20.	5.	5.	4.87
HYDROGRAPH AT								
+		DI16S	809.	12.20	90.	25.	24.	4.87
ROUTED TO								
+		R16-17	695.	12.40	90.	25.	24.	4.87
HYDROGRAPH AT								
+		S17	414.	12.05	27.	7.	7.	.29
2 COMBINED AT								
+		HC17	773.	12.35	116.	32.	31.	5.15
HYDROGRAPH AT								
+		S18	585.	12.05	49.	14.	14.	.36
ROUTED TO								
+		R18-19	530.	12.20	49.	14.	14.	.36
HYDROGRAPH AT								
+		S19	499.	12.05	37.	10.	10.	.29
2 COMBINED AT								
+		HC19	928.	12.10	86.	24.	23.	.65
ROUTED TO								
+		R19-20	851.	12.25	86.	24.	23.	.65
HYDROGRAPH AT								
+		S20	125.	12.05	9.	2.	2.	.09
2 COMBINED AT								
+		HC20	923.	12.20	94.	27.	26.	.73
HYDROGRAPH AT								
+		S21	1075.	12.05	77.	21.	20.	.62
HYDROGRAPH AT								
+		S22	815.	12.10	59.	15.	14.	.55
HYDROGRAPH AT								
+		DI22	285.	12.20	20.	5.	5.	4.87
ROUTED TO								
+		RDI22	214.	12.50	20.	5.	5.	4.87
2 COMBINED AT								
+		HC22	815.	12.10	79.	20.	19.	5.41
HYDROGRAPH AT								
+		S23	629.	12.10	47.	12.	11.	.49
HYDROGRAPH AT								
+		S24	274.	12.30	34.	9.	8.	.32
HYDROGRAPH AT								
+		S25	49.	12.05	3.	1.	1.	.03
ROUTED TO								
+		R25-26	29.	12.45	3.	1.	1.	.03
HYDROGRAPH AT								
+		S26	325.	12.10	24.	6.	6.	.21
2 COMBINED AT								
+		HC26	326.	12.10	27.	7.	6.	.24
HYDROGRAPH AT								
+		S27	852.	12.05	70.	20.	19.	.51
HYDROGRAPH AT								
+		DI27	916.	12.90	458.	141.	136.	3.93

	ROUTED TO							
+		RDI27	916.	12.95	457.	141.	136.	3.93
	2 COMBINED AT							
+		HC27	941.	12.10	517.	160.	154.	4.43
	ROUTED TO							
+		R27-28	939.	12.90	517.	160.	154.	4.43
	HYDROGRAPH AT							
+		S28	80.	12.00	4.	1.	1.	.04
	2 COMBINED AT							
+		HC28	957.	12.90	533.	165.	159.	.55
	ROUTED TO							
+		R28-29	954.	13.00	532.	164.	158.	.55
	HYDROGRAPH AT							
+		S29	181.	12.05	11.	3.	3.	.10
	2 COMBINED AT							
+		HC29	971.	12.20	541.	167.	160.	.65
	8 COMBINED AT							
+		HCBES3	4937.	12.10	979.	285.	274.	8.75

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

APPENDIX G

Alternative 1A Hydrology Calculations

HydroCAD Model Results	
Head above Invert	42" Culvert Outflow Q
(ft)	(cfs)
0	0
0.4	0
0.8	0
1.2	0.24
1.6	2.32
2	6.23
2.4	11.64
2.8	18.25
3.2	25.8
3.6	34.02
4	42.63
4.4	51.28
4.8	59.53
5.2	66.68
5.6	71.11
6	77.38
6.4	84.77
6.8	91.56
7.2	97.88
7.6	103.82
8	109.43
8.4	114.78
8.8	119.88
9.2	124.77
9.6	129.48
10	133.64
10.4	137.28
10.8	140.83
11.2	144.28
11.6	147.66
12	150.96
12.4	154.19
12.8	157.35
13.2	160.45
13.6	163.49
14	166.48
14.4	169.41
14.8	172.3
15.2	175.13
15.6	177.92
16	180.67

Alternative 1A Basin			
Stage	Storage	Storage	Interpolated Q for HEC-1
(ft)	(CY)	(ac-ft)	(cfs)
1343	104	0	0
1344	18,458	11	0.12
1345	37,980	24	6.23
1346	58,661	36	22.03
1347	80,492	50	42.63
1348	103,464	64	63.11
1349	127,567	79	77.38
1350	152,792	95	94.72
1351	179,132	111	109.43
1352	207,489	129	122.33
1353	236,691	147	133.64
1354	266,746	165	142.56
1355	297,664	185	150.96
1356	329,452	204	158.90
1357	362,120	224	166.48
1358	395,675	245	173.72
1359	430,126	267	180.67

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   03APR13  TIME  10:49:58   *
*                                       *
*****************************************
```

```
***************************************
*                                     *
*   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         SKYLINE WASH AND TRIBUTARIES
   2          ID         FLOODPLAIN DELINEATION STUDY
   3          ID         FCD 96-08
   4          ID
   5          ID         HEC-1
   6          ID
   7          ID         DATE:   8-19-98
   8          ID         STORM:  100-YR 6-HOUR STORM
   9          ID         FILE NAME:  SKYLINE6.DAT
  10          ID
  11          ID         FILE NAME CHANGED TO SL3-1A-6.DAT
  12          ID         (SKYLINE DCR PHASE 3 ALTERNATIVE 1A 6-HOUR STORM)
  13          ID
  14          ID   DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA
              *DIAGRAM
              *
              * REPERFORMED WITH FOLLOWING MODIFICATIONS - JULY 2012, SEI
              * NOAA ATLAS 14 POINT RAINFALL DEPTH USED
              * DEPTH-AREA REDUCTION FACTOR UPDATED
              * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
              * OTHER MINOR MODIFICATIONS MADE
              *
              * REPERFORMED WITH FOLLOWING MODIFICATIONS - FEBRUARY 2012, SEI
              * DETENTION BASIN DB13 ADDED TO SKYLINE WASH APEX (HC13)
              * 48" DIAMETER RCP - LOW FLOW OUTLET OF DETENTION BASIN CALCULATED USING HY8
              * HYDROGRAPH SPLITTED AT DB13 TO DI13 AND DI27
              * 0 HYDROGRAPH DI13 ROUTED TO S14
              * NO HYDROGRAPH ROUTED TO S24
              * DI24, RDI24 AND HC24 DELETED
              * HYDROGRAPH DI27 ROUTED TO S27
              * DI27, RDI27 AND HC27 ADDED
              * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
              * OTHER MINOR MODIFICATIONS MADE
              *
              * REPERFORMED WITH FOLLOWING MODIFICATIONS - FEBRUARY 2013, SEI
              * DETENTION BASIN DB13 MODIFIED BASED ON UPDATED STAGE-STORAGE DATA - BASIN 1A
              * 42" DIAMETER RCP - LOW FLOW OUTLET OF DETENTION BASIN
              * STAGE-OUTFLOW CALCULATED USING HYDROCAD
              * 100% DETENTION BASIN OUTLET HYDROGRAPH ROUTED TO S27 THROUGH DI27
              * (TO PROSPECT WASH)
              * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
              *
  15          IT      3                     300
  16          IN     15
  17          IO      5
  18          JD   2.80    0.01
  19          PC   .000    .008    .016    .025    .033    .041    .050    .058    .066    .074
  20          PC   .087    .099    .118    .138    .216    .377    .834    .911    .931    .950
  21          PC   .962    .972    .983    .991   1.000
  22          JD   2.78    0.50
  23          JD   2.73    2.80
  24          PC   .000    .009    .016    .025    .034    .042    .051    .059    .067    .076
  25          PC   .087    .100    .120    .163    .252    .451    .694    .837    .900    .938
  26          PC   .950    .963    .975    .988   1.000
  27          JD   2.58    16.0
```

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

 28           PC    .000    .015    .020    .030    .048    .063    .076    .090    .105    .119
 29           PC    .135    .152    .175    .222    .304    .472    .670    .796    .868    .912
 30           PC    .946    .960    .973    .987   1.000
 31           JD    2.27    90.0
 32           PC    .000    .021    .035    .051    .071    .087    .105    .125    .143    .160
 33           PC    .179    .201    .232    .281    .364    .500    .658    .773    .841    .888
 34           PC    .927    .945    .964    .982   1.000
 35           JD    2.24   100.0
 36           PC    .000    .024    .043    .059    .078    .098    .119    .141    .162    .186
 37           PC    .212    .239    .271    .321    .408    .515    .627    .735    .814    .864
 38           PC    .907    .930    .954    .977   1.000
              *  BASIN S1 - BEGINNING OF SKYLINE WASH
              * DDM   ***** Updated *****

 39           KK      S1
 40           KM   BASIN S1
 41           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 42           KM    L=       1.2  Lca=        .6   S= 1102.5  Kn= .050  LAG=  16.6
 43           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 44           BA     .51
 45           LG     .25     .25    3.95     .53   18.00
 46           UI    103.    273.    577.    783.   1122.    746.    585.    489.    400.    306.
 47           UI    248.    206.    151.    123.    102.     79.     60.     51.     48.     20.
 48           UI     20.     20.     20.     20.     20.      0.      0.      0.      0.      0.
 49           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *  BASIN S2 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

 50           KK      S2
 51           KM   BASIN S2
 52           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 53           KM    L=        .9  Lca=        .6   S=  916.1  Kn= .050  LAG=  16.0
 54           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 55           BA     .22
 56           LG     .25     .25    3.95     .53   18.00
 57           UI     46.    130.    269.    364.    496.    310.    251.    207.    166.    124.
 58           UI    105.     82.     60.     51.     38.     32.     23.     23.     12.      9.
 59           UI      9.      9.      9.      9.      0.      0.      0.      0.      0.      0.
 60           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 61           KK     HC2
 62           KM         COMBINE HYDROGRAPHS FROM S1 AND S2 - UPSTREAM PORTION OF SKYLINE WASH
 63           HC       2  0.7296
              * DDM   ***** Preserved *****

 64           KK    R2-3
 65           KM         ROUTE HYDROGRAPH HC2 THROUGH S3 - SKYLINE WASH
 66           RS       1    FLOW      -1
 67           RC     .07    .036     .07    2930    .029
 68           RX    1000    1030    1100    1120    1130    1190    1220    1250
 69           RY    1626    1624    1594    1594    1596    1624    1626    1625
              *  BASIN S3 - MAIN SUBBASIN FOR GRANITE FALLS WASH
              * DDM   ***** Updated *****
```



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

 70           KK      S3
 71           KM   BASIN S3
 72           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 73           KM    L=       1.5  Lca=       1.0   S=  481.0  Kn= .040  LAG=  21.0
 74           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 75           BA     .65
 76           LG     .20     .25    4.00     .52   13.00
 77           UI    104.    180.    422.    652.    797.   1088.    945.    652.    567.    492.
 78           UI    420.    348.    274.    245.    212.    164.    133.    115.     99.     80.
 79           UI     70.     51.     51.     49.     20.     20.     20.     20.     20.     20.
 80           UI     20.     20.      0.      0.      0.      0.      0.      0.      0.      0.
 81           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 82           KK     HC3
 83           KM         COMBINE HYDROGRAPH R2-3 WITH HYDROGRAPH FROM S3 - CONFLUENCE OF SKYLINE
 84           KM         WASH AND GRANITE FALLS WASH
 85           HC       2  1.3787
              * DDM   ***** Preserved *****

 86           KK    R3-4
 87           KM         ROUTE COMBINED HYDROGRAPHS HC3 THROUGH S4 - SKYLINE WASH
 88           RS       1    FLOW      -1
 89           RC     .07    .036     .07    2927    .032
 90           RX    1000    1030    1085    1160    1200    1240    1250    1275
 91           RY    1520    1518    1496    1496    1498    1516    1518    1520
              *  BASIN S4 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

 92           KK      S4
 93           KM   BASIN S4
 94           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 95           KM    L=       1.3  Lca=        .6   S=  503.9  Kn= .040  LAG=  16.2
 96           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 97           BA     .41
 98           LG     .20     .25    4.00     .52   13.00
 99           UI     85.    231.    486.    656.    913.    579.    465.    386.    312.    234.
100           UI    196.    156.    114.     95.     73.     63.     41.     41.     28.     16.
101           UI     16.     16.     16.     16.      0.      0.      0.      0.      0.      0.
102           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

103           KK     HC4
104           KM         COMBINE HYDROGRAPH R3-4 WITH HYDROGRAPH FROM S4 - CONCENTRATION POINT
105           KM         ON SKYLINE WASH.
106           HC       2  1.7864
              * DDM   ***** Preserved *****

107           KK    R4-7
108           KM         ROUTE COMBINED HYDROGRAPHS HC4 THROUGH S7 - SKYLINE WASH
109           RS       1    FLOW      -1
110           RC     .07    .036     .07    2211    .022
111           RX    1000    1025    1055    1120    1145    1180    1240    1370
112           RY    1462    1460    1462    1462    1432    1432    1456    1462
              *  BASIN S7 - TRIBUTARY BASIN TO MOUNTAIN WASH NEAR AT CONFLUENCE WITH SKYLINE
              *   WASH
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 113          KK      S7
 114          KM   BASIN S7
 115          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 116          KM    L=        .9  Lca=        .6   S=  955.3  Kn= .040  LAG=  12.7
 117          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 118          BA     .13
 119          LG     .20     .25    4.00     .52   12.00
 120          UI     37.    147.    254.    365.    229.    178.    137.     97.     78.     53.
 121          UI     41.     30.     22.     17.     12.      7.      7.      7.      7.      0.
 122          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 123          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 124          KK    IHC7
 125          KM         COMBINE HYDROGRAPHS R4-7 AND S7 - UPSTREAM OF CONFLUENCE WITH MOUNTAIN
 126          KM         WASH
 127          HC       2  1.9208
              *  BASIN S5 - BEGINNING OF MOUNTAIN WASH
              * DDM   ***** Updated *****

 128          KK      S5
 129          KM   BASIN S5
 130          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 131          KM    L=       1.4  Lca=        .7   S=  654.8  Kn= .050  LAG=  20.2
 132          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 133          BA     .53
 134          LG     .25     .25    3.95     .53   20.00
 135          UI     89.    164.    385.    573.    705.    988.    689.    532.    459.    396.
 136          UI    334.    265.    219.    195.    157.    120.    104.     93.     68.     65.
 137          UI     43.     43.     43.     18.     17.     17.     17.     17.     17.     17.
 138          UI     17.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 139          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 140          KK    R5-6
 141          KM         ROUTE HYDROGRAPH S5 THROUGH S6 - MOUNTAIN WASH
 142          RS       1    FLOW      -1
 143          RC     .07    .036     .07    2494    .030
 144          RX    1000    1025    1075    1105    1150    1170    1220    1240
 145          RY    1480    1476    1476    1460    1454    1454    1478    1480
              *  BASIN S6 - SUBBASIN TRIBUTARY TO MOUNTAIN WASH
              * DDM   ***** Updated *****

 146          KK      S6
 147          KM   BASIN S6
 148          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 149          KM    L=        .8  Lca=        .4   S=  491.4  Kn= .042  LAG=  12.3
 150          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 151          BA     .25
 152          LG     .21     .25    4.00     .52   15.00
 153          UI     75.    289.    495.    680.    415.    323.    244.    172.    135.     93.
 154          UI     71.     52.     35.     33.     13.     13.     13.     13.      0.      0.
 155          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 156          KK     HC6
 157          KM         COMBINE HYDROGRAPHS R5-6 WITH SUBBASIN S6 - UPSTREAM OF CONFLUENCE WITH
 158          KM         SKYLINE WASH
 159          HC       2  0.7787
              * DDM   ***** Preserved *****

 160          KK     HC7
 161          KM         COMBINE HYDROGRAPHS IHC7 WITH HC6 - CONFLUENCE OF MOUNTAIN WASH WITH
 162          KM         SKYLINE WASH
 163          HC       2  2.6995
              * DDM   ***** Preserved *****

 164          KK  R7-12E
 165          KM         ROUTE COMBINED HYDROGRAPHS AT HC7 THROUGH S12E - SKYLINE WASH
 166          RS       1    FLOW      -1
 167          RC     .07    .036     .07    1930   .0166
 168          RX    1000    1085    1170    1240    1255    1265    1310    1350
 169          RY    1430    1424    1422    1420    1422    1424    1428    1430
              *
              *   BASIN S12E - SUBBASIN TRIBUTARY TO PYRITE WASH AND SKYLINE WASH CONFLUENCE
              * DDM   ***** Updated *****

 170          KK    S12E
 171          KM   BASIN S12E
 172          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 173          KM    L=        .6  Lca=        .2   S=  142.9  Kn= .030  LAG=   7.8
 174          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 175          BA     .05
 176          LG     .15     .25    3.91     .55   18.00
 177          UI     47.    167.    200.    114.     70.     44.     27.     16.     11.      5.
 178          UI      5.      5.      0.      0.      0.      0.      0.      0.      0.      0.
 179          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 180          KK   HC12E
 181          KM         COMBINE HYDROGRAPHS S12E WITH R7-12E - CONFLUENCE OF PYRITE WASH WITH
 182          KM         SKYLINE WASH
 183          HC       2  2.7544
              *  BASIN S8 - BEGINNING OF PYRITE WASH
              * DDM   ***** Updated *****

 184          KK      S8
 185          KM   BASIN S8
 186          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 187          KM    L=        .8  Lca=        .4   S=  692.1  Kn= .050  LAG=  13.0
 188          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 189          BA     .34
 190          LG     .25     .25    3.95     .53   20.00
 191          UI     88.    352.    614.    906.    585.    452.    354.    254.    200.    145.
 192          UI    105.     81.     62.     43.     38.     17.     17.     17.     17.     17.
 193          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 194          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 195          KK    R8-9
 196          KM        ROUTE HYDROGRAPH S8 THROUGH S9 - PYRITE WASH
 197          RS       1    FLOW      -1
 198          RC     .07    .036     .07     911    .013
 199          RX    1000    1020    1050    1065    1080    1125    1185    1190
 200          RY    1518    1518    1494    1492    1494    1494    1520    1524
              *  BASIN S9 - SUBBASIN TRIBUTARY TO PYRITE WASH
              * DDM   ***** Updated *****

 201          KK      S9
 202          KM   BASIN S9
 203          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 204          KM    L=      1.0  Lca=       .7   S=  415.7  Kn= .040  LAG=  15.9
 205          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 206          BA     .21
 207          LG     .20     .25    3.95     .53   17.00
 208          UI     44.    126.    259.    351.    471.    293.    238.    196.    157.    117.
 209          UI     99.     77.     56.     48.     35.     29.     22.     22.     10.      8.
 210          UI      8.      8.      8.      8.      0.      0.      0.      0.      0.      0.
 211          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 212          KK     HC9
 213          KM        COMBINE ROUTED HYDROGRAPH R8-9 WITH HYDROGRAPH S9 - CONCENTRATION POINT
 214          KM        ON PYRITE WASH
 215          HC       2  0.5472
              * DDM   ***** Preserved *****

 216          KK   R9-11
 217          KM        ROUTE COMBINED HYDROGRAPHS HC9 THROUGH S11 - PYRITE WASH
 218          RS       3    FLOW      -1
 219          RC     .07    .036     .07    3462    .023
 220          RX    1000    1080    1090    1120    1140    1290    1340    1375
 221          RY    1496    1494    1492    1472    1471    1472    1490    1494
              *  BASIN S11 -PYRITE WASH UPSTREAM OF CONFLUENCE WITH WAGON WASH
              * DDM   ***** Updated *****

 222          KK     S11
 223          KM   BASIN S11
 224          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 225          KM    L=       .7  Lca=       .3   S=  797.1  Kn= .040  LAG=   9.3
 226          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 227          BA     .17
 228          LG     .20     .25    4.00     .52   11.00
 229          UI     96.    360.    590.    366.    262.    169.    119.     73.     51.     32.
 230          UI     23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
 231          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 232          KK   IHC11
 233          KM        COMBINE ROUTED HYDROGRAPH R9-11 WITH HYDROGRAPHS S11 - UPSTREAM OF
 234          KM        CONFLUENCE WITH WAGON WASH
 235          HC       2  0.7154
              *  BASIN S10 - BEGINNING OF WAGON WASH
              * DDM   ***** Updated *****

 236          KK     S10
 237          KM   BASIN S10
 238          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 239          KM    L=      1.0  Lca=       .5   S=  896.9  Kn= .048  LAG=  14.2
 240          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 241          BA     .19
 242          LG     .24     .25    3.95     .53   18.00
 243          UI     46.    157.    302.    430.    397.    263.    213.    167.    122.    101.
 244          UI     71.     55.     43.     35.     23.     23.     11.      9.      9.      9.
 245          UI      9.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 246          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 247          KK    HC11
 248          KM        COMBINE HYDROGRAPH IHC11 WITH HYDROGRAPH S10 - CONFLUENCE OF WAGON WASH
 249          KM        WITH PYRITE WASH
 250          HC       2  0.9089
              * DDM   ***** Preserved *****

 251          KK  R1112W
 252          KM        ROUTE COMBINED HYDROGRAPHS HC11 THROUGH S12W - CONTINUATION OF PYRITE
 253          KM        WASH DOWNSTREAM OF CONFLUENCE WITH WAGON WASH
 254          RS       1    FLOW      -1
 255          RC     .07    .036     .07    1501    .019
 256          RX    1000    1030    1065    1150    1240    1330    1375    1410
 257          RY    1422    1420    1410    1410    1410    1412    1414    1428
              *  BASIN S12W - SUBBASIN TRIBUTARY FOR PYRITE WASH AND SKYLINE WASH
              * DDM   ***** Updated *****

 258          KK    S12W
 259          KM   BASIN S12W
 260          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 261          KM    L=       .7  Lca=       .2   S=  153.6  Kn= .030  LAG=   8.2
 262          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 263          BA     .09
 264          LG     .15     .25    3.91     .55   18.00
 265          UI     68.    246.    330.    189.    123.     79.     47.     31.     19.     11.
 266          UI      7.      7.      0.      0.      0.      0.      0.      0.      0.      0.
 267          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 268          KK   HC12W
 269          KM        COMBINE HYDROGRAPH R1112W WITH HYDROGRAPH S12W - CONFLUENCE OF SKYLINE
 270          KM        WASH WITH PYRITE WASH
 271          HC       2  0.9994
              * DDM   ***** Preserved *****
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 272      KK    HC12
 273      KM         COMBINE ROUTED HYDROGRAPH HC12W AND HC12E
 274      KM         CONFLUENCE OF SKYLINE WASH AND PYRITE WASH
 275      HC       2  3.7538
          * DDM   ***** Preserved *****

 276      KK  R12-13
 277      KM         ROUTE COMBINED HYDROGRAPHS HC12 THROUGH S13 - SKYLINE WASH
 278      RS       1    FLOW      -1
 279      RC     .07    .036     .07    1854    .017
 280      RX    1000    1080    1110    1320    1370    1420    1500    1550
 281      RY    1400    1392    1384    1382    1382    1380    1380    1400
          *  BASIN S13 - SKYLINE WASH DOWNSTREAM OF CONFLUENCE OF PYRITE WASH
          * DDM   ***** Updated *****

 282      KK     S13
 283      KM   BASIN S13
 284      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 285      KM    L=        .9  Lca=        .3   S=  174.2  Kn= .030  LAG=  10.1
 286      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 287      BA     .17
 288      LG     .15     .25    3.88     .56    4.00
 289      UI     82.    312.    550.    397.    278.    195.    135.     90.     64.     43.
 290      UI     28.     20.     11.     11.     11.      0.      0.      0.      0.      0.
 291      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 292      KK    HC13
 293      KM         COMBINE ROUTED HYDROGRAPH R12-13 WITH HYDROGRAPH S13 - SKYLINE WASH
 294      HC       2  3.9274
          * KO     3
          *

 295      KK    DB13
 296      KM   DETENTION BASIN AT SKYLINE WASH APEX
 297      RS       1    STOR       0
 298      SV     0.0    11.0    24.0    36.0    50.0    64.0    79.0    95.0   111.0   129.0
 299      SV   147.0   165.0   185.0   204.0   224.0   245.0   267.0
          *
 300      SE  1343.0  1344.0  1345.0  1346.0  1347.0  1348.0  1349.0  1350.0  1351.0  1352.0
 301      SE  1353.0  1354.0  1355.0  1356.0  1357.0  1358.0  1359.0
          *
 302      SQ     0.0    0.12    6.23   22.03   42.63   63.11   77.38   94.72  109.43  122.33
 303      SQ  133.64  142.56  150.96  158.90  166.48  173.72  180.67
 304      KO       3
          * DDM   ***** Preserved *****

 305      KK    DI13
          * KM       SPLIT FLOW AT HC13; MAIN FLOW TO S24 AND MINOR FLOW TO S14
          * DT  DI24
          * DI     0     201     556    1353    2595    4157
          * DQ     0     201     461     879    1427  2078.5
 306      KM         SPLIT FLOW AT DB13; ALL FLOW TO S27 AND NONE TO S14
 307      DT    DI27
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 308      DI       0     200     500    1000    2500    4000
 309      DQ       0     200     500    1000    2500    4000
          * DDM   ***** Preserved *****

 310      KK   RDI13
 311      KM         ROUTE HYDROGRAPH DI13 THROUGH S14 -SKYLINE WASH DOWNSTREAM OF SPLIT
 312      RS       1    FLOW      -1
 313      RC     .07    .036     .07    4353    .021
 314      RX    1000    1025    1270    1280    1320    1330    1370    1385
 315      RY    1360    1354    1354    1356    1356    1358    1358    1360
          *  BASIN S14 - BEGINNING OF COYOTE WASH
          * DDM   ***** Updated *****

 316      KK     S14
 317      KM   BASIN S14
 318      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 319      KM    L=       1.2  Lca=        .6   S=  340.7  Kn= .030  LAG=  12.4
 320      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 321      BA     .49
 322      LG     .15     .25    3.91     .55   11.00
 323      UI    144.    562.    962.   1341.    822.    640.    487.    343.    270.    185.
 324      UI    145.    101.     72.     65.     31.     25.     25.     25.     25.      0.
 325      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 326      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 327      KK    HC14
 328      KM         COMBINE ROUTED HYDROGRAPH RDI13 WITH HYDROGRAPH S14 - SPLIT FLOW FROM
 329      KM         SKYLINE WASH AND COYOTE WASH SUBBASIN
 330      HC       2  4.4139
          * DDM   ***** Preserved *****

 331      KK  R1416S
 332      KM         ROUTE COMBINED HYDROGRAPHS HC14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
 333      KM         OF CONFLUENCE WITH COYOTE WASH
 334      RS       3    FLOW      -1
 335      RC     .07    .036     .07    3140    .017
 336      RX    1000    1035    1150    1180    1320    1360    1480    1481
 337      RY    1236    1234    1234    1232    1232    1234    1236    1236
          *  BASIN S15 - SUBBASIN IN AREA OF EXISTING A.D.O.T. BORROW PITS
          * DDM   ***** Updated *****

 338      KK     S15
 339      KM   BASIN S15
 340      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 341      KM    L=        .8  Lca=        .3   S=  105.0  Kn= .030  LAG=   9.8
 342      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 343      BA     .11
 344      LG     .15     .27    3.40     .77     .00
 345      UI     56.    213.    370.    246.    176.    120.     84.     54.     37.     25.
 346      UI     19.      9.      7.      7.      7.      0.      0.      0.      0.      0.
 347      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 348        KK  R1516S
 349        KM        ROUTE HYDROGRAPH HC15 THROUGH S16S - SKYLINE WASH DOWNSTREAM OF
 350        KM        CONFLUENCE WITH COYOTE WASH
 351        RS      3    FLOW      -1
 352        RC     .07    .036     .07    2218    .018
 353        RX    1000    1035    1150    1180    1320    1360    1480    1481
 354        RY    1236    1234    1234    1232    1232    1234    1236    1236
            *  BASIN S16S - SUBBASIN AT SKYLINE WASH DOWNSTREAM OF CONFLUENCE WITH COYOTE W.
            * DDM   ***** Updated *****

 355        KK    S16S
 356        KM   BASIN S16S
 357        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 358        KM    L=       .6  Lca=       .3   S=  116.4  Kn= .030  LAG=   9.3
 359        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 360        BA     .17
 361        LG     .15     .25    3.95     .53    6.00
 362        UI    100.    373.    611.    379.    271.    175.    123.     76.     53.     34.
 363        UI     23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
 364        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 365        KK  IHC16S
 366        KM        COMBINE ROUTED HYDROGRAPH R14-16S AND R15-16S WITH HYDROGRAPH S16S
 367        KM        DOWNSTREAM OF CONFLUENCE OF SKYLINE WASH WITH COYOTE WASH
 368        HC      3  4.6952
            *  BASIN S16N - SUBBASIN TRIBUTARY TO SKYLINE WASH
            * DDM   ***** Updated *****

 369        KK    S16N
 370        KM   BASIN S16N
 371        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 372        KM    L=       .9  Lca=       .6   S=  653.2  Kn= .050  LAG=  16.5
 373        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 374        BA     .17
 375        LG     .25     .25    3.95     .53   18.00
 376        UI     34.     90.    189.    256.    366.    238.    189.    158.    129.     98.
 377        UI     80.     66.     48.     39.     32.     26.     19.     16.     15.      6.
 378        UI      6.      6.      6.      6.      6.      0.      0.      0.      0.      0.
 379        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 380        KK  R16N-S
 381        KM        ROUTE HYDROGRAPH S16N THROUGH S16S
 382        RS      4    FLOW      -1
 383        RC     .07    .036     .07    3230    .022
 384        RX    1000    1035    1150    1180    1320    1360    1480    1481
 385        RY    1236    1234    1234    1232    1232    1234    1236    1236
            * DDM   ***** Preserved *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 386        KK   HC16S
 387        KM        COMBINE ROUTED HYDROGRAPH R16N-S AND IHC16S
 388        KM        SKYLINE WASH DOWNSTREAM OF COYOTE WASH
 389        HC      2  4.8652
            * DDM   ***** Preserved *****

 390        KK   DI16S
 391        KM        SPLIT FLOW AT HC16S; MAIN FLOW TO S17 AND MINOR FLOW TO S22
 392        DT    DI22
 393        DI       0      46     144     344   708.5    1223
 394        DQ       0       0       8      52     153     329
            * DDM   ***** Preserved *****

 395        KK  R16-17
 396        KM        ROUTE HYDROGRAPH DI16S THROUGH S17
 397        RS      5    FLOW      -1
 398        RC     .07    .036     .07    4341    .015
 399        RX    1000    1060    1090    1120    1145    1180    1200    1320
 400        RY    1202    1200  1199.5    1200    1199    1199    1200    1202
            *  BASIN S17 - SUBBASIN OF SKYLINE WASH SOUTH OF MCDOWELL ROAD ON EAST SIDE
            *  OF WATERSHED
            * DDM   ***** Updated *****

 401        KK     S17
 402        KM   BASIN S17
 403        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 404        KM    L=       .9  Lca=       .5   S=  117.9  Kn= .030  LAG=  12.8
 405        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 406        BA     .29
 407        LG     .15     .26    3.60     .67     .00
 408        UI     79.    311.    540.    784.    495.    385.    298.    212.    170.    117.
 409        UI     89.     66.     50.     37.     28.     15.     15.     15.     15.      0.
 410        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 411        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 412        KK    HC17
 413        KM        COMBINE ROUTED HYDROGRAPH R16-17 WITH HYDROGRAPH S17 AT EAST SIDE OF
 414        KM        BUCKEYE F.R.S. NO. 3
 415        HC      2  5.1537
            *  BASIN S18 - BEGINNING OF RATTLER WASH
            * DDM   ***** Updated *****

 416        KK     S18
 417        KM   BASIN S18
 418        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 419        KM    L=       .8  Lca=       .4   S=  292.7  Kn= .040  LAG=  12.9
 420        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 421        BA     .36
 422        LG     .20     .25    3.95     .53   17.00
 423        UI     96.    380.    662.    968.    618.    479.    373.    267.    211.    149.
 424        UI    111.     84.     64.     46.     38.     18.     18.     18.     18.      0.
 425        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 426        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 427      KK  R18-19
 428      KM          ROUTE HYDROGRAPH HC18 THROUGH S19
 429      RS       2    FLOW      -1
 430      RC     .07    .036     .07    4253     .02
 431      RX    1000    1050    1100    1125    1140    1180    1240    1241
 432      RY    1266    1264    1242    1240    1242    1264    1266    1266
          *  BASIN S19 - SUBBASIN OF RATTLER WASH
          * DDM   ***** Updated *****

 433      KK     S19
 434      KM   BASIN S19
 435      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 436      KM    L=      1.2  Lca=        .8   S=  824.8  Kn= .030  LAG=  11.6
 437      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 438      BA     .29
 439      LG     .15     .25    4.00     .52   12.00
 440      UI    102.    389.    662.    802.    483.    372.    266.    195.    138.     99.
 441      UI     72.     51.     41.     22.     16.     16.     16.      0.      0.      0.
 442      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 443      KK    HC19
 444      KM          COMBINE ROUTED HYDROGRAPH R18-19 WITH HYDROGRAPH S19 - RATTLER WASH
 445      HC       2  0.6498
          * DDM   ***** Preserved *****

 446      KK  R19-20
 447      KM          ROUTE COMBINED HYDROGRAPHS HC19 THROUGH S20 - RATTLER WASH
 448      RS       2    FLOW      -1
 449      RC     .07    .036     .07    3740    .022
 450      RX     999    1000    1030    1095    1130    1150    1220    1221
 451      RY    1208    1208    1206    1204    1204    1206    1208    1208
          *  BASIN S20 - SUBBASIN OF RATTLER WASH
          * DDM   ***** Updated *****

 452      KK     S20
 453      KM   BASIN S20
 454      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 455      KM    L=       .9  Lca=        .4   S=   84.1  Kn= .030  LAG=  13.0
 456      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 457      BA     .09
 458      LG     .15     .26    3.60     .67    4.00
 459      UI     22.     88.    155.    228.    147.    114.     89.     64.     50.     36.
 460      UI     26.     20.     16.     11.     10.      4.      4.      4.      4.      4.
 461      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 462      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 463      KK    HC20
 464      KM          COMBINE ROUTED HYDROGRAPH R19-20 WITH HYDROGRAPH S20 AT FAR EAST SIDE
 465      KM          OF STUDY AREA NORTH OF BUCKEYE F.R.S. NO. 3
 466      HC       2  0.7344
          *  BASIN S21 - SUBBASIN NORTH OF BUCKEYE F.R.S. NO 3 SPILLWAY
          * DDM   ***** Updated *****
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 467      KK     S21
 468      KM   BASIN S21
 469      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 470      KM    L=      1.2  Lca=        .6   S=  780.6  Kn= .030  LAG=  11.0
 471      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 472      BA     .62
 473      LG     .15     .25    4.10     .51   10.00
 474      UI    245.    927.   1593.   1636.   1019.    766.    522.    392.    260.    190.
 475      UI    136.     93.     67.     36.     36.     36.      0.      0.      0.      0.
 476      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          *  BASIN S22 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
          * DDM   ***** Updated *****

 477      KK     S22
 478      KM   BASIN S22
 479      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 480      KM    L=      1.3  Lca=        .4   S=  110.1  Kn= .029  LAG=  13.7
 481      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 482      BA     .55
 483      LG     .16     .25    3.91     .53    1.00
 484      UI    135.    496.    909.   1351.   1029.    742.    594.    451.    332.    268.
 485      UI    188.    151.    108.     84.     66.     51.     26.     26.     26.     26.
 486      UI     26.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 487      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 488      KK    DI22
 489      KM          RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S22
 490      DR    DI22
          * DDM   ***** Preserved *****

 491      KK   RDI22
 492      KM          ROUTE HYDROGRAPH DI22 THROUGH S22 - PORTION OF DIVERT OF SKYLINE WASH
 493      RS       8    FLOW      -1
 494      RC     .07    .036     .07    4253    .015
 495      RX     997     998     999    1000    1060    1210    1300    1300
 496      RY    1217    1216    1216    1215    1215    1216    1216    1217
          * DDM   ***** Preserved *****

 497      KK    HC22
 498      KM          COMBINE HYDROGRAPHS AT HC22
 499      HC       2  5.4141
          *  BASIN S23 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
          * DDM   ***** Updated *****

 500      KK     S23
 501      KM   BASIN S23
 502      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 503      KM    L=      1.6  Lca=        .5   S=  112.1  Kn= .028  LAG=  15.2
 504      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 505      BA     .49
 506      LG     .17     .26    3.50     .70    2.00
 507      UI    108.    331.    660.    901.   1086.    670.    547.    446.    338.    263.
 508      UI    217.    155.    125.     98.     81.     53.     53.     31.     21.     21.
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 509      UI     21.     21.     21.      0.      0.      0.      0.      0.      0.      0.
 510      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          *  BASIN S24 - SUBBASIN DOWNSTREAM OF SKYLINE WASH SPLIT FLOW
          * DDM   ***** Updated *****

 511      KK      S24
 512      KM   BASIN S24
 513      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 514      KM    L=      2.4  Lca=      1.2   S=  113.8  Kn= .037  LAG=  32.2
 515      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 516      BA     .32
 517      LG     .20     .25    4.00     .51    1.00
 518      UI     33.     33.     66.    117.    171.    211.    242.    273.    350.    361.
 519      UI    241.    206.    189.    172.    157.    142.    129.    111.     96.     84.
 520      UI     78.     73.     65.     54.     45.     42.     37.     36.     30.     25.
 521      UI     25.     22.     16.     16.     16.     16.     13.      6.      6.      6.
 522      UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      0.
 523      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 524      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****
          * KK  DI24
          * KM       RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S24
          * DR  DI24
          * DDM   ***** Preserved *****
          * KK RDI24
          * KM       ROUTE HYDROGRAPH DI24 THROUGH S24
          * RS     5    FLOW      -1
          * RC   .07    .036     .07    9929     .02
          * RX 1000    1045    1060    1080    1100    1120    1155    1220
          * RY 1222    1220    1218    1218    1216    1216    1220    1220
          * DDM   ***** Preserved *****
          * KK  HC24
          * KM       COMBINE HYDROGRAPHS AT HC24
          * HC     2  4.2443
          *  BASIN S25 - UPSTREAM END OF SMALL WATERSHED EAST OF PROSPECT WASH
          * DDM   ***** Updated *****

 525      KK      S25
 526      KM   BASIN S25
 527      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 528      KM    L=       .7  Lca=       .3   S=  103.0  Kn= .030  LAG=  10.0
 529      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 530      BA     .03
 531      LG     .15     .25    4.15     .49     .00
 532      UI     13.     50.     87.     61.     43.     30.     21.     14.     10.      7.
 533      UI      4.      3.      2.      2.      2.      0.      0.      0.      0.      0.
 534      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 535      KK  R25-26
 536      KM        ROUTE HYDROGRAPH S25 THROUGH S26 CROSSING NEAR THE INTERSECTION OF
 537      KM        WATSON ROAD AND MCDOWELL ROAD
 538      RS       8    FLOW      -1
 539      RC     .07    .036     .07    6571     .02
 540      RX    1000    1045    1060    1080    1100    1120    1155    1220
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 541      RY    1222    1220    1218    1218    1216    1216    1220    1220
          *  BASIN S26 - SUBBASIN ON THE LOWER WEST SIDE OF STUDY AREA
          * DDM   ***** Updated *****

 542      KK      S26
 543      KM   BASIN S26
 544      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 545      KM    L=      1.2  Lca=       .5   S=  119.7  Kn= .029  LAG=  13.8
 546      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 547      BA     .21
 548      LG     .16     .25    4.20     .47    1.00
 549      UI     52.    187.    347.    513.    403.    286.    230.    177.    129.    105.
 550      UI     74.     59.     43.     33.     25.     21.     10.     10.     10.     10.
 551      UI     10.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 552      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 553      KK    HC26
 554      KM         COMBINE ROUTED HYDROGRAPH R25-26 WITH HYDROGRAPH S26
 555      KM         AT WEST SIDE OF WATERSHED NORTH OF BUCKEYE F.R.S. NO. 3
 556      HC       2  0.2377
          *  BASIN S27 - BEGINNING OF PROSPECT WASH
          * DDM   ***** Updated *****

 557      KK      S27
 558      KM   BASIN S27
 559      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 560      KM    L=      1.4  Lca=       .5   S=  345.2  Kn= .030  LAG=  12.6
 561      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 562      BA     .51
 563      LG     .15     .25    4.00     .52   16.00
 564      UI    146.    575.    989.   1411.    878.    682.    524.    370.    295.    201.
 565      UI    157.    111.     82.     67.     41.     26.     26.     26.     26.      0.
 566      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 567      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 568      KK    DI27
 569      KM         RETURN DIVERTED HYDROGRAPH FROM DI27 DOWNSTREAM OF DB13 TO ROUTE
 570      KM         AND COMBINE WITH S27
 571      DR    DI27
          * DDM   ***** Preserved *****

 572      KK   RDI27
 573      KM         ROUTE HYDROGRAPH DI27 THROUGH S27
 574      RS       1    FLOW      -1
 575      RC     .07    .040     .07    1200     .02
 576      RX    1000    1050    1100    1120    1125    1145    1195    1245
 577      RY    1222    1221    1221    1216    1216    1221    1221    1222
          * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 578          KK    HC27
 579          KM        COMBINE HYDROGRAPHS AT HC27
 580          HC       2  4.4343

 581          KK  R27-28
 582          KM        ROUTE HYDROGRAPH S27 THROUGH S28
 583          RS       1    FLOW      -1
 584          RC     .07    .036     .07    2482    .022
 585          RX    1000    1060    1090    1100    1120    1130    1160    1230
 586          RY    1250    1248    1240    1238    1238    1240    1242    1250
              *  BASIN S28 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****

 587          KK     S28
 588          KM   BASIN S28
 589          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 590          KM    L=        .4  Lca=        .2   S=  120.0  Kn= .028  LAG=   6.2
 591          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 592          BA     .04
 593          LG     .17     .25    4.15     .48    2.00
 594          UI     55.    180.    114.     65.     36.     19.     11.      4.      4.      0.
 595          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 596          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 597          KK    HC28
 598          KM        COMBINE ROUTED HYDROGRAPH R27-28 WITH HYDROGRAPH S28 - PROSPECT WASH
 599          KM        AT WATSON ROAD CROSSING
 600          HC       2  0.5526
              * DDM   ***** Preserved *****

 601          KK  R28-29
 602          KM        ROUTE COMBINED HYDROGRAPHS HC28 THROUGH S29
 603          RS       2    FLOW      -1
 604          RC     .07    .036     .07    3804   .0184
 605          RX    1000    1000    1110    1125    1165    1170    1250    1251
 606          RY    1192    1192    1190    1188    1188    1190    1192    1192
              *  BASIN S29 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****

 607          KK     S29
 608          KM   BASIN S29
 609          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 610          KM    L=        .7  Lca=        .3   S=  102.9  Kn= .030  LAG=   9.4
 611          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 612          BA     .10
 613          LG     .15     .25    4.15     .49     .00
 614          UI     55.    207.    343.    215.    154.    101.     71.     44.     31.     20.
 615          UI     14.      7.      7.      7.      0.      0.      0.      0.      0.      0.
 616          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 617          KK    HC29
 618          KM        COMBINE ROUTED HYDROGRAPH R28-29 WITH HYDROGRAPH S29 - PROSPECT WASH
 619          KM        AT BUCKEYE F.R.S. NO 3
 620          HC       2  0.6515
              *
              * DDM   ***** Preserved *****

 621          KK  HCBES3
 622          KM        COMBINE ALL HYDROGRAPHS AT BUCKEYE FRS-3
 623          HC       8  8.7485
 624          ZZ
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                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE    (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   39          S1
               .
               .
   50          .          S2
               .          .
               .          .
   61         HC2..........
               V
               V
   64        R2-3
               .
               .
   70          .          S3
               .          .
               .          .
   82         HC3..........
               V
               V
   86        R3-4
               .
               .
   92          .          S4
               .          .
               .          .
  103         HC4..........
               V
               V
  107        R4-7
               .
               .
  113          .          S7
               .          .
               .          .
  124        IHC7..........
               .
               .
  128          .          S5
               .          V
               .          V
  140          .        R5-6
               .          .
               .          .
  146          .          .          S6
               .          .          .
               .          .          .
  156          .         HC6..........
               .          .
               .          .
  160         HC7..........
               V
               V
  164       R7-12E
               .
               .
  170          .        S12E

               .          .
               .          .
  180       HC12E..........
               .
               .
  184          .          S8
               .          V
               .          V
  195          .        R8-9
               .          .
               .          .
  201          .          .          S9
               .          .          .
               .          .          .
  212          .         HC9..........
               .          V
               .          V
  216          .       R9-11
               .          .
               .          .
  222          .          .         S11
               .          .          .
               .          .          .
  232          .       IHC11..........
               .          .
               .          .
  236          .          .         S10
               .          .          .
               .          .          .
  247          .        HC11..........
               .          V
               .          V
  251          .      R1112W
               .          .
               .          .
  258          .          .        S12W
               .          .          .
               .          .          .
  268          .       HC12W..........
               .          .
               .          .
  272        HC12..........
               V
               V
  276       R12-13
               .
               .
  282          .         S13
               .          .
               .          .
  292        HC13..........
               V
               V
  295        DB13
               .
               .
  307          .------->    DI27
  305        DI13
               V
               V
  310       RDI13
               .
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       .
316    .          S14
       .           .
       .           .
327  HC14............
       V
       V
331 R1416S
       .
338    .          S15
       .           V
       .           V
348    .        R1516S
       .           .
       .           .
355    .           .          S16S
       .           .            .
       .           .            .
365 IHC16S.......................
       .
369    .          S16N
       .           V
       .           V
380    .        R16N-S
       .           .
       .           .
386  HC16S...........
       .
392    .------->   DI22
390  DI16S
       V
       V
395  R16-17
       .
401    .          S17
       .           .
       .           .
412  HC17............
       .
416    .          S18
       .           V
       .           V
427    .        R18-19
       .           .
       .           .
433    .           .          S19
       .           .            .
       .           .            .
443    .         HC19............
       .           V
       .           V
446    .        R19-20
       .           .
       .           .
452    .           .          S20
       .           .            .
       .           .            .
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463    .     HC20...........
       .       .
467    .       .      S21
       .       .       .
477    .       .       .      S22
       .       .       .       .
490    .       .       .       .       .<-------    DI22
488    .       .       .       .      DI22
       .       .       .       .       V
       .       .       .       .       V
491    .       .       .       .     RDI22
       .       .       .       .       .
497    .       .       .     HC22...........
       .       .       .       .
500    .       .       .       .      S23
       .       .       .       .       .
511    .       .       .       .       .      S24
       .       .       .       .       .       .
525    .       .       .       .       .       .      S25
       .       .       .       .       .       .       V
       .       .       .       .       .       .       V
535    .       .       .       .       .       .    R25-26
       .       .       .       .       .       .       .
542    .       .       .       .       .       .       .      S26
       .       .       .       .       .       .       .       .
553    .       .       .       .       .       .     HC26...........
       .       .       .       .       .       .       .
557    .       .       .       .       .       .       .      S27
       .       .       .       .       .       .       .       .
571    .       .       .       .       .       .       .       .       .<-------    DI27
568    .       .       .       .       .       .       .       .      DI27
       .       .       .       .       .       .       .       .       V
       .       .       .       .       .       .       .       .       V
572    .       .       .       .       .       .       .       .     RDI27
       .       .       .       .       .       .       .       .       .
578    .       .       .       .       .       .       .     HC27...........
       .       .       .       .       .       .       .       V
       .       .       .       .       .       .       .       V
581    .       .       .       .       .       .       .    R27-28
       .       .       .       .       .       .       .       .
587    .       .       .       .       .       .       .       .      S28
       .       .       .       .       .       .       .       .       .
597    .       .       .       .       .       .       .     HC28...........
       .       .       .       .       .       .       .       V
       .       .       .       .       .       .       .       V
601    .       .       .       .       .       .       .    R28-29
       .       .       .       .       .       .       .       .
```

```
607           .          .          .          .          .          .          .          .          S29
              .          .          .          .          .          .          .          .           .
617           .          .          .          .          .          .          .        HC29............
              .          .          .          .          .          .          .          .
621      HCBES3.......................................................................................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*            VERSION 4.1                *
*                                       *
* RUN DATE   03APR13  TIME  10:49:58    *
*                                       *
*****************************************
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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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                              SKYLINE WASH AND TRIBUTARIES
                              FLOODPLAIN DELINEATION STUDY
                              FCD 96-08

                              HEC-1

                              DATE:   8-19-98
                              STORM:  100-YR 6-HOUR STORM
                              FILE NAME:  SKYLINE6.DAT

                              FILE NAME CHANGED TO SL3-1A-6.DAT
                              (SKYLINE DCR PHASE 3 ALTERNATIVE 1A 6-HOUR STORM)

                        DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA

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

     IT         HYDROGRAPH TIME DATA
                       NMIN           3  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        1457  ENDING TIME
                      ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL     .05 HOURS
                       TOTAL TIME BASE   14.95 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

  18 JD         INDEX STORM NO. 1
                       STRM        2.80  PRECIPITATION DEPTH
                       TRDA         .01  TRANSPOSITION DRAINAGE AREA

  19 PI           PRECIPITATION PATTERN
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                     .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

```
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .02     .02     .02     .02     .02
           .03     .03     .03     .03     .03     .09     .09     .09     .09     .09
           .02     .02     .02     .02     .02     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00

22 JD      INDEX STORM NO. 2
             STRM        2.78  PRECIPITATION DEPTH
             TRDA         .50  TRANSPOSITION DRAINAGE AREA

 0 PI        PRECIPITATION PATTERN
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .02     .02     .02     .02     .02
           .03     .03     .03     .03     .03     .09     .09     .09     .09     .09
           .02     .02     .02     .02     .02     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00

23 JD      INDEX STORM NO. 3
             STRM        2.73  PRECIPITATION DEPTH
             TRDA        2.80  TRANSPOSITION DRAINAGE AREA

24 PI        PRECIPITATION PATTERN
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .01     .01     .01     .01     .01     .02     .02     .02     .02     .02
           .04     .04     .04     .04     .04     .05     .05     .05     .05     .05
           .03     .03     .03     .03     .03     .01     .01     .01     .01     .01
           .01     .01     .01     .01     .01     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00

27 JD      INDEX STORM NO. 4
             STRM        2.58  PRECIPITATION DEPTH
             TRDA       16.00  TRANSPOSITION DRAINAGE AREA

28 PI        PRECIPITATION PATTERN
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .01     .01     .01     .01     .01     .02     .02     .02     .02     .02
           .03     .03     .03     .03     .03     .04     .04     .04     .04     .04
           .03     .03     .03     .03     .03     .01     .01     .01     .01     .01
           .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
```

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

31 JD      INDEX STORM NO. 5
             STRM        2.27  PRECIPITATION DEPTH
             TRDA       90.00  TRANSPOSITION DRAINAGE AREA

32 PI        PRECIPITATION PATTERN
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .01     .01     .01     .01     .01
           .01     .01     .01     .01     .01     .02     .02     .02     .02     .02
           .03     .03     .03     .03     .03     .03     .03     .03     .03     .03
           .02     .02     .02     .02     .02     .01     .01     .01     .01     .01
           .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00

35 JD      INDEX STORM NO. 6
             STRM        2.24  PRECIPITATION DEPTH
             TRDA      100.00  TRANSPOSITION DRAINAGE AREA

36 PI        PRECIPITATION PATTERN
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .01     .01     .01     .01     .01
           .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
           .01     .01     .01     .01     .01     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .02     .02     .02     .02     .02     .02     .02     .02     .02     .02
           .01     .01     .01     .01     .01     .01     .01     .01     .01     .01
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
           .00     .00     .00     .00     .00     .00     .00     .00     .00     .00
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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
295 KK      *    DB13    *
            *            *
            **************

304 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          3  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

297 RS        STORAGE ROUTING
                    NSTPS          1  NUMBER OF SUBREACHES
                     ITYP       STOR  TYPE OF INITIAL CONDITION
                   RSVRIC        .00  INITIAL CONDITION
                        X        .00 WORKING R AND D COEFFICIENT

298 SV          STORAGE        .0      11.0      24.0      36.0      50.0      64.0      79.0      95.0     111.0     129.0
                            147.0     165.0     185.0     204.0     224.0     245.0     267.0

300 SE        ELEVATION   1343.00   1344.00   1345.00   1346.00   1347.00   1348.00   1349.00   1350.00   1351.00   1352.00
                          1353.00   1354.00   1355.00   1356.00   1357.00   1358.00   1359.00

302 SQ        DISCHARGE        0.        0.        6.       22.       43.       63.       77.       95.      109.      122.
                             134.      143.      151.      159.      166.      174.      181.

                                                          ***

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

                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA       .0 SQ MI

  PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR       72-HR     14.95-HR
+    (CFS)       (HR)
                             (CFS)
+     178.       5.60                     169.         113.        113.         113.
                          (INCHES)        .399         .669        .669         .669
                           (AC-FT)         84.         140.        140.         140.

 PEAK STORAGE    TIME                          MAXIMUM AVERAGE STORAGE
                                         6-HR        24-HR       72-HR     14.95-HR
+   (AC-FT)      (HR)
       257.      5.60                     231.         147.        147.         147.

  PEAK STAGE     TIME                          MAXIMUM AVERAGE STAGE
                                         6-HR        24-HR       72-HR     14.95-HR
+   (FEET)       (HR)
    1358.55      5.60                  1357.31      1352.42     1352.42      1352.42

                    CUMULATIVE AREA =    3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA       .5 SQ MI

  PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR       72-HR     14.95-HR
+    (CFS)       (HR)
                             (CFS)
+     177.       5.60                     168.         113.        113.         113.
                          (INCHES)        .397         .665        .665         .665
                           (AC-FT)         83.         139.        139.         139.

 PEAK STORAGE    TIME                          MAXIMUM AVERAGE STORAGE
                                         6-HR        24-HR       72-HR     14.95-HR
+   (AC-FT)      (HR)
       254.      5.60                     228.         146.        146.         146.

  PEAK STAGE     TIME                          MAXIMUM AVERAGE STAGE
                                         6-HR        24-HR       72-HR     14.95-HR
+   (FEET)       (HR)
    1358.42      5.60                  1357.17      1352.32     1352.32      1352.32

                    CUMULATIVE AREA =    3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA      2.8 SQ MI

  PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR       72-HR     14.95-HR
+    (CFS)       (HR)
                             (CFS)
+     156.       5.70                     146.          96.         96.          96.
                          (INCHES)        .346         .567        .567         .567
                           (AC-FT)         73.         119.        119.         119.

 PEAK STORAGE    TIME                          MAXIMUM AVERAGE STORAGE
                                         6-HR        24-HR       72-HR     14.95-HR
+   (AC-FT)      (HR)
       196.      5.70                     175.         110.        110.         110.

  PEAK STAGE     TIME                          MAXIMUM AVERAGE STAGE
                                         6-HR        24-HR       72-HR     14.95-HR
+   (FEET)       (HR)
    1355.60      5.70                  1354.47      1350.48     1350.48      1350.48

                    CUMULATIVE AREA =    3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA     16.0 SQ MI

  PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR       72-HR     14.95-HR
+    (CFS)       (HR)
                             (CFS)
+     132.       5.80                     120.          76.         76.          76.
                          (INCHES)        .284         .446        .446         .446
                           (AC-FT)         60.          93.         93.          93.
```

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE		
		6-HR	24-HR	72-HR	14.95-HR
+ (AC-FT)	(HR)				
144.	5.80	126.	80.	80.	80.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE		
		6-HR	24-HR	72-HR	14.95-HR
+ (FEET)	(HR)				
1352.82	5.80	1351.86	1348.79	1348.79	1348.79

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 90.0 SQ MI

PEAK FLOW	TIME			MAXIMUM AVERAGE FLOW		
			6-HR	24-HR	72-HR	14.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 83.	6.15		73.	44.	44.	44.
		(INCHES)	.173	.259	.259	.259
		(AC-FT)	36.	54.	54.	54.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE		
		6-HR	24-HR	72-HR	14.95-HR
+ (AC-FT)	(HR)				
84.	6.15	74.	49.	49.	49.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE		
		6-HR	24-HR	72-HR	14.95-HR
+ (FEET)	(HR)				
1349.30	6.15	1348.68	1346.79	1346.79	1346.79

CUMULATIVE AREA = 3.93 SQ MI

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

HYDROGRAPH AT STATION DB13
TRANSPOSITION AREA 100.0 SQ MI

PEAK FLOW	TIME			MAXIMUM AVERAGE FLOW		
			6-HR	24-HR	72-HR	14.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 63.	6.50		53.	31.	31.	31.
		(INCHES)	.125	.184	.184	.184
		(AC-FT)	26.	38.	38.	38.

PEAK STORAGE	TIME		MAXIMUM AVERAGE STORAGE		
		6-HR	24-HR	72-HR	14.95-HR
+ (AC-FT)	(HR)				
64.	6.50	57.	39.	39.	39.

PEAK STAGE	TIME		MAXIMUM AVERAGE STAGE		
		6-HR	24-HR	72-HR	14.95-HR
+ (FEET)	(HR)				
1347.98	6.50	1347.49	1346.11	1346.11	1346.11

CUMULATIVE AREA = 3.93 SQ MI

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

INTERPOLATED HYDROGRAPH AT DB13

PEAK FLOW	TIME			MAXIMUM AVERAGE FLOW		
			6-HR	24-HR	72-HR	14.95-HR
+ (CFS)	(HR)					
		(CFS)				
+ 151.	5.70		141.	92.	92.	92.
		(INCHES)	.334	.544	.544	.544
		(AC-FT)	70.	114.	114.	114.

CUMULATIVE AREA = 3.93 SQ MI

1

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S1	844.	4.10	75.	30.	30.	.51		
+	HYDROGRAPH AT	S2	376.	4.10	32.	13.	13.	.22		
+	2 COMBINED AT	HC2	1094.	4.10	102.	41.	41.	.73		
+	ROUTED TO	R2-3	1047.	4.15	102.	41.	41.	.73		
+	HYDROGRAPH AT	S3	858.	4.15	88.	35.	35.	.65		
+	2 COMBINED AT	HC3	1517.	4.15	173.	70.	70.	1.38		
+	ROUTED TO	R3-4	1448.	4.20	173.	70.	70.	1.38		
+	HYDROGRAPH AT	S4	681.	4.10	57.	23.	23.	.41		
+	2 COMBINED AT	HC4	1703.	4.20	214.	86.	86.	1.79		
+	ROUTED TO	R4-7	1664.	4.25	214.	86.	86.	1.79		
+	HYDROGRAPH AT	S7	255.	4.05	19.	7.	7.	.13		
+	2 COMBINED AT	IHC7	1714.	4.25	227.	91.	91.	1.92		
+	HYDROGRAPH AT	S5	780.	4.15	80.	32.	32.	.53		
+	ROUTED TO	R5-6	750.	4.20	79.	32.	32.	.53		
+	HYDROGRAPH AT	S6	481.	4.05	35.	14.	14.	.25		
+	2 COMBINED AT	HC6	999.	4.15	109.	44.	44.	.78		
+	2 COMBINED AT	HC7	2088.	4.25	308.	124.	124.	2.70		
+	ROUTED TO	R7-12E	2048.	4.30	308.	124.	124.	2.70		
+	HYDROGRAPH AT	S12E	129.	4.00	8.	3.	3.	.05		
+	2 COMBINED AT	HC12E	2060.	4.30	314.	126.	126.	2.75		
+	HYDROGRAPH AT	S8	645.	4.05	51.	20.	20.	.34		
+	ROUTED TO	R8-9	634.	4.10	51.	20.	20.	.34		
+	HYDROGRAPH AT	S9	359.	4.10	31.	12.	12.	.21		
+	2 COMBINED AT	HC9	967.	4.10	81.	32.	32.	.55		
+	ROUTED TO	R9-11	874.	4.20	81.	32.	32.	.55		
+	HYDROGRAPH AT	S11	370.	4.05	23.	9.	9.	.17		
+	2 COMBINED AT	IHC11	945.	4.20	100.	40.	40.	.72		
+	HYDROGRAPH AT	S10	354.	4.10	29.	11.	11.	.19		
+	2 COMBINED AT	HC11	1100.	4.20	124.	50.	50.	.91		
+	ROUTED TO	R1112W	1049.	4.25	123.	50.	50.	.91		
+	HYDROGRAPH AT	S12W	207.	4.05	13.	5.	5.	.09		
+	2 COMBINED AT	HC12W	1083.	4.20	134.	54.	54.	1.00		
+	2 COMBINED AT	HC12	2624.	4.30	411.	166.	166.	3.75		
+	ROUTED TO	R12-13	2556.	4.35	411.	166.	166.	3.75		
+	HYDROGRAPH AT	S13	357.	4.05	21.	9.	9.	.17		
+	2 COMBINED AT	HC13	2597.	4.35	422.	170.	170.	3.93		
+	ROUTED TO	DB13	151.	5.70	141.	92.	92.	3.93		
+	DIVERSION TO	DI27	151.	5.70	141.	92.	92.	3.93		
	HYDROGRAPH AT									

+		DI13	0.	.00	0.	0.	0.	3.93
+	ROUTED TO	RDI13	0.	.00	0.	0.	0.	3.93
+	HYDROGRAPH AT	S14	927.	4.05	66.	27.	27.	.49
+	2 COMBINED AT	HC14	405.	4.05	47.	19.	19.	4.41
+	ROUTED TO	R1416S	375.	4.20	47.	19.	19.	4.41
+	HYDROGRAPH AT	S15	208.	4.05	11.	4.	4.	.11
+	ROUTED TO	R1516S	163.	4.20	11.	4.	4.	.11
+	HYDROGRAPH AT	S16S	378.	4.05	23.	9.	9.	.17
+	3 COMBINED AT	IHC16S	512.	4.20	66.	27.	27.	4.70
+	HYDROGRAPH AT	S16N	276.	4.10	24.	10.	10.	.17
+	ROUTED TO	R16N-S	240.	4.30	24.	10.	10.	.17
+	2 COMBINED AT	HC16S	599.	4.20	84.	34.	34.	4.87
+	DIVERSION TO	DI22	123.	4.20	12.	5.	5.	4.87
+	HYDROGRAPH AT	DI16S	477.	4.20	72.	29.	29.	4.87
+	ROUTED TO	R16-17	441.	4.45	72.	29.	29.	4.87
+	HYDROGRAPH AT	S17	488.	4.05	31.	12.	12.	.29
+	2 COMBINED AT	HC17	493.	4.40	87.	35.	35.	5.15
+	HYDROGRAPH AT	S18	685.	4.05	53.	21.	21.	.36
+	ROUTED TO	R18-19	604.	4.15	53.	21.	21.	.36
+	HYDROGRAPH AT	S19	586.	4.05	41.	16.	16.	.29
+	2 COMBINED AT	HC19	1008.	4.10	90.	36.	36.	.65
+	ROUTED TO	R19-20	896.	4.20	90.	36.	36.	.65
+	HYDROGRAPH AT	S20	145.	4.05	10.	4.	4.	.09
+	2 COMBINED AT	HC20	948.	4.20	98.	39.	39.	.73
+	HYDROGRAPH AT	S21	1188.	4.05	82.	33.	33.	.62
+	HYDROGRAPH AT	S22	932.	4.10	65.	26.	26.	.55
+	HYDROGRAPH AT	DI22	123.	4.20	12.	5.	5.	4.87
+	ROUTED TO	RDI22	102.	4.60	12.	5.	5.	4.87
+	2 COMBINED AT	HC22	932.	4.10	131.	52.	52.	5.41
+	HYDROGRAPH AT	S23	746.	4.10	53.	21.	21.	.49
+	HYDROGRAPH AT	S24	313.	4.30	38.	15.	15.	.32
+	HYDROGRAPH AT	S25	57.	4.05	3.	1.	1.	.03
+	ROUTED TO	R25-26	33.	4.45	3.	1.	1.	.03
+	HYDROGRAPH AT	S26	379.	4.10	26.	11.	11.	.21
+	2 COMBINED AT	HC26	380.	4.10	30.	12.	12.	.24
+	HYDROGRAPH AT	S27	997.	4.05	76.	30.	30.	.51
+	HYDROGRAPH AT	DI27	151.	5.70	141.	92.	92.	3.93
+	ROUTED TO	RDI27	151.	5.75	141.	92.	92.	3.93
+	2 COMBINED AT	HC27	997.	4.10	300.	197.	197.	4.43
+	ROUTED TO	R27-28	456.	4.15	175.	112.	112.	4.43
+	HYDROGRAPH AT	S28	93.	4.00	5.	2.	2.	.04
+	2 COMBINED AT	HC28	982.	4.10	225.	142.	142.	.55

	ROUTED TO							
+		R28-29	907.	4.20	223.	140.	140.	.55
	HYDROGRAPH AT							
+		S29	212.	4.05	12.	5.	5.	.10
	2 COMBINED AT							
+		HC29	945.	4.20	229.	142.	142.	.65
	8 COMBINED AT							
+		HCBES3	2307.	4.15	454.	225.	225.	8.75

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

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1***************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *            VERSION 4.1               *
 *                                      *
 *  RUN DATE   14FEB13  TIME  08:42:52  *
 *                                      *
 ****************************************
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***************************************
*                                     *
*    U.S. ARMY CORPS OF ENGINEERS     *
*    HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET          *
*        DAVIS, CALIFORNIA 95616      *
*            (916) 756-1104           *
*                                     *
***************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X                X
XXXXXXX  XXXX     X         XXXXX  X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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


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

  1       ID        SKYLINE WASH AND TRIBUTARIES
  2       ID        FLOODPLAIN DELINEATION STUDY
  3       ID        FCD 96-08
  4       ID
  5       ID        HEC-1
  6       ID
  7       ID        DATE:   8-19-98
  8       ID        STORM:  100-YR 24-HOUR STORM
  9       ID        FILE NAME:  SKYLINE.DAT
 10       ID
 11       ID        FILE NAME CHANGED TO SL3-1A-24.DAT
 12       ID        (SKYLINE DCR PHASE 3 ALTERNATIVE 1A 24-HOUR STORM)
 13       ID
 14       ID   DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA
          *DIAGRAM
          *
          * REPERFORMED WITH FOLLOWING MODIFICATIONS - JULY 2012, SEI
          * NOAA ATLAS 14 POINT RAINFALL DEPTH USED
          * DEPTH-AREA REDUCTION FACTOR UPDATED
          * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
          * OTHER MINOR MODIFICATIONS MADE
          *
          * REPERFORMED WITH FOLLOWING MODIFICATIONS - SEPTEMBER 2012, SEI
          * DETENTION BASIN DB13 ADDED TO SKYLINE WASH APEX (HC13)
          * 48" DIAMETER RCP - LOW FLOW OUTLET OF DETENTION BASIN CALCULATED USING HY8
          * HYDROGRAPH SPLITTED AT DB13 TO DI13 AND DI27
          * 0 HYDROGRAPH DI13 ROUTED TO S14
          * NO HYDROGRAPH ROUTED TO S24
          * DI24, RDI24 AND HC24 DELETED
          * HYDROGRAPH DI27 ROUTED TO S27
          * DI27, RDI27 AND HC27 ADDED
          * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
          * OTHER MINOR MODIFICATIONS MADE
          *
          * REPERFORMED WITH FOLLOWING MODIFICATIONS - FEBRUARY 2013, SEI
          * DETENTION BASIN DB13 MODIFIED BASED ON UPDATED STAGE-STORAGE DATA - BASIN 1A
          * 42" DIAMETER RCP - LOW FLOW OUTLET OF DETENTION BASIN
          * STAGE-OUTFLOW CALCULATED USING HYDROCAD
          * 100% DETENTION BASIN OUTLET HYDROGRAPH ROUTED TO S27 THROUGH DI27
          * (TO PROSPECT WASH)
          * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
          *
 15       IT      3                      500
 16       IN     15
 17       IO      5
 18       JD   3.97    0.01
 19       PC   .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
 20       PC   .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
 21       PC   .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
 22       PC   .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
 23       PC   .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
 24       PC   .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
 25       PC   .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
 26       PC   .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
 27       PC   .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  28          PC    .983    .986    .989    .992    .995    .998   1.000
  29          JD    3.77   10.00
  30          JD    3.57   30.00
  31          JD    3.45   60.00
  32          JD    3.38   90.00
  33          JD    3.34  120.00
  34          JD    3.30  150.00
  35          JD    3.20  300.00
  36          JD    3.11  500.00
              *  BASIN S1 - BEGINNING OF SKYLINE WASH
              * DDM   ***** Updated *****

  37          KK      S1
  38          KM   BASIN S1
  39          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  40          KM    L=       1.2  Lca=       .6   S= 1102.5  Kn= .050  LAG=  16.6
  41          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  42          BA     .51
  43          LG     .25     .25    3.95     .53   18.00
  44          UI    103.    273.    577.    783.   1122.    746.    585.    489.    400.    306.
  45          UI    248.    206.    151.    123.    102.     79.     60.     51.     48.     20.
  46          UI     20.     20.     20.     20.     20.      0.      0.      0.      0.      0.
  47          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *  BASIN S2 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

  48          KK      S2
  49          KM   BASIN S2
  50          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  51          KM    L=        .9  Lca=       .6   S=  916.1  Kn= .050  LAG=  16.0
  52          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  53          BA     .22
  54          LG     .25     .25    3.95     .53   18.00
  55          UI     46.    130.    269.    364.    496.    310.    251.    207.    166.    124.
  56          UI    105.     82.     60.     51.     38.     32.     23.     23.     12.      9.
  57          UI      9.      9.      9.      9.      0.      0.      0.      0.      0.      0.
  58          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

  59          KK     HC2
  60          KM        COMBINE HYDROGRAPHS FROM S1 AND S2 - UPSTREAM PORTION OF SKYLINE WASH
  61          HC       2  0.7296
              * DDM   ***** Preserved *****

  62          KK    R2-3
  63          KM        ROUTE HYDROGRAPH HC2 THROUGH S3 - SKYLINE WASH
  64          RS       1    FLOW      -1
  65          RC     .07    .036     .07    2930    .029
  66          RX    1000    1030    1100    1120    1130    1190    1220    1250
  67          RY    1626    1624    1594    1594    1596    1624    1626    1625
              *  BASIN S3 - MAIN SUBBASIN FOR GRANITE FALLS WASH
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  68          KK      S3
  69          KM   BASIN S3
  70          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  71          KM    L=       1.5  Lca=      1.0   S=  481.0  Kn= .040  LAG=  21.0
  72          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  73          BA     .65
  74          LG     .20     .25    4.00     .52   13.00
  75          UI    104.    180.    422.    652.    797.   1088.    945.    652.    567.    492.
  76          UI    420.    348.    274.    245.    212.    164.    133.    115.     99.     80.
  77          UI     70.     51.     51.     49.     20.     20.     20.     20.     20.     20.
  78          UI     20.     20.      0.      0.      0.      0.      0.      0.      0.      0.
  79          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

  80          KK     HC3
  81          KM        COMBINE HYDROGRAPH R2-3 WITH HYDROGRAPH FROM S3 - CONFLUENCE OF SKYLINE
  82          KM        WASH AND GRANITE FALLS WASH
  83          HC       2  1.3787
              * DDM   ***** Preserved *****

  84          KK    R3-4
  85          KM        ROUTE COMBINED HYDROGRAPHS HC3 THROUGH S4 - SKYLINE WASH
  86          RS       1    FLOW      -1
  87          RC     .07    .036     .07    2927    .032
  88          RX    1000    1030    1085    1160    1200    1240    1250    1275
  89          RY    1520    1518    1496    1496    1498    1516    1518    1520
              *  BASIN S4 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

  90          KK      S4
  91          KM   BASIN S4
  92          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  93          KM    L=       1.3  Lca=       .6   S=  503.9  Kn= .040  LAG=  16.2
  94          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  95          BA     .41
  96          LG     .20     .25    4.00     .52   13.00
  97          UI     85.    231.    486.    656.    913.    579.    465.    386.    312.    234.
  98          UI    196.    156.    114.     95.     73.     63.     41.     41.     28.     16.
  99          UI     16.     16.     16.     16.      0.      0.      0.      0.      0.      0.
 100          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 101          KK     HC4
 102          KM        COMBINE HYDROGRAPH R3-4 WITH HYDROGRAPH FROM S4 - CONCENTRATION POINT
 103          KM        ON SKYLINE WASH.
 104          HC       2  1.7864
              * DDM   ***** Preserved *****

 105          KK    R4-7
 106          KM        ROUTE COMBINED HYDROGRAPHS HC4 THROUGH S7 - SKYLINE WASH
 107          RS       1    FLOW      -1
 108          RC     .07    .036     .07    2211    .022
 109          RX    1000    1025    1055    1120    1145    1180    1240    1370
 110          RY    1462    1460    1462    1462    1432    1432    1456    1462
              *  BASIN S7 - TRIBUTARY BASIN TO MOUNTAIN WASH NEAR AT CONFLUENCE WITH SKYLINE
              *   WASH
              * DDM   ***** Updated *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 111        KK      S7
 112        KM   BASIN S7
 113        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 114        KM    L=       .9  Lca=       .6   S=  955.3  Kn= .040  LAG=  12.7
 115        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 116        BA     .13
 117        LG     .20     .25    4.00     .52   12.00
 118        UI     37.    147.    254.    365.    229.    178.    137.     97.     78.     53.
 119        UI     41.     30.     22.     17.     12.      7.      7.      7.      7.      0.
 120        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 121        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 122        KK    IHC7
 123        KM        COMBINE HYDROGRAPHS R4-7 AND S7 - UPSTREAM OF CONFLUENCE WITH MOUNTAIN
 124        KM        WASH
 125        HC       2  1.9208
            *  BASIN S5 - BEGINNING OF MOUNTAIN WASH
            * DDM   ***** Updated *****

 126        KK      S5
 127        KM   BASIN S5
 128        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 129        KM    L=      1.4  Lca=       .7   S=  654.8  Kn= .050  LAG=  20.2
 130        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 131        BA     .53
 132        LG     .25     .25    3.95     .53   20.00
 133        UI     89.    164.    385.    573.    705.    988.    689.    532.    459.    396.
 134        UI    334.    265.    219.    195.    157.    120.    104.     93.     68.     65.
 135        UI     43.     43.     43.     18.     17.     17.     17.     17.     17.     17.
 136        UI     17.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 137        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 138        KK    R5-6
 139        KM        ROUTE HYDROGRAPH S5 THROUGH S6 - MOUNTAIN WASH
 140        RS       1    FLOW      -1
 141        RC     .07    .036     .07    2494    .030
 142        RX    1000    1025    1075    1105    1150    1170    1220    1240
 143        RY    1480    1476    1476    1460    1454    1454    1478    1480
            *  BASIN S6 - SUBBASIN TRIBUTARY TO MOUNTAIN WASH
            * DDM   ***** Updated *****

 144        KK      S6
 145        KM   BASIN S6
 146        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 147        KM    L=       .8  Lca=       .4   S=  491.4  Kn= .042  LAG=  12.3
 148        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 149        BA     .25
 150        LG     .21     .25    4.00     .52   15.00
 151        UI     75.    289.    495.    680.    415.    323.    244.    172.    135.     93.
 152        UI     71.     52.     35.     33.     13.     13.     13.     13.      0.      0.
 153        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 154        KK     HC6
 155        KM        COMBINE HYDROGRAPHS R5-6 WITH SUBBASIN S6 - UPSTREAM OF CONFLUENCE WITH
 156        KM        SKYLINE WASH
 157        HC       2  0.7787
            * DDM   ***** Preserved *****

 158        KK     HC7
 159        KM        COMBINE HYDROGRAPHS IHC7 WITH HC6 - CONFLUENCE OF MOUNTAIN WASH WITH
 160        KM        SKYLINE WASH
 161        HC       2  2.6995
            * DDM   ***** Preserved *****

 162        KK  R7-12E
 163        KM        ROUTE COMBINED HYDROGRAPHS AT HC7 THROUGH S12E - SKYLINE WASH
 164        RS       1    FLOW      -1
 165        RC     .07    .036     .07    1930   .0166
 166        RX    1000    1085    1170    1240    1255    1265    1310    1350
 167        RY    1430    1424    1422    1420    1422    1424    1428    1430
            *
            *   BASIN S12E - SUBBASIN TRIBUTARY TO PYRITE WASH AND SKYLINE WASH CONFLUENCE
            * DDM   ***** Updated *****

 168        KK    S12E
 169        KM   BASIN S12E
 170        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 171        KM    L=       .6  Lca=       .2   S=  142.9  Kn= .030  LAG=   7.8
 172        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 173        BA     .05
 174        LG     .15     .25    3.91     .55   18.00
 175        UI     47.    167.    200.    114.     70.     44.     27.     16.     11.      5.
 176        UI      5.      5.      0.      0.      0.      0.      0.      0.      0.      0.
 177        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 178        KK   HC12E
 179        KM        COMBINE HYDROGRAPHS S12E WITH R7-12E - CONFLUENCE OF PYRITE WASH WITH
 180        KM        SKYLINE WASH
 181        HC       2  2.7544
            *  BASIN S8 - BEGINNING OF PYRITE WASH
            * DDM   ***** Updated *****

 182        KK      S8
 183        KM   BASIN S8
 184        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 185        KM    L=       .8  Lca=       .4   S=  692.1  Kn= .050  LAG=  13.0
 186        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 187        BA     .34
 188        LG     .25     .25    3.95     .53   20.00
 189        UI     88.    352.    614.    906.    585.    452.    354.    254.    200.    145.
 190        UI    105.     81.     62.     43.     38.     17.     17.     17.     17.     17.
 191        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 192        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 193          KK    R8-9
 194          KM         ROUTE HYDROGRAPH S8 THROUGH S9 - PYRITE WASH
 195          RS       1    FLOW      -1
 196          RC     .07    .036     .07     911    .013
 197          RX    1000    1020    1050    1065    1080    1125    1185    1190
 198          RY    1518    1518    1494    1492    1494    1494    1520    1524
              *  BASIN S9 - SUBBASIN TRIBUTARY TO PYRITE WASH
              * DDM   ***** Updated *****

 199          KK      S9
 200          KM   BASIN S9
 201          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 202          KM    L=       1.0  Lca=        .7   S=  415.7  Kn= .040  LAG=  15.9
 203          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 204          BA     .21
 205          LG     .20     .25    3.95     .53   17.00
 206          UI     44.    126.    259.    351.    471.    293.    238.    196.    157.    117.
 207          UI     99.     77.     56.     48.     35.     29.     22.     22.     10.      8.
 208          UI      8.      8.      8.      8.      0.      0.      0.      0.      0.      0.
 209          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 210          KK     HC9
 211          KM         COMBINE ROUTED HYDROGRAPH R8-9 WITH HYDROGRAPH S9 - CONCENTRATION POINT
 212          KM         ON PYRITE WASH
 213          HC       2  0.5472
              * DDM   ***** Preserved *****

 214          KK   R9-11
 215          KM         ROUTE COMBINED HYDROGRAPHS HC9 THROUGH S11 - PYRITE WASH
 216          RS       3    FLOW      -1
 217          RC     .07    .036     .07    3462    .023
 218          RX    1000    1080    1090    1120    1140    1290    1340    1375
 219          RY    1496    1494    1492    1472    1471    1472    1490    1494
              *  BASIN S11 -PYRITE WASH UPSTREAM OF CONFLUENCE WITH WAGON WASH
              * DDM   ***** Updated *****

 220          KK     S11
 221          KM   BASIN S11
 222          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 223          KM    L=        .7  Lca=        .3   S=  797.1  Kn= .040  LAG=   9.3
 224          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 225          BA     .17
 226          LG     .20     .25    4.00     .52   11.00
 227          UI     96.    360.    590.    366.    262.    169.    119.     73.     51.     32.
 228          UI     23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
 229          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 230          KK   IHC11
 231          KM         COMBINE ROUTED HYDROGRAPH R9-11 WITH HYDROGRAPHS S11 - UPSTREAM OF
 232          KM         CONFLUENCE WITH WAGON WASH
 233          HC       2  0.7154
              *  BASIN S10 - BEGINNING OF WAGON WASH
              * DDM   ***** Updated *****

 234          KK     S10
 235          KM   BASIN S10
 236          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 237          KM    L=       1.0  Lca=        .5   S=  896.9  Kn= .048  LAG=  14.2
 238          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 239          BA     .19
 240          LG     .24     .25    3.95     .53   18.00
 241          UI     46.    157.    302.    430.    397.    263.    213.    167.    122.    101.
 242          UI     71.     55.     43.     35.     23.     23.     11.      9.      9.      9.
 243          UI      9.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 244          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 245          KK    HC11
 246          KM         COMBINE HYDROGRAPH IHC11 WITH HYDROGRAPH S10 - CONFLUENCE OF WAGON WASH
 247          KM         WITH PYRITE WASH
 248          HC       2  0.9089
              * DDM   ***** Preserved *****

 249          KK  R1112W
 250          KM         ROUTE COMBINED HYDROGRAPHS HC11 THROUGH S12W - CONTINUATION OF PYRITE
 251          KM         WASH DOWNSTREAM OF CONFLUENCE WITH WAGON WASH
 252          RS       1    FLOW      -1
 253          RC     .07    .036     .07    1501    .019
 254          RX    1000    1030    1065    1150    1240    1330    1375    1410
 255          RY    1422    1420    1410    1410    1410    1412    1414    1428
              *  BASIN S12W - SUBBASIN TRIBUTARY FOR PYRITE WASH AND SKYLINE WASH
              * DDM   ***** Updated *****

 256          KK    S12W
 257          KM   BASIN S12W
 258          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 259          KM    L=        .7  Lca=        .2   S=  153.6  Kn= .030  LAG=   8.2
 260          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 261          BA     .09
 262          LG     .15     .25    3.91     .55   18.00
 263          UI     68.    246.    330.    189.    123.     79.     47.     31.     19.     11.
 264          UI      7.      7.      0.      0.      0.      0.      0.      0.      0.      0.
 265          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 266          KK   HC12W
 267          KM         COMBINE HYDROGRAPH R1112W WITH HYDROGRAPH S12W - CONFLUENCE OF SKYLINE
 268          KM         WASH WITH PYRITE WASH
 269          HC       2  0.9994
              * DDM   ***** Preserved *****
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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  270          KK    HC12
  271          KM         COMBINE ROUTED HYDROGRAPH HC12W AND HC12E
  272          KM         CONFLUENCE OF SKYLINE WASH AND PYRITE WASH
  273          HC       2  3.7538
               * DDM   ***** Preserved *****

  274          KK  R12-13
  275          KM         ROUTE COMBINED HYDROGRAPHS HC12 THROUGH S13 - SKYLINE WASH
  276          RS       1    FLOW      -1
  277          RC     .07    .036     .07    1854    .017
  278          RX    1000    1080    1110    1320    1370    1420    1500    1550
  279          RY    1400    1392    1384    1382    1382    1380    1380    1400
               *  BASIN S13 - SKYLINE WASH DOWNSTREAM OF CONFLUENCE OF PYRITE WASH
               * DDM   ***** Updated *****

  280          KK     S13
  281          KM   BASIN S13
  282          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  283          KM    L=        .9  Lca=        .3   S=  174.2  Kn= .030  LAG=  10.1
  284          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  285          BA     .17
  286          LG     .15     .25    3.88     .56    4.00
  287          UI     82.    312.    550.    397.    278.    195.    135.     90.     64.     43.
  288          UI     28.     20.     11.     11.     11.      0.      0.      0.      0.      0.
  289          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

  290          KK    HC13
  291          KM         COMBINE ROUTED HYDROGRAPH R12-13 WITH HYDROGRAPH S13 - SKYLINE WASH
  292          HC       2  3.9274
               * KO     3
               *

  293          KK    DB13
  294          KM   DETENTION BASIN AT SKYLINE WASH APEX
  295          RS       1    STOR       0
  296          SV     0.0    11.0    24.0    36.0    50.0    64.0    79.0    95.0   111.0   129.0
  297          SV   147.0   165.0   185.0   204.0   224.0   245.0   267.0
               *
  298          SE  1343.0  1344.0  1345.0  1346.0  1347.0  1348.0  1349.0  1350.0  1351.0  1352.0
  299          SE  1353.0  1354.0  1355.0  1356.0  1357.0  1358.0  1359.0
               *
  300          SQ     0.0    0.12    6.23   22.03   42.63   63.11   77.38   94.72  109.43  122.33
  301          SQ  133.64  142.56  150.96  158.90  166.48  173.72  180.67
  302          KO       3
               * DDM   ***** Preserved *****

  303          KK    DI13
               * KM       SPLIT FLOW AT HC13; MAIN FLOW TO S24 AND MINOR FLOW TO S14
               * DT  DI24
               * DI     0     201     556    1353    2595    4157
               * DQ     0     201     461     879    1427  2078.5
  304          KM         SPLIT FLOW AT DB13; ALL FLOW TO S27 AND NONE TO S14
  305          DT    DI27
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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  306          DI       0     200     500    1000    2500    4000
  307          DQ       0     200     500    1000    2500    4000
               * DDM   ***** Preserved *****

  308          KK   RDI13
  309          KM         ROUTE HYDROGRAPH DI13 THROUGH S14 -SKYLINE WASH DOWNSTREAM OF SPLIT
  310          RS       1    FLOW      -1
  311          RC     .07    .036     .07    4353    .021
  312          RX    1000    1025    1270    1280    1320    1330    1370    1385
  313          RY    1360    1354    1354    1356    1356    1358    1358    1360
               *  BASIN S14 - BEGINNING OF COYOTE WASH
               * DDM   ***** Updated *****

  314          KK     S14
  315          KM   BASIN S14
  316          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  317          KM    L=       1.2  Lca=        .6   S=  340.7  Kn= .030  LAG=  12.4
  318          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  319          BA     .49
  320          LG     .15     .25    3.91     .55   11.00
  321          UI    144.    562.    962.   1341.    822.    640.    487.    343.    270.    185.
  322          UI    145.    101.     72.     65.     31.     25.     25.     25.     25.      0.
  323          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
  324          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

  325          KK    HC14
  326          KM         COMBINE ROUTED HYDROGRAPH RDI13 WITH HYDROGRAPH S14 - SPLIT FLOW FROM
  327          KM         SKYLINE WASH AND COYOTE WASH SUBBASIN
  328          HC       2  4.4139
               * DDM   ***** Preserved *****

  329          KK  R1416S
               * KM       ROUTE COMBINED HYDROGRAPHS HC14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
  330          KM         ROUTE HYDROGRAPH S14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
  331          KM         OF CONFLUENCE WITH COYOTE WASH
  332          RS       3    FLOW      -1
  333          RC     .07    .036     .07    3140    .017
  334          RX    1000    1035    1150    1180    1320    1360    1480    1481
  335          RY    1236    1234    1234    1232    1232    1234    1236    1236
               *  BASIN S15 - SUBBASIN IN AREA OF EXISTING A.D.O.T. BORROW PITS
               * DDM   ***** Updated *****

  336          KK     S15
  337          KM   BASIN S15
  338          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  339          KM    L=        .8  Lca=        .3   S=  105.0  Kn= .030  LAG=   9.8
  340          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  341          BA     .11
  342          LG     .15     .27    3.40     .77     .00
  343          UI     56.    213.    370.    246.    176.    120.     84.     54.     37.     25.
  344          UI     19.      9.      7.      7.      7.      0.      0.      0.      0.      0.
  345          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 346        KK  R1516S
 347        KM        ROUTE HYDROGRAPH S15 THROUGH S16S - SKYLINE WASH DOWNSTREAM OF
 348        KM        CONFLUENCE WITH COYOTE WASH
 349        RS      3    FLOW      -1
 350        RC    .07    .036     .07    2218    .018
 351        RX   1000    1035    1150    1180    1320    1360    1480    1481
 352        RY   1236    1234    1234    1232    1232    1234    1236    1236
            *  BASIN S16S - SUBBASIN AT SKYLINE WASH DOWNSTREAM OF CONFLUENCE WITH COYOTE W.
            * DDM   ***** Updated *****

 353        KK    S16S
 354        KM   BASIN S16S
 355        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 356        KM    L=        .6  Lca=        .3   S=  116.4  Kn= .030  LAG=   9.3
 357        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 358        BA    .17
 359        LG    .15     .25    3.95     .53    6.00
 360        UI   100.    373.    611.    379.    271.    175.    123.     76.     53.     34.
 361        UI    23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
 362        UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 363        KK  IHC16S
 364        KM        COMBINE ROUTED HYDROGRAPH R14-16S AND R15-16S WITH HYDROGRAPH S16S
 365        KM        DOWNSTREAM OF CONFLUENCE OF SKYLINE WASH WITH COYOTE WASH
 366        HC      3  4.6952
            *  BASIN S16N - SUBBASIN TRIBUTARY TO SKYLINE WASH
            * DDM   ***** Updated *****

 367        KK    S16N
 368        KM   BASIN S16N
 369        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 370        KM    L=        .9  Lca=        .6   S=  653.2  Kn= .050  LAG=  16.5
 371        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 372        BA    .17
 373        LG    .25     .25    3.95     .53   18.00
 374        UI    34.     90.    189.    256.    366.    238.    189.    158.    129.     98.
 375        UI    80.     66.     48.     39.     32.     26.     19.     16.     15.      6.
 376        UI     6.      6.      6.      6.      6.      0.      0.      0.      0.      0.
 377        UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 378        KK  R16N-S
 379        KM        ROUTE HYDROGRAPH S16N THROUGH S16S
 380        RS      4    FLOW      -1
 381        RC    .07    .036     .07    3230    .022
 382        RX   1000    1035    1150    1180    1320    1360    1480    1481
 383        RY   1236    1234    1234    1232    1232    1234    1236    1236
            * DDM   ***** Preserved *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 384        KK   HC16S
 385        KM        COMBINE ROUTED HYDROGRAPH R16N-S AND IHC16S
 386        KM        SKYLINE WASH DOWNSTREAM OF COYOTE WASH
 387        HC      2  4.8652
            * DDM   ***** Preserved *****

 388        KK   DI16S
 389        KM        SPLIT FLOW AT HC16S; MAIN FLOW TO S17 AND MINOR FLOW TO S22
 390        DT    DI22
 391        DI      0      46     144     344   708.5    1223
 392        DQ      0       0       8      52     153     329
            * DDM   ***** Preserved *****

 393        KK  R16-17
 394        KM        ROUTE HYDROGRAPH DI16S THROUGH S17
 395        RS      4    FLOW      -1
 396        RC    .07    .036     .07    4341    .015
 397        RX   1000    1060    1090    1120    1145    1180    1200    1320
 398        RY   1202    1200  1199.5    1200    1199    1199    1200    1202
            *  BASIN S17 - SUBBASIN OF SKYLINE WASH SOUTH OF MCDOWELL ROAD ON EAST SIDE
            *  OF WATERSHED
            * DDM   ***** Updated *****

 399        KK     S17
 400        KM   BASIN S17
 401        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 402        KM    L=        .9  Lca=        .5   S=  117.9  Kn= .030  LAG=  12.8
 403        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 404        BA    .29
 405        LG    .15     .26    3.60     .67     .00
 406        UI    79.    311.    540.    784.    495.    385.    298.    212.    170.    117.
 407        UI    89.     66.     50.     37.     28.     15.     15.     15.     15.      0.
 408        UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 409        UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 410        KK    HC17
 411        KM        COMBINE ROUTED HYDROGRAPH R16-17 WITH HYDROGRAPH S17 AT EAST SIDE OF
 412        KM        BUCKEYE F.R.S. NO. 3
 413        HC      2  5.1537
            *  BASIN S18 - BEGINNING OF RATTLER WASH
            * DDM   ***** Updated *****

 414        KK     S18
 415        KM   BASIN S18
 416        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 417        KM    L=        .8  Lca=        .4   S=  292.7  Kn= .040  LAG=  12.9
 418        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 419        BA    .36
 420        LG    .20     .25    3.95     .53   17.00
 421        UI    96.    380.    662.    968.    618.    479.    373.    267.    211.    149.
 422        UI   111.     84.     64.     46.     38.     18.     18.     18.     18.      0.
 423        UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 424        UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 425          KK   R18-19
 426          KM         ROUTE HYDROGRAPH HC18 THROUGH S19
 427          RS       3    FLOW      -1
 428          RC     .07    .036     .07    4253     .02
 429          RX    1000    1050    1100    1125    1140    1180    1240    1241
 430          RY    1266    1264    1242    1240    1242    1264    1266    1266
              *  BASIN S19 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****

 431          KK      S19
 432          KM    BASIN S19
 433          KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 434          KM     L=      1.2  Lca=        .8   S=  824.8  Kn= .030  LAG=  11.6
 435          KM     PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 436          BA     .29
 437          LG     .15     .25    4.00     .52   12.00
 438          UI    102.    389.    662.    802.    483.    372.    266.    195.    138.     99.
 439          UI     72.     51.     41.     22.     16.     16.     16.      0.      0.      0.
 440          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 441          KK     HC19
 442          KM         COMBINE ROUTED HYDROGRAPH R18-19 WITH HYDROGRAPH S19 - RATTLER WASH
 443          HC       2  0.6498
              * DDM   ***** Preserved *****

 444          KK   R19-20
 445          KM         ROUTE COMBINED HYDROGRAPHS HC19 THROUGH S20 - RATTLER WASH
 446          RS       3    FLOW      -1
 447          RC     .07    .036     .07    3740    .022
 448          RX     999    1000    1030    1095    1130    1150    1220    1221
 449          RY    1208    1208    1206    1204    1204    1206    1208    1208
              *  BASIN S20 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****

 450          KK      S20
 451          KM    BASIN S20
 452          KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 453          KM     L=       .9  Lca=        .4   S=   84.1  Kn= .030  LAG=  13.0
 454          KM     PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 455          BA     .09
 456          LG     .15     .26    3.60     .67    4.00
 457          UI     22.     88.    155.    228.    147.    114.     89.     64.     50.     36.
 458          UI     26.     20.     16.     11.     10.      4.      4.      4.      4.      4.
 459          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 460          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 461          KK     HC20
 462          KM         COMBINE ROUTED HYDROGRAPH R19-20 WITH HYDROGRAPH S20 AT FAR EAST SIDE
 463          KM         OF STUDY AREA NORTH OF BUCKEYE F.R.S. NO. 3
 464          HC       2  0.7344
              *  BASIN S21 - SUBBASIN NORTH OF BUCKEYE F.R.S. NO 3 SPILLWAY
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 465          KK      S21
 466          KM    BASIN S21
 467          KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 468          KM     L=      1.2  Lca=        .6   S=  780.6  Kn= .030  LAG=  11.0
 469          KM     PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 470          BA     .62
 471          LG     .15     .25    4.10     .51   10.00
 472          UI    245.    927.   1593.   1636.   1019.    766.    522.    392.    260.    190.
 473          UI    136.     93.     67.     36.     36.     36.      0.      0.      0.      0.
 474          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *  BASIN S22 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
              * DDM   ***** Updated *****

 475          KK      S22
 476          KM    BASIN S22
 477          KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 478          KM     L=      1.3  Lca=        .4   S=  110.1  Kn= .029  LAG=  13.7
 479          KM     PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 480          BA     .55
 481          LG     .16     .25    3.91     .53    1.00
 482          UI    135.    496.    909.   1351.   1029.    742.    594.    451.    332.    268.
 483          UI    188.    151.    108.     84.     66.     51.     26.     26.     26.     26.
 484          UI     26.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 485          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 486          KK     DI22
 487          KM         RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S22
 488          DR     DI22
              * DDM   ***** Preserved *****

 489          KK    RDI22
 490          KM         ROUTE HYDROGRAPH DI22 THROUGH S22 - PORTION OF DIVERT OF SKYLINE WASH
 491          RS       6    FLOW      -1
 492          RC     .07    .036     .07    4253    .015
 493          RX     997     998     999    1000    1060    1210    1300    1300
 494          RY    1217    1216    1216    1215    1215    1216    1216    1217
              * DDM   ***** Preserved *****

 495          KK     HC22
 496          KM         COMBINE HYDROGRAPHS AT HC22
 497          HC       2  5.4141
              *  BASIN S23 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
              * DDM   ***** Updated *****

 498          KK      S23
 499          KM    BASIN S23
 500          KM     THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 501          KM     L=      1.6  Lca=        .5   S=  112.1  Kn= .028  LAG=  15.2
 502          KM     PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 503          BA     .49
 504          LG     .17     .26    3.50     .70    2.00
 505          UI    108.    331.    660.    901.   1086.    670.    547.    446.    338.    263.
 506          UI    217.    155.    125.     98.     81.     53.     53.     31.     21.     21.
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 507           UI     21.     21.     21.      0.      0.      0.      0.      0.      0.      0.
 508           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               *  BASIN S24 - SUBBASIN DOWNSTREAM OF SKYLINE WASH SPLIT FLOW
               * DDM   ***** Updated *****

 509           KK     S24
 510           KM   BASIN S24
 511           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 512           KM    L=       2.4  Lca=       1.2   S=  113.8  Kn= .037  LAG=  32.2
 513           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 514           BA     .32
 515           LG     .20     .25    4.00     .51    1.00
 516           UI     33.     33.     66.    117.    171.    211.    242.    273.    350.    361.
 517           UI    241.    206.    189.    172.    157.    142.    129.    111.     96.     84.
 518           UI     78.     73.     65.     54.     45.     42.     37.     36.     30.     25.
 519           UI     25.     22.     16.     16.     16.     16.     13.      6.      6.      6.
 520           UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      0.
 521           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 522           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****
               * KK  DI24
               * KM       RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S24
               * DR  DI24
               * DDM   ***** Preserved *****
               * KK RDI24
               * KM       ROUTE HYDROGRAPH DI24 THROUGH S24
               * RS      5    FLOW      -1
               * RC   .07    .036     .07    9929     .02
               * RX  1000    1045    1060    1080    1100    1120    1155    1220
               * RY  1222    1220    1218    1218    1216    1216    1220    1220
               * DDM   ***** Preserved *****
               * KK  HC24
               * KM       COMBINE HYDROGRAPHS AT HC24
               * HC      2  4.2443
               *  BASIN S25 - UPSTREAM END OF SMALL WATERSHED EAST OF PROSPECT WASH
               * DDM   ***** Updated *****

 523           KK     S25
 524           KM   BASIN S25
 525           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 526           KM    L=        .7  Lca=        .3   S=  103.0  Kn= .030  LAG=  10.0
 527           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 528           BA     .03
 529           LG     .15     .25    4.15     .49     .00
 530           UI     13.     50.     87.     61.     43.     30.     21.     14.     10.      7.
 531           UI      4.      3.      2.      2.      2.      0.      0.      0.      0.      0.
 532           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

 533           KK  R25-26
 534           KM         ROUTE HYDROGRAPH S25 THROUGH S26 CROSSING NEAR THE INTERSECTION OF
 535           KM         WATSON ROAD AND MCDOWELL ROAD
 536           RS      8    FLOW      -1
 537           RC    .07    .036     .07    6571     .02
 538           RX   1000    1045    1060    1080    1100    1120    1155    1220
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LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 539           RY   1222    1220    1218    1218    1216    1216    1220    1220
               *  BASIN S26 - SUBBASIN ON THE LOWER WEST SIDE OF STUDY AREA
               * DDM   ***** Updated *****

 540           KK     S26
 541           KM   BASIN S26
 542           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 543           KM    L=       1.2  Lca=        .5   S=  119.7  Kn= .029  LAG=  13.8
 544           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 545           BA     .21
 546           LG     .16     .25    4.20     .47    1.00
 547           UI     52.    187.    347.    513.    403.    286.    230.    177.    129.    105.
 548           UI     74.     59.     43.     33.     25.     21.     10.     10.     10.     10.
 549           UI     10.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 550           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

 551           KK    HC26
 552           KM         COMBINE ROUTED HYDROGRAPH R25-26 WITH HYDROGRAPH S26
 553           KM         AT WEST SIDE OF WATERSHED NORTH OF BUCKEYE F.R.S. NO. 3
 554           HC      2  0.2377
               *  BASIN S27 - BEGINNING OF PROSPECT WASH
               * DDM   ***** Updated *****

 555           KK     S27
 556           KM   BASIN S27
 557           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 558           KM    L=       1.4  Lca=        .5   S=  345.2  Kn= .030  LAG=  12.6
 559           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 560           BA     .51
 561           LG     .15     .25    4.00     .52   16.00
 562           UI    146.    575.    989.   1411.    878.    682.    524.    370.    295.    201.
 563           UI    157.    111.     82.     67.     41.     26.     26.     26.     26.      0.
 564           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 565           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

 566           KK    DI27
 567           KM         RETURN DIVERTED HYDROGRAPH FROM DI27 DOWNSTREAM OF DB13 TO ROUTE
 568           KM         AND COMBINE WITH S27
 569           DR    DI27
               * DDM   ***** Preserved *****

 570           KK   RDI27
 571           KM         ROUTE HYDROGRAPH DI27 THROUGH S27
 572           RS      1    FLOW      -1
 573           RC    .07    .040     .07    1200     .02
 574           RX   1000    1050    1100    1120    1125    1145    1195    1245
 575           RY   1222    1221    1221    1216    1216    1221    1221    1222
               * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 576          KK    HC27
 577          KM         COMBINE HYDROGRAPHS AT HC27
 578          HC       2  4.4343

 579          KK  R27-28
 580          KM         ROUTE HYDROGRAPH S27 THROUGH S28
 581          RS       1    FLOW      -1
 582          RC     .07    .036     .07    2482    .022
 583          RX    1000    1060    1090    1100    1120    1130    1160    1230
 584          RY    1250    1248    1240    1238    1238    1240    1242    1250
              *  BASIN S28 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****

 585          KK     S28
 586          KM   BASIN S28
 587          KM   THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 588          KM   L=       .4  Lca=       .2   S=  120.0  Kn= .028  LAG=    6.2
 589          KM   PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 590          BA     .04
 591          LG     .17     .25    4.15     .48    2.00
 592          UI     55.    180.    114.     65.     36.     19.     11.      4.      4.      0.
 593          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 594          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 595          KK    HC28
 596          KM         COMBINE ROUTED HYDROGRAPH R27-28 WITH HYDROGRAPH S28 - PROSPECT WASH
 597          KM         AT WATSON ROAD CROSSING
 598          HC       2  0.5526
              * DDM   ***** Preserved *****

 599          KK  R28-29
 600          KM         ROUTE COMBINED HYDROGRAPHS HC28 THROUGH S29
 601          RS       2    FLOW      -1
 602          RC     .07    .036     .07    3804   .0184
 603          RX    1000    1000    1110    1125    1165    1170    1250    1251
 604          RY    1192    1192    1190    1188    1188    1190    1192    1192
              *  BASIN S29 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****

 605          KK     S29
 606          KM   BASIN S29
 607          KM   THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 608          KM   L=       .7  Lca=       .3   S=  102.9  Kn= .030  LAG=    9.4
 609          KM   PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 610          BA     .10
 611          LG     .15     .25    4.15     .49     .00
 612          UI     55.    207.    343.    215.    154.    101.     71.     44.     31.     20.
 613          UI     14.      7.      7.      7.      0.      0.      0.      0.      0.      0.
 614          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 615          KK    HC29
 616          KM         COMBINE ROUTED HYDROGRAPH R28-29 WITH HYDROGRAPH S29 - PROSPECT WASH
 617          KM         AT BUCKEYE F.R.S. NO 3
 618          HC       2  0.6515
              *
              * DDM   ***** Preserved *****

 619          KK  HCBES3
 620          KM         COMBINE ALL HYDROGRAPHS AT BUCKEYE FRS-3
 621          HC       8  8.7485
 622          ZZ
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1

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

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

   37         S1
               .
               .
   48          .         S2
               .          .
               .          .
   59        HC2...........
               V
               V
   62       R2-3
               .
               .
   68          .         S3
               .          .
               .          .
   80        HC3...........
               V
               V
   84       R3-4
               .
               .
   90          .         S4
               .          .
               .          .
  101        HC4...........
               V
               V
  105       R4-7
               .
               .
  111          .         S7
               .          .
               .          .
  122       IHC7...........
               .
               .
  126          .         S5
               .          V
               .          V
  138          .       R5-6
               .          .
               .          .
  144          .          .         S6
               .          .          .
               .          .          .
  154          .        HC6...........
               .          .
               .          .
  158        HC7...........
               V
               V
  162     R7-12E
               .
               .
  168          .       S12E
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               .          .
  178     HC12E...........
               .
               .
  182          .         S8
               .          V
               .          V
  193          .       R8-9
               .          .
               .          .
  199          .          .         S9
               .          .          .
               .          .          .
  210          .        HC9...........
               .          V
               .          V
  214          .      R9-11
               .          .
               .          .
  220          .          .        S11
               .          .          .
               .          .          .
  230          .      IHC11...........
               .          .
               .          .
  234          .          .        S10
               .          .          .
               .          .          .
  245          .       HC11...........
               .          V
               .          V
  249          .     R1112W
               .          .
               .          .
  256          .          .       S12W
               .          .          .
               .          .          .
  266          .      HC12W...........
               .          .
               .          .
  270       HC12...........
               V
               V
  274     R12-13
               .
               .
  280          .        S13
               .          .
               .          .
  290       HC13...........
               V
               V
  293       DB13
               .
               .
  305          .------->    DI27
  303       DI13
               V
               V
  308      RDI13
               .
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314        .        S14
                    .
325    HC14..........
           V
           V
329  R1416S
           .
336        .        S15
                    V
                    V
346        .   R1516S
                    .
353        .        .        S16S
                    .           .
363  IHC16S.......................
           .
367        .        S16N
                    V
                    V
378        .   R16N-S
                    .
384   HC16S..........
           .
390        .------->   DI22
388   DI16S
           V
           V
393  R16-17
           .
399        .        S17
                    .
410    HC17..........
           .
414        .        S18
                    V
                    V
425        .   R18-19
                    .
431        .        .        S19
                    .           .
441        .     HC19...........
                    V
                    V
444        .    R19-20
                    .
450        .        .        S20
           .        .           .

461   .   HC20..........
          .
465   .   .   S21
              .
475   .   .   .   S22
                  .
488   .   .   .   .   .<-------   DI22
486   .   .   .   .   DI22
                      V
                      V
489   .   .   .   .  RDI22
                      .
495   .   .   .  HC22.....
                  .
498   .   .   .   .   S23
                      .
509   .   .   .   .   .   S24
                          .
523   .   .   .   .   .   .   S25
                              V
                              V
533   .   .   .   .   .   .  R25-26
                              .
540   .   .   .   .   .   .   .   S26
                                  .
551   .   .   .   .   .   .  HC26.....
                              .
555   .   .   .   .   .   .   .   S27
                                  .
569   .   .   .   .   .   .   .   .   .<-------   DI27
566   .   .   .   .   .   .   .   .  DI27
                                      V
                                      V
570   .   .   .   .   .   .   .   .  RDI27
                                      .
576   .   .   .   .   .   .   .  HC27.....
                                  V
                                  V
579   .   .   .   .   .   .   . R27-28
                                  .
585   .   .   .   .   .   .   .   .   S28
                                      .
595   .   .   .   .   .   .   .  HC28.....
                                  V
                                  V
599   .   .   .   .   .   .   . R28-29
      .   .   .   .   .   .   .   .
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605        .        .        .        .        .        .        .        .       S29
           .        .        .        .        .        .        .        .        .
615        .        .        .        .        .        .        .      HC29...........
           .        .        .        .        .        .        .        .
619      HCBES3.............................................................................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
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1***************************************                      ***************************************
*                                       *                      *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                      *   U.S. ARMY CORPS OF ENGINEERS      *
*              JUN   1998               *                      *   HYDROLOGIC ENGINEERING CENTER     *
*            VERSION 4.1                *                      *         609 SECOND STREET           *
*                                       *                      *      DAVIS, CALIFORNIA 95616        *
* RUN DATE   14FEB13  TIME  08:42:52    *                      *         (916) 756-1104              *
*                                       *                      *                                     *
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                              SKYLINE WASH AND TRIBUTARIES
                              FLOODPLAIN DELINEATION STUDY
                              FCD 96-08

                              HEC-1

                              DATE:   8-19-98
                              STORM:  100-YR 24-HOUR STORM
                              FILE NAME:  SKYLINE.DAT

                              FILE NAME CHANGED TO SL3-1A-24.DAT
                              (SKYLINE DCR PHASE 3 ALTERNATIVE 1A 24-HOUR STORM)

                          DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA

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

     IT        HYDROGRAPH TIME DATA
                      NMIN          3  MINUTES IN COMPUTATION INTERVAL
                     IDATE      1   0  STARTING DATE
                     ITIME       0000  STARTING TIME
                        NQ        500  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE      2   0  ENDING DATE
                    NDTIME       0057  ENDING TIME
                     ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL     .05 HOURS
                      TOTAL TIME BASE   24.95 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

  18 JD        INDEX STORM NO. 1
                      STRM       3.97  PRECIPITATION DEPTH
                      TRDA        .01  TRANSPOSITION DRAINAGE AREA

  19 PI          PRECIPITATION PATTERN
                      .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                      .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
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29 JD INDEX STORM NO. 2

STRM 3.77 PRECIPITATION DEPTH

TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

30 JD INDEX STORM NO. 3

STRM 3.57 PRECIPITATION DEPTH

TRDA 30.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

31 JD INDEX STORM NO. 4
STRM 3.45 PRECIPITATION DEPTH
TRDA 60.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

32 JD INDEX STORM NO. 5
STRM 3.38 PRECIPITATION DEPTH
TRDA 90.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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33 JD INDEX STORM NO. 6

STRM 3.34 PRECIPITATION DEPTH

TRDA 120.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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34 JD INDEX STORM NO. 7

STRM 3.30 PRECIPITATION DEPTH

TRDA 150.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

35 JD INDEX STORM NO. 8

STRM 3.20 PRECIPITATION DEPTH
TRDA 300.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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36 JD INDEX STORM NO. 9
STRM 3.11 PRECIPITATION DEPTH
TRDA 500.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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              *            *
293 KK        *    DB13    *
              *            *
              **************

302 KO             OUTPUT CONTROL VARIABLES
                         IPRNT          3  PRINT CONTROL
                         IPLOT          0  PLOT CONTROL
                         QSCAL         0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

295 RS             STORAGE ROUTING
                         NSTPS          1  NUMBER OF SUBREACHES
                          ITYP       STOR  TYPE OF INITIAL CONDITION
                        RSVRIC        .00  INITIAL CONDITION
                             X        .00 WORKING R AND D COEFFICIENT

296 SV              STORAGE        .0     11.0     24.0     36.0     50.0     64.0     79.0     95.0    111.0    129.0
                                147.0    165.0    185.0    204.0    224.0    245.0    267.0

298 SE             ELEVATION  1343.00  1344.00  1345.00  1346.00  1347.00  1348.00  1349.00  1350.00  1351.00  1352.00
                              1353.00  1354.00  1355.00  1356.00  1357.00  1358.00  1359.00

300 SQ             DISCHARGE       0.       0.       6.      22.      43.      63.      77.      95.     109.     122.
                                 134.     143.     151.     159.     166.     174.     181.
                                                                ***

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

                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA        .0 SQ MI

   PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR        72-HR      24.95-HR
 +    (CFS)       (HR)
                               (CFS)
 +      177.     13.70                   170.          85.          82.          82.
                            (INCHES)     .403         .803         .803         .803
                             (AC-FT)      84.         168.         168.         168.

  PEAK STORAGE    TIME                              MAXIMUM AVERAGE STORAGE
                                         6-HR        24-HR        72-HR      24.95-HR
 +   (AC-FT)      (HR)
        255.     13.70                   235.         113.         109.         109.

   PEAK STAGE     TIME                               MAXIMUM AVERAGE STAGE
                                         6-HR        24-HR        72-HR      24.95-HR
 +    (FEET)      (HR)
     1358.44     13.70                1357.50      1350.31      1350.03      1350.03

                           CUMULATIVE AREA =      3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA      10.0 SQ MI

   PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR        72-HR      24.95-HR
 +    (CFS)       (HR)
                               (CFS)
 +      170.     13.70                   163.          81.          78.          78.
                            (INCHES)     .387         .765         .765         .765
                             (AC-FT)      81.         160.         160.         160.

  PEAK STORAGE    TIME                              MAXIMUM AVERAGE STORAGE
                                         6-HR        24-HR        72-HR      24.95-HR
 +   (AC-FT)      (HR)
        236.     13.70                   216.         104.         100.         100.

   PEAK STAGE     TIME                               MAXIMUM AVERAGE STAGE
                                         6-HR        24-HR        72-HR      24.95-HR
 +    (FEET)      (HR)
     1357.55     13.70                1356.61      1349.83      1349.57      1349.57

                           CUMULATIVE AREA =      3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA      30.0 SQ MI

   PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR        72-HR      24.95-HR
 +    (CFS)       (HR)
                               (CFS)
 +      164.     13.65                   156.          76.          74.          74.
                            (INCHES)     .370         .724         .724         .724
                             (AC-FT)      77.         152.         152.         152.

  PEAK STORAGE    TIME                              MAXIMUM AVERAGE STORAGE
                                         6-HR        24-HR        72-HR      24.95-HR
 +   (AC-FT)      (HR)
        216.     13.65                   198.          94.          91.          91.

   PEAK STAGE     TIME                               MAXIMUM AVERAGE STAGE
                                         6-HR        24-HR        72-HR      24.95-HR
 +    (FEET)      (HR)
     1356.62     13.65                1355.68      1349.34      1349.10      1349.10

                           CUMULATIVE AREA =      3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                   TRANSPOSITION AREA      60.0 SQ MI

   PEAK FLOW      TIME                               MAXIMUM AVERAGE FLOW
                                         6-HR        24-HR        72-HR      24.95-HR
 +    (CFS)       (HR)
                               (CFS)
 +      159.     13.65                   152.          74.          71.          71.
                            (INCHES)     .359         .697         .697         .697
                             (AC-FT)      75.         146.         146.         146.
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 PEAK STORAGE   TIME                     MAXIMUM AVERAGE STORAGE
                               6-HR        24-HR       72-HR     24.95-HR
+  (AC-FT)      (HR)
     205.      13.65           187.         89.         85.         85.

  PEAK STAGE    TIME                     MAXIMUM AVERAGE STAGE
                               6-HR        24-HR       72-HR     24.95-HR
+   (FEET)      (HR)
   1356.04     13.65        1355.11      1349.04     1348.81     1348.81

                     CUMULATIVE AREA =    3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                     TRANSPOSITION AREA    90.0 SQ MI

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                               6-HR        24-HR       72-HR     24.95-HR
+   (CFS)       (HR)
                       (CFS)
+    156.      13.65           149.         72.         69.         69.
                    (INCHES)   .353        .681        .681        .681
                     (AC-FT)    74.        143.        143.        143.

 PEAK STORAGE   TIME                     MAXIMUM AVERAGE STORAGE
                               6-HR        24-HR       72-HR     24.95-HR
+  (AC-FT)      (HR)
     198.      13.65           180.         86.         82.         82.

  PEAK STAGE    TIME                     MAXIMUM AVERAGE STAGE
                               6-HR        24-HR       72-HR     24.95-HR
+   (FEET)      (HR)
   1355.69     13.65        1354.77      1348.86     1348.64     1348.64

                     CUMULATIVE AREA =    3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                     TRANSPOSITION AREA   120.0 SQ MI

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                               6-HR        24-HR       72-HR     24.95-HR
+   (CFS)       (HR)
                       (CFS)
+    155.      13.65           147.         71.         68.         68.
                    (INCHES)   .349        .671        .671        .671
                     (AC-FT)    73.        141.        141.        141.

 PEAK STORAGE   TIME                     MAXIMUM AVERAGE STORAGE
                               6-HR        24-HR       72-HR     24.95-HR
+  (AC-FT)      (HR)
     194.      13.65           177.         84.         81.         81.

  PEAK STAGE    TIME                     MAXIMUM AVERAGE STAGE
                               6-HR        24-HR       72-HR     24.95-HR
+   (FEET)      (HR)
   1355.48     13.65        1354.58      1348.76     1348.54     1348.54
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                     CUMULATIVE AREA =    3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                     TRANSPOSITION AREA   150.0 SQ MI

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                               6-HR        24-HR       72-HR     24.95-HR
+   (CFS)       (HR)
                       (CFS)
+    153.      13.65           146.         70.         67.         67.
                    (INCHES)   .345        .662        .662        .662
                     (AC-FT)    72.        139.        139.        139.

 PEAK STORAGE   TIME                     MAXIMUM AVERAGE STORAGE
                               6-HR        24-HR       72-HR     24.95-HR
+  (AC-FT)      (HR)
     190.      13.65           173.         82.         79.         79.

  PEAK STAGE    TIME                     MAXIMUM AVERAGE STAGE
                               6-HR        24-HR       72-HR     24.95-HR
+   (FEET)      (HR)
   1355.28     13.65        1354.39      1348.66     1348.45     1348.45

                     CUMULATIVE AREA =    3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                     TRANSPOSITION AREA   300.0 SQ MI

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                               6-HR        24-HR       72-HR     24.95-HR
+   (CFS)       (HR)
                       (CFS)
+    149.      13.65           142.         67.         65.         65.
                    (INCHES)   .335        .636        .636        .636
                     (AC-FT)    70.        133.        133.        133.

 PEAK STORAGE   TIME                     MAXIMUM AVERAGE STORAGE
                               6-HR        24-HR       72-HR     24.95-HR
+  (AC-FT)      (HR)
     181.      13.65           164.         78.         75.         75.

  PEAK STAGE    TIME                     MAXIMUM AVERAGE STAGE
                               6-HR        24-HR       72-HR     24.95-HR
+   (FEET)      (HR)
   1354.78     13.65        1353.90      1348.41     1348.20     1348.20

                     CUMULATIVE AREA =    3.93 SQ MI

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

                     HYDROGRAPH AT STATION     DB13
                     TRANSPOSITION AREA   500.0 SQ MI

  PEAK FLOW     TIME                      MAXIMUM AVERAGE FLOW
                               6-HR        24-HR       72-HR     24.95-HR
```

	Peak flow	Time		6-HR	24-HR	72-HR	24.95-HR
+	(CFS)	(HR)					
			(CFS)				
+	145.	13.65		137.	65.	62.	62.
			(INCHES)	.325	.612	.612	.612
			(AC-FT)	68.	128.	128.	128.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE 6-HR	24-HR	72-HR	24.95-HR
+ (AC-FT)	(HR)				
172.	13.65	155.	74.	71.	71.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE 6-HR	24-HR	72-HR	24.95-HR
+ (FEET)	(HR)				
1354.34	13.65	1353.46	1348.19	1347.99	1347.99

CUMULATIVE AREA = 3.93 SQ MI

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INTERPOLATED HYDROGRAPH AT DB13

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	24.95-HR
+	(CFS)	(HR)					
			(CFS)				
+	171.	13.70		164.	81.	78.	78.
			(INCHES)	.389	.770	.770	.770
			(AC-FT)	81.	161.	161.	161.

CUMULATIVE AREA = 3.93 SQ MI

1

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S1	728.	12.10	70.	20.	19.	.51		
+	HYDROGRAPH AT	S2	324.	12.10	30.	9.	8.	.22		
+	2 COMBINED AT	HC2	1045.	12.10	100.	29.	28.	.73		
+	ROUTED TO	R2-3	998.	12.15	100.	29.	28.	.73		
+	HYDROGRAPH AT	S3	792.	12.15	84.	23.	23.	.65		
+	2 COMBINED AT	HC3	1777.	12.15	182.	52.	50.	1.38		
+	ROUTED TO	R3-4	1692.	12.20	182.	52.	50.	1.38		
+	HYDROGRAPH AT	S4	584.	12.10	53.	15.	14.	.41		
+	2 COMBINED AT	HC4	2175.	12.20	233.	66.	64.	1.79		
+	ROUTED TO	R4-7	2132.	12.20	233.	66.	64.	1.79		
+	HYDROGRAPH AT	S7	220.	12.05	17.	5.	5.	.13		
+	2 COMBINED AT	IHC7	2261.	12.20	250.	71.	68.	1.92		
+	HYDROGRAPH AT	S5	680.	12.15	75.	22.	21.	.53		
+	ROUTED TO	R5-6	655.	12.20	75.	22.	21.	.53		
+	HYDROGRAPH AT	S6	412.	12.05	33.	9.	9.	.25		
+	2 COMBINED AT	HC6	965.	12.15	107.	31.	30.	.78		
+	2 COMBINED AT	HC7	3133.	12.20	355.	101.	98.	2.70		
+	ROUTED TO	R7-12E	3028.	12.25	355.	101.	98.	2.70		

+	HYDROGRAPH AT	S12E	110.	12.00	8.	2.	2.	.05
+	2 COMBINED AT	HC12E	3049.	12.25	362.	103.	100.	2.75
+	HYDROGRAPH AT	S8	552.	12.05	48.	14.	14.	.34
+	ROUTED TO	R8-9	542.	12.10	48.	14.	14.	.34
+	HYDROGRAPH AT	S9	309.	12.10	29.	8.	8.	.21
+	2 COMBINED AT	HC9	846.	12.10	76.	22.	21.	.55
+	ROUTED TO	R9-11	720.	12.25	76.	22.	21.	.55
+	HYDROGRAPH AT	S11	314.	12.05	21.	6.	6.	.17
+	2 COMBINED AT	IHC11	803.	12.20	97.	28.	27.	.72
+	HYDROGRAPH AT	S10	303.	12.10	27.	8.	7.	.19
+	2 COMBINED AT	HC11	1036.	12.15	123.	35.	34.	.91
+	ROUTED TO	R1112W	989.	12.25	123.	35.	34.	.91
+	HYDROGRAPH AT	S12W	176.	12.00	13.	4.	4.	.09
+	2 COMBINED AT	HC12W	1045.	12.20	135.	39.	38.	1.00
+	2 COMBINED AT	HC12	4045.	12.25	494.	142.	136.	3.75
+	ROUTED TO	R12-13	3913.	12.30	494.	142.	136.	3.75
+	HYDROGRAPH AT	S13	303.	12.05	19.	5.	5.	.17
+	2 COMBINED AT	HC13	3973.	12.30	512.	146.	141.	3.93
+	ROUTED TO	DB13	171.	13.70	164.	81.	78.	3.93
+	DIVERSION TO	DI27	171.	13.70	164.	81.	78.	3.93
+	HYDROGRAPH AT	DI13	0.	.00	0.	0.	0.	3.93
+	ROUTED TO	RDI13	0.	.00	0.	0.	0.	3.93
+	HYDROGRAPH AT	S14	787.	12.05	61.	17.	16.	.49
+	2 COMBINED AT	HC14	769.	12.05	59.	16.	16.	4.41
+	ROUTED TO	R1416S	685.	12.20	59.	16.	16.	4.41
+	HYDROGRAPH AT	S15	175.	12.05	10.	2.	2.	.11
+	ROUTED TO	R1516S	137.	12.20	10.	2.	2.	.11
+	HYDROGRAPH AT	S16S	321.	12.05	21.	5.	5.	.17
+	3 COMBINED AT	IHC16S	970.	12.15	88.	24.	23.	4.70
+	HYDROGRAPH AT	S16N	239.	12.10	23.	7.	6.	.17
+	ROUTED TO	R16N-S	204.	12.30	23.	7.	6.	.17
+	2 COMBINED AT	HC16S	1093.	12.20	110.	30.	29.	4.87
+	DIVERSION TO	DI22	285.	12.20	20.	5.	5.	4.87
+	HYDROGRAPH AT	DI16S	809.	12.20	90.	25.	24.	4.87
+	ROUTED TO	R16-17	695.	12.40	90.	25.	24.	4.87
+	HYDROGRAPH AT	S17	414.	12.05	27.	7.	7.	.29
+	2 COMBINED AT	HC17	773.	12.35	116.	32.	31.	5.15
+	HYDROGRAPH AT	S18	585.	12.05	49.	14.	14.	.36
+	ROUTED TO	R18-19	530.	12.20	49.	14.	14.	.36
+	HYDROGRAPH AT	S19	499.	12.05	37.	10.	10.	.29
+	2 COMBINED AT	HC19	928.	12.10	86.	24.	23.	.65

+	ROUTED TO	R19-20	851.	12.25	86.	24.	23.	.65
+	HYDROGRAPH AT	S20	125.	12.05	9.	2.	2.	.09
+	2 COMBINED AT	HC20	923.	12.20	94.	27.	26.	.73
+	HYDROGRAPH AT	S21	1075.	12.05	77.	21.	20.	.62
+	HYDROGRAPH AT	S22	815.	12.10	59.	15.	14.	.55
+	HYDROGRAPH AT	DI22	285.	12.20	20.	5.	5.	4.87
+	ROUTED TO	RDI22	214.	12.50	20.	5.	5.	4.87
+	2 COMBINED AT	HC22	815.	12.10	79.	20.	19.	5.41
+	HYDROGRAPH AT	S23	629.	12.10	47.	12.	11.	.49
+	HYDROGRAPH AT	S24	274.	12.30	34.	9.	8.	.32
+	HYDROGRAPH AT	S25	49.	12.05	3.	1.	1.	.03
+	ROUTED TO	R25-26	29.	12.45	3.	1.	1.	.03
+	HYDROGRAPH AT	S26	325.	12.10	24.	6.	6.	.21
+	2 COMBINED AT	HC26	326.	12.10	27.	7.	6.	.24
+	HYDROGRAPH AT	S27	852.	12.05	70.	20.	19.	.51
+	HYDROGRAPH AT	DI27	171.	13.70	164.	81.	78.	3.93
+	ROUTED TO	RDI27	171.	13.70	164.	81.	78.	3.93
+	2 COMBINED AT	HC27	864.	12.05	216.	100.	97.	4.43
+	ROUTED TO	R27-28	820.	12.10	215.	100.	96.	4.43
+	HYDROGRAPH AT	S28	80.	12.00	4.	1.	1.	.04
+	2 COMBINED AT	HC28	882.	12.10	222.	102.	99.	.55
+	ROUTED TO	R28-29	819.	12.20	221.	101.	97.	.55
+	HYDROGRAPH AT	S29	181.	12.05	11.	3.	3.	.10
+	2 COMBINED AT	HC29	887.	12.20	229.	104.	100.	.65
+	8 COMBINED AT	HCBES3	4873.	12.10	677.	225.	216.	8.75

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

APPENDIX H

Alternative 1B Hydrology Calculations

Dual Outlets (1 & 2 x 48")		HydroCAD Model Results	
Head above Invert	Total Outflow	Water Depth	48" Culvert Outflow Q
(ft)	(cfs)	(ft)	(cfs)
0	0	0	0
0.3	0	0.3	0
0.6	0	0.6	0
0.9	0	0.9	0
1.2	0.78	1.2	0.26
1.5	5.2	1.5	1.73
1.8	13.2	1.8	4.4
2.1	24.29	2.1	8.1
2.4	38.07	2.4	12.69
2.7	54.21	2.7	18.07
3	72.4	3	24.13
3.3	92.35	3.3	30.78
3.6	113.77	3.6	37.92
3.9	136.34	3.9	45.45
4.2	159.74	4.2	53.25
4.5	183.58	4.5	61.19
4.8	207.44	4.8	69.15
5.1	230.81	5.1	76.94
5.4	253.06	5.4	84.35
5.7	273.3	5.7	91.1
6	290.09	6	96.7
6.3	299.24	6.3	99.75
6.6	318.5	6.6	106.17
6.9	340.49	6.9	113.5
7.2	361.15	7.2	120.38
7.5	380.68	7.5	126.89
7.8	399.26	7.8	133.09
8.1	417.02	8.1	139.01
8.4	434.05	8.4	144.68
8.7	450.43	8.7	150.14
9	466.24	9	155.41
9.3	481.53	9.3	160.51
9.6	496.35	9.6	165.45
9.9	510.74	9.9	170.25
10.2	521.86	10.2	173.95
10.5	532.62	10.5	177.54
10.8	543.17	10.8	181.06

Alternative 1B Basin			
Stage	Storage	Storage	Interpolated Q for HEC-1
(ft)	(CY)	(ac-ft)	(cfs)
1348	252	0	0
1349	29004	18	0.52
1350	59056	37	20.59
1351	90399	56	72.40
1352	123024	76	144.14
1353	156925	97	223.02
1354	192091	119	290.09
1355	228516	142	347.38
1356	266190	165	411.10
1357	306108	190	466.24
1358	347013	215	514.45
1359	388907	241	550.20

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1***************************************
 *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998             *
 *            VERSION 4.1              *
 *                                     *
 *  RUN DATE   14FEB13  TIME  08:43:11  *
 *                                     *
 ***************************************
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***************************************
*                                     *
*    U.S. ARMY CORPS OF ENGINEERS     *
*    HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET          *
*       DAVIS, CALIFORNIA 95616       *
*           (916) 756-1104            *
*                                     *
***************************************
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X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X          XXXXX X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1         ID        SKYLINE WASH AND TRIBUTARIES
   2         ID        FLOODPLAIN DELINEATION STUDY
   3         ID        FCD 96-08
   4         ID
   5         ID        HEC-1
   6         ID
   7         ID        DATE:   8-19-98
   8         ID        STORM:  100-YR 6-HOUR STORM
   9         ID        FILE NAME:  SKYLINE6.DAT
  10         ID
  11         ID        FILE NAME CHANGED TO SL3-1B-6.DAT
  12         ID        (SKYLINE DCR PHASE 3 ALTERNATIVE 1B 6-HOUR STORM)
  13         ID
  14         ID   DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA
             *DIAGRAM
             *
             * REPERFORMED WITH FOLLOWING MODIFICATIONS - JULY 2012, SEI
             * NOAA ATLAS 14 POINT RAINFALL DEPTH USED
             * DEPTH-AREA REDUCTION FACTOR UPDATED
             * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
             * OTHER MINOR MODIFICATIONS MADE
             *
             * REPERFORMED WITH FOLLOWING MODIFICATIONS - FEBRUARY 2013, SEI
             * DETENTION BASIN DB13 ADDED TO SKYLINE WASH APEX (HC13)
             * 48?DIAMETER RCP - LOW FLOW OUTLET OF DETENTION BASIN CALCULATED USING HY8
             * HYDROGRAPH SPLITTED AT DB13 TO DI13 AND DI27
             * 0 HYDROGRAPH DI13 ROUTED TO S14
             * NO HYDROGRAPH ROUTED TO S24
             * DI24, RDI24 AND HC24 DELETED
             * HYDROGRAPH DI27 ROUTED TO S27
             * DI27, RDI27 AND HC27 ADDED
             * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
             * OTHER MINOR MODIFICATIONS MADE
             *
             * REPERFORMED WITH FOLLOWING MODIFICATIONS - FEBRUARY 2013, SEI
             * DETENTION BASIN DB13 MODIFIED BASED ON UPDATED STAGE-STORAGE DATA ?BASIN 1B
             * 3 X 48?DIAMETER RCPS - LOW FLOW OUTLET OF DETENTION BASIN
             * STAGE-OUTFLOW CALCULATED USING HYDROCAD
             * HYDROGRAPH SPLITTED AT DB13 TO DI13 AND DI27
             * 2/3 DETENTION BASIN OUTLET HYDROGRAPH ROUTED TO S14 THROUGH DI13
             * (CONTINUE IN SKYLINE WASH)
             * 1/3 DETENTION BASIN OUTLET HYDROGRAPH ROUTED TO S27 THROUGH DI27
             * (TO PROSPECT WASH)
             * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
             *
  15         IT      3                     300
  16         IN     15
  17         IO      5
  18         JD   2.80    0.01
  19         PC   .000    .008    .016    .025    .033    .041    .050    .058    .066    .074
  20         PC   .087    .099    .118    .138    .216    .377    .834    .911    .931    .950
  21         PC   .962    .972    .983    .991   1.000
  22         JD   2.78    0.50
  23         JD   2.73    2.80
  24         PC   .000    .009    .016    .025    .034    .042    .051    .059    .067    .076
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 25           PC    .087    .100    .120    .163    .252    .451    .694    .837    .900    .938
 26           PC    .950    .963    .975    .988   1.000
 27           JD    2.58    16.0
 28           PC    .000    .015    .020    .030    .048    .063    .076    .090    .105    .119
 29           PC    .135    .152    .175    .222    .304    .472    .670    .796    .868    .912
 30           PC    .946    .960    .973    .987   1.000
 31           JD    2.27    90.0
 32           PC    .000    .021    .035    .051    .071    .087    .105    .125    .143    .160
 33           PC    .179    .201    .232    .281    .364    .500    .658    .773    .841    .888
 34           PC    .927    .945    .964    .982   1.000
 35           JD    2.24   100.0
 36           PC    .000    .024    .043    .059    .078    .098    .119    .141    .162    .186
 37           PC    .212    .239    .271    .321    .408    .515    .627    .735    .814    .864
 38           PC    .907    .930    .954    .977   1.000
              *  BASIN S1 - BEGINNING OF SKYLINE WASH
              * DDM   ***** Updated *****

 39           KK      S1
 40           KM   BASIN S1
 41           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 42           KM    L=       1.2  Lca=       .6   S= 1102.5  Kn= .050  LAG=  16.6
 43           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 44           BA     .51
 45           LG     .25     .25    3.95     .53   18.00
 46           UI    103.    273.    577.    783.   1122.    746.    585.    489.    400.    306.
 47           UI    248.    206.    151.    123.    102.     79.     60.     51.     48.     20.
 48           UI     20.     20.     20.     20.     20.      0.      0.      0.      0.      0.
 49           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *  BASIN S2 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

 50           KK      S2
 51           KM   BASIN S2
 52           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 53           KM    L=        .9  Lca=       .6   S=  916.1  Kn= .050  LAG=  16.0
 54           KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 55           BA     .22
 56           LG     .25     .25    3.95     .53   18.00
 57           UI     46.    130.    269.    364.    496.    310.    251.    207.    166.    124.
 58           UI    105.     82.     60.     51.     38.     32.     23.     23.     12.      9.
 59           UI      9.      9.      9.      9.      0.      0.      0.      0.      0.      0.
 60           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 61           KK     HC2
 62           KM         COMBINE HYDROGRAPHS FROM S1 AND S2 - UPSTREAM PORTION OF SKYLINE WASH
 63           HC       2  0.7296
              * DDM   ***** Preserved *****

 64           KK    R2-3
 65           KM         ROUTE HYDROGRAPH HC2 THROUGH S3 - SKYLINE WASH
 66           RS       1    FLOW      -1
 67           RC     .07    .036     .07    2930    .029
 68           RX    1000    1030    1100    1120    1130    1190    1220    1250
 69           RY    1626    1624    1594    1594    1596    1624    1626    1625
              *  BASIN S3 - MAIN SUBBASIN FOR GRANITE FALLS WASH
              * DDM   ***** Updated *****
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  70      KK      S3
  71      KM   BASIN S3
  72      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  73      KM    L=       1.5  Lca=       1.0   S=  481.0  Kn= .040  LAG=  21.0
  74      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  75      BA     .65
  76      LG     .20     .25    4.00     .52   13.00
  77      UI    104.    180.    422.    652.    797.   1088.    945.    652.    567.    492.
  78      UI    420.    348.    274.    245.    212.    164.    133.    115.     99.     80.
  79      UI     70.     51.     51.     49.     20.     20.     20.     20.     20.     20.
  80      UI     20.     20.      0.      0.      0.      0.      0.      0.      0.      0.
  81      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

  82      KK     HC3
  83      KM         COMBINE HYDROGRAPH R2-3 WITH HYDROGRAPH FROM S3 - CONFLUENCE OF SKYLINE
  84      KM         WASH AND GRANITE FALLS WASH
  85      HC       2  1.3787
          * DDM   ***** Preserved *****

  86      KK    R3-4
  87      KM         ROUTE COMBINED HYDROGRAPHS HC3 THROUGH S4 - SKYLINE WASH
  88      RS       1    FLOW      -1
  89      RC     .07    .036     .07    2927    .032
  90      RX    1000    1030    1085    1160    1200    1240    1250    1275
  91      RY    1520    1518    1496    1496    1498    1516    1518    1520
          *  BASIN S4 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
          * DDM   ***** Updated *****

  92      KK      S4
  93      KM   BASIN S4
  94      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  95      KM    L=       1.3  Lca=        .6   S=  503.9  Kn= .040  LAG=  16.2
  96      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  97      BA     .41
  98      LG     .20     .25    4.00     .52   13.00
  99      UI     85.    231.    486.    656.    913.    579.    465.    386.    312.    234.
 100      UI    196.    156.    114.     95.     73.     63.     41.     41.     28.     16.
 101      UI     16.     16.     16.     16.      0.      0.      0.      0.      0.      0.
 102      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 103      KK     HC4
 104      KM         COMBINE HYDROGRAPH R3-4 WITH HYDROGRAPH FROM S4 - CONCENTRATION POINT
 105      KM         ON SKYLINE WASH.
 106      HC       2  1.7864
          * DDM   ***** Preserved *****

 107      KK    R4-7
 108      KM         ROUTE COMBINED HYDROGRAPHS HC4 THROUGH S7 - SKYLINE WASH
 109      RS       1    FLOW      -1
 110      RC     .07    .036     .07    2211    .022
 111      RX    1000    1025    1055    1120    1145    1180    1240    1370
 112      RY    1462    1460    1462    1462    1432    1432    1456    1462
          *  BASIN S7 - TRIBUTARY BASIN TO MOUNTAIN WASH NEAR AT CONFLUENCE WITH SKYLINE
          *   WASH
          * DDM   ***** Updated *****
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 113      KK      S7
 114      KM   BASIN S7
 115      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 116      KM    L=        .9  Lca=        .6   S=  955.3  Kn= .040  LAG=  12.7
 117      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 118      BA     .13
 119      LG     .20     .25    4.00     .52   12.00
 120      UI     37.    147.    254.    365.    229.    178.    137.     97.     78.     53.
 121      UI     41.     30.     22.     17.     12.      7.      7.      7.      7.      0.
 122      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 123      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 124      KK    IHC7
 125      KM         COMBINE HYDROGRAPHS R4-7 AND S7 - UPSTREAM OF CONFLUENCE WITH MOUNTAIN
 126      KM         WASH
 127      HC       2  1.9208
          *  BASIN S5 - BEGINNING OF MOUNTAIN WASH
          * DDM   ***** Updated *****

 128      KK      S5
 129      KM   BASIN S5
 130      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 131      KM    L=       1.4  Lca=        .7   S=  654.8  Kn= .050  LAG=  20.2
 132      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 133      BA     .53
 134      LG     .25     .25    3.95     .53   20.00
 135      UI     89.    164.    385.    573.    705.    988.    689.    532.    459.    396.
 136      UI    334.    265.    219.    195.    157.    120.    104.     93.     68.     65.
 137      UI     43.     43.     43.     18.     17.     17.     17.     17.     17.     17.
 138      UI     17.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 139      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 140      KK    R5-6
 141      KM         ROUTE HYDROGRAPH S5 THROUGH S6 - MOUNTAIN WASH
 142      RS       1    FLOW      -1
 143      RC     .07    .036     .07    2494    .030
 144      RX    1000    1025    1075    1105    1150    1170    1220    1240
 145      RY    1480    1476    1476    1460    1454    1454    1478    1480
          *  BASIN S6 - SUBBASIN TRIBUTARY TO MOUNTAIN WASH
          * DDM   ***** Updated *****

 146      KK      S6
 147      KM   BASIN S6
 148      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 149      KM    L=        .8  Lca=        .4   S=  491.4  Kn= .042  LAG=  12.3
 150      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 151      BA     .25
 152      LG     .21     .25    4.00     .52   15.00
 153      UI     75.    289.    495.    680.    415.    323.    244.    172.    135.     93.
 154      UI     71.     52.     35.     33.     13.     13.     13.     13.      0.      0.
 155      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 156          KK     HC6
 157          KM        COMBINE HYDROGRAPHS R5-6 WITH SUBBASIN S6 - UPSTREAM OF CONFLUENCE WITH
 158          KM        SKYLINE WASH
 159          HC       2  0.7787
              * DDM   ***** Preserved *****

 160          KK     HC7
 161          KM        COMBINE HYDROGRAPHS IHC7 WITH HC6 - CONFLUENCE OF MOUNTAIN WASH WITH
 162          KM        SKYLINE WASH
 163          HC       2  2.6995
              * DDM   ***** Preserved *****

 164          KK  R7-12E
 165          KM        ROUTE COMBINED HYDROGRAPHS AT HC7 THROUGH S12E - SKYLINE WASH
 166          RS       1    FLOW      -1
 167          RC     .07    .036     .07    1930   .0166
 168          RX    1000    1085    1170    1240    1255    1265    1310    1350
 169          RY    1430    1424    1422    1420    1422    1424    1428    1430
              *
              *   BASIN S12E - SUBBASIN TRIBUTARY TO PYRITE WASH AND SKYLINE WASH CONFLUENCE
              * DDM   ***** Updated *****

 170          KK    S12E
 171          KM   BASIN S12E
 172          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 173          KM    L=        .6  Lca=        .2   S=  142.9  Kn= .030  LAG=   7.8
 174          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 175          BA     .05
 176          LG     .15     .25    3.91     .55   18.00
 177          UI     47.    167.    200.    114.     70.     44.     27.     16.     11.      5.
 178          UI      5.      5.      0.      0.      0.      0.      0.      0.      0.      0.
 179          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 180          KK   HC12E
 181          KM        COMBINE HYDROGRAPHS S12E WITH R7-12E - CONFLUENCE OF PYRITE WASH WITH
 182          KM        SKYLINE WASH
 183          HC       2  2.7544
              *  BASIN S8 - BEGINNING OF PYRITE WASH
              * DDM   ***** Updated *****

 184          KK      S8
 185          KM   BASIN S8
 186          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 187          KM    L=        .8  Lca=        .4   S=  692.1  Kn= .050  LAG=  13.0
 188          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 189          BA     .34
 190          LG     .25     .25    3.95     .53   20.00
 191          UI     88.    352.    614.    906.    585.    452.    354.    254.    200.    145.
 192          UI    105.     81.     62.     43.     38.     17.     17.     17.     17.     17.
 193          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 194          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 195          KK    R8-9
 196          KM        ROUTE HYDROGRAPH S8 THROUGH S9 - PYRITE WASH
 197          RS       1    FLOW      -1
 198          RC     .07    .036     .07     911    .013
 199          RX    1000    1020    1050    1065    1080    1125    1185    1190
 200          RY    1518    1518    1494    1492    1494    1494    1520    1524
              *  BASIN S9 - SUBBASIN TRIBUTARY TO PYRITE WASH
              * DDM   ***** Updated *****

 201          KK      S9
 202          KM   BASIN S9
 203          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 204          KM    L=       1.0  Lca=        .7   S=  415.7  Kn= .040  LAG=  15.9
 205          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 206          BA     .21
 207          LG     .20     .25    3.95     .53   17.00
 208          UI     44.    126.    259.    351.    471.    293.    238.    196.    157.    117.
 209          UI     99.     77.     56.     48.     35.     29.     22.     22.     10.      8.
 210          UI      8.      8.      8.      8.      0.      0.      0.      0.      0.      0.
 211          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 212          KK     HC9
 213          KM        COMBINE ROUTED HYDROGRAPH R8-9 WITH HYDROGRAPH S9 - CONCENTRATION POINT
 214          KM        ON PYRITE WASH
 215          HC       2  0.5472
              * DDM   ***** Preserved *****

 216          KK   R9-11
 217          KM        ROUTE COMBINED HYDROGRAPHS HC9 THROUGH S11 - PYRITE WASH
 218          RS       3    FLOW      -1
 219          RC     .07    .036     .07    3462    .023
 220          RX    1000    1080    1090    1120    1140    1290    1340    1375
 221          RY    1496    1494    1492    1472    1471    1472    1490    1494
              *  BASIN S11 -PYRITE WASH UPSTREAM OF CONFLUENCE WITH WAGON WASH
              * DDM   ***** Updated *****

 222          KK     S11
 223          KM   BASIN S11
 224          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 225          KM    L=        .7  Lca=        .3   S=  797.1  Kn= .040  LAG=   9.3
 226          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 227          BA     .17
 228          LG     .20     .25    4.00     .52   11.00
 229          UI     96.    360.    590.    366.    262.    169.    119.     73.     51.     32.
 230          UI     23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
 231          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 232          KK   IHC11
 233          KM        COMBINE ROUTED HYDROGRAPH R9-11 WITH HYDROGRAPHS S11 - UPSTREAM OF
 234          KM        CONFLUENCE WITH WAGON WASH
 235          HC       2  0.7154
              *  BASIN S10 - BEGINNING OF WAGON WASH
              * DDM   ***** Updated *****

 236          KK     S10
 237          KM   BASIN S10
 238          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 239          KM    L=       1.0  Lca=        .5   S=  896.9  Kn= .048  LAG=  14.2
 240          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 241          BA     .19
 242          LG     .24     .25    3.95     .53   18.00
 243          UI     46.    157.    302.    430.    397.    263.    213.    167.    122.    101.
 244          UI     71.     55.     43.     35.     23.     23.     11.      9.      9.      9.
 245          UI      9.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 246          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 247          KK    HC11
 248          KM        COMBINE HYDROGRAPH IHC11 WITH HYDROGRAPH S10 - CONFLUENCE OF WAGON WASH
 249          KM        WITH PYRITE WASH
 250          HC       2  0.9089
              * DDM   ***** Preserved *****

 251          KK  R1112W
 252          KM        ROUTE COMBINED HYDROGRAPHS HC11 THROUGH S12W - CONTINUATION OF PYRITE
 253          KM        WASH DOWNSTREAM OF CONFLUENCE WITH WAGON WASH
 254          RS       1    FLOW      -1
 255          RC     .07    .036     .07    1501    .019
 256          RX    1000    1030    1065    1150    1240    1330    1375    1410
 257          RY    1422    1420    1410    1410    1410    1412    1414    1428
              *  BASIN S12W - SUBBASIN TRIBUTARY FOR PYRITE WASH AND SKYLINE WASH
              * DDM   ***** Updated *****

 258          KK    S12W
 259          KM   BASIN S12W
 260          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 261          KM    L=        .7  Lca=        .2   S=  153.6  Kn= .030  LAG=   8.2
 262          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 263          BA     .09
 264          LG     .15     .25    3.91     .55   18.00
 265          UI     68.    246.    330.    189.    123.     79.     47.     31.     19.     11.
 266          UI      7.      7.      0.      0.      0.      0.      0.      0.      0.      0.
 267          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 268          KK   HC12W
 269          KM        COMBINE HYDROGRAPH R1112W WITH HYDROGRAPH S12W - CONFLUENCE OF SKYLINE
 270          KM        WASH WITH PYRITE WASH
 271          HC       2  0.9994
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 272          KK    HC12
 273          KM        COMBINE ROUTED HYDROGRAPH HC12W AND HC12E
 274          KM        CONFLUENCE OF SKYLINE WASH AND PYRITE WASH
 275          HC       2  3.7538
              * DDM   ***** Preserved *****

 276          KK  R12-13
 277          KM        ROUTE COMBINED HYDROGRAPHS HC12 THROUGH S13 - SKYLINE WASH
 278          RS       1    FLOW      -1
 279          RC     .07    .036     .07    1854    .017
 280          RX    1000    1080    1110    1320    1370    1420    1500    1550
 281          RY    1400    1392    1384    1382    1382    1380    1380    1400
              *  BASIN S13 - SKYLINE WASH DOWNSTREAM OF CONFLUENCE OF PYRITE WASH
              * DDM   ***** Updated *****

 282          KK     S13
 283          KM   BASIN S13
 284          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 285          KM    L=        .9  Lca=        .3   S=  174.2  Kn= .030  LAG=  10.1
 286          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 287          BA     .17
 288          LG     .15     .25    3.88     .56    4.00
 289          UI     82.    312.    550.    397.    278.    195.    135.     90.     64.     43.
 290          UI     28.     20.     11.     11.     11.      0.      0.      0.      0.      0.
 291          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 292          KK    HC13
 293          KM        COMBINE ROUTED HYDROGRAPH R12-13 WITH HYDROGRAPH S13 - SKYLINE WASH
 294          HC       2  3.9274
              * KO      3
              *

 295          KK    DB13
 296          KM   DETENTION BASIN AT SKYLINE WASH APEX
 297          RS       1    STOR       0
 298          SV     0.0    18.0    37.0    56.0    76.0    97.0   119.0   142.0   165.0   190.0
 299          SV   215.0   241.0
              *
 300          SE  1348.0  1349.0  1350.0  1351.0  1352.0  1353.0  1354.0  1355.0  1356.0  1357.0
 301          SE  1358.0  1359.0
              *
 302          SQ     0.0    0.52   20.59   72.40  144.14  223.02  290.09  347.38  411.10  466.24
 303          SQ  514.45  550.00
 304          KO       3
              * DDM   ***** Preserved *****

 305          KK    DI13
              * KM      SPLIT FLOW AT HC13; MAIN FLOW TO S24 AND MINOR FLOW TO S14
              * DT  DI24
              * DI       0     201     556    1353    2595    4157
              * DQ       0     201     461     879    1427  2078.5
 306          KM        SPLIT FLOW AT DB13; ALL FLOW TO S27 AND NONE TO S14
 307          DT    DI27
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 308          DI       0      60     120     240     480     960    1920
 309          DQ       0      20      40      80     160     320     640
              * DDM   ***** Preserved *****

 310          KK   RDI13
 311          KM         ROUTE HYDROGRAPH DI13 THROUGH S14 -SKYLINE WASH DOWNSTREAM OF SPLIT
 312          RS       8    FLOW      -1
 313          RC     .07    .036     .07    4353    .021
 314          RX    1000    1025    1270    1280    1320    1330    1370    1385
 315          RY    1360    1354    1354    1356    1356    1358    1358    1360
              *  BASIN S14 - BEGINNING OF COYOTE WASH
              * DDM   ***** Updated *****

 316          KK     S14
 317          KM   BASIN S14
 318          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 319          KM    L=       1.2  Lca=        .6   S=  340.7  Kn= .030  LAG=  12.4
 320          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 321          BA     .49
 322          LG     .15     .25    3.91     .55   11.00
 323          UI    144.    562.    962.   1341.    822.    640.    487.    343.    270.    185.
 324          UI    145.    101.     72.     65.     31.     25.     25.     25.     25.      0.
 325          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 326          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 327          KK    HC14
 328          KM         COMBINE ROUTED HYDROGRAPH RDI13 WITH HYDROGRAPH S14 - SPLIT FLOW FROM
 329          KM         SKYLINE WASH AND COYOTE WASH SUBBASIN
 330          HC       2  4.4139
              * DDM   ***** Preserved *****

 331          KK  R1416S
 332          KM         ROUTE COMBINED HYDROGRAPHS HC14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
 333          KM         OF CONFLUENCE WITH COYOTE WASH
 334          RS       3    FLOW      -1
 335          RC     .07    .036     .07    3140    .017
 336          RX    1000    1035    1150    1180    1320    1360    1480    1481
 337          RY    1236    1234    1234    1232    1232    1234    1236    1236
              *  BASIN S15 - SUBBASIN IN AREA OF EXISTING A.D.O.T. BORROW PITS
              * DDM   ***** Updated *****

 338          KK     S15
 339          KM   BASIN S15
 340          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 341          KM    L=        .8  Lca=        .3   S=  105.0  Kn= .030  LAG=   9.8
 342          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 343          BA     .11
 344          LG     .15     .27    3.40     .77     .00
 345          UI     56.    213.    370.    246.    176.    120.     84.     54.     37.     25.
 346          UI     19.      9.      7.      7.      7.      0.      0.      0.      0.      0.
 347          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 348          KK  R1516S
 349          KM         ROUTE HYDROGRAPH HC15 THROUGH S16S - SKYLINE WASH DOWNSTREAM OF
 350          KM         CONFLUENCE WITH COYOTE WASH
 351          RS       3    FLOW      -1
 352          RC     .07    .036     .07    2218    .018
 353          RX    1000    1035    1150    1180    1320    1360    1480    1481
 354          RY    1236    1234    1234    1232    1232    1234    1236    1236
              *  BASIN S16S - SUBBASIN AT SKYLINE WASH DOWNSTREAM OF CONFLUENCE WITH COYOTE W.
              * DDM   ***** Updated *****

 355          KK    S16S
 356          KM   BASIN S16S
 357          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 358          KM    L=        .6  Lca=        .3   S=  116.4  Kn= .030  LAG=   9.3
 359          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 360          BA     .17
 361          LG     .15     .25    3.95     .53    6.00
 362          UI    100.    373.    611.    379.    271.    175.    123.     76.     53.     34.
 363          UI     23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
 364          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 365          KK  IHC16S
 366          KM         COMBINE ROUTED HYDROGRAPH R14-16S AND R15-16S WITH HYDROGRAPH S16S
 367          KM         DOWNSTREAM OF CONFLUENCE OF SKYLINE WASH WITH COYOTE WASH
 368          HC       3  4.6952
              *  BASIN S16N - SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

 369          KK    S16N
 370          KM   BASIN S16N
 371          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 372          KM    L=        .9  Lca=        .6   S=  653.2  Kn= .050  LAG=  16.5
 373          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 374          BA     .17
 375          LG     .25     .25    3.95     .53   18.00
 376          UI     34.     90.    189.    256.    366.    238.    189.    158.    129.     98.
 377          UI     80.     66.     48.     39.     32.     26.     19.     16.     15.      6.
 378          UI      6.      6.      6.      6.      6.      0.      0.      0.      0.      0.
 379          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 380          KK  R16N-S
 381          KM         ROUTE HYDROGRAPH S16N THROUGH S16S
 382          RS       4    FLOW      -1
 383          RC     .07    .036     .07    3230    .022
 384          RX    1000    1035    1150    1180    1320    1360    1480    1481
 385          RY    1236    1234    1234    1232    1232    1234    1236    1236
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 386          KK   HC16S
 387          KM        COMBINE ROUTED HYDROGRAPH R16N-S AND IHC16S
 388          KM        SKYLINE WASH DOWNSTREAM OF COYOTE WASH
 389          HC       2  4.8652
              * DDM   ***** Preserved *****

 390          KK   DI16S
 391          KM        SPLIT FLOW AT HC16S; MAIN FLOW TO S17 AND MINOR FLOW TO S22
 392          DT    DI22
 393          DI       0      46     144     344   708.5    1223
 394          DQ       0       0       8      52     153     329
              * DDM   ***** Preserved *****

 395          KK  R16-17
 396          KM        ROUTE HYDROGRAPH DI16S THROUGH S17
 397          RS       5    FLOW      -1
 398          RC     .07    .036     .07    4341    .015
 399          RX    1000    1060    1090    1120    1145    1180    1200    1320
 400          RY    1202    1200  1199.5    1200    1199    1199    1200    1202
              *  BASIN S17 - SUBBASIN OF SKYLINE WASH SOUTH OF MCDOWELL ROAD ON EAST SIDE
              *  OF WATERSHED
              * DDM   ***** Updated *****

 401          KK     S17
 402          KM   BASIN S17
 403          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 404          KM    L=       .9  Lca=       .5   S=  117.9  Kn= .030  LAG=  12.8
 405          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 406          BA     .29
 407          LG     .15     .26    3.60     .67     .00
 408          UI     79.    311.    540.    784.    495.    385.    298.    212.    170.    117.
 409          UI     89.     66.     50.     37.     28.     15.     15.     15.     15.      0.
 410          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 411          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 412          KK    HC17
 413          KM        COMBINE ROUTED HYDROGRAPH R16-17 WITH HYDROGRAPH S17 AT EAST SIDE OF
 414          KM        BUCKEYE F.R.S. NO. 3
 415          HC       2  5.1537
              *  BASIN S18 - BEGINNING OF RATTLER WASH
              * DDM   ***** Updated *****

 416          KK     S18
 417          KM   BASIN S18
 418          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 419          KM    L=       .8  Lca=       .4   S=  292.7  Kn= .040  LAG=  12.9
 420          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 421          BA     .36
 422          LG     .20     .25    3.95     .53   17.00
 423          UI     96.    380.    662.    968.    618.    479.    373.    267.    211.    149.
 424          UI    111.     84.     64.     46.     38.     18.     18.     18.     18.      0.
 425          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 426          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 427          KK  R18-19
 428          KM        ROUTE HYDROGRAPH HC18 THROUGH S19
 429          RS       2    FLOW      -1
 430          RC     .07    .036     .07    4253     .02
 431          RX    1000    1050    1100    1125    1140    1180    1240    1241
 432          RY    1266    1264    1242    1240    1242    1264    1266    1266
              *  BASIN S19 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****

 433          KK     S19
 434          KM   BASIN S19
 435          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 436          KM    L=      1.2  Lca=       .8   S=  824.8  Kn= .030  LAG=  11.6
 437          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 438          BA     .29
 439          LG     .15     .25    4.00     .52   12.00
 440          UI    102.    389.    662.    802.    483.    372.    266.    195.    138.     99.
 441          UI     72.     51.     41.     22.     16.     16.     16.      0.      0.      0.
 442          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 443          KK    HC19
 444          KM        COMBINE ROUTED HYDROGRAPH R18-19 WITH HYDROGRAPH S19 - RATTLER WASH
 445          HC       2  0.6498
              * DDM   ***** Preserved *****

 446          KK  R19-20
 447          KM        ROUTE COMBINED HYDROGRAPHS HC19 THROUGH S20 - RATTLER WASH
 448          RS       2    FLOW      -1
 449          RC     .07    .036     .07    3740    .022
 450          RX     999    1000    1030    1095    1130    1150    1220    1221
 451          RY    1208    1208    1206    1204    1204    1206    1208    1208
              *  BASIN S20 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****

 452          KK     S20
 453          KM   BASIN S20
 454          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 455          KM    L=       .9  Lca=       .4   S=   84.1  Kn= .030  LAG=  13.0
 456          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 457          BA     .09
 458          LG     .15     .26    3.60     .67    4.00
 459          UI     22.     88.    155.    228.    147.    114.     89.     64.     50.     36.
 460          UI     26.     20.     16.     11.     10.      4.      4.      4.      4.      4.
 461          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 462          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 463          KK    HC20
 464          KM        COMBINE ROUTED HYDROGRAPH R19-20 WITH HYDROGRAPH S20 AT FAR EAST SIDE
 465          KM        OF STUDY AREA NORTH OF BUCKEYE F.R.S. NO. 3
 466          HC       2  0.7344
              *  BASIN S21 - SUBBASIN NORTH OF BUCKEYE F.R.S. NO 3 SPILLWAY
              * DDM   ***** Updated *****
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 467        KK     S21
 468        KM   BASIN S21
 469        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 470        KM    L=       1.2  Lca=        .6   S=  780.6  Kn= .030  LAG=  11.0
 471        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 472        BA     .62
 473        LG     .15     .25    4.10     .51   10.00
 474        UI    245.    927.   1593.   1636.   1019.    766.    522.    392.    260.    190.
 475        UI    136.     93.     67.     36.     36.     36.      0.      0.      0.      0.
 476        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *  BASIN S22 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
            * DDM   ***** Updated *****

 477        KK     S22
 478        KM   BASIN S22
 479        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 480        KM    L=       1.3  Lca=        .4   S=  110.1  Kn= .029  LAG=  13.7
 481        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 482        BA     .55
 483        LG     .16     .25    3.91     .53    1.00
 484        UI    135.    496.    909.   1351.   1029.    742.    594.    451.    332.    268.
 485        UI    188.    151.    108.     84.     66.     51.     26.     26.     26.     26.
 486        UI     26.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 487        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 488        KK    DI22
 489        KM         RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S22
 490        DR    DI22
            * DDM   ***** Preserved *****

 491        KK   RDI22
 492        KM         ROUTE HYDROGRAPH DI22 THROUGH S22 - PORTION OF DIVERT OF SKYLINE WASH
 493        RS       8    FLOW      -1
 494        RC     .07    .036     .07    4253    .015
 495        RX     997     998     999    1000    1060    1210    1300    1300
 496        RY    1217    1216    1216    1215    1215    1216    1216    1217
            * DDM   ***** Preserved *****

 497        KK    HC22
 498        KM         COMBINE HYDROGRAPHS AT HC22
 499        HC       2  5.4141
            *  BASIN S23 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
            * DDM   ***** Updated *****

 500        KK     S23
 501        KM   BASIN S23
 502        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 503        KM    L=       1.6  Lca=        .5   S=  112.1  Kn= .028  LAG=  15.2
 504        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 505        BA     .49
 506        LG     .17     .26    3.50     .70    2.00
 507        UI    108.    331.    660.    901.   1086.    670.    547.    446.    338.    263.
 508        UI    217.    155.    125.     98.     81.     53.     53.     31.     21.     21.
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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 509        UI     21.     21.     21.      0.      0.      0.      0.      0.      0.      0.
 510        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            *  BASIN S24 - SUBBASIN DOWNSTREAM OF SKYLINE WASH SPLIT FLOW
            * DDM   ***** Updated *****

 511        KK     S24
 512        KM   BASIN S24
 513        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 514        KM    L=       2.4  Lca=       1.2   S=  113.8  Kn= .037  LAG=  32.2
 515        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 516        BA     .32
 517        LG     .20     .25    4.00     .51    1.00
 518        UI     33.     33.     66.    117.    171.    211.    242.    273.    350.    361.
 519        UI    241.    206.    189.    172.    157.    142.    129.    111.     96.     84.
 520        UI     78.     73.     65.     54.     45.     42.     37.     36.     30.     25.
 521        UI     25.     22.     16.     16.     16.     16.     13.      6.      6.      6.
 522        UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      0.
 523        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 524        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****
            * KK  DI24
            * KM       RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S24
            * DR  DI24
            * DDM   ***** Preserved *****
            * KK RDI24
            * KM       ROUTE HYDROGRAPH DI24 THROUGH S24
            * RS      5    FLOW      -1
            * RC   .07    .036     .07    9929     .02
            * RX  1000    1045    1060    1080    1100    1120    1155    1220
            * RY  1222    1220    1218    1218    1216    1216    1220    1220
            * DDM   ***** Preserved *****
            * KK  HC24
            * KM       COMBINE HYDROGRAPHS AT HC24
            * HC      2  4.2443
            *  BASIN S25 - UPSTREAM END OF SMALL WATERSHED EAST OF PROSPECT WASH
            * DDM   ***** Updated *****

 525        KK     S25
 526        KM   BASIN S25
 527        KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 528        KM    L=        .7  Lca=        .3   S=  103.0  Kn= .030  LAG=  10.0
 529        KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 530        BA     .03
 531        LG     .15     .25    4.15     .49     .00
 532        UI     13.     50.     87.     61.     43.     30.     21.     14.     10.      7.
 533        UI      4.      3.      2.      2.      2.      0.      0.      0.      0.      0.
 534        UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
            * DDM   ***** Preserved *****

 535        KK  R25-26
 536        KM         ROUTE HYDROGRAPH S25 THROUGH S26 CROSSING NEAR THE INTERSECTION OF
 537        KM         WATSON ROAD AND MCDOWELL ROAD
 538        RS       8    FLOW      -1
 539        RC     .07    .036     .07    6571     .02
 540        RX    1000    1045    1060    1080    1100    1120    1155    1220
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 541          RY    1222    1220    1218    1218    1216    1216    1220    1220
              *  BASIN S26 - SUBBASIN ON THE LOWER WEST SIDE OF STUDY AREA
              * DDM   ***** Updated *****

 542          KK     S26
 543          KM   BASIN S26
 544          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 545          KM    L=       1.2  Lca=       .5   S=  119.7  Kn= .029  LAG=  13.8
 546          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 547          BA     .21
 548          LG     .16     .25    4.20     .47    1.00
 549          UI     52.    187.    347.    513.    403.    286.    230.    177.    129.    105.
 550          UI     74.     59.     43.     33.     25.     21.     10.     10.     10.     10.
 551          UI     10.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 552          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 553          KK    HC26
 554          KM        COMBINE ROUTED HYDROGRAPH R25-26 WITH HYDROGRAPH S26
 555          KM        AT WEST SIDE OF WATERSHED NORTH OF BUCKEYE F.R.S. NO. 3
 556          HC       2  0.2377
              *  BASIN S27 - BEGINNING OF PROSPECT WASH
              * DDM   ***** Updated *****

 557          KK     S27
 558          KM   BASIN S27
 559          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 560          KM    L=       1.4  Lca=       .5   S=  345.2  Kn= .030  LAG=  12.6
 561          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 562          BA     .51
 563          LG     .15     .25    4.00     .52   16.00
 564          UI    146.    575.    989.   1411.    878.    682.    524.    370.    295.    201.
 565          UI    157.    111.     82.     67.     41.     26.     26.     26.     26.      0.
 566          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 567          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 568          KK    DI27
 569          KM        RETURN DIVERTED HYDROGRAPH FROM DI27 DOWNSTREAM OF DB13 TO ROUTE
 570          KM        AND COMBINE WITH S27
 571          DR    DI27
              * DDM   ***** Preserved *****

 572          KK   RDI27
 573          KM        ROUTE HYDROGRAPH DI27 THROUGH S27
 574          RS       1    FLOW      -1
 575          RC     .07    .040     .07    1200     .02
 576          RX    1000    1050    1100    1120    1125    1145    1195    1245
 577          RY    1222    1221    1221    1216    1216    1221    1221    1222
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 578          KK    HC27
 579          KM        COMBINE HYDROGRAPHS AT HC27
 580          HC       2  4.4343

 581          KK  R27-28
 582          KM        ROUTE HYDROGRAPH S27 THROUGH S28
 583          RS       2    FLOW      -1
 584          RC     .07    .036     .07    2482    .022
 585          RX    1000    1060    1090    1100    1120    1130    1160    1230
 586          RY    1250    1248    1240    1238    1238    1240    1242    1250
              *  BASIN S28 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****

 587          KK     S28
 588          KM   BASIN S28
 589          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 590          KM    L=        .4  Lca=       .2   S=  120.0  Kn= .028  LAG=   6.2
 591          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 592          BA     .04
 593          LG     .17     .25    4.15     .48    2.00
 594          UI     55.    180.    114.     65.     36.     19.     11.      4.      4.      0.
 595          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 596          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 597          KK    HC28
 598          KM        COMBINE ROUTED HYDROGRAPH R27-28 WITH HYDROGRAPH S28 - PROSPECT WASH
 599          KM        AT WATSON ROAD CROSSING
 600          HC       2  0.5526
              * DDM   ***** Preserved *****

 601          KK  R28-29
 602          KM        ROUTE COMBINED HYDROGRAPHS HC28 THROUGH S29
 603          RS       2    FLOW      -1
 604          RC     .07    .036     .07    3804   .0184
 605          RX    1000    1000    1110    1125    1165    1170    1250    1251
 606          RY    1192    1192    1190    1188    1188    1190    1192    1192
              *  BASIN S29 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****

 607          KK     S29
 608          KM   BASIN S29
 609          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 610          KM    L=        .7  Lca=       .3   S=  102.9  Kn= .030  LAG=   9.4
 611          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 612          BA     .10
 613          LG     .15     .25    4.15     .49     .00
 614          UI     55.    207.    343.    215.    154.    101.     71.     44.     31.     20.
 615          UI     14.      7.      7.      7.      0.      0.      0.      0.      0.      0.
 616          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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1                                          HEC-1 INPUT                                        PAGE 17

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


  617          KK    HC29
  618          KM         COMBINE ROUTED HYDROGRAPH R28-29 WITH HYDROGRAPH S29 - PROSPECT WASH
  619          KM         AT BUCKEYE F.R.S. NO 3
  620          HC        2  0.6515
               *
               * DDM   ***** Preserved *****

  621          KK  HCBES3
  622          KM         COMBINE ALL HYDROGRAPHS AT BUCKEYE FRS-3
  623          HC        8  8.7485
  624          ZZ
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1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
INPUT
 LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   39         S1
               .
               .
   50          .           S2
               .            .
               .            .
   61        HC2............
               V
               V
   64       R2-3
               .
               .
   70          .           S3
               .            .
               .            .
   82        HC3............
               V
               V
   86       R3-4
               .
               .
   92          .           S4
               .            .
               .            .
  103        HC4............
               V
               V
  107       R4-7
               .
               .
  113          .           S7
               .            .
               .            .
  124       IHC7............
               .
               .
  128          .           S5
               .            V
               .            V
  140          .         R5-6
               .            .
               .            .
  146          .            .           S6
               .            .            .
               .            .            .
  156          .          HC6............
               .            .
               .            .
  160        HC7............
               V
               V
  164     R7-12E
               .
               .
  170          .         S12E
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               .           .
               .           .
180         HC12E...........
               .
               .
184            .          S8
               .           V
               .           V
195            .        R8-9
               .           .
               .           .
201            .           .           S9
               .           .            .
               .           .            .
212            .         HC9............
               .           V
               .           V
216            .       R9-11
               .           .
               .           .
222            .           .          S11
               .           .            .
               .           .            .
232            .       IHC11............
               .           .
               .           .
236            .           .          S10
               .           .            .
               .           .            .
247            .        HC11............
               .           V
               .           V
251            .      R1112W
               .           .
               .           .
258            .           .         S12W
               .           .            .
               .           .            .
268            .       HC12W............
               .           .
               .           .
272          HC12...........
               V
               V
276         R12-13
               .
               .
282            .          S13
               .           .
               .           .
292          HC13...........
               V
               V
295          DB13
               .
               .
307            .------->   DI27
305          DI13
               V
               V
310         RDI13
               .
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               .
316            .          S14
               .           .
               .           .
327          HC14...........
               V
               V
331        R1416S
               .
               .
338            .          S15
               .           V
               .           V
348            .      R1516S
               .           .
               .           .
355            .           .         S16S
               .           .            .
               .           .            .
365        IHC16S........................
               .
               .
369            .         S16N
               .           V
               .           V
380            .      R16N-S
               .           .
               .           .
386         HC16S...........
               .
               .
392            .------->   DI22
390         DI16S
               V
               V
395        R16-17
               .
               .
401            .          S17
               .           .
               .           .
412          HC17...........
               .
               .
416            .          S18
               .           V
               .           V
427            .      R18-19
               .           .
               .           .
433            .           .          S19
               .           .            .
               .           .            .
443            .        HC19............
               .           V
               .           V
446            .      R19-20
               .           .
               .           .
452            .           .          S20
               .           .            .
               .           .            .
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463         .      HC20..........
            .         .
            .         .
467         .         .       S21
            .         .         .
            .         .         .
477         .         .         .       S22
            .         .         .         .
            .         .         .         .
490         .         .         .         .         .<-------  DI22
488         .         .         .         .      DI22
            .         .         .         .         V
            .         .         .         .         V
491         .         .         .         .     RDI22
            .         .         .         .         .
            .         .         .         .         .
497         .         .         .      HC22..........
            .         .         .         .
            .         .         .         .
500         .         .         .         .       S23
            .         .         .         .         .
            .         .         .         .         .
511         .         .         .         .         .       S24
            .         .         .         .         .         .
            .         .         .         .         .         .
525         .         .         .         .         .         .       S25
            .         .         .         .         .         .         V
            .         .         .         .         .         .         V
535         .         .         .         .         .         .    R25-26
            .         .         .         .         .         .         .
            .         .         .         .         .         .         .
542         .         .         .         .         .         .         .       S26
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .
553         .         .         .         .         .         .      HC26..........
            .         .         .         .         .         .         .
            .         .         .         .         .         .         .
557         .         .         .         .         .         .         .       S27
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .
571         .         .         .         .         .         .         .         .         .<-------  DI27
568         .         .         .         .         .         .         .         .      DI27
            .         .         .         .         .         .         .         .         V
            .         .         .         .         .         .         .         .         V
572         .         .         .         .         .         .         .         .     RDI27
            .         .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .         .
578         .         .         .         .         .         .         .      HC27..........
            .         .         .         .         .         .         .         V
            .         .         .         .         .         .         .         V
581         .         .         .         .         .         .         .    R27-28
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .
587         .         .         .         .         .         .         .         .       S28
            .         .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .         .
597         .         .         .         .         .         .         .      HC28..........
            .         .         .         .         .         .         .         V
            .         .         .         .         .         .         .         V
601         .         .         .         .         .         .         .    R28-29
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .

607         .         .         .         .         .         .         .         .       S29
            .         .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .         .
617         .         .         .         .         .         .         .      HC29..........
            .         .         .         .         .         .         .         .
            .         .         .         .         .         .         .         .
621     HCBES3......................................................................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
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1***************************************          ***************************************
 *                                      *          *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *          *   U.S. ARMY CORPS OF ENGINEERS      *
 *              JUN   1998              *          *   HYDROLOGIC ENGINEERING CENTER     *
 *            VERSION 4.1               *          *         609 SECOND STREET           *
 *                                      *          *      DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   14FEB13  TIME  08:43:11  *          *         (916) 756-1104              *
 *                                      *          *                                     *
 ***************************************          ***************************************
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                              SKYLINE WASH AND TRIBUTARIES
                              FLOODPLAIN DELINEATION STUDY
                              FCD 96-08

                              HEC-1

                              DATE:   8-19-98
                              STORM:  100-YR 6-HOUR STORM
                              FILE NAME:  SKYLINE6.DAT

                              FILE NAME CHANGED TO SL3-1B-6.DAT
                              (SKYLINE DCR PHASE 3 ALTERNATIVE 1B 6-HOUR STORM)

                         DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA

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

     IT          HYDROGRAPH TIME DATA
                       NMIN           3  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        1457  ENDING TIME
                      ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL     .05 HOURS
                     TOTAL TIME BASE   14.95 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

  18 JD          INDEX STORM NO. 1
                       STRM        2.80  PRECIPITATION DEPTH
                       TRDA         .01  TRANSPOSITION DRAINAGE AREA

  19 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
```

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                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .02       .02       .02       .02       .02
                      .03       .03       .03       .03       .03       .09       .09       .09       .09       .09
                      .02       .02       .02       .02       .02       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  22 JD          INDEX STORM NO. 2
                       STRM        2.78  PRECIPITATION DEPTH
                       TRDA         .50  TRANSPOSITION DRAINAGE AREA

   0 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .02       .02       .02       .02       .02
                      .03       .03       .03       .03       .03       .09       .09       .09       .09       .09
                      .02       .02       .02       .02       .02       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  23 JD          INDEX STORM NO. 3
                       STRM        2.73  PRECIPITATION DEPTH
                       TRDA        2.80  TRANSPOSITION DRAINAGE AREA

  24 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                      .04       .04       .04       .04       .04       .05       .05       .05       .05       .05
                      .03       .03       .03       .03       .03       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

  27 JD          INDEX STORM NO. 4
                       STRM        2.58  PRECIPITATION DEPTH
                       TRDA       16.00  TRANSPOSITION DRAINAGE AREA

  28 PI            PRECIPITATION PATTERN
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                      .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                      .03       .03       .03       .03       .03       .04       .04       .04       .04       .04
                      .03       .03       .03       .03       .03       .01       .01       .01       .01       .01
                      .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
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                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

 31 JD         INDEX STORM NO. 5
                      STRM         2.27  PRECIPITATION DEPTH
                      TRDA        90.00  TRANSPOSITION DRAINAGE AREA

 32 PI           PRECIPITATION PATTERN
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                 .03       .03       .03       .03       .03       .03       .03       .03       .03       .03
                 .02       .02       .02       .02       .02       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

 35 JD         INDEX STORM NO. 6
                      STRM         2.24  PRECIPITATION DEPTH
                      TRDA       100.00  TRANSPOSITION DRAINAGE AREA

 36 PI           PRECIPITATION PATTERN
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                 .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                 .02       .02       .02       .02       .02       .02       .02       .02       .02       .02
                 .02       .02       .02       .02       .02       .02       .02       .02       .02       .02
                 .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                 .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 295 KK     *     DB13   *
            *            *
            **************

 304 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

               HYDROGRAPH ROUTING DATA

 297 RS          STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC        .00  INITIAL CONDITION
                          X        .00 WORKING R AND D COEFFICIENT

 298 SV            STORAGE        .0      18.0      37.0      56.0      76.0      97.0     119.0     142.0     165.0     190.0
                               215.0     241.0

 300 SE          ELEVATION   1348.00   1349.00   1350.00   1351.00   1352.00   1353.00   1354.00   1355.00   1356.00   1357.00
                             1358.00   1359.00

 302 SQ          DISCHARGE        0.        1.       21.       72.      144.      223.      290.      347.      411.      466.
                                514.      550.

                                                   ***

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

                          HYDROGRAPH AT STATION     DB13
                        TRANSPOSITION AREA       .0 SQ MI

  PEAK FLOW     TIME                        MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR     14.95-HR
+   (CFS)       (HR)
                           (CFS)
+    534.       5.15                 386.         190.         190.         190.
                         (INCHES)    .914        1.119        1.119        1.119
                         (AC-FT)     191.         234.         234.         234.

 PEAK STORAGE   TIME                       MAXIMUM AVERAGE STORAGE
                                     6-HR        24-HR        72-HR     14.95-HR
+  (AC-FT)      (HR)
     229.       5.15                 160.          87.          87.          87.

  PEAK STAGE    TIME                        MAXIMUM AVERAGE STAGE
                                     6-HR        24-HR        72-HR     14.95-HR
+   (FEET)      (HR)
   1358.55      5.15              1355.72      1352.30      1352.30      1352.30

                     CUMULATIVE AREA =     3.93 SQ MI


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

                          HYDROGRAPH AT STATION     DB13
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                 TRANSPOSITION AREA       .5 SQ MI

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     14.95-HR
+   (CFS)       (HR)
                             (CFS)
+     530.      5.15                    382.        187.        187.        187.
                         (INCHES)       .904       1.106       1.106       1.106
                          (AC-FT)       189.        232.        232.        232.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR       72-HR     14.95-HR
+  (AC-FT)      (HR)
      227.      5.15                    158.         86.         86.         86.

  PEAK STAGE    TIME                         MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR       72-HR     14.95-HR
+   (FEET)      (HR)
   1358.45      5.15                 1355.65     1352.26     1352.26     1352.26

                          CUMULATIVE AREA =     3.93 SQ MI


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

                           HYDROGRAPH AT STATION      DB13
                         TRANSPOSITION AREA      2.8 SQ MI

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     14.95-HR
+   (CFS)       (HR)
                             (CFS)
+     431.      5.25                    294.        143.        143.        143.
                         (INCHES)       .697        .844        .844        .844
                          (AC-FT)       146.        177.        177.        177.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR       72-HR     14.95-HR
+  (AC-FT)      (HR)
      174.      5.25                    124.         70.         70.         70.

  PEAK STAGE    TIME                         MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR       72-HR     14.95-HR
+   (FEET)      (HR)
   1356.37      5.25                 1354.18     1351.54     1351.54     1351.54

                          CUMULATIVE AREA =     3.93 SQ MI


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

                           HYDROGRAPH AT STATION      DB13
                         TRANSPOSITION AREA     16.0 SQ MI

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     14.95-HR
+   (CFS)       (HR)
                             (CFS)
+     313.      5.30                    208.        101.        101.        101.
                         (INCHES)       .493        .596        .596        .596
                          (AC-FT)       103.        125.        125.        125.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR       72-HR     14.95-HR
+  (AC-FT)      (HR)
      128.      5.30                     95.         56.         56.         56.

  PEAK STAGE    TIME                         MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR       72-HR     14.95-HR
+   (FEET)      (HR)
   1354.40      5.30                 1352.87     1350.91     1350.91     1350.91

                          CUMULATIVE AREA =     3.93 SQ MI


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

                           HYDROGRAPH AT STATION      DB13
                         TRANSPOSITION AREA     90.0 SQ MI

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     14.95-HR
+   (CFS)       (HR)
                             (CFS)
+     150.      5.65                    101.         51.         51.         51.
                         (INCHES)       .239        .300        .300        .300
                          (AC-FT)        50.         63.         63.         63.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR       72-HR     14.95-HR
+  (AC-FT)      (HR)
       78.      5.65                     64.         41.         41.         41.

  PEAK STAGE    TIME                         MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR       72-HR     14.95-HR
+   (FEET)      (HR)
   1352.08      5.65                 1351.38     1350.19     1350.19     1350.19

                          CUMULATIVE AREA =     3.93 SQ MI


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

                           HYDROGRAPH AT STATION      DB13
                         TRANSPOSITION AREA    100.0 SQ MI

  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR     14.95-HR
+   (CFS)       (HR)
                             (CFS)
+      89.      6.25                     64.         34.         34.         34.
                         (INCHES)       .152        .198        .198        .198
                          (AC-FT)        32.         42.         42.         42.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR       72-HR     14.95-HR
+  (AC-FT)      (HR)
       61.      6.25                     53.         36.         36.         36.

  PEAK STAGE    TIME                         MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR       72-HR     14.95-HR
+   (FEET)      (HR)
   1351.24      6.25                 1350.82     1349.92     1349.92     1349.92
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CUMULATIVE AREA = 3.93 SQ MI

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

INTERPOLATED HYDROGRAPH AT DB13

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	14.95-HR
+	(CFS)	(HR)					
			(CFS)				
+	408.	5.25		278.	135.	135.	135.
			(INCHES)	.657	.796	.796	.796
			(AC-FT)	138.	167.	167.	167.

CUMULATIVE AREA = 3.93 SQ MI

1

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	S1	844.	4.10	75.	30.	30.	.51		
+	HYDROGRAPH AT	S2	376.	4.10	32.	13.	13.	.22		
+	2 COMBINED AT	HC2	1094.	4.10	102.	41.	41.	.73		
+	ROUTED TO	R2-3	1047.	4.15	102.	41.	41.	.73		
+	HYDROGRAPH AT	S3	858.	4.15	88.	35.	35.	.65		
+	2 COMBINED AT	HC3	1517.	4.15	173.	70.	70.	1.38		
+	ROUTED TO	R3-4	1448.	4.20	173.	70.	70.	1.38		
+	HYDROGRAPH AT	S4	681.	4.10	57.	23.	23.	.41		
+	2 COMBINED AT	HC4	1703.	4.20	214.	86.	86.	1.79		
+	ROUTED TO	R4-7	1664.	4.25	214.	86.	86.	1.79		
+	HYDROGRAPH AT	S7	255.	4.05	19.	7.	7.	.13		
+	2 COMBINED AT	IHC7	1714.	4.25	227.	91.	91.	1.92		
+	HYDROGRAPH AT	S5	780.	4.15	80.	32.	32.	.53		
+	ROUTED TO	R5-6	750.	4.20	79.	32.	32.	.53		
+	HYDROGRAPH AT	S6	481.	4.05	35.	14.	14.	.25		
+	2 COMBINED AT	HC6	999.	4.15	109.	44.	44.	.78		
+	2 COMBINED AT	HC7	2088.	4.25	308.	124.	124.	2.70		
+	ROUTED TO	R7-12E	2048.	4.30	308.	124.	124.	2.70		

+	HYDROGRAPH AT	S12E	129.	4.00	8.	3.	3.	.05
+	2 COMBINED AT	HC12E	2060.	4.30	314.	126.	126.	2.75
+	HYDROGRAPH AT	S8	645.	4.05	51.	20.	20.	.34
+	ROUTED TO	R8-9	634.	4.10	51.	20.	20.	.34
+	HYDROGRAPH AT	S9	359.	4.10	31.	12.	12.	.21
+	2 COMBINED AT	HC9	967.	4.10	81.	32.	32.	.55
+	ROUTED TO	R9-11	874.	4.20	81.	32.	32.	.55
+	HYDROGRAPH AT	S11	370.	4.05	23.	9.	9.	.17
+	2 COMBINED AT	IHC11	945.	4.20	100.	40.	40.	.72
+	HYDROGRAPH AT	S10	354.	4.10	29.	11.	11.	.19
+	2 COMBINED AT	HC11	1100.	4.20	124.	50.	50.	.91
+	ROUTED TO	R1112W	1049.	4.25	123.	50.	50.	.91
+	HYDROGRAPH AT	S12W	207.	4.05	13.	5.	5.	.09
+	2 COMBINED AT	HC12W	1083.	4.20	134.	54.	54.	1.00
+	2 COMBINED AT	HC12	2624.	4.30	411.	166.	166.	3.75
+	ROUTED TO	R12-13	2556.	4.35	411.	166.	166.	3.75
+	HYDROGRAPH AT	S13	357.	4.05	21.	9.	9.	.17
+	2 COMBINED AT	HC13	2597.	4.35	422.	170.	170.	3.93
+	ROUTED TO	DB13	408.	5.25	278.	135.	135.	3.93
+	DIVERSION TO	DI27	136.	5.25	93.	45.	45.	3.93
+	HYDROGRAPH AT	DI13	272.	5.25	185.	90.	90.	3.93
+	ROUTED TO	RDI13	271.	5.65	182.	88.	88.	3.93
+	HYDROGRAPH AT	S14	927.	4.05	66.	27.	27.	.49
+	2 COMBINED AT	HC14	405.	4.05	201.	105.	105.	4.41
+	ROUTED TO	R1416S	375.	4.20	200.	104.	104.	4.41
+	HYDROGRAPH AT	S15	208.	4.05	11.	4.	4.	.11
+	ROUTED TO	R1516S	163.	4.20	11.	4.	4.	.11
+	HYDROGRAPH AT	S16S	378.	4.05	23.	9.	9.	.17
+	3 COMBINED AT	IHC16S	512.	4.20	214.	111.	111.	4.70
+	HYDROGRAPH AT	S16N	276.	4.10	24.	10.	10.	.17
+	ROUTED TO	R16N-S	240.	4.30	24.	10.	10.	.17
+	2 COMBINED AT	HC16S	599.	4.20	229.	118.	118.	4.87
+	DIVERSION TO	DI22	123.	4.20	28.	12.	12.	4.87
+	HYDROGRAPH AT	DI16S	477.	4.20	201.	106.	106.	4.87
+	ROUTED TO	R16-17	441.	4.45	200.	104.	104.	4.87
+	HYDROGRAPH AT	S17	488.	4.05	31.	12.	12.	.29
+	2 COMBINED AT	HC17	493.	4.40	210.	110.	110.	5.15
+	HYDROGRAPH AT	S18	685.	4.05	53.	21.	21.	.36
+	ROUTED TO	R18-19	604.	4.15	53.	21.	21.	.36
+	HYDROGRAPH AT	S19	586.	4.05	41.	16.	16.	.29
+	2 COMBINED AT	HC19	1008.	4.10	90.	36.	36.	.65

+	ROUTED TO	R19-20	896.	4.20	90.	36.	36.	.65
+	HYDROGRAPH AT	S20	145.	4.05	10.	4.	4.	.09
+	2 COMBINED AT	HC20	948.	4.20	98.	39.	39.	.73
+	HYDROGRAPH AT	S21	1188.	4.05	82.	33.	33.	.62
+	HYDROGRAPH AT	S22	932.	4.10	65.	26.	26.	.55
+	HYDROGRAPH AT	DI22	123.	4.20	28.	12.	12.	4.87
+	ROUTED TO	RDI22	103.	4.60	28.	12.	12.	4.87
+	2 COMBINED AT	HC22	932.	4.10	174.	74.	74.	5.41
+	HYDROGRAPH AT	S23	746.	4.10	53.	21.	21.	.49
+	HYDROGRAPH AT	S24	313.	4.30	38.	15.	15.	.32
+	HYDROGRAPH AT	S25	57.	4.05	3.	1.	1.	.03
+	ROUTED TO	R25-26	33.	4.45	3.	1.	1.	.03
+	HYDROGRAPH AT	S26	379.	4.10	26.	11.	11.	.21
+	2 COMBINED AT	HC26	380.	4.10	30.	12.	12.	.24
+	HYDROGRAPH AT	S27	997.	4.05	76.	30.	30.	.51
+	HYDROGRAPH AT	DI27	136.	5.25	93.	45.	45.	3.93
+	ROUTED TO	RDI27	136.	5.30	92.	45.	45.	3.93
+	2 COMBINED AT	HC27	997.	4.05	279.	133.	133.	4.43
+	ROUTED TO	R27-28	449.	4.15	137.	66.	66.	4.43
+	HYDROGRAPH AT	S28	93.	4.00	5.	2.	2.	.04
+	2 COMBINED AT	HC28	996.	4.10	193.	93.	93.	.55
+	ROUTED TO	R28-29	916.	4.20	192.	93.	93.	.55
+	HYDROGRAPH AT	S29	212.	4.05	12.	5.	5.	.10
+	2 COMBINED AT	HC29	953.	4.20	198.	95.	95.	.65
+	8 COMBINED AT	HCBES3	2305.	4.15	540.	257.	257.	8.75

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

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1***************************************
 *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1) *
 *             JUN   1998              *
 *           VERSION 4.1               *
 *                                     *
 * RUN DATE   14FEB13  TIME  08:43:32  *
 *                                     *
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 ***************************************
 *                                     *
 *   U.S. ARMY CORPS OF ENGINEERS      *
 *   HYDROLOGIC ENGINEERING CENTER     *
 *        609 SECOND STREET            *
 *     DAVIS, CALIFORNIA 95616         *
 *         (916) 756-1104              *
 *                                     *
 ***************************************
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X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X         XXXXX  X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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


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

  1       ID        SKYLINE WASH AND TRIBUTARIES
  2       ID        FLOODPLAIN DELINEATION STUDY
  3       ID        FCD 96-08
  4       ID
  5       ID        HEC-1
  6       ID
  7       ID        DATE:   8-19-98
  8       ID        STORM:  100-YR 24-HOUR STORM
  9       ID        FILE NAME:  SKYLINE.DAT
 10       ID
 11       ID        FILE NAME CHANGED TO SL3-1B-24.DAT
 12       ID        (SKYLINE DCR PHASE 3 ALTERNATIVE 1B 24-HOUR STORM)
 13       ID
 14       ID   DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA
          *DIAGRAM
          *
          * REPERFORMED WITH FOLLOWING MODIFICATIONS - JULY 2012, SEI
          * NOAA ATLAS 14 POINT RAINFALL DEPTH USED
          * DEPTH-AREA REDUCTION FACTOR UPDATED
          * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
          * OTHER MINOR MODIFICATIONS MADE
          *
          * REPERFORMED WITH FOLLOWING MODIFICATIONS - FEBRUARY 2013, SEI
          * DETENTION BASIN DB13 ADDED TO SKYLINE WASH APEX (HC13)
          * 48?DIAMETER RCP - LOW FLOW OUTLET OF DETENTION BASIN CALCULATED USING HY8
          * HYDROGRAPH SPLITTED AT DB13 TO DI13 AND DI27
          * 0 HYDROGRAPH DI13 ROUTED TO S14
          * NO HYDROGRAPH ROUTED TO S24
          * DI24, RDI24 AND HC24 DELETED
          * HYDROGRAPH DI27 ROUTED TO S27
          * DI27, RDI27 AND HC27 ADDED
          * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
          * OTHER MINOR MODIFICATIONS MADE
          *
          * REPERFORMED WITH FOLLOWING MODIFICATIONS - FEBRUARY 2013, SEI
          * DETENTION BASIN DB13 MODIFIED BASED ON UPDATED STAGE-STORAGE DATA ?BASIN 1B
          * 3 X 48?DIAMETER RCPS - LOW FLOW OUTLET OF DETENTION BASIN
          * STAGE-OUTFLOW CALCULATED USING HYDROCAD
          * HYDROGRAPH SPLITTED AT DB13 TO DI13 AND DI27
          * 2/3 DETENTION BASIN OUTLET HYDROGRAPH ROUTED TO S14 THROUGH DI13
          * (CONTINUE IN SKYLINE WASH)
          * 1/3 DETENTION BASIN OUTLET HYDROGRAPH ROUTED TO S27 THROUGH DI27
          * (TO PROSPECT WASH)
          * NEW NSTPS INERATIONS FOR CHANNEL ROUTINGS CONDUCTED
          *
 15       IT       3                     500
 16       IN      15
 17       IO       5
 18       JD    3.97    0.01
 19       PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
 20       PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
 21       PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
 22       PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
 23       PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
 24       PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  25          PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
  26          PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
  27          PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
  28          PC    .983    .986    .989    .992    .995    .998   1.000
  29          JD    3.77   10.00
  30          JD    3.57   30.00
  31          JD    3.45   60.00
  32          JD    3.38   90.00
  33          JD    3.34  120.00
  34          JD    3.30  150.00
  35          JD    3.20  300.00
  36          JD    3.11  500.00
              *  BASIN S1 - BEGINNING OF SKYLINE WASH
              * DDM   ***** Updated *****

  37          KK      S1
  38          KM   BASIN S1
  39          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  40          KM    L=       1.2  Lca=        .6   S= 1102.5  Kn= .050  LAG=  16.6
  41          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  42          BA     .51
  43          LG     .25     .25    3.95     .53   18.00
  44          UI    103.    273.    577.    783.   1122.    746.    585.    489.    400.    306.
  45          UI    248.    206.    151.    123.    102.     79.     60.     51.     48.     20.
  46          UI     20.     20.     20.     20.     20.      0.      0.      0.      0.      0.
  47          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *  BASIN S2 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

  48          KK      S2
  49          KM   BASIN S2
  50          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  51          KM    L=        .9  Lca=        .6   S=  916.1  Kn= .050  LAG=  16.0
  52          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  53          BA     .22
  54          LG     .25     .25    3.95     .53   18.00
  55          UI     46.    130.    269.    364.    496.    310.    251.    207.    166.    124.
  56          UI    105.     82.     60.     51.     38.     32.     23.     23.     12.      9.
  57          UI      9.      9.      9.      9.      0.      0.      0.      0.      0.      0.
  58          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

  59          KK     HC2
  60          KM         COMBINE HYDROGRAPHS FROM S1 AND S2 - UPSTREAM PORTION OF SKYLINE WASH
  61          HC       2  0.7296
              * DDM   ***** Preserved *****

  62          KK    R2-3
  63          KM         ROUTE HYDROGRAPH HC2 THROUGH S3 - SKYLINE WASH
  64          RS       1    FLOW      -1
  65          RC     .07    .036     .07    2930    .029
  66          RX    1000    1030    1100    1120    1130    1190    1220    1250
  67          RY    1626    1624    1594    1594    1596    1624    1626    1625
              *  BASIN S3 - MAIN SUBBASIN FOR GRANITE FALLS WASH
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  68          KK      S3
  69          KM   BASIN S3
  70          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  71          KM    L=       1.5  Lca=       1.0   S=  481.0  Kn= .040  LAG=  21.0
  72          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  73          BA     .65
  74          LG     .20     .25    4.00     .52   13.00
  75          UI    104.    180.    422.    652.    797.   1088.    945.    652.    567.    492.
  76          UI    420.    348.    274.    245.    212.    164.    133.    115.     99.     80.
  77          UI     70.     51.     51.     49.     20.     20.     20.     20.     20.     20.
  78          UI     20.     20.      0.      0.      0.      0.      0.      0.      0.      0.
  79          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

  80          KK     HC3
  81          KM         COMBINE HYDROGRAPH R2-3 WITH HYDROGRAPH FROM S3 - CONFLUENCE OF SKYLINE
  82          KM         WASH AND GRANITE FALLS WASH
  83          HC       2  1.3787
              * DDM   ***** Preserved *****

  84          KK    R3-4
  85          KM         ROUTE COMBINED HYDROGRAPHS HC3 THROUGH S4 - SKYLINE WASH
  86          RS       1    FLOW      -1
  87          RC     .07    .036     .07    2927    .032
  88          RX    1000    1030    1085    1160    1200    1240    1250    1275
  89          RY    1520    1518    1496    1496    1498    1516    1518    1520
              *  BASIN S4 - UPSTREAM SUBBASIN TRIBUTARY TO SKYLINE WASH
              * DDM   ***** Updated *****

  90          KK      S4
  91          KM   BASIN S4
  92          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  93          KM    L=       1.3  Lca=        .6   S=  503.9  Kn= .040  LAG=  16.2
  94          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  95          BA     .41
  96          LG     .20     .25    4.00     .52   13.00
  97          UI     85.    231.    486.    656.    913.    579.    465.    386.    312.    234.
  98          UI    196.    156.    114.     95.     73.     63.     41.     41.     28.     16.
  99          UI     16.     16.     16.     16.      0.      0.      0.      0.      0.      0.
 100          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 101          KK     HC4
 102          KM         COMBINE HYDROGRAPH R3-4 WITH HYDROGRAPH FROM S4 - CONCENTRATION POINT
 103          KM         ON SKYLINE WASH.
 104          HC       2  1.7864
              * DDM   ***** Preserved *****

 105          KK    R4-7
 106          KM         ROUTE COMBINED HYDROGRAPHS HC4 THROUGH S7 - SKYLINE WASH
 107          RS       1    FLOW      -1
 108          RC     .07    .036     .07    2211    .022
 109          RX    1000    1025    1055    1120    1145    1180    1240    1370
 110          RY    1462    1460    1462    1462    1432    1432    1456    1462
              *  BASIN S7 - TRIBUTARY BASIN TO MOUNTAIN WASH NEAR AT CONFLUENCE WITH SKYLINE
              *   WASH
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 111          KK      S7
 112          KM   BASIN S7
 113          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 114          KM    L=        .9  Lca=       .6   S=  955.3  Kn= .040  LAG=  12.7
 115          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 116          BA     .13
 117          LG     .20     .25    4.00     .52   12.00
 118          UI     37.    147.    254.    365.    229.    178.    137.     97.     78.     53.
 119          UI     41.     30.     22.     17.     12.      7.      7.      7.      7.      0.
 120          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 121          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 122          KK    IHC7
 123          KM         COMBINE HYDROGRAPHS R4-7 AND S7 - UPSTREAM OF CONFLUENCE WITH MOUNTAIN
 124          KM         WASH
 125          HC       2  1.9208
              *  BASIN S5 - BEGINNING OF MOUNTAIN WASH
              * DDM   ***** Updated *****

 126          KK      S5
 127          KM   BASIN S5
 128          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 129          KM    L=       1.4  Lca=       .7   S=  654.8  Kn= .050  LAG=  20.2
 130          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 131          BA     .53
 132          LG     .25     .25    3.95     .53   20.00
 133          UI     89.    164.    385.    573.    705.    988.    689.    532.    459.    396.
 134          UI    334.    265.    219.    195.    157.    120.    104.     93.     68.     65.
 135          UI     43.     43.     43.     18.     17.     17.     17.     17.     17.     17.
 136          UI     17.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 137          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 138          KK    R5-6
 139          KM         ROUTE HYDROGRAPH S5 THROUGH S6 - MOUNTAIN WASH
 140          RS       1    FLOW      -1
 141          RC     .07    .036     .07    2494    .030
 142          RX    1000    1025    1075    1105    1150    1170    1220    1240
 143          RY    1480    1476    1476    1460    1454    1454    1478    1480
              *  BASIN S6 - SUBBASIN TRIBUTARY TO MOUNTAIN WASH
              * DDM   ***** Updated *****

 144          KK      S6
 145          KM   BASIN S6
 146          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 147          KM    L=        .8  Lca=       .4   S=  491.4  Kn= .042  LAG=  12.3
 148          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 149          BA     .25
 150          LG     .21     .25    4.00     .52   15.00
 151          UI     75.    289.    495.    680.    415.    323.    244.    172.    135.     93.
 152          UI     71.     52.     35.     33.     13.     13.     13.     13.      0.      0.
 153          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 154          KK     HC6
 155          KM         COMBINE HYDROGRAPHS R5-6 WITH SUBBASIN S6 - UPSTREAM OF CONFLUENCE WITH
 156          KM         SKYLINE WASH
 157          HC       2  0.7787
              * DDM   ***** Preserved *****

 158          KK     HC7
 159          KM         COMBINE HYDROGRAPHS IHC7 WITH HC6 - CONFLUENCE OF MOUNTAIN WASH WITH
 160          KM         SKYLINE WASH
 161          HC       2  2.6995
              * DDM   ***** Preserved *****

 162          KK  R7-12E
 163          KM         ROUTE COMBINED HYDROGRAPHS AT HC7 THROUGH S12E - SKYLINE WASH
 164          RS       1    FLOW      -1
 165          RC     .07    .036     .07    1930   .0166
 166          RX    1000    1085    1170    1240    1255    1265    1310    1350
 167          RY    1430    1424    1422    1420    1422    1424    1428    1430
              *
              *   BASIN S12E - SUBBASIN TRIBUTARY TO PYRITE WASH AND SKYLINE WASH CONFLUENCE
              * DDM   ***** Updated *****

 168          KK    S12E
 169          KM   BASIN S12E
 170          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 171          KM    L=        .6  Lca=       .2   S=  142.9  Kn= .030  LAG=   7.8
 172          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 173          BA     .05
 174          LG     .15     .25    3.91     .55   18.00
 175          UI     47.    167.    200.    114.     70.     44.     27.     16.     11.      5.
 176          UI      5.      5.      0.      0.      0.      0.      0.      0.      0.      0.
 177          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 178          KK   HC12E
 179          KM         COMBINE HYDROGRAPHS S12E WITH R7-12E - CONFLUENCE OF PYRITE WASH WITH
 180          KM         SKYLINE WASH
 181          HC       2  2.7544
              *  BASIN S8 - BEGINNING OF PYRITE WASH
              * DDM   ***** Updated *****

 182          KK      S8
 183          KM   BASIN S8
 184          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 185          KM    L=        .8  Lca=       .4   S=  692.1  Kn= .050  LAG=  13.0
 186          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 187          BA     .34
 188          LG     .25     .25    3.95     .53   20.00
 189          UI     88.    352.    614.    906.    585.    452.    354.    254.    200.    145.
 190          UI    105.     81.     62.     43.     38.     17.     17.     17.     17.     17.
 191          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 192          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 193          KK    R8-9
 194          KM         ROUTE HYDROGRAPH S8 THROUGH S9 - PYRITE WASH
 195          RS       1    FLOW      -1
 196          RC     .07    .036     .07     911    .013
 197          RX    1000    1020    1050    1065    1080    1125    1185    1190
 198          RY    1518    1518    1494    1492    1494    1494    1520    1524
              *  BASIN S9 - SUBBASIN TRIBUTARY TO PYRITE WASH
              * DDM   ***** Updated *****

 199          KK      S9
 200          KM   BASIN S9
 201          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 202          KM    L=       1.0  Lca=       .7   S=  415.7  Kn= .040  LAG=  15.9
 203          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 204          BA     .21
 205          LG     .20     .25    3.95     .53   17.00
 206          UI     44.    126.    259.    351.    471.    293.    238.    196.    157.    117.
 207          UI     99.     77.     56.     48.     35.     29.     22.     22.     10.      8.
 208          UI      8.      8.      8.      8.      0.      0.      0.      0.      0.      0.
 209          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 210          KK     HC9
 211          KM         COMBINE ROUTED HYDROGRAPH R8-9 WITH HYDROGRAPH S9 - CONCENTRATION POINT
 212          KM         ON PYRITE WASH
 213          HC       2  0.5472
              * DDM   ***** Preserved *****

 214          KK   R9-11
 215          KM         ROUTE COMBINED HYDROGRAPHS HC9 THROUGH S11 - PYRITE WASH
 216          RS       3    FLOW      -1
 217          RC     .07    .036     .07    3462    .023
 218          RX    1000    1080    1090    1120    1140    1290    1340    1375
 219          RY    1496    1494    1492    1472    1471    1472    1490    1494
              *  BASIN S11 -PYRITE WASH UPSTREAM OF CONFLUENCE WITH WAGON WASH
              * DDM   ***** Updated *****

 220          KK     S11
 221          KM   BASIN S11
 222          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 223          KM    L=        .7  Lca=       .3   S=  797.1  Kn= .040  LAG=   9.3
 224          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 225          BA     .17
 226          LG     .20     .25    4.00     .52   11.00
 227          UI     96.    360.    590.    366.    262.    169.    119.     73.     51.     32.
 228          UI     23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
 229          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 230          KK   IHC11
 231          KM         COMBINE ROUTED HYDROGRAPH R9-11 WITH HYDROGRAPHS S11 - UPSTREAM OF
 232          KM         CONFLUENCE WITH WAGON WASH
 233          HC       2  0.7154
              *  BASIN S10 - BEGINNING OF WAGON WASH
              * DDM   ***** Updated *****

 234          KK     S10
 235          KM   BASIN S10
 236          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 237          KM    L=       1.0  Lca=       .5   S=  896.9  Kn= .048  LAG=  14.2
 238          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 239          BA     .19
 240          LG     .24     .25    3.95     .53   18.00
 241          UI     46.    157.    302.    430.    397.    263.    213.    167.    122.    101.
 242          UI     71.     55.     43.     35.     23.     23.     11.      9.      9.      9.
 243          UI      9.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 244          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 245          KK    HC11
 246          KM         COMBINE HYDROGRAPH IHC11 WITH HYDROGRAPH S10 - CONFLUENCE OF WAGON WASH
 247          KM         WITH PYRITE WASH
 248          HC       2  0.9089
              * DDM   ***** Preserved *****

 249          KK  R1112W
 250          KM         ROUTE COMBINED HYDROGRAPHS HC11 THROUGH S12W - CONTINUATION OF PYRITE
 251          KM         WASH DOWNSTREAM OF CONFLUENCE WITH WAGON WASH
 252          RS       1    FLOW      -1
 253          RC     .07    .036     .07    1501    .019
 254          RX    1000    1030    1065    1150    1240    1330    1375    1410
 255          RY    1422    1420    1410    1410    1410    1412    1414    1428
              *  BASIN S12W - SUBBASIN TRIBUTARY FOR PYRITE WASH AND SKYLINE WASH
              * DDM   ***** Updated *****

 256          KK    S12W
 257          KM   BASIN S12W
 258          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 259          KM    L=        .7  Lca=       .2   S=  153.6  Kn= .030  LAG=   8.2
 260          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 261          BA     .09
 262          LG     .15     .25    3.91     .55   18.00
 263          UI     68.    246.    330.    189.    123.     79.     47.     31.     19.     11.
 264          UI      7.      7.      0.      0.      0.      0.      0.      0.      0.      0.
 265          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 266          KK   HC12W
 267          KM         COMBINE HYDROGRAPH R1112W WITH HYDROGRAPH S12W - CONFLUENCE OF SKYLINE
 268          KM         WASH WITH PYRITE WASH
 269          HC       2  0.9994
              * DDM   ***** Preserved *****
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 270      KK    HC12
 271      KM          COMBINE ROUTED HYDROGRAPH HC12W AND HC12E
 272      KM          CONFLUENCE OF SKYLINE WASH AND PYRITE WASH
 273      HC       2  3.7538
          * DDM   ***** Preserved *****

 274      KK  R12-13
 275      KM          ROUTE COMBINED HYDROGRAPHS HC12 THROUGH S13 - SKYLINE WASH
 276      RS       1    FLOW      -1
 277      RC     .07    .036     .07    1854    .017
 278      RX    1000    1080    1110    1320    1370    1420    1500    1550
 279      RY    1400    1392    1384    1382    1382    1380    1380    1400
          *  BASIN S13 - SKYLINE WASH DOWNSTREAM OF CONFLUENCE OF PYRITE WASH
          * DDM   ***** Updated *****

 280      KK     S13
 281      KM   BASIN S13
 282      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 283      KM    L=        .9  Lca=        .3   S=  174.2  Kn= .030  LAG=  10.1
 284      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 285      BA     .17
 286      LG     .15     .25    3.88     .56    4.00
 287      UI     82.    312.    550.    397.    278.    195.    135.     90.     64.     43.
 288      UI     28.     20.     11.     11.     11.      0.      0.      0.      0.      0.
 289      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 290      KK    HC13
 291      KM          COMBINE ROUTED HYDROGRAPH R12-13 WITH HYDROGRAPH S13 - SKYLINE WASH
 292      HC       2  3.9274
          * KO     3
          *

 293      KK    DB13
 294      KM   DETENTION BASIN AT SKYLINE WASH APEX
 295      RS       1    STOR       0
 296      SV     0.0    18.0    37.0    56.0    76.0    97.0   119.0   142.0   165.0   190.0
 297      SV   215.0   241.0
          *
 298      SE  1348.0  1349.0  1350.0  1351.0  1352.0  1353.0  1354.0  1355.0  1356.0  1357.0
 299      SE  1358.0  1359.0
          *
 300      SQ     0.0    0.52   20.59   72.40  144.14  223.02  290.09  347.38  411.10  466.24
 301      SQ  514.45  550.00
 302      KO       3
          * DDM   ***** Preserved *****

 303      KK    DI13
          * KM        SPLIT FLOW AT HC13; MAIN FLOW TO S24 AND MINOR FLOW TO S14
          * DT  DI24
          * DI     0     201     556    1353    2595    4157
          * DQ     0     201     461     879    1427  2078.5
 304      KM          SPLIT FLOW AT DB13; 1/3 FLOW TO S27 AND 2/3 FLOW TO S14
 305      DT    DI27
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LINE      ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 306      DI       0      60     120     240     480     960    1920
 307      DQ       0      20      40      80     160     320     640
          * DDM   ***** Preserved *****

 308      KK   RDI13
 309      KM          ROUTE HYDROGRAPH DI13 THROUGH S14 - SKYLINE WASH DOWNSTREAM OF SPLIT
 310      RS       9    FLOW      -1
 311      RC     .07    .036     .07    4353    .021
 312      RX    1000    1025    1270    1280    1320    1330    1370    1385
 313      RY    1360    1354    1354    1356    1356    1358    1358    1360
          *  BASIN S14 - BEGINNING OF COYOTE WASH
          * DDM   ***** Updated *****

 314      KK     S14
 315      KM   BASIN S14
 316      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 317      KM    L=       1.2  Lca=        .6   S=  340.7  Kn= .030  LAG=  12.4
 318      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 319      BA     .49
 320      LG     .15     .25    3.91     .55   11.00
 321      UI    144.    562.    962.   1341.    822.    640.    487.    343.    270.    185.
 322      UI    145.    101.     72.     65.     31.     25.     25.     25.     25.      0.
 323      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 324      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****

 325      KK    HC14
 326      KM          COMBINE ROUTED HYDROGRAPH RDI13 WITH HYDROGRAPH S14 - SPLIT FLOW FROM
 327      KM          SKYLINE WASH AND COYOTE WASH SUBBASIN
 328      HC       2  4.4139
          * DDM   ***** Preserved *****

 329      KK  R1416S
          * KM        ROUTE COMBINED HYDROGRAPHS HC14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
 330      KM          ROUTE HYDROGRAPH S14 THROUGH S16S - SKYLINE WASH DOWNSTREAM
 331      KM          OF CONFLUENCE WITH COYOTE WASH
 332      RS       3    FLOW      -1
 333      RC     .07    .036     .07    3140    .017
 334      RX    1000    1035    1150    1180    1320    1360    1480    1481
 335      RY    1236    1234    1234    1232    1232    1234    1236    1236
          *  BASIN S15 - SUBBASIN IN AREA OF EXISTING A.D.O.T. BORROW PITS
          * DDM   ***** Updated *****

 336      KK     S15
 337      KM   BASIN S15
 338      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 339      KM    L=        .8  Lca=        .3   S=  105.0  Kn= .030  LAG=   9.8
 340      KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 341      BA     .11
 342      LG     .15     .27    3.40     .77     .00
 343      UI     56.    213.    370.    246.    176.    120.     84.     54.     37.     25.
 344      UI     19.      9.      7.      7.      7.      0.      0.      0.      0.      0.
 345      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          * DDM   ***** Preserved *****
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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  346          KK  R1516S
  347          KM         ROUTE HYDROGRAPH S15 THROUGH S16S - SKYLINE WASH DOWNSTREAM OF
  348          KM         CONFLUENCE WITH COYOTE WASH
  349          RS        3    FLOW      -1
  350          RC      .07    .036     .07    2218    .018
  351          RX     1000    1035    1150    1180    1320    1360    1480    1481
  352          RY     1236    1234    1234    1232    1232    1234    1236    1236
               *  BASIN S16S - SUBBASIN AT SKYLINE WASH DOWNSTREAM OF CONFLUENCE WITH COYOTE W.
               * DDM   ***** Updated *****

  353          KK    S16S
  354          KM   BASIN S16S
  355          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  356          KM    L=        .6  Lca=        .3   S=  116.4  Kn= .030  LAG=   9.3
  357          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  358          BA      .17
  359          LG      .15     .25    3.95     .53    6.00
  360          UI     100.    373.    611.    379.    271.    175.    123.     76.     53.     34.
  361          UI      23.     12.     12.     12.      0.      0.      0.      0.      0.      0.
  362          UI       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

  363          KK  IHC16S
  364          KM         COMBINE ROUTED HYDROGRAPH R14-16S AND R15-16S WITH HYDROGRAPH S16S
  365          KM         DOWNSTREAM OF CONFLUENCE OF SKYLINE WASH WITH COYOTE WASH
  366          HC        3  4.6952
               *  BASIN S16N - SUBBASIN TRIBUTARY TO SKYLINE WASH
               * DDM   ***** Updated *****

  367          KK    S16N
  368          KM   BASIN S16N
  369          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  370          KM    L=        .9  Lca=        .6   S=  653.2  Kn= .050  LAG=  16.5
  371          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  372          BA      .17
  373          LG      .25     .25    3.95     .53   18.00
  374          UI      34.     90.    189.    256.    366.    238.    189.    158.    129.     98.
  375          UI      80.     66.     48.     39.     32.     26.     19.     16.     15.      6.
  376          UI       6.      6.      6.      6.      6.      0.      0.      0.      0.      0.
  377          UI       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

  378          KK  R16N-S
  379          KM         ROUTE HYDROGRAPH S16N THROUGH S16S
  380          RS        4    FLOW      -1
  381          RC      .07    .036     .07    3230    .022
  382          RX     1000    1035    1150    1180    1320    1360    1480    1481
  383          RY     1236    1234    1234    1232    1232    1234    1236    1236
               * DDM   ***** Preserved *****
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 LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  384          KK   HC16S
  385          KM         COMBINE ROUTED HYDROGRAPH R16N-S AND IHC16S
  386          KM         SKYLINE WASH DOWNSTREAM OF COYOTE WASH
  387          HC        2  4.8652
               * DDM   ***** Preserved *****

  388          KK   DI16S
  389          KM         SPLIT FLOW AT HC16S; MAIN FLOW TO S17 AND MINOR FLOW TO S22
  390          DT    DI22
  391          DI        0      46     144     344   708.5    1223
  392          DQ        0       0       8      52     153     329
               * DDM   ***** Preserved *****

  393          KK  R16-17
  394          KM         ROUTE HYDROGRAPH DI16S THROUGH S17
  395          RS        4    FLOW      -1
  396          RC      .07    .036     .07    4341    .015
  397          RX     1000    1060    1090    1120    1145    1180    1200    1320
  398          RY     1202    1200  1199.5    1200    1199    1199    1200    1202
               *  BASIN S17 - SUBBASIN OF SKYLINE WASH SOUTH OF MCDOWELL ROAD ON EAST SIDE
               *  OF WATERSHED
               * DDM   ***** Updated *****

  399          KK     S17
  400          KM   BASIN S17
  401          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  402          KM    L=        .9  Lca=        .5   S=  117.9  Kn= .030  LAG=  12.8
  403          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  404          BA      .29
  405          LG      .15     .26    3.60     .67     .00
  406          UI      79.    311.    540.    784.    495.    385.    298.    212.    170.    117.
  407          UI      89.     66.     50.     37.     28.     15.     15.     15.     15.      0.
  408          UI       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
  409          UI       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****

  410          KK    HC17
  411          KM         COMBINE ROUTED HYDROGRAPH R16-17 WITH HYDROGRAPH S17 AT EAST SIDE OF
  412          KM         BUCKEYE F.R.S. NO. 3
  413          HC        2  5.1537
               *  BASIN S18 - BEGINNING OF RATTLER WASH
               * DDM   ***** Updated *****

  414          KK     S18
  415          KM   BASIN S18
  416          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  417          KM    L=        .8  Lca=        .4   S=  292.7  Kn= .040  LAG=  12.9
  418          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
  419          BA      .36
  420          LG      .20     .25    3.95     .53   17.00
  421          UI      96.    380.    662.    968.    618.    479.    373.    267.    211.    149.
  422          UI     111.     84.     64.     46.     38.     18.     18.     18.     18.      0.
  423          UI       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
  424          UI       0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
               * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 425          KK  R18-19
 426          KM         ROUTE HYDROGRAPH HC18 THROUGH S19
 427          RS       3    FLOW      -1
 428          RC     .07    .036     .07    4253     .02
 429          RX    1000    1050    1100    1125    1140    1180    1240    1241
 430          RY    1266    1264    1242    1240    1242    1264    1266    1266
              *  BASIN S19 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****

 431          KK     S19
 432          KM   BASIN S19
 433          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 434          KM    L=       1.2  Lca=       .8   S=  824.8  Kn= .030  LAG=  11.6
 435          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 436          BA     .29
 437          LG     .15     .25    4.00     .52   12.00
 438          UI    102.    389.    662.    802.    483.    372.    266.    195.    138.     99.
 439          UI     72.     51.     41.     22.     16.     16.     16.      0.      0.      0.
 440          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 441          KK    HC19
 442          KM         COMBINE ROUTED HYDROGRAPH R18-19 WITH HYDROGRAPH S19 - RATTLER WASH
 443          HC       2  0.6498
              * DDM   ***** Preserved *****

 444          KK  R19-20
 445          KM         ROUTE COMBINED HYDROGRAPHS HC19 THROUGH S20 - RATTLER WASH
 446          RS       3    FLOW      -1
 447          RC     .07    .036     .07    3740    .022
 448          RX     999    1000    1030    1095    1130    1150    1220    1221
 449          RY    1208    1208    1206    1204    1204    1206    1208    1208
              *  BASIN S20 - SUBBASIN OF RATTLER WASH
              * DDM   ***** Updated *****

 450          KK     S20
 451          KM   BASIN S20
 452          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 453          KM    L=        .9  Lca=       .4   S=   84.1  Kn= .030  LAG=  13.0
 454          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 455          BA     .09
 456          LG     .15     .26    3.60     .67    4.00
 457          UI     22.     88.    155.    228.    147.    114.     89.     64.     50.     36.
 458          UI     26.     20.     16.     11.     10.      4.      4.      4.      4.      4.
 459          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 460          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 461          KK    HC20
 462          KM         COMBINE ROUTED HYDROGRAPH R19-20 WITH HYDROGRAPH S20 AT FAR EAST SIDE
 463          KM         OF STUDY AREA NORTH OF BUCKEYE F.R.S. NO. 3
 464          HC       2  0.7344
              *  BASIN S21 - SUBBASIN NORTH OF BUCKEYE F.R.S. NO 3 SPILLWAY
              * DDM   ***** Updated *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 465          KK     S21
 466          KM   BASIN S21
 467          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 468          KM    L=       1.2  Lca=       .6   S=  780.6  Kn= .030  LAG=  11.0
 469          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 470          BA     .62
 471          LG     .15     .25    4.10     .51   10.00
 472          UI    245.    927.   1593.   1636.   1019.    766.    522.    392.    260.    190.
 473          UI    136.     93.     67.     36.     36.     36.      0.      0.      0.      0.
 474          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *  BASIN S22 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
              * DDM   ***** Updated *****

 475          KK     S22
 476          KM   BASIN S22
 477          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 478          KM    L=       1.3  Lca=       .4   S=  110.1  Kn= .029  LAG=  13.7
 479          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 480          BA     .55
 481          LG     .16     .25    3.91     .53    1.00
 482          UI    135.    496.    909.   1351.   1029.    742.    594.    451.    332.    268.
 483          UI    188.    151.    108.     84.     66.     51.     26.     26.     26.     26.
 484          UI     26.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 485          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 486          KK    DI22
 487          KM         RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S22
 488          DR    DI22
              * DDM   ***** Preserved *****

 489          KK   RDI22
 490          KM         ROUTE HYDROGRAPH DI22 THROUGH S22 - PORTION OF DIVERT OF SKYLINE WASH
 491          RS       6    FLOW      -1
 492          RC     .07    .036     .07    4253    .015
 493          RX     997     998     999    1000    1060    1210    1300    1300
 494          RY    1217    1216    1216    1215    1215    1216    1216    1217
              * DDM   ***** Preserved *****

 495          KK    HC22
 496          KM         COMBINE HYDROGRAPHS AT HC22
 497          HC       2  5.4141
              *  BASIN S23 - SUBBASIN IN MIDDLE LOWER PART OF WATERSHED
              * DDM   ***** Updated *****

 498          KK     S23
 499          KM   BASIN S23
 500          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 501          KM    L=       1.6  Lca=       .5   S=  112.1  Kn= .028  LAG=  15.2
 502          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 503          BA     .49
 504          LG     .17     .26    3.50     .70    2.00
 505          UI    108.    331.    660.    901.   1086.    670.    547.    446.    338.    263.
 506          UI    217.    155.    125.     98.     81.     53.     53.     31.     21.     21.
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 507          UI     21.     21.     21.      0.      0.      0.      0.      0.      0.      0.
 508          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *  BASIN S24 - SUBBASIN DOWNSTREAM OF SKYLINE WASH SPLIT FLOW
              * DDM   ***** Updated *****

 509          KK     S24
 510          KM   BASIN S24
 511          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 512          KM    L=       2.4  Lca=       1.2   S=  113.8  Kn= .037  LAG=  32.2
 513          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 514          BA     .32
 515          LG     .20     .25    4.00     .51    1.00
 516          UI     33.     33.     66.    117.    171.    211.    242.    273.    350.    361.
 517          UI    241.    206.    189.    172.    157.    142.    129.    111.     96.     84.
 518          UI     78.     73.     65.     54.     45.     42.     37.     36.     30.     25.
 519          UI     25.     22.     16.     16.     16.     16.     13.      6.      6.      6.
 520          UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      0.
 521          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 522          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****
              * KK  DI24
              * KM       RETURN DIVERTED HYDROGRAPH TO ROUTE AND COMBINE WITH S24
              * DR  DI24
              * DDM   ***** Preserved *****
              * KK RDI24
              * KM       ROUTE HYDROGRAPH DI24 THROUGH S24
              * RS     5    FLOW      -1
              * RC   .07    .036     .07    9929     .02
              * RX  1000    1045    1060    1080    1100    1120    1155    1220
              * RY  1222    1220    1218    1218    1216    1216    1220    1220
              * DDM   ***** Preserved *****
              * KK  HC24
              * KM       COMBINE HYDROGRAPHS AT HC24
              * HC     2  4.2443
              *  BASIN S25 - UPSTREAM END OF SMALL WATERSHED EAST OF PROSPECT WASH
              * DDM   ***** Updated *****

 523          KK     S25
 524          KM   BASIN S25
 525          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 526          KM    L=        .7  Lca=        .3   S=  103.0  Kn= .030  LAG=  10.0
 527          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 528          BA     .03
 529          LG     .15     .25    4.15     .49     .00
 530          UI     13.     50.     87.     61.     43.     30.     21.     14.     10.      7.
 531          UI      4.      3.      2.      2.      2.      0.      0.      0.      0.      0.
 532          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 533          KK  R25-26
 534          KM        ROUTE HYDROGRAPH S25 THROUGH S26 CROSSING NEAR THE INTERSECTION OF
 535          KM        WATSON ROAD AND MCDOWELL ROAD
 536          RS       8    FLOW      -1
 537          RC     .07    .036     .07    6571     .02
 538          RX    1000    1045    1060    1080    1100    1120    1155    1220
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 539          RY    1222    1220    1218    1218    1216    1216    1220    1220
              *  BASIN S26 - SUBBASIN ON THE LOWER WEST SIDE OF STUDY AREA
              * DDM   ***** Updated *****

 540          KK     S26
 541          KM   BASIN S26
 542          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 543          KM    L=       1.2  Lca=        .5   S=  119.7  Kn= .029  LAG=  13.8
 544          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 545          BA     .21
 546          LG     .16     .25    4.20     .47    1.00
 547          UI     52.    187.    347.    513.    403.    286.    230.    177.    129.    105.
 548          UI     74.     59.     43.     33.     25.     21.     10.     10.     10.     10.
 549          UI     10.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 550          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 551          KK    HC26
 552          KM        COMBINE ROUTED HYDROGRAPH R25-26 WITH HYDROGRAPH S26
 553          KM        AT WEST SIDE OF WATERSHED NORTH OF BUCKEYE F.R.S. NO. 3
 554          HC       2  0.2377
              *  BASIN S27 - BEGINNING OF PROSPECT WASH
              * DDM   ***** Updated *****

 555          KK     S27
 556          KM   BASIN S27
 557          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 558          KM    L=       1.4  Lca=        .5   S=  345.2  Kn= .030  LAG=  12.6
 559          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 560          BA     .51
 561          LG     .15     .25    4.00     .52   16.00
 562          UI    146.    575.    989.   1411.    878.    682.    524.    370.    295.    201.
 563          UI    157.    111.     82.     67.     41.     26.     26.     26.     26.      0.
 564          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 565          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              * DDM   ***** Preserved *****

 566          KK    DI27
 567          KM        RETURN DIVERTED HYDROGRAPH FROM DI27 DOWNSTREAM OF DB13 TO ROUTE
 568          KM        AND COMBINE WITH S27
 569          DR    DI27
              * DDM   ***** Preserved *****

 570          KK   RDI27
 571          KM        ROUTE HYDROGRAPH DI27 THROUGH S27
 572          RS       1    FLOW      -1
 573          RC     .07    .040     .07    1200     .02
 574          RX    1000    1050    1100    1120    1125    1145    1195    1245
 575          RY    1222    1221    1221    1216    1216    1221    1221    1222
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 576          KK    HC27
 577          KM          COMBINE HYDROGRAPHS AT HC27
 578          HC       2  4.4343

 579          KK  R27-28
 580          KM          ROUTE HYDROGRAPH S27 THROUGH S28
 581          RS       1     FLOW       -1
 582          RC     .07     .036      .07     2482     .022
 583          RX    1000     1060     1090     1100     1120     1130     1160     1230
 584          RY    1250     1248     1240     1238     1238     1240     1242     1250
              *  BASIN S28 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****

 585          KK     S28
 586          KM   BASIN S28
 587          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 588          KM    L=         .4  Lca=         .2   S=  120.0  Kn= .028  LAG=    6.2
 589          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 590          BA     .04
 591          LG     .17      .25     4.15      .48     2.00
 592          UI     55.     180.     114.      65.      36.      19.      11.       4.       4.       0.
 593          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
 594          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****

 595          KK    HC28
 596          KM          COMBINE ROUTED HYDROGRAPH R27-28 WITH HYDROGRAPH S28 - PROSPECT WASH
 597          KM          AT WATSON ROAD CROSSING
 598          HC       2  0.5526
              * DDM   ***** Preserved *****

 599          KK  R28-29
 600          KM          ROUTE COMBINED HYDROGRAPHS HC28 THROUGH S29
 601          RS       2     FLOW       -1
 602          RC     .07     .036      .07     3804    .0184
 603          RX    1000     1000     1110     1125     1165     1170     1250     1251
 604          RY    1192     1192     1190     1188     1188     1190     1192     1192
              *  BASIN S29 - SUBBASIN OF PROSPECT WASH
              * DDM   ***** Updated *****

 605          KK     S29
 606          KM   BASIN S29
 607          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 608          KM    L=         .7  Lca=         .3   S=  102.9  Kn= .030  LAG=    9.4
 609          KM    PHOENIX MOUNTAIN S-GRAPH WAS USED FOR THIS BASIN
 610          BA     .10
 611          LG     .15      .25     4.15      .49      .00
 612          UI     55.     207.     343.     215.     154.     101.      71.      44.      31.      20.
 613          UI     14.       7.       7.       7.       0.       0.       0.       0.       0.       0.
 614          UI      0.       0.       0.       0.       0.       0.       0.       0.       0.       0.
              * DDM   ***** Preserved *****
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 615          KK    HC29
 616          KM          COMBINE ROUTED HYDROGRAPH R28-29 WITH HYDROGRAPH S29 - PROSPECT WASH
 617          KM          AT BUCKEYE F.R.S. NO 3
 618          HC       2  0.6515
              *
              * DDM   ***** Preserved *****

 619          KK  HCBES3
 620          KM          COMBINE ALL HYDROGRAPHS AT BUCKEYE FRS-3
 621          HC       8  8.7485
 622          ZZ
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1
                  SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE    (V) ROUTING           (--->) DIVERSION OR PUMP FLOW

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

    37          S1
                 .
                 .
    48           .          S2
                 .           .
                 .           .
    59         HC2............
                 V
                 V
    62        R2-3
                 .
                 .
    68           .          S3
                 .           .
                 .           .
    80         HC3............
                 V
                 V
    84        R3-4
                 .
                 .
    90           .          S4
                 .           .
                 .           .
   101         HC4............
                 V
                 V
   105        R4-7
                 .
                 .
   111           .          S7
                 .           .
                 .           .
   122        IHC7............
                 .
                 .
   126           .          S5
                 .           V
                 .           V
   138           .         R5-6
                 .           .
                 .           .
   144           .           .          S6
                 .           .           .
                 .           .           .
   154           .         HC6............
                 .           .
                 .           .
   158         HC7............
                 V
                 V
   162      R7-12E
                 .
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   168           .         S12E
                 .           .
                 .           .
   178       HC12E............
                 .
                 .
   182           .          S8
                 .           V
                 .           V
   193           .         R8-9
                 .           .
                 .           .
   199           .           .          S9
                 .           .           .
                 .           .           .
   210           .         HC9............
                 .           V
                 .           V
   214           .        R9-11
                 .           .
                 .           .
   220           .           .         S11
                 .           .           .
                 .           .           .
   230           .       IHC11............
                 .           .
                 .           .
   234           .           .         S10
                 .           .           .
                 .           .           .
   245           .        HC11............
                 .           V
                 .           V
   249           .       R1112W
                 .           .
                 .           .
   256           .           .        S12W
                 .           .           .
                 .           .           .
   266           .       HC12W............
                 .           .
                 .           .
   270        HC12............
                 V
                 V
   274      R12-13
                 .
                 .
   280           .         S13
                 .           .
                 .           .
   290        HC13............
                 V
                 V
   293        DB13
                 .
                 .
   305           .------->    DI27
   303        DI13
                 V
                 V
   308       RDI13
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314          .       S14
325     HC14............
                V
                V
329    R1416S
336          .       S15
                     V
                     V
346          .   R1516S
353          .       .        S16S
363   IHC16S.......................
367          .      S16N
                     V
                     V
378          .    R16N-S
384     HC16S...........
390          .------->   DI22
388     DI16S
             V
             V
393    R16-17
399          .       S17
410      HC17...........
414          .       S18
                     V
                     V
425          .    R18-19
431          .       .        S19
441          .     HC19...........
                     V
                     V
444          .    R19-20
450          .       .        S20
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461    .    HC20...........
465    .    .    S21
475    .    .    .    S22
488    .    .    .    .    .<-------   DI22
486    .    .    .    .    DI22
                           V
                           V
489    .    .    .    .    RDI22
495    .    .    .    HC22...........
498    .    .    .    .    S23
509    .    .    .    .    .    S24
523    .    .    .    .    .    .    S25
                                    V
                                    V
533    .    .    .    .    .    .    R25-26
540    .    .    .    .    .    .    .    S26
551    .    .    .    .    .    .    HC26...........
555    .    .    .    .    .    .    .    S27
569    .    .    .    .    .    .    .    .    .<-------   DI27
566    .    .    .    .    .    .    .    .    DI27
                                                V
                                                V
570    .    .    .    .    .    .    .    .    RDI27
576    .    .    .    .    .    .    .    HC27...........
                                           V
                                           V
579    .    .    .    .    .    .    .    R27-28
585    .    .    .    .    .    .    .    .    S28
595    .    .    .    .    .    .    .    HC28...........
                                           V
                                           V
599    .    .    .    .    .    .    .    R28-29
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605          .         .         .         .         .         .         .         .        S29
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615          .         .         .         .         .         .         .      HC29...........
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             .         .         .         .         .         .         .         .
619      HCBES3.........................................................................

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
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1***************************************          ***************************************
*                                      *          *                                     *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *          *   U.S. ARMY CORPS OF ENGINEERS      *
*              JUN   1998              *          *   HYDROLOGIC ENGINEERING CENTER     *
*           VERSION 4.1                *          *         609 SECOND STREET           *
*                                      *          *     DAVIS, CALIFORNIA 95616         *
*  RUN DATE   14FEB13  TIME  08:43:32  *          *         (916) 756-1104              *
*                                      *          *                                     *
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                              SKYLINE WASH AND TRIBUTARIES
                              FLOODPLAIN DELINEATION STUDY
                              FCD 96-08

                              HEC-1

                              DATE:   8-19-98
                              STORM:  100-YR 24-HOUR STORM
                              FILE NAME:  SKYLINE.DAT

                              FILE NAME CHANGED TO SL3-1B-24.DAT
                              (SKYLINE DCR PHASE 3 ALTERNATIVE 1B 24-HOUR STORM)

                      DDM MCUHP2 SKYLINE WASH-BUCKEYE, ARIZONA

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

    IT          HYDROGRAPH TIME DATA
                       NMIN           3  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME        0000  STARTING TIME
                         NQ         500  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2    0  ENDING DATE
                     NDTIME        0057  ENDING TIME
                      ICENT          19  CENTURY MARK

                  COMPUTATION INTERVAL     .05 HOURS
                       TOTAL TIME BASE   24.95 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

 18 JD           INDEX STORM NO. 1
                       STRM        3.97  PRECIPITATION DEPTH
                       TRDA         .01  TRANSPOSITION DRAINAGE AREA

 19 PI             PRECIPITATION PATTERN
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29 JD INDEX STORM NO. 2

STRM 3.77 PRECIPITATION DEPTH

TRDA 10.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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30 JD INDEX STORM NO. 3

STRM 3.57 PRECIPITATION DEPTH

TRDA 30.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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31 JD INDEX STORM NO. 4
STRM 3.45 PRECIPITATION DEPTH
TRDA 60.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

32 JD INDEX STORM NO. 5
STRM 3.38 PRECIPITATION DEPTH
TRDA 90.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

33 JD INDEX STORM NO. 6

STRM 3.34 PRECIPITATION DEPTH

TRDA 120.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

34 JD INDEX STORM NO. 7

STRM 3.30 PRECIPITATION DEPTH

TRDA 150.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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35 JD INDEX STORM NO. 8

STRM 3.20 PRECIPITATION DEPTH
TRDA 300.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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36 JD INDEX STORM NO. 9
STRM 3.11 PRECIPITATION DEPTH
TRDA 500.00 TRANSPOSITION DRAINAGE AREA

0 PI PRECIPITATION PATTERN

.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
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.00	.00	.00	.00	.00	.01	.01	.01	.01	.01
.02	.02	.02	.02	.02	.06	.06	.06	.06	.06
.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
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.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
.00	.00	.00	.00	.00	.00	.00	.00	.00	.00

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              *            *
 293 KK       *      DB13  *
              *            *
              **************

 302 KO         OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

 295 RS         STORAGE ROUTING
                      NSTPS          1  NUMBER OF SUBREACHES
                       ITYP       STOR  TYPE OF INITIAL CONDITION
                     RSVRIC        .00  INITIAL CONDITION
                          X        .00 WORKING R AND D COEFFICIENT

 296 SV           STORAGE          .0      18.0      37.0      56.0      76.0      97.0     119.0     142.0     165.0     190.0
                                215.0     241.0

 298 SE         ELEVATION     1348.00   1349.00   1350.00   1351.00   1352.00   1353.00   1354.00   1355.00   1356.00   1357.00
                              1358.00   1359.00

 300 SQ         DISCHARGE          0.        1.       21.       72.      144.      223.      290.      347.      411.      466.
                                 514.      550.

                                                                   ***

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

                       HYDROGRAPH AT STATION      DB13
                      TRANSPOSITION AREA        .0 SQ MI

  PEAK FLOW      TIME                        MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR     24.95-HR
+   (CFS)        (HR)
                            (CFS)
+     529.       13.15                394.        132.        127.        127.
                          (INCHES)    .934       1.247       1.247       1.247
                           (AC-FT)    196.        261.        261.        261.

 PEAK STORAGE    TIME                       MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR       72-HR     24.95-HR
+  (AC-FT)       (HR)
      225.       13.15                163.         65.         63.         63.

  PEAK STAGE     TIME                        MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR       72-HR     24.95-HR
+   (FEET)       (HR)
   1358.40       13.15             1355.84     1351.27     1351.14     1351.14

                           CUMULATIVE AREA =     3.93 SQ MI

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

                       HYDROGRAPH AT STATION      DB13
                      TRANSPOSITION AREA      10.0 SQ MI

  PEAK FLOW      TIME                        MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR     24.95-HR
+   (CFS)        (HR)
                            (CFS)
+     502.       13.15                366.        121.        117.        117.
                          (INCHES)    .867       1.148       1.148       1.148
                           (AC-FT)    181.        241.        241.        241.

 PEAK STORAGE    TIME                       MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR       72-HR     24.95-HR
+  (AC-FT)       (HR)
      209.       13.15                151.         61.         59.         59.

  PEAK STAGE     TIME                        MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR       72-HR     24.95-HR
+   (FEET)       (HR)
   1357.75       13.15             1355.33     1351.08     1350.97     1350.97

                           CUMULATIVE AREA =     3.93 SQ MI

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

                       HYDROGRAPH AT STATION      DB13
                      TRANSPOSITION AREA      30.0 SQ MI

  PEAK FLOW      TIME                        MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR     24.95-HR
+   (CFS)        (HR)
                            (CFS)
+     470.       13.15                336.        111.        107.        107.
                          (INCHES)    .796       1.049       1.049       1.049
                           (AC-FT)    167.        220.        220.        220.

 PEAK STORAGE    TIME                       MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR       72-HR     24.95-HR
+  (AC-FT)       (HR)
      192.       13.15                139.         57.         55.         55.

  PEAK STAGE     TIME                        MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR       72-HR     24.95-HR
+   (FEET)       (HR)
   1357.08       13.15             1354.83     1350.90     1350.79     1350.79

                           CUMULATIVE AREA =     3.93 SQ MI

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

                       HYDROGRAPH AT STATION      DB13
                      TRANSPOSITION AREA      60.0 SQ MI

  PEAK FLOW      TIME                        MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR       72-HR     24.95-HR
+   (CFS)        (HR)
                            (CFS)
+     449.       13.15                318.        104.        100.        100.
                          (INCHES)    .752        .989        .989        .989
                           (AC-FT)    158.        207.        207.        207.
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 PEAK STORAGE    TIME                        MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR        72-HR     24.95-HR
+  (AC-FT)       (HR)
      182.      13.15                 132.          55.          52.          52.

  PEAK STAGE     TIME                        MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR        72-HR     24.95-HR
+   (FEET)       (HR)
   1356.68      13.15              1354.53     1350.79      1350.69      1350.69

                         CUMULATIVE AREA =     3.93 SQ MI


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

                           HYDROGRAPH AT STATION      DB13
                         TRANSPOSITION AREA      90.0 SQ MI

  PEAK FLOW      TIME                        MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     24.95-HR
+   (CFS)        (HR)
                              (CFS)
+      436.     13.15                 307.         101.          97.          97.
                           (INCHES)   .726         .954         .954         .954
                            (AC-FT)   152.         200.         200.         200.

 PEAK STORAGE    TIME                        MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR        72-HR     24.95-HR
+  (AC-FT)       (HR)
      176.      13.15                 128.          53.          51.          51.

  PEAK STAGE     TIME                        MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR        72-HR     24.95-HR
+   (FEET)       (HR)
   1356.45      13.15              1354.36     1350.73      1350.62      1350.62

                         CUMULATIVE AREA =     3.93 SQ MI


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

                           HYDROGRAPH AT STATION      DB13
                         TRANSPOSITION AREA     120.0 SQ MI

  PEAK FLOW      TIME                        MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     24.95-HR
+   (CFS)        (HR)
                              (CFS)
+      428.     13.15                 300.          99.          95.          95.
                           (INCHES)   .711         .933         .933         .933
                            (AC-FT)   149.         196.         196.         196.

 PEAK STORAGE    TIME                        MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR        72-HR     24.95-HR
+  (AC-FT)       (HR)
      173.      13.15                 126.          52.          50.          50.

  PEAK STAGE     TIME                        MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR        72-HR     24.95-HR
+   (FEET)       (HR)
   1356.31      13.15              1354.26     1350.69      1350.59      1350.59

                         CUMULATIVE AREA =     3.93 SQ MI


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

                           HYDROGRAPH AT STATION      DB13
                         TRANSPOSITION AREA     150.0 SQ MI

  PEAK FLOW      TIME                        MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     24.95-HR
+   (CFS)        (HR)
                              (CFS)
+      421.     13.15                 294.          96.          93.          93.
                           (INCHES)   .696         .913         .913         .913
                            (AC-FT)   146.         191.         191.         191.

 PEAK STORAGE    TIME                        MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR        72-HR     24.95-HR
+  (AC-FT)       (HR)
      170.      13.15                 123.          52.          50.          50.

  PEAK STAGE     TIME                        MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR        72-HR     24.95-HR
+   (FEET)       (HR)
   1356.18      13.15              1354.16     1350.66      1350.56      1350.56

                         CUMULATIVE AREA =     3.93 SQ MI


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

                           HYDROGRAPH AT STATION      DB13
                         TRANSPOSITION AREA     300.0 SQ MI

  PEAK FLOW      TIME                        MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     24.95-HR
+   (CFS)        (HR)
                              (CFS)
+      401.     13.15                 278.          91.          88.          88.
                           (INCHES)   .658         .862         .862         .862
                            (AC-FT)   138.         181.         181.         181.

 PEAK STORAGE    TIME                        MAXIMUM AVERAGE STORAGE
                                      6-HR        24-HR        72-HR     24.95-HR
+  (AC-FT)       (HR)
      161.      13.15                 118.          50.          48.          48.

  PEAK STAGE     TIME                        MAXIMUM AVERAGE STAGE
                                      6-HR        24-HR        72-HR     24.95-HR
+   (FEET)       (HR)
   1355.84      13.15              1353.91     1350.57      1350.47      1350.47

                         CUMULATIVE AREA =     3.93 SQ MI


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

                           HYDROGRAPH AT STATION      DB13
                         TRANSPOSITION AREA     500.0 SQ MI

  PEAK FLOW      TIME                        MAXIMUM AVERAGE FLOW
                                      6-HR        24-HR        72-HR     24.95-HR
```

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	24.95-HR
+	(CFS)	(HR)					
			(CFS)				
+	380.	13.15		263.	86.	83.	83.
			(INCHES)	.623	.817	.817	.817
			(AC-FT)	130.	171.	171.	171.

	PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
			6-HR	24-HR	72-HR	24.95-HR
+	(AC-FT)	(HR)				
	154.	13.15	113.	48.	46.	46.

	PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
			6-HR	24-HR	72-HR	24.95-HR
+	(FEET)	(HR)				
	1355.51	13.15	1353.69	1350.49	1350.39	1350.39

CUMULATIVE AREA = 3.93 SQ MI

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

INTERPOLATED HYDROGRAPH AT DB13

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	24.95-HR
+	(CFS)	(HR)					
			(CFS)				
+	506.	13.15		370.	123.	118.	118.
			(INCHES)	.876	1.162	1.162	1.162
			(AC-FT)	183.	243.	243.	243.

CUMULATIVE AREA = 3.93 SQ MI

1

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+					6-HOUR	24-HOUR	72-HOUR			
+	HYDROGRAPH AT	S1	728.	12.10	70.	20.	19.	.51		
+	HYDROGRAPH AT	S2	324.	12.10	30.	9.	8.	.22		
+	2 COMBINED AT	HC2	1045.	12.10	100.	29.	28.	.73		
+	ROUTED TO	R2-3	998.	12.15	100.	29.	28.	.73		
+	HYDROGRAPH AT	S3	792.	12.15	84.	23.	23.	.65		
+	2 COMBINED AT	HC3	1777.	12.15	182.	52.	50.	1.38		
+	ROUTED TO	R3-4	1692.	12.20	182.	52.	50.	1.38		
+	HYDROGRAPH AT	S4	584.	12.10	53.	15.	14.	.41		
+	2 COMBINED AT	HC4	2175.	12.20	233.	66.	64.	1.79		
+	ROUTED TO	R4-7	2132.	12.20	233.	66.	64.	1.79		
+	HYDROGRAPH AT	S7	220.	12.05	17.	5.	5.	.13		
+	2 COMBINED AT	IHC7	2261.	12.20	250.	71.	68.	1.92		
+	HYDROGRAPH AT	S5	680.	12.15	75.	22.	21.	.53		
+	ROUTED TO	R5-6	655.	12.20	75.	22.	21.	.53		
+	HYDROGRAPH AT	S6	412.	12.05	33.	9.	9.	.25		
+	2 COMBINED AT	HC6	965.	12.15	107.	31.	30.	.78		
+	2 COMBINED AT	HC7	3133.	12.20	355.	101.	98.	2.70		
+	ROUTED TO	R7-12E	3028.	12.25	355.	101.	98.	2.70		

+	HYDROGRAPH AT	S12E	110.	12.00	8.	2.	2.	.05
+	2 COMBINED AT	HC12E	3049.	12.25	362.	103.	100.	2.75
+	HYDROGRAPH AT	S8	552.	12.05	48.	14.	14.	.34
+	ROUTED TO	R8-9	542.	12.10	48.	14.	14.	.34
+	HYDROGRAPH AT	S9	309.	12.10	29.	8.	8.	.21
+	2 COMBINED AT	HC9	846.	12.10	76.	22.	21.	.55
+	ROUTED TO	R9-11	720.	12.25	76.	22.	21.	.55
+	HYDROGRAPH AT	S11	314.	12.05	21.	6.	6.	.17
+	2 COMBINED AT	IHC11	803.	12.20	97.	28.	27.	.72
+	HYDROGRAPH AT	S10	303.	12.10	27.	8.	7.	.19
+	2 COMBINED AT	HC11	1036.	12.15	123.	35.	34.	.91
+	ROUTED TO	R1112W	989.	12.25	123.	35.	34.	.91
+	HYDROGRAPH AT	S12W	176.	12.00	13.	4.	4.	.09
+	2 COMBINED AT	HC12W	1045.	12.20	135.	39.	38.	1.00
+	2 COMBINED AT	HC12	4045.	12.25	494.	142.	136.	3.75
+	ROUTED TO	R12-13	3913.	12.30	494.	142.	136.	3.75
+	HYDROGRAPH AT	S13	303.	12.05	19.	5.	5.	.17
+	2 COMBINED AT	HC13	3973.	12.30	512.	146.	141.	3.93
+	ROUTED TO	DB13	506.	13.15	370.	123.	118.	3.93
+	DIVERSION TO	DI27	169.	13.15	123.	41.	39.	3.93
+	HYDROGRAPH AT	DI13	337.	13.15	247.	82.	79.	3.93
+	ROUTED TO	RDI13	336.	13.55	243.	81.	77.	3.93
+	HYDROGRAPH AT	S14	787.	12.05	61.	17.	16.	.49
+	2 COMBINED AT	HC14	774.	12.05	275.	97.	93.	4.41
+	ROUTED TO	R1416S	690.	12.20	273.	96.	92.	4.41
+	HYDROGRAPH AT	S15	175.	12.05	10.	2.	2.	.11
+	ROUTED TO	R1516S	137.	12.20	10.	2.	2.	.11
+	HYDROGRAPH AT	S16S	321.	12.05	21.	5.	5.	.17
+	3 COMBINED AT	IHC16S	976.	12.15	298.	103.	100.	4.70
+	HYDROGRAPH AT	S16N	239.	12.10	23.	7.	6.	.17
+	ROUTED TO	R16N-S	204.	12.30	23.	7.	6.	.17
+	2 COMBINED AT	HC16S	1099.	12.20	319.	110.	106.	4.87
+	DIVERSION TO	DI22	287.	12.20	50.	14.	13.	4.87
+	HYDROGRAPH AT	DI16S	812.	12.20	269.	96.	92.	4.87
+	ROUTED TO	R16-17	700.	12.40	267.	95.	92.	4.87
+	HYDROGRAPH AT	S17	414.	12.05	27.	7.	7.	.29
+	2 COMBINED AT	HC17	778.	12.35	287.	102.	98.	5.15
+	HYDROGRAPH AT	S18	585.	12.05	49.	14.	14.	.36
+	ROUTED TO	R18-19	530.	12.20	49.	14.	14.	.36
+	HYDROGRAPH AT	S19	499.	12.05	37.	10.	10.	.29
+	2 COMBINED AT	HC19	928.	12.10	86.	24.	23.	.65

+	ROUTED TO	R19-20	851.	12.25	86.	24.	23.	.65
+	HYDROGRAPH AT	S20	125.	12.05	9.	2.	2.	.09
+	2 COMBINED AT	HC20	923.	12.20	94.	27.	26.	.73
+	HYDROGRAPH AT	S21	1075.	12.05	77.	21.	20.	.62
+	HYDROGRAPH AT	S22	815.	12.10	59.	15.	14.	.55
+	HYDROGRAPH AT	DI22	287.	12.20	50.	14.	13.	4.87
+	ROUTED TO	RDI22	216.	12.50	49.	14.	13.	4.87
+	2 COMBINED AT	HC22	815.	12.10	107.	29.	28.	5.41
+	HYDROGRAPH AT	S23	629.	12.10	47.	12.	11.	.49
+	HYDROGRAPH AT	S24	274.	12.30	34.	9.	8.	.32
+	HYDROGRAPH AT	S25	49.	12.05	3.	1.	1.	.03
+	ROUTED TO	R25-26	29.	12.45	3.	1.	1.	.03
+	HYDROGRAPH AT	S26	325.	12.10	24.	6.	6.	.21
+	2 COMBINED AT	HC26	326.	12.10	27.	7.	6.	.24
+	HYDROGRAPH AT	S27	852.	12.05	70.	20.	19.	.51
+	HYDROGRAPH AT	DI27	169.	13.15	123.	41.	39.	3.93
+	ROUTED TO	RDI27	169.	13.20	123.	41.	39.	3.93
+	2 COMBINED AT	HC27	852.	12.05	184.	61.	59.	4.43
+	ROUTED TO	R27-28	799.	12.10	182.	60.	58.	4.43
+	HYDROGRAPH AT	S28	80.	12.00	4.	1.	1.	.04
+	2 COMBINED AT	HC28	860.	12.10	190.	63.	60.	.55
+	ROUTED TO	R28-29	796.	12.20	189.	62.	60.	.55
+	HYDROGRAPH AT	S29	181.	12.05	11.	3.	3.	.10
+	2 COMBINED AT	HC29	864.	12.20	198.	65.	62.	.65
+	8 COMBINED AT	HCBES3	4858.	12.10	840.	264.	254.	8.75

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

APPENDIX I

Prospect Wash Hydraulic Calculations

HEC-RAS Plan: PROSPECT 3 PFS River: PROSPECT WASH Reach: REACH 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
REACH 1	1.9	PF 1	997.00	1348.97	1352.48	1353.37	1355.24	0.036894	13.34	74.73	39.60	1.71
REACH 1	1.9	PF 2	1897.00	1348.97	1353.48	1354.82	1357.46	0.036909	16.00	118.56	47.70	1.79
REACH 1	1.9	PF 3	4825.00	1348.97	1355.65	1357.41	1361.49	0.036864	19.39	248.79	75.03	1.88
REACH 1	1.9	PF 4	177.00	1348.97	1350.65	1351.01	1351.82	0.036863	8.66	20.44	20.80	1.54
REACH 1	1.83	PF 1	997.00	1335.40	1339.55	1340.65	1343.14	0.029125	15.20	65.60	22.10	1.55
REACH 1	1.83	PF 2	1897.00	1335.40	1341.31	1342.79	1346.08	0.025901	17.52	108.27	26.26	1.52
REACH 1	1.83	PF 3	4825.00	1335.40	1345.47	1347.29	1351.78	0.019629	20.15	239.49	37.03	1.40
REACH 1	1.83	PF 4	177.00	1335.40	1337.04	1337.45	1338.46	0.035554	9.55	18.53	15.47	1.54
REACH 1	1.77	PF 1	997.00	1328.05	1331.01	1331.79	1333.60	0.033905	12.91	77.21	40.63	1.65
REACH 1	1.77	PF 2	1897.00	1328.05	1331.78	1333.22	1336.49	0.042016	17.42	108.89	42.45	1.92
REACH 1	1.77	PF 3	4825.00	1328.05	1333.73	1336.55	1343.06	0.045329	24.51	196.84	47.56	2.12
REACH 1	1.77	PF 4	177.00	1328.05	1329.78	1329.87	1330.35	0.020764	6.05	29.27	33.87	1.15
REACH 1	1.72	PF 1	997.00	1321.85	1324.42	1324.68	1325.67	0.020048	8.98	111.04	68.92	1.25
REACH 1	1.72	PF 2	1897.00	1321.85	1325.18	1325.70	1327.24	0.020925	11.52	164.64	72.29	1.35
REACH 1	1.72	PF 3	4825.00	1321.85	1326.64	1328.10	1331.43	0.027775	17.57	274.69	78.70	1.66
REACH 1	1.72	PF 4	177.00	1321.85	1323.03	1323.15	1323.58	0.025692	5.95	29.77	41.45	1.24
REACH 1	1.68	PF 1	997.00	1316.76	1319.78	1320.34	1321.79	0.025501	11.39	87.56	44.97	1.44
REACH 1	1.68	PF 2	1897.00	1316.76	1320.95	1321.67	1323.65	0.020824	13.20	143.74	50.27	1.38
REACH 1	1.68	PF 3	4825.00	1316.76	1323.76	1324.73	1327.75	0.015598	16.04	300.86	62.22	1.29
REACH 1	1.68	PF 4	177.00	1316.76	1318.20	1318.37	1318.92	0.029499	6.78	26.10	33.06	1.35
REACH 1	1.61	PF 1	997.00	1310.71	1314.03	1314.07	1315.19	0.012310	8.65	115.21	52.26	1.03
REACH 1	1.61	PF 2	1897.00	1310.71	1314.95	1315.32	1317.00	0.014850	11.48	165.17	56.03	1.18
REACH 1	1.61	PF 3	4825.00	1310.71	1316.97	1318.23	1321.35	0.019080	16.79	287.45	65.99	1.42
REACH 1	1.61	PF 4	177.00	1310.71	1312.33	1312.16	1312.65	0.009190	4.52	39.16	38.05	0.79
REACH 1	1.55	PF 1	997.00	1307.36	1309.68	1309.82	1310.65	0.016915	7.94	125.62	83.06	1.14
REACH 1	1.55	PF 2	1897.00	1307.36	1310.44	1310.71	1311.93	0.016616	9.79	193.74	92.05	1.19
REACH 1	1.55	PF 3	4825.00	1307.36	1311.97	1312.77	1315.09	0.018502	14.19	340.12	99.92	1.36
REACH 1	1.55	PF 4	177.00	1307.36	1308.42	1308.42	1308.76	0.017630	4.68	37.85	57.19	1.01
REACH 1	1.53	PF 1	997.00	1304.00	1306.43	1306.82	1307.95	0.025686	9.89	100.78	65.38	1.40
REACH 1	1.53	PF 2	1897.00	1304.00	1307.33	1307.86	1309.46	0.021164	11.72	161.84	70.10	1.36
REACH 1	1.53	PF 3	4825.00	1304.00	1309.54	1310.32	1312.87	0.015887	14.65	329.37	81.62	1.29
REACH 1	1.53	PF 4	177.00	1304.00	1305.10	1305.28	1305.75	0.031791	6.48	27.33	39.38	1.37

STATION UPSTREAM OFF CONNECTION ~ P

O

N

M

FIRM CROSS SECTION

HEC-RAS Plan: PROSPECT 3 PFS River: PROSPECT WASH Reach: REACH 1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
REACH 1	1.42	PF 1	997.00	1295.70	1298.85	1298.85	1299.86	0.012286	8.08	123.42	61.58	1.01
REACH 1	1.42	PF 2	1897.00	1295.70	1299.96	1299.96	1301.44	0.010948	9.77	194.24	66.43	1.01
REACH 1	1.42	PF 3	4825.00	1295.70	1302.11	1302.55	1305.11	0.012306	13.90	347.21	75.86	1.14
REACH 1	1.42	PF 4	177.00	1295.70	1297.20	1297.20	1297.63	0.016396	5.26	33.62	39.89	1.01
REACH 1	1.38	PF 1	997.00	1292.12	1295.63	1295.72	1297.00	0.012850	9.40	106.05	42.94	1.05
REACH 1	1.38	PF 2	1897.00	1292.12	1297.10	1297.23	1298.85	0.011831	10.61	178.75	56.79	1.05
REACH 1	1.38	PF 3	4825.00	1292.12	1300.01	1300.10	1302.68	0.009667	13.12	367.86	72.49	1.03
REACH 1	1.38	PF 4	177.00	1292.12	1293.72	1293.60	1294.12	0.010774	5.06	34.96	31.83	0.85
REACH 1	1.33	PF 1	997.00	1288.40	1291.88	1292.00	1293.06	0.014344	8.70	114.57	57.95	1.09
REACH 1	1.33	PF 2	1897.00	1288.40	1292.71	1293.17	1294.75	0.017459	11.45	165.71	64.20	1.26
REACH 1	1.33	PF 3	4825.00	1288.40	1294.61	1296.11	1298.62	0.020810	16.08	300.35	83.76	1.46
REACH 1	1.33	PF 4	177.00	1288.40	1290.15	1290.11	1290.57	0.014506	5.20	34.05	37.79	0.96
REACH 1	1.27	PF 1	997.00	1284.38	1286.85	1287.14	1288.15	0.021540	9.14	109.12	69.94	1.29
REACH 1	1.27	PF 2	1897.00	1284.38	1287.73	1288.17	1289.60	0.018789	10.96	173.02	75.91	1.28
REACH 1	1.27	PF 3	4825.00	1284.38	1289.63	1290.56	1292.76	0.018992	14.21	339.51	101.46	1.37
REACH 1	1.27	PF 4	177.00	1284.38	1285.75	1285.75	1286.10	0.017196	4.74	37.37	54.39	1.01
REACH 1	1.2	PF 1	971.00	1272.20	1276.62	1276.66	1278.08	0.028611	9.69	100.17	35.81	1.02
REACH 1	1.2	PF 2	1871.00	1272.20	1278.15	1278.31	1280.29	0.028209	11.73	159.46	41.87	1.06
REACH 1	1.2	PF 3	4820.00	1272.20	1281.89	1281.89	1284.87	0.022131	13.86	347.87	58.69	1.00
REACH 1	1.2	PF 4	177.00	1272.20	1274.14	1274.25	1274.88	0.049292	6.88	25.71	23.66	1.16
REACH 1	1.14	PF 1	971.00	1262.86	1266.58	1266.92	1268.39	0.039607	10.80	89.91	35.08	1.19
REACH 1	1.14	PF 2	1871.00	1262.86	1267.95	1268.56	1270.64	0.039712	13.16	142.17	40.88	1.24
REACH 1	1.14	PF 3	4820.00	1262.86	1270.59	1272.07	1275.70	0.046519	18.14	265.70	52.56	1.42
REACH 1	1.14	PF 4	177.00	1262.86	1264.96	1264.62	1265.29	0.015739	4.56	38.86	28.18	0.68
REACH 1	1.05	PF 1	971.00	1255.27	1259.09	1258.33	1259.49	0.009666	5.11	190.01	81.03	0.59
REACH 1	1.05	PF 2	1871.00	1255.27	1260.64	1259.30	1261.16	0.007084	5.79	323.00	89.86	0.54
REACH 1	1.05	PF 3	4820.00	1255.27	1264.43	1261.56	1265.17	0.004682	6.93	695.91	107.15	0.48
REACH 1	1.05	PF 4	177.00	1255.27	1257.02		1257.25	0.019330	3.90	45.35	49.03	0.72
REACH 1	0.98	PF 1	971.00	1248.00	1253.13		1254.31	0.017689	8.71	111.53	31.40	0.81
REACH 1	0.98	PF 2	1871.00	1248.00	1255.01	1254.55	1256.68	0.019005	10.39	180.03	41.01	0.87
REACH 1	0.98	PF 3	4820.00	1248.00	1258.41	1258.33	1261.46	0.021647	14.02	343.94	55.99	0.98

McDOWELL ROAD ~ L

K

J

HEC-RAS Plan: PROSPECT 3 PFS River: PROSPECT WASH Reach: REACH 1 (Continued)

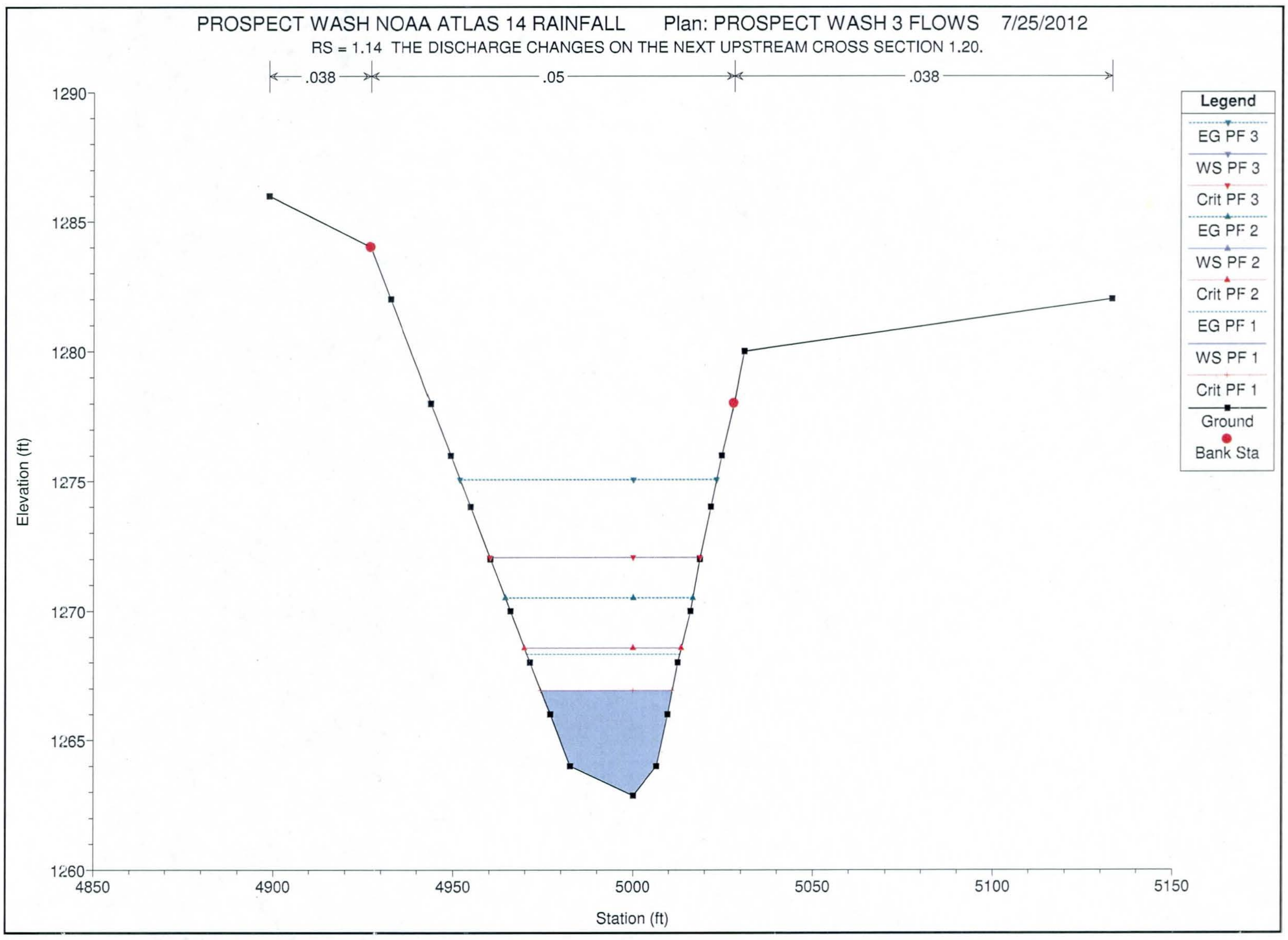
	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
	REACH 1	0.98	PF 4	177.00	1248.00	1250.24		1250.63	0.014374	4.96	35.67	20.62	0.66
	REACH 1	0.9	PF 1	971.00	1242.24	1246.65		1247.33	0.014524	6.65	145.94	56.61	0.73
I	REACH 1	0.9	PF 2	1871.00	1242.24	1247.91		1248.99	0.016335	8.36	223.84	67.18	0.81
	REACH 1	0.9	PF 3	4820.00	1242.24	1250.43	1250.11	1252.49	0.019066	11.51	418.69	86.97	0.92
	REACH 1	0.9	PF 4	177.00	1242.24	1244.51		1244.75	0.013006	3.88	45.60	36.80	0.61
WATSON ROAD CROSSING	REACH 1	0.82	PF 1	971.00	1233.90	1238.11	1238.11	1239.14	0.030829	8.14	119.33	59.97	1.02
H	REACH 1	0.82	PF 2	1871.00	1233.90	1239.30	1239.30	1240.71	0.026847	9.53	196.24	70.00	1.00
	REACH 1	0.82	PF 3	4820.00	1233.90	1241.88	1241.88	1243.80	0.024750	11.13	433.23	115.75	1.01
	REACH 1	0.82	PF 4	177.00	1233.90	1235.88	1235.88	1236.45	0.037752	6.08	29.12	26.33	1.02
	REACH 1	0.75	PF 1	971.00	1221.80	1223.81	1224.24	1225.38	0.036006	10.05	96.60	68.96	1.50
G	REACH 1	0.75	PF 2	1871.00	1221.80	1224.46	1225.26	1227.12	0.039124	13.09	142.92	72.83	1.65
	REACH 1	0.75	PF 3	4820.00	1221.80	1226.09	1227.65	1231.12	0.037129	18.00	267.70	80.71	1.74
	REACH 1	0.75	PF 4	177.00	1221.80	1222.81	1222.89	1223.25	0.027556	5.32	33.29	50.69	1.16
ROOSEVELT ROAD CROSSING →													
	REACH 1	0.64	PF 1	932.00	1210.64	1213.75	1213.75	1214.83	0.014371	8.35	111.63	52.42	1.01
	REACH 1	0.64	PF 2	1832.00	1210.64	1215.04	1215.04	1216.57	0.012652	9.94	184.26	60.17	1.00
F	REACH 1	0.64	PF 3	4821.00	1210.64	1217.97	1218.00	1220.31	0.011076	12.28	394.33	87.67	1.00
	REACH 1	0.64	PF 4	177.00	1210.64	1212.05	1212.05	1212.48	0.019557	5.26	33.62	40.07	1.01
	REACH 1	0.58	PF 1	932.00	1206.10	1208.59	1208.73	1209.55	0.020249	7.85	118.79	79.85	1.13
	REACH 1	0.58	PF 2	1832.00	1206.10	1209.19	1209.67	1211.05	0.026632	10.96	167.18	83.41	1.36
	REACH 1	0.58	PF 3	4821.00	1206.10	1210.67	1212.38	1214.76	0.031236	16.23	297.03	92.19	1.59
	REACH 1	0.58	PF 4	177.00	1206.10	1207.62	1207.46	1207.85	0.011562	3.80	46.57	61.15	0.77
	REACH 1	0.51	PF 1	932.00	1200.43	1202.95	1202.95	1203.75	0.015842	7.19	129.71	82.93	1.01
	REACH 1	0.51	PF 2	1832.00	1200.43	1203.88	1203.88	1205.04	0.013929	8.62	212.63	93.84	1.01
E	REACH 1	0.51	PF 3	4821.00	1200.43	1206.17	1206.37	1207.91	0.009996	10.64	480.86	210.54	0.94
	REACH 1	0.51	PF 4	177.00	1200.43	1201.72	1201.72	1202.06	0.021298	4.63	38.25	59.20	1.01
	REACH 1	0.42	PF 1	932.00	1191.60	1194.52	1194.60	1195.48	0.017586	7.82	119.12	71.82	1.07
D	REACH 1	0.42	PF 2	1832.00	1191.60	1195.33	1195.62	1196.96	0.019126	10.22	179.24	76.83	1.18
	REACH 1	0.42	PF 3	4821.00	1191.60	1196.94	1198.43	1200.52	0.023085	15.32	337.27	137.07	1.40
	REACH 1	0.42	PF 4	177.00	1191.60	1193.27	1193.16	1193.58	0.013895	4.42	40.06	47.84	0.85
C	REACH 1	0.29	PF 1	932.00	1181.81	1184.28	1184.28	1184.91	0.016687	6.37	147.61	126.95	1.00
	REACH 1	0.29	PF 2	1832.00	1181.81	1185.04	1185.08	1185.85	0.014130	7.32	262.98	175.44	0.97

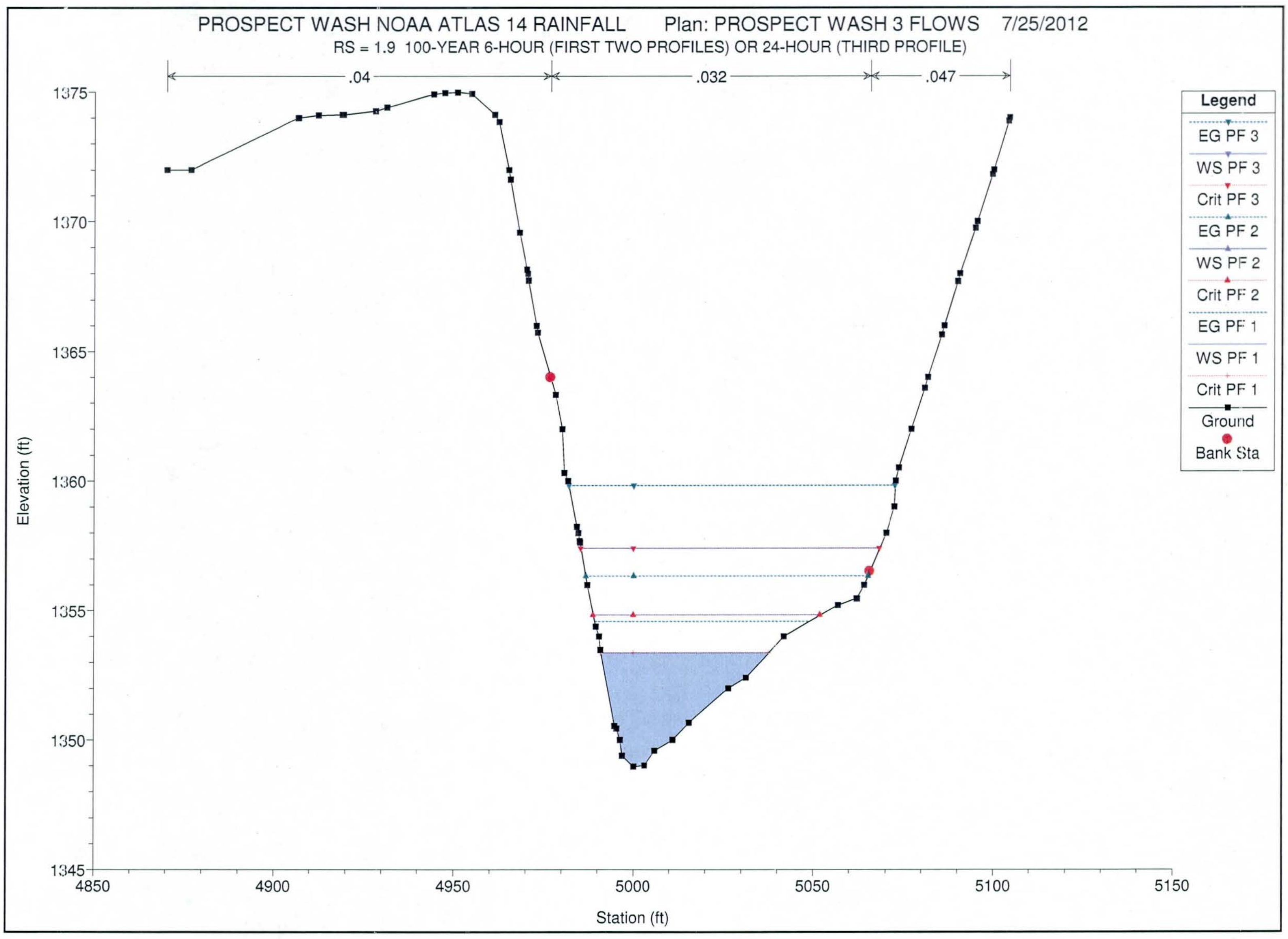
3

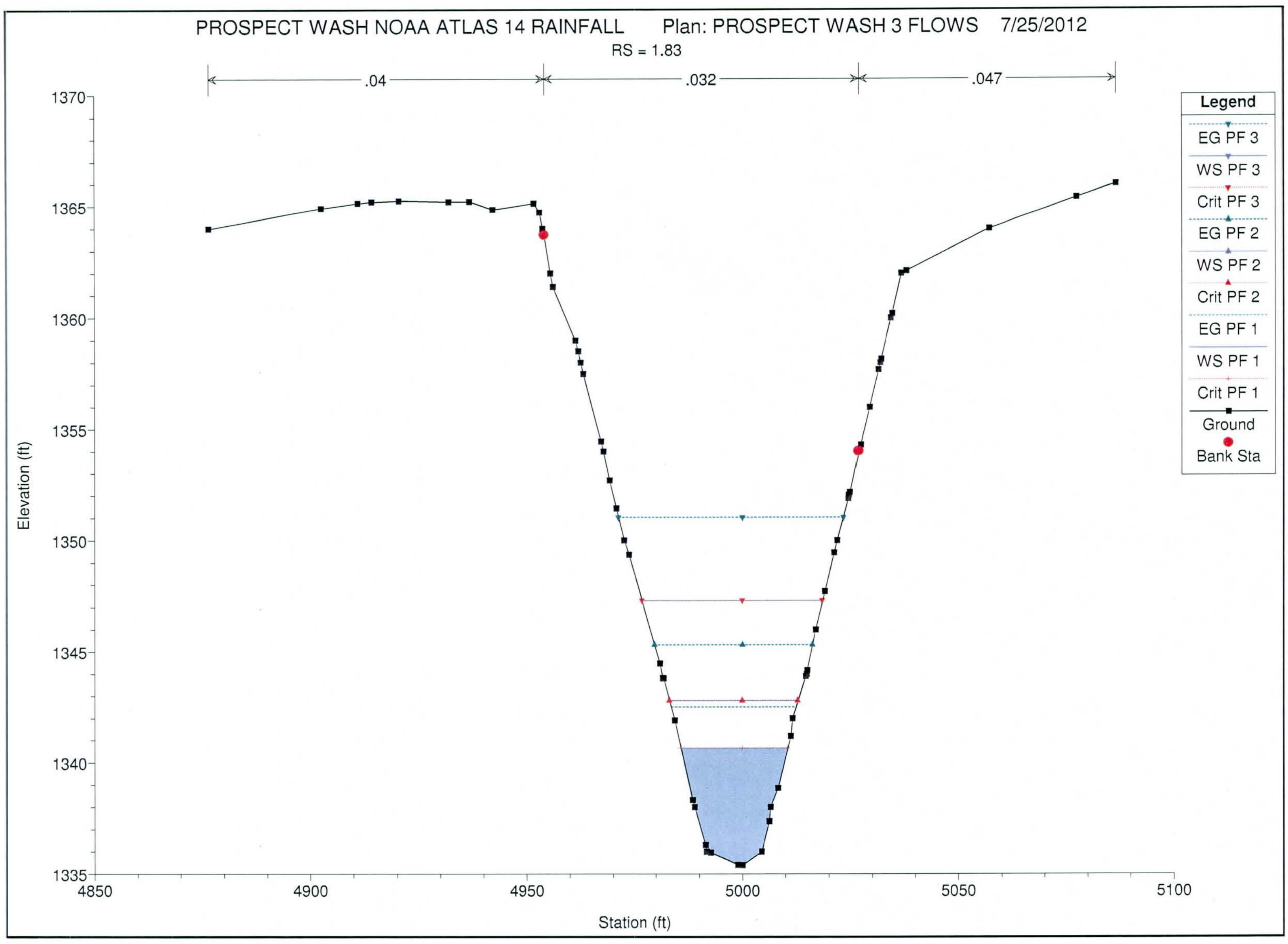
HEC-RAS Plan: PROSPECT 3 PFS River: PROSPECT WASH Reach: REACH 1 (Continued)

	Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
C	REACH 1	0.29	PF 3	4821.00	1181.81	1186.31	1186.49	1187.95	0.014511	10.60	485.09	175.44	1.08
	REACH 1	0.29	PF 4	177.00	1181.81	1183.18	1183.12	1183.44	0.016793	4.13	42.91	65.90	0.90
	REACH 1	0.19	PF 1	932.00	1171.29	1173.88	1173.97	1174.62	0.020670	6.90	135.10	112.14	1.11
B	REACH 1	0.19	PF 2	1832.00	1171.29	1174.43	1174.75	1175.71	0.024325	9.08	204.84	142.29	1.26
	REACH 1	0.19	PF 3	4821.00	1171.29	1175.77	1176.31	1177.97	0.022698	12.07	413.83	167.49	1.32
	REACH 1	0.19	PF 4	177.00	1171.29	1172.74	1172.74	1173.08	0.020854	4.63	38.25	58.16	1.01
BUCKEYE	REACH 1	0.08	PF 1	932.00	1158.79	1160.74	1160.91	1161.62	0.025705	7.54	123.54	105.68	1.23
FRS A	REACH 1	0.08	PF 2	1832.00	1158.79	1161.47	1161.71	1162.68	0.021845	8.82	207.64	124.29	1.20
#3	REACH 1	0.08	PF 3	4821.00	1158.79	1162.80	1163.46	1165.10	0.023061	12.21	402.00	173.41	1.33
	REACH 1	0.08	PF 4	177.00	1158.79	1159.85	1159.87	1160.15	0.024563	4.36	40.59	76.37	1.05

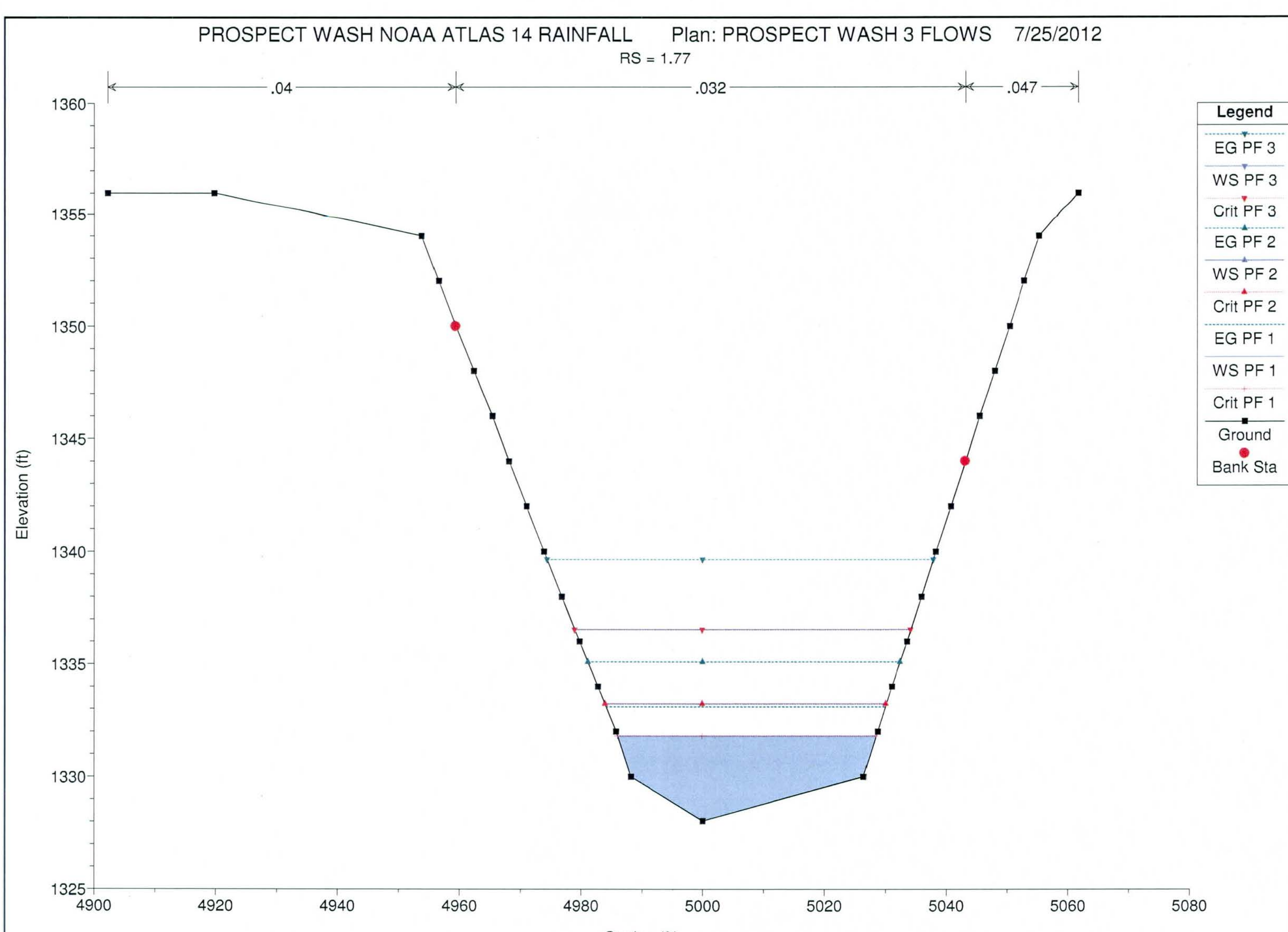
4


PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.14 THE DISCHARGE CHANGES ON THE NEXT UPSTREAM CROSS SECTION 1.20.
.038
.05
.038
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1290
1285
1280
1275
1270
1265
1260
4850
4900
4950
5000
5050
5100
5150
Station (ft)

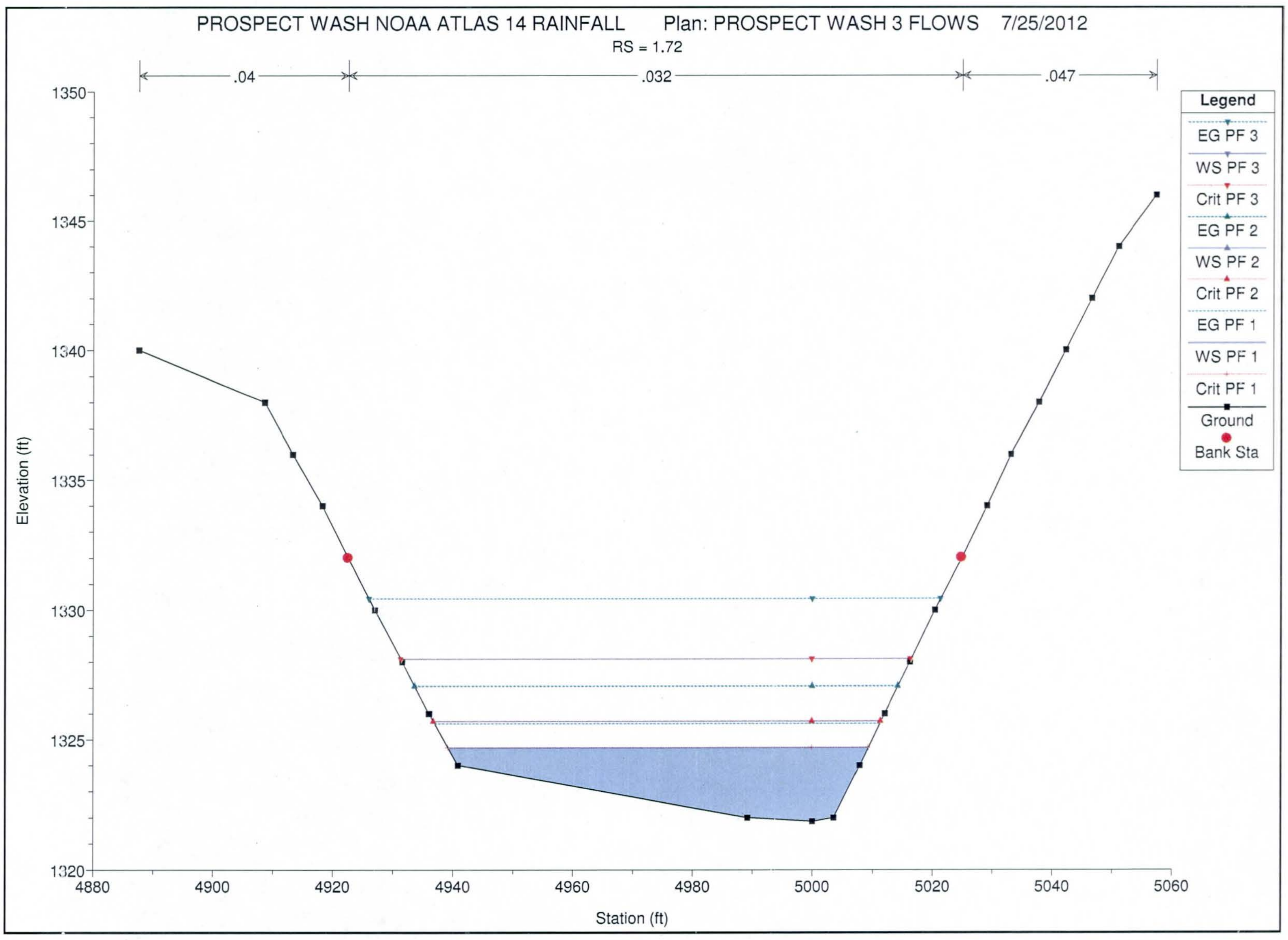

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.9 100-YEAR 6-HOUR (FIRST TWO PROFILES) OR 24-HOUR (THIRD PROFILE)
.04
.032
.047
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1375
1370
1365
1360
1355
1350
1345
4850
4900
4950
5000
5050
5100
5150
Station (ft)



PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.83
.04
.032
.047
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1335
1340
1345
1350
1355
1360
1365
1370
Station (ft)
4850
4900
4950
5000
5050
5100



PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.77
.04
.032
.047
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1325
1330
1335
1340
1345
1350
1355
1360
Station (ft)
4900
4920
4940
4960
4980
5000
5020
5040
5060
5080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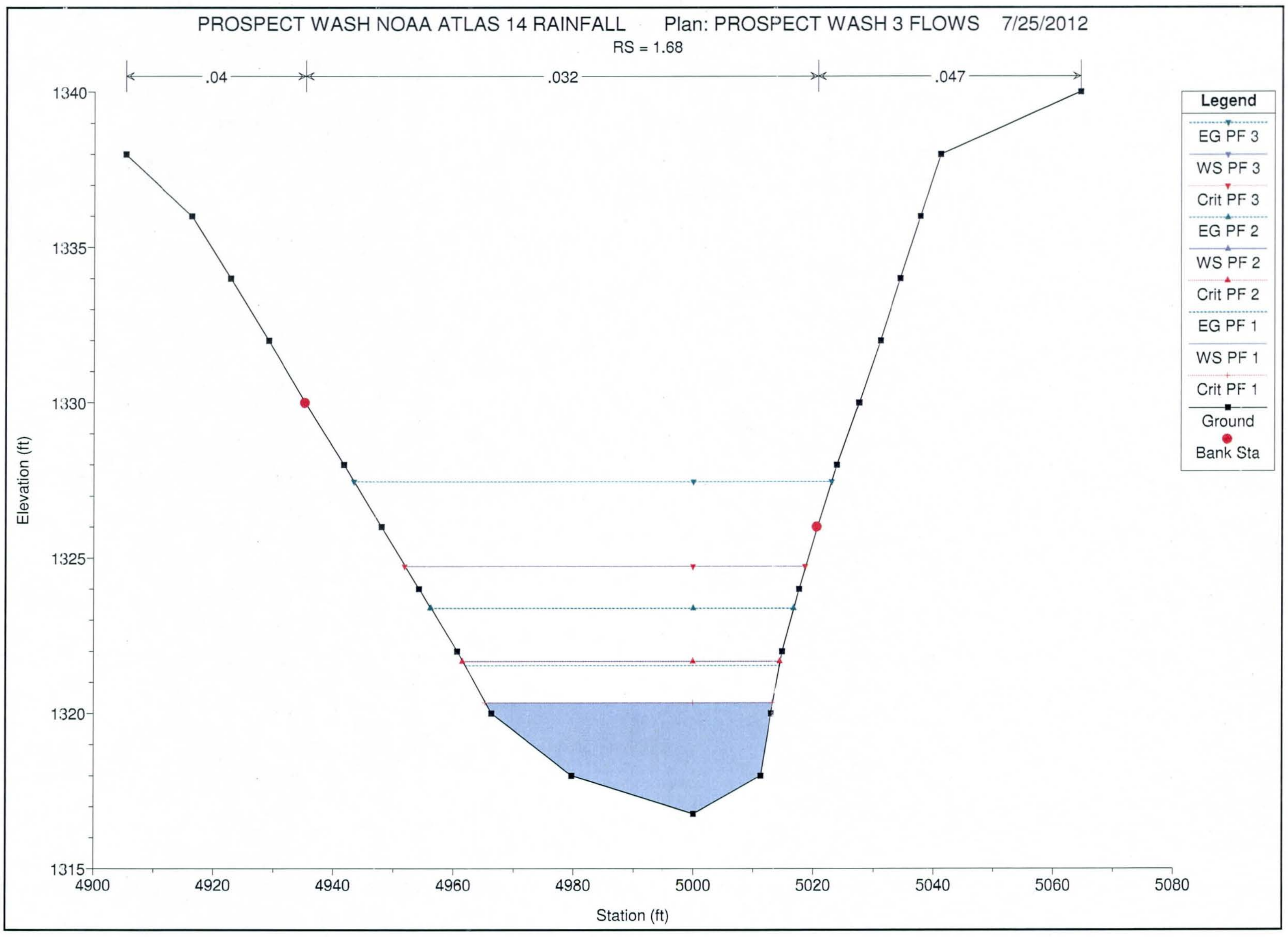
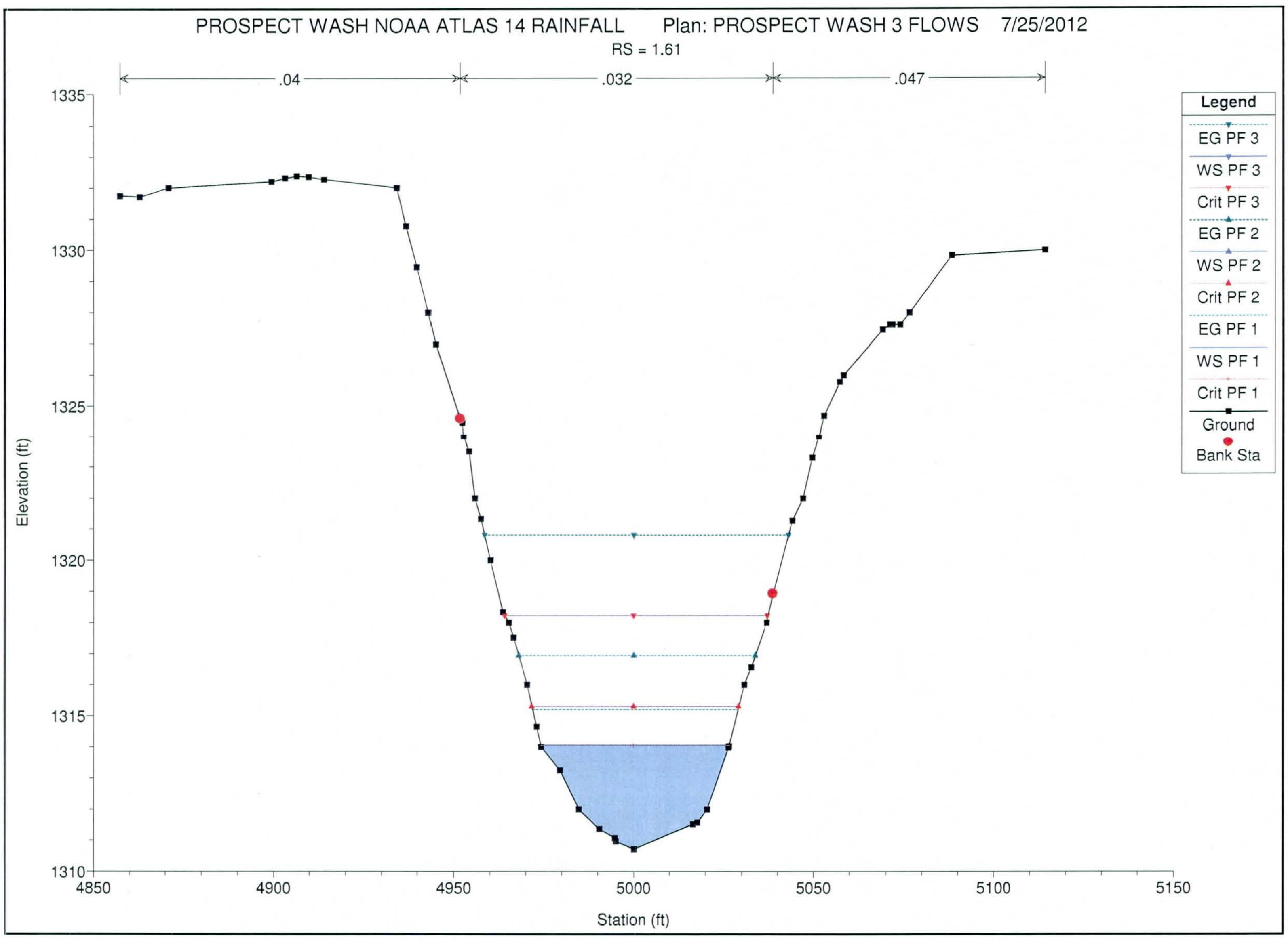
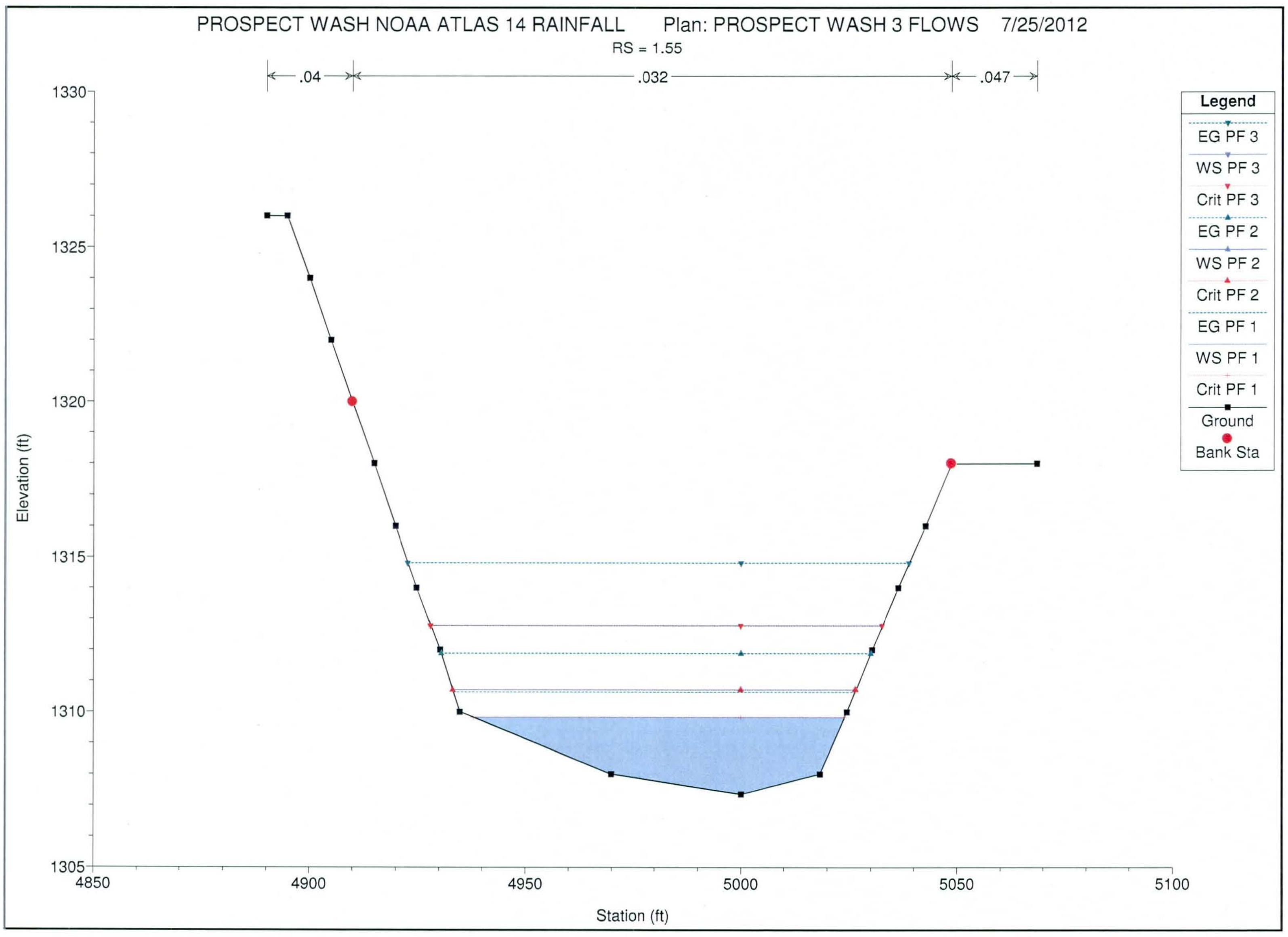
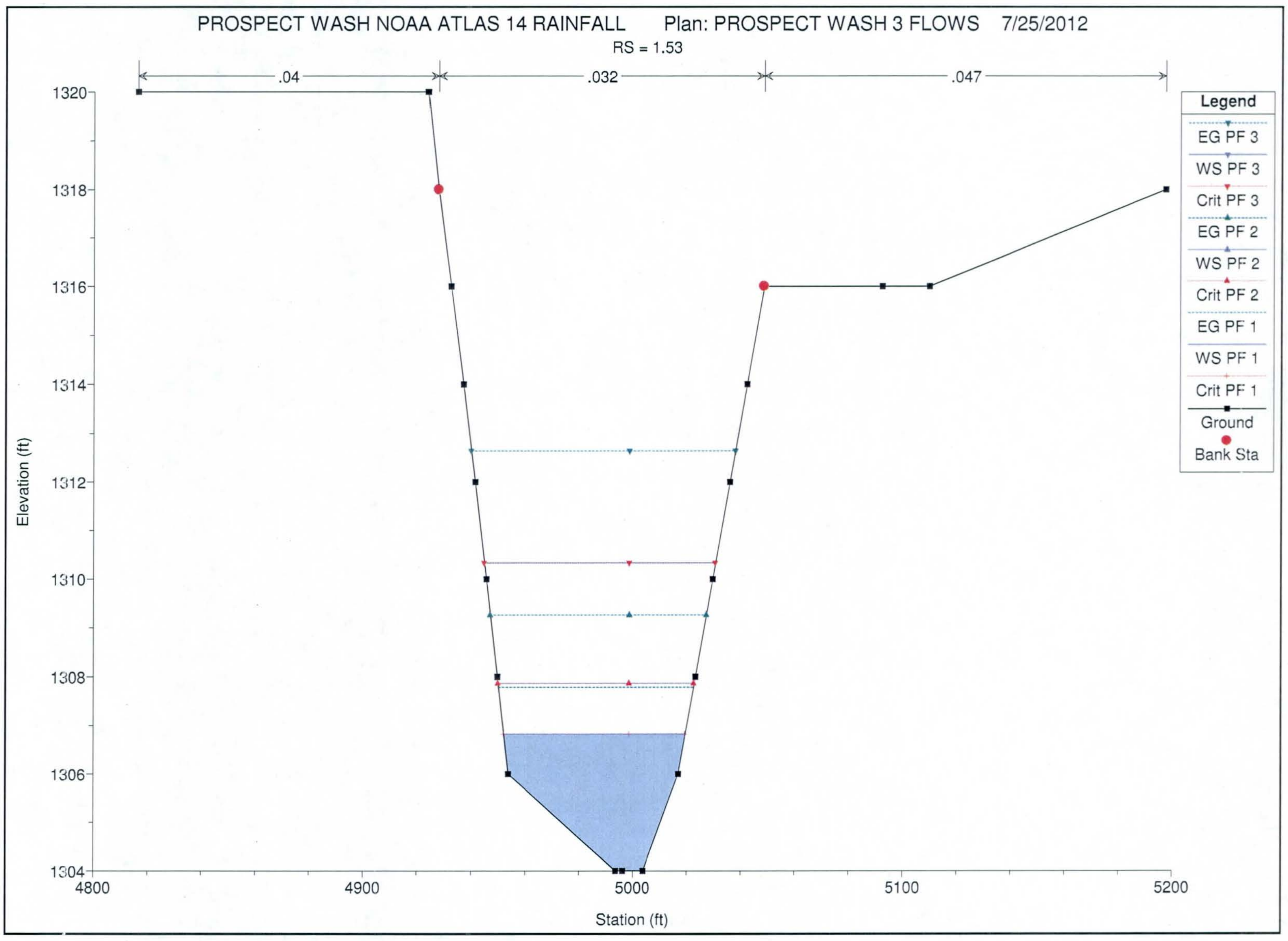
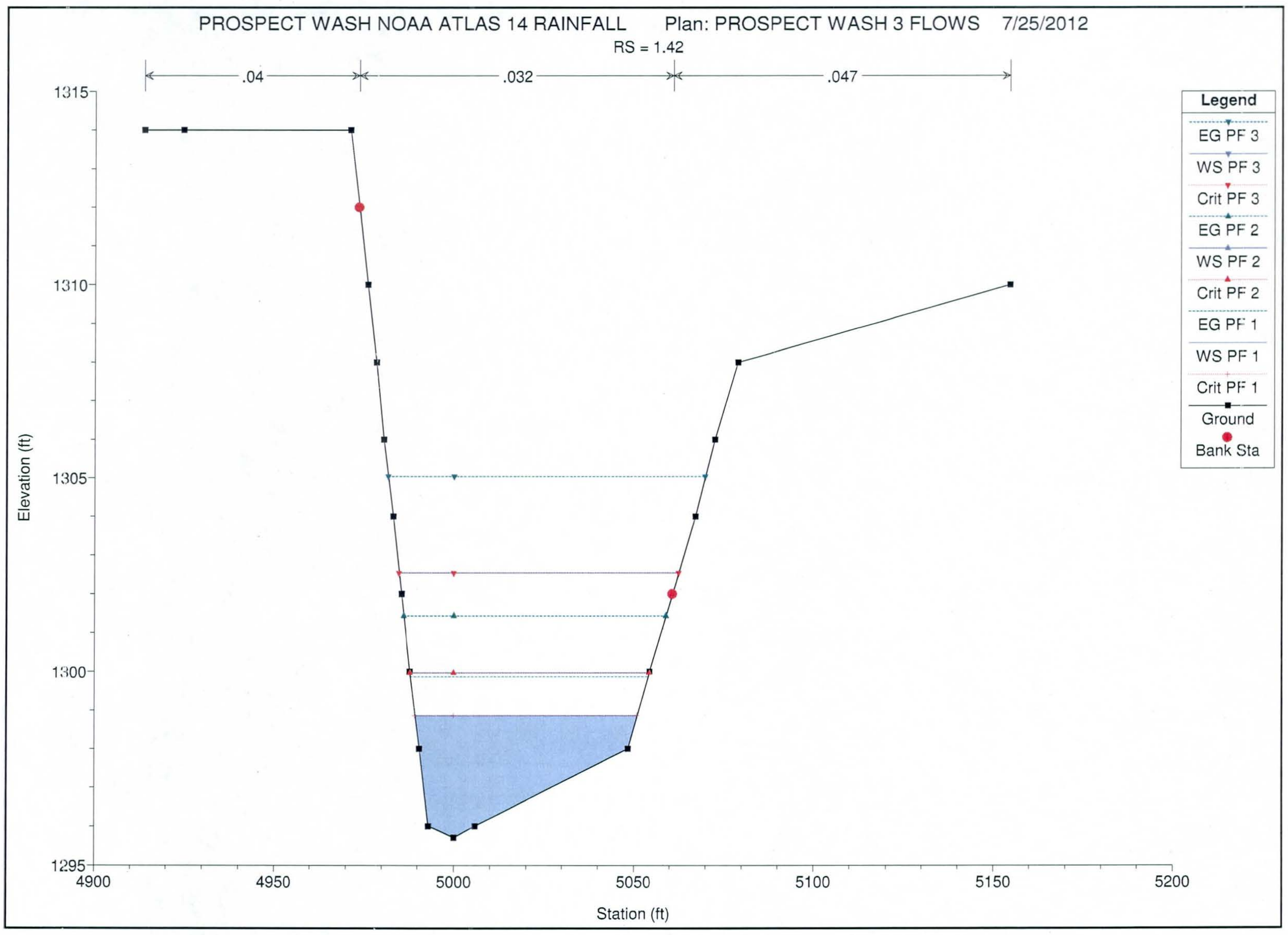
RS = 1.72
.04
.032
.047
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1320
1325
1330
1335
1340
1345
1350
4880
4900
4920
4940
4960
4980
5000
5020
5040
5060

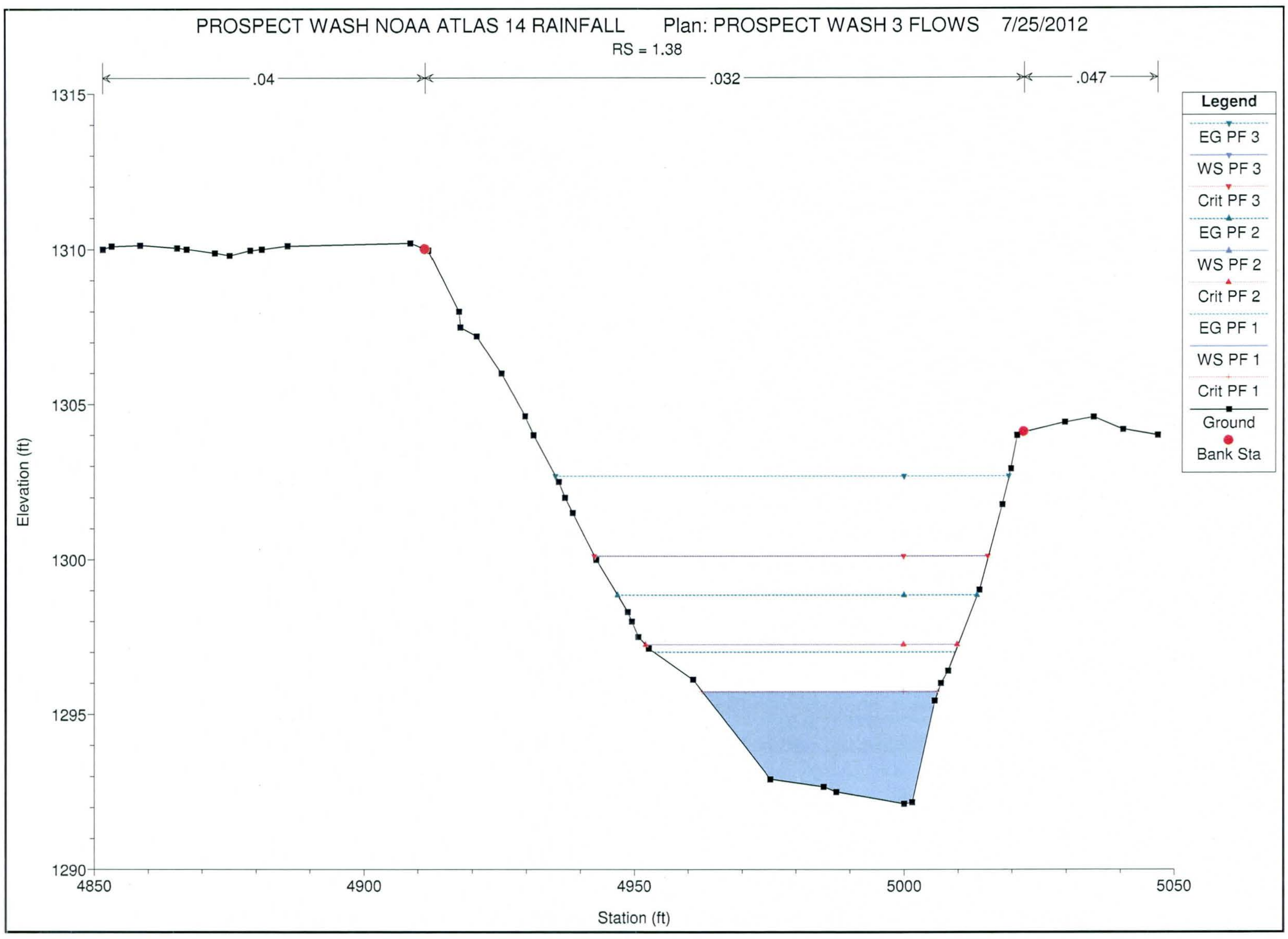

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.68
.04
.032
.047
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1315
1320
1325
1330
1335
1340
4900
4920
4940
4960
4980
5000
5020
5040
5060
5080

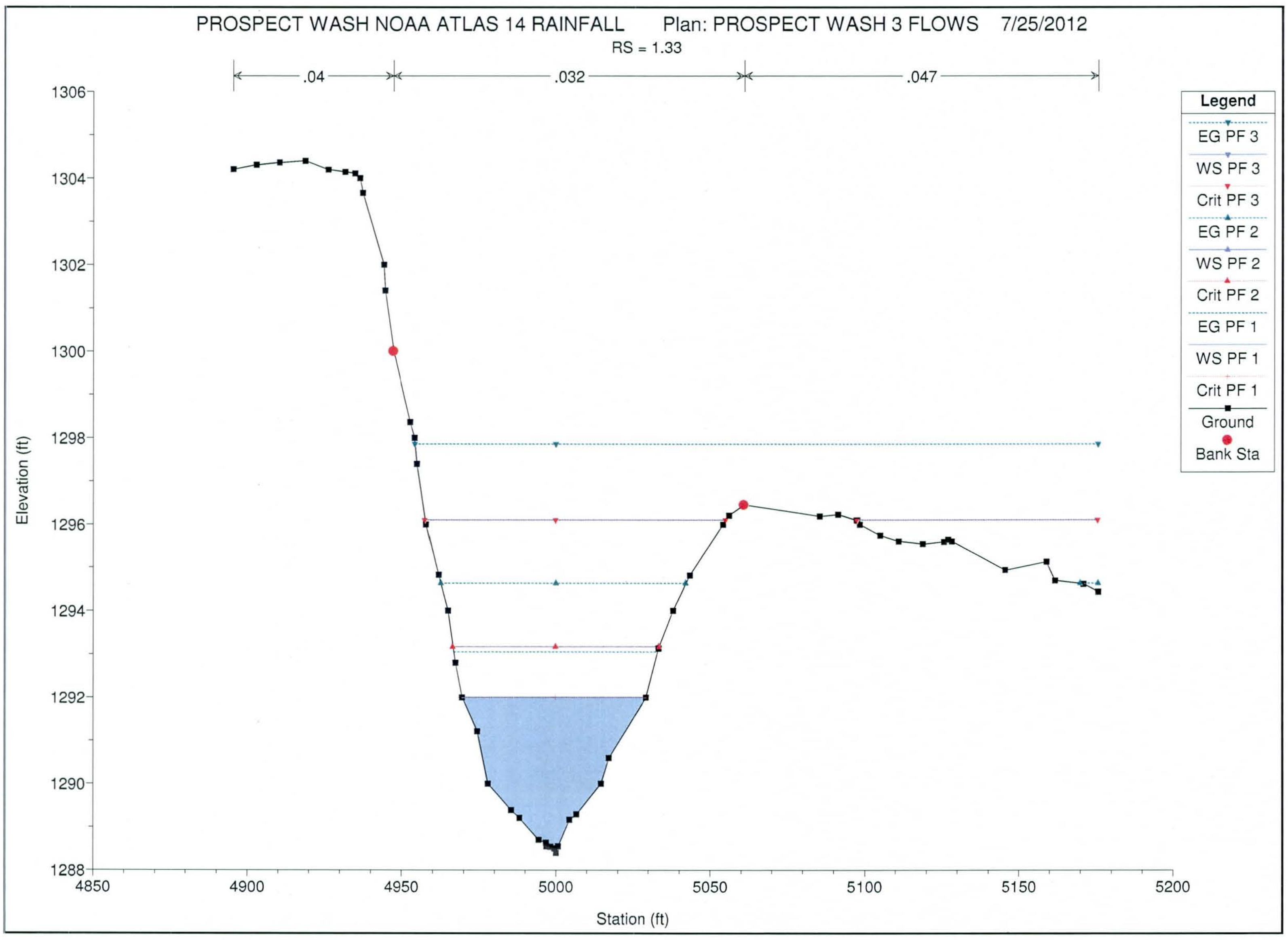

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.61
.04
.032
.047
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1335
1330
1325
1320
1315
1310
4850
4900
4950
5000
5050
5100
5150
Station (ft)

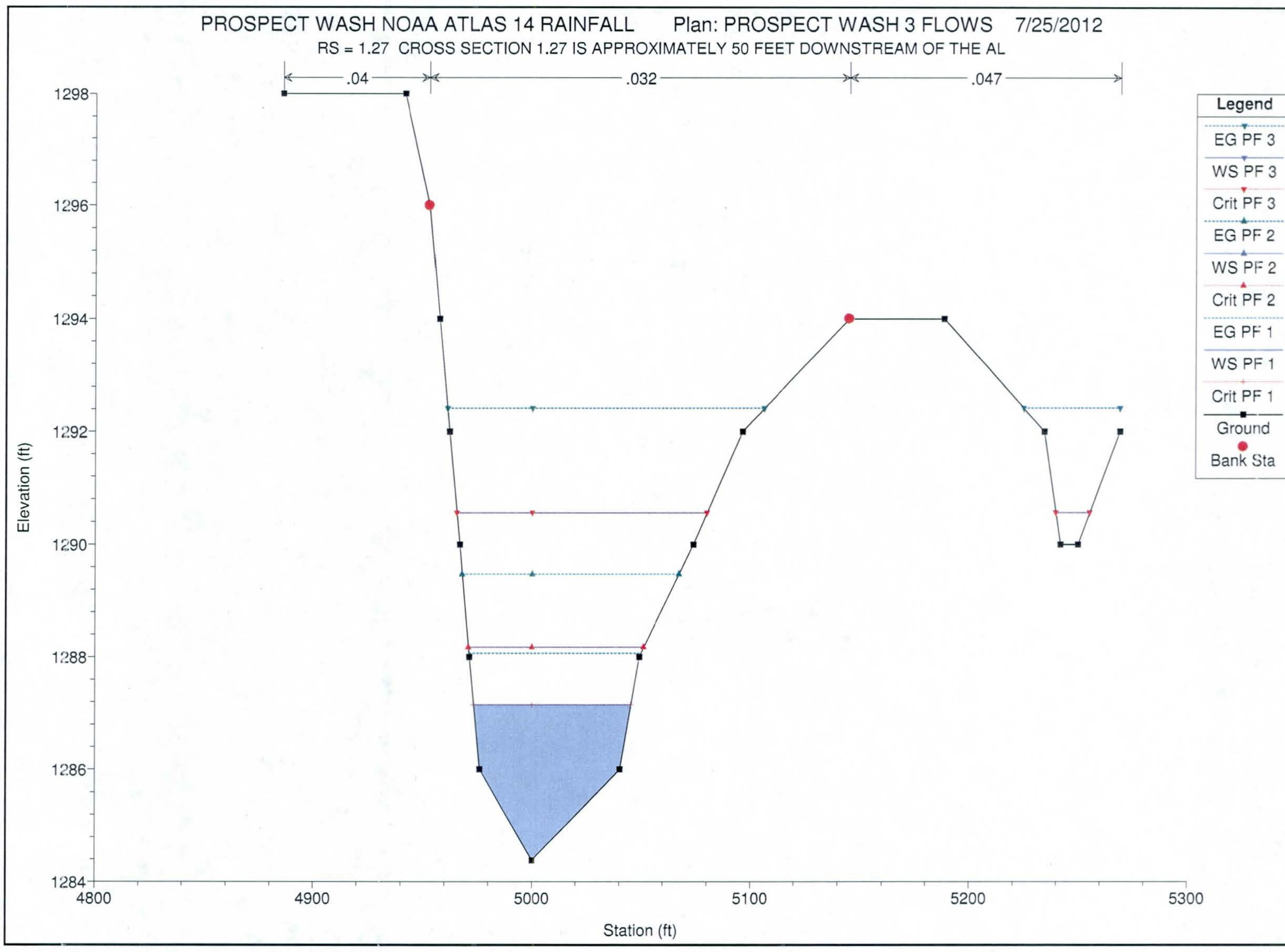

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.55
.04
.032
.047
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1330
1325
1320
1315
1310
1305
4850
4900
4950
5000
5050
5100
Station (ft)

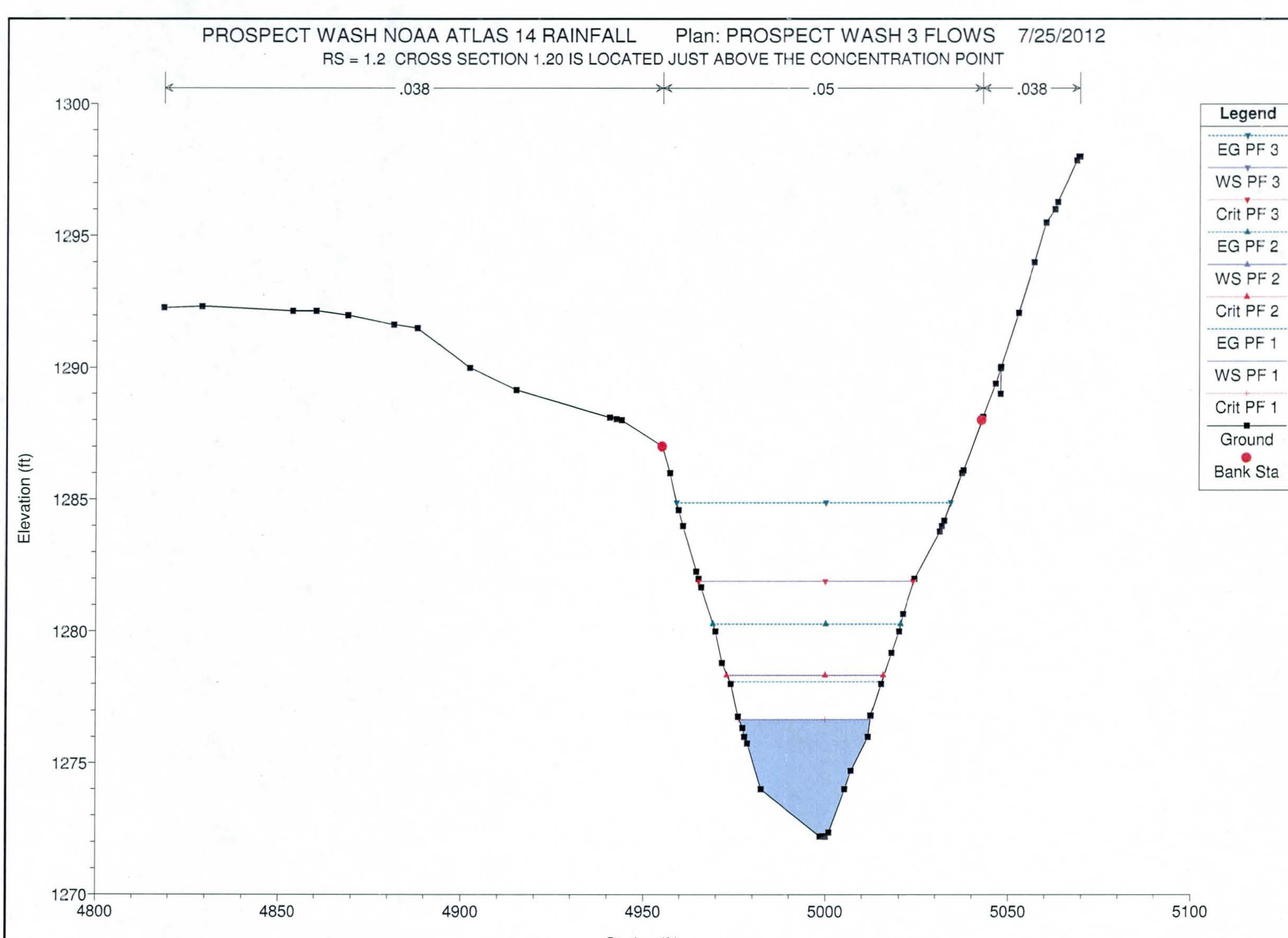

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.53
.04
.032
.047
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1320
1318
1316
1314
1312
1310
1308
1306
1304
4800
4900
5000
5100
5200
Station (ft)

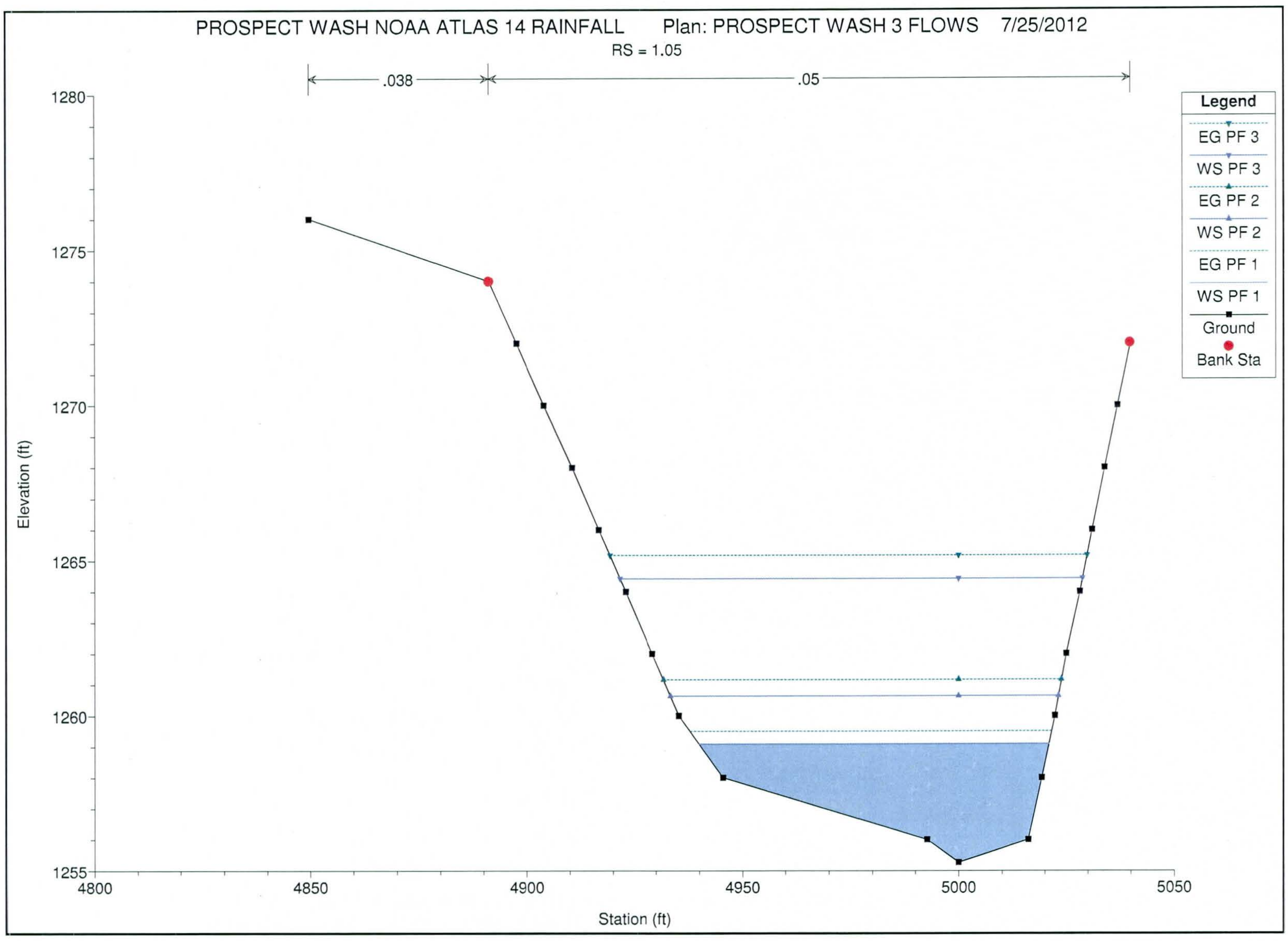

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.42
.04
.032
.047
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1315
1310
1305
1300
1295
4900
4950
5000
5050
5100
5150
5200
Station (ft)

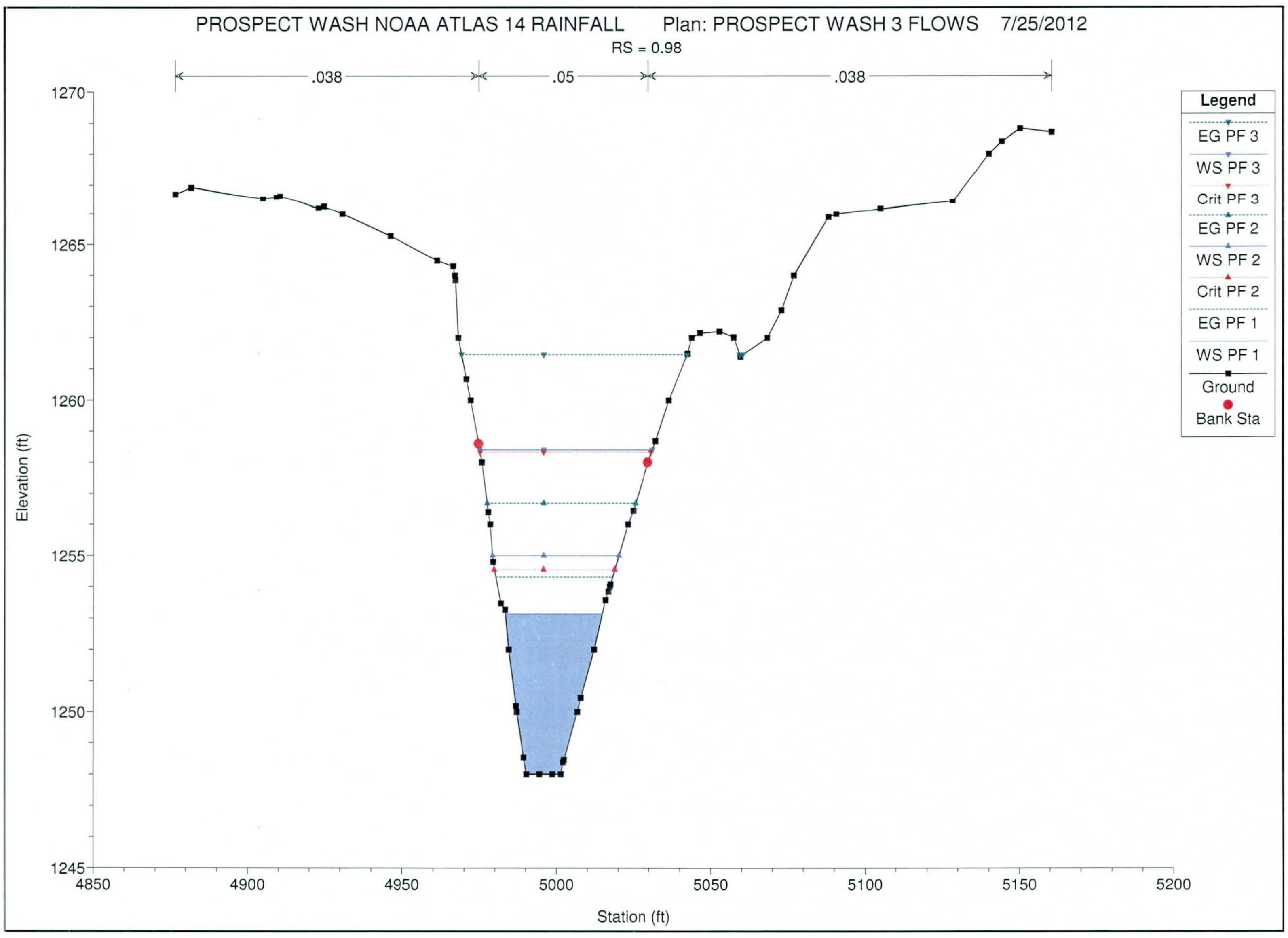

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.38
.04
.032
.047
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1315
1310
1305
1300
1295
1290
4850
4900
4950
5000
5050
Station (ft)

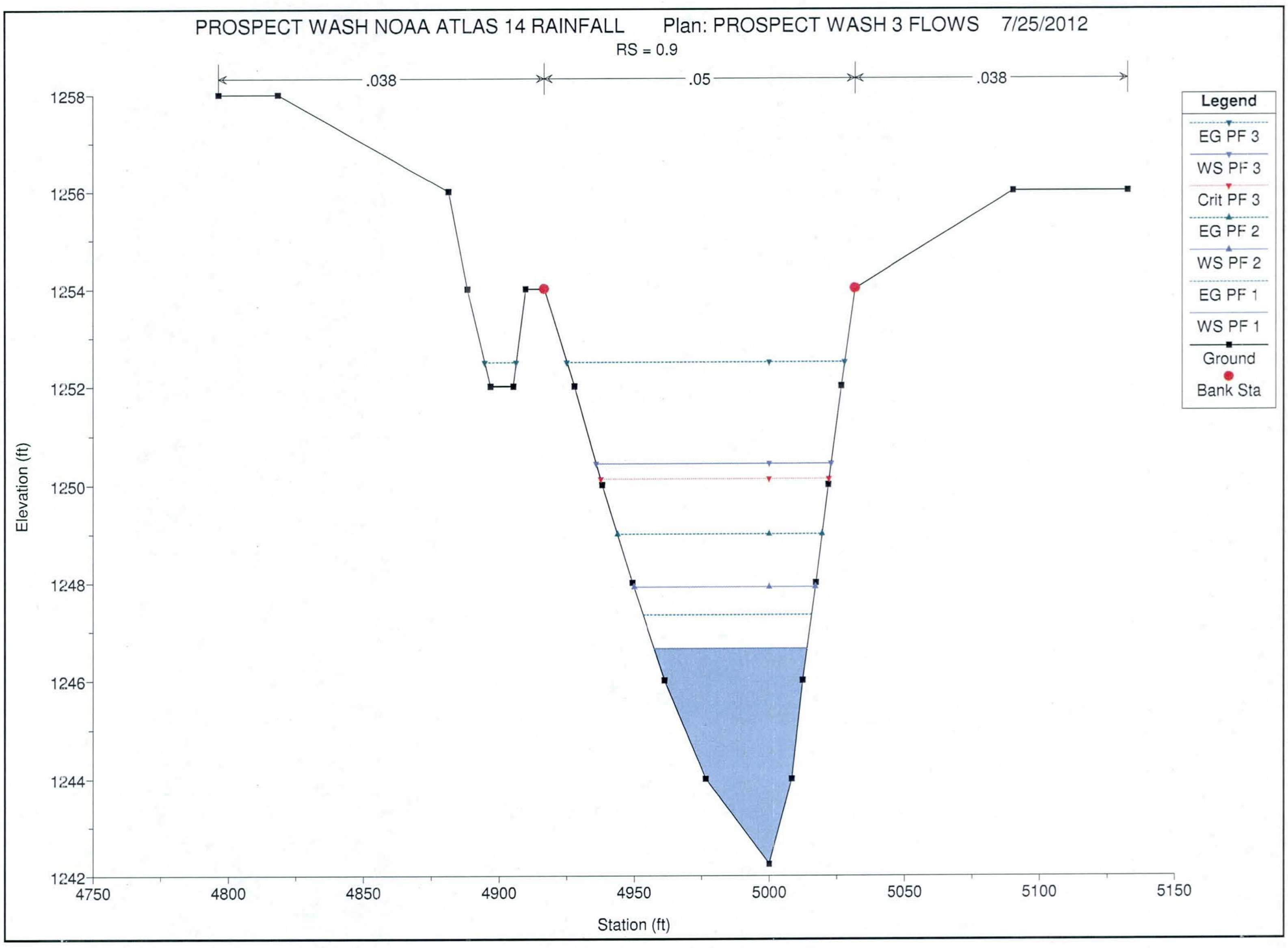

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.33
.04
.032
.047
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1306
1304
1302
1300
1298
1296
1294
1292
1290
1288
4850
4900
4950
5000
5050
5100
5150
5200
Station (ft)

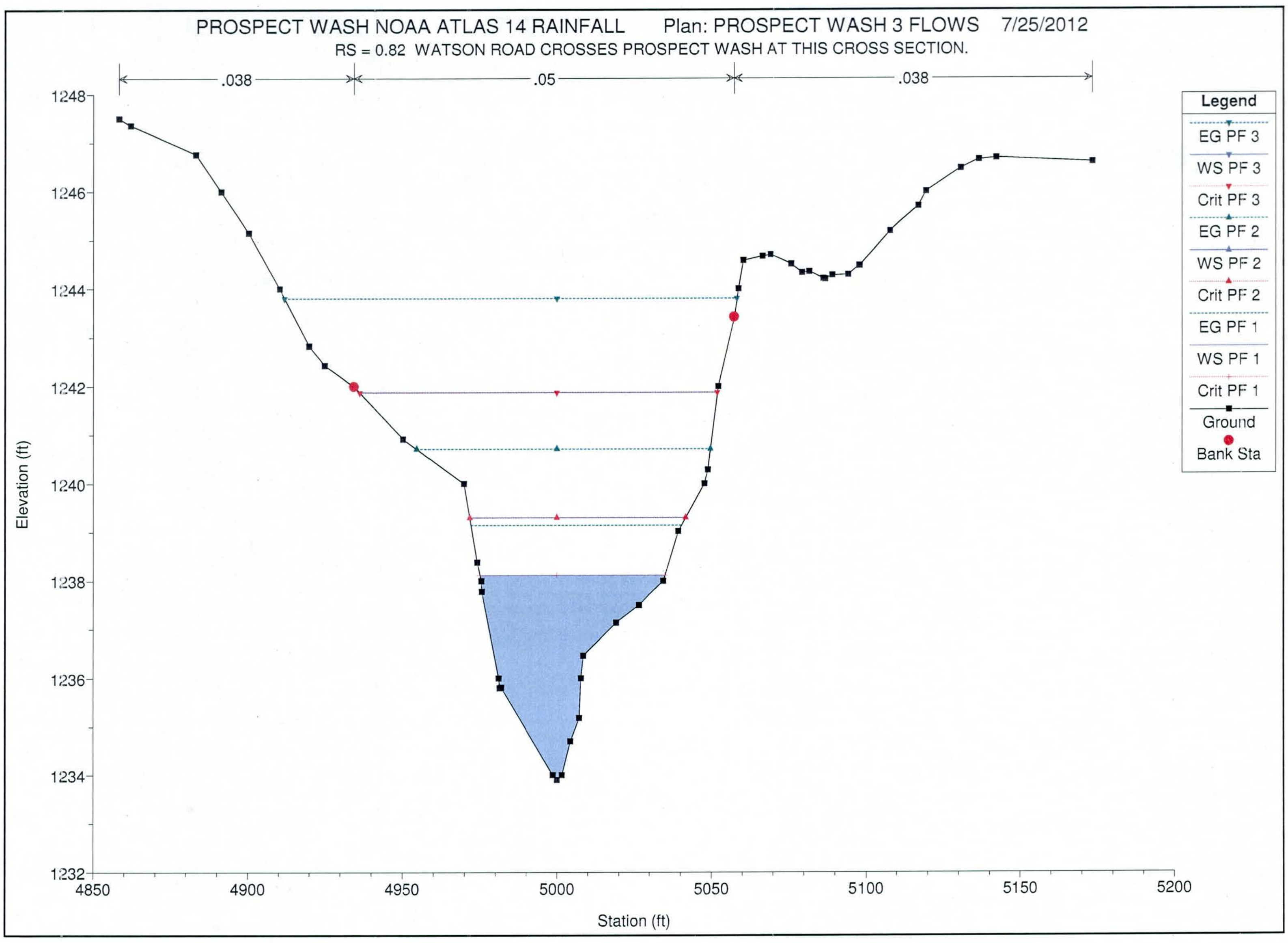

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.27 CROSS SECTION 1.27 IS APPROXIMATELY 50 FEET DOWNSTREAM OF THE AL
.04
.032
.047
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1298
1296
1294
1292
1290
1288
1286
1284
4800
4900
5000
5100
5200
5300
Station (ft)

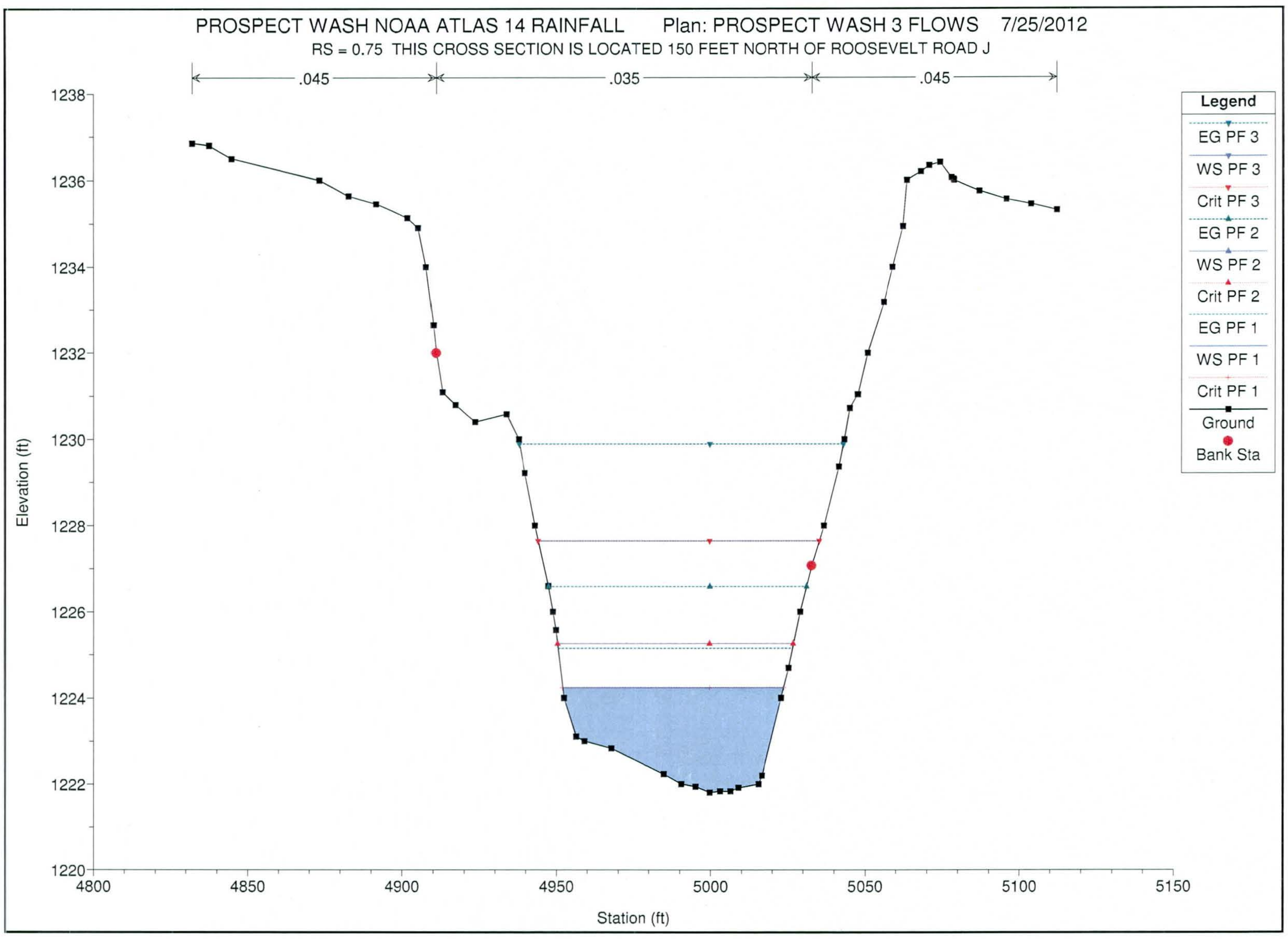

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.2 CROSS SECTION 1.20 IS LOCATED JUST ABOVE THE CONCENTRATION POINT
.038
.05
.038
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1300
1295
1290
1285
1280
1275
1270
4800
4850
4900
4950
5000
5050
5100
Station (ft)


PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 1.05
.038
.05
Legend
EG PF 3
WS PF 3
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1280
1275
1270
1265
1260
1255
4800
4850
4900
4950
5000
5050
Station (ft)

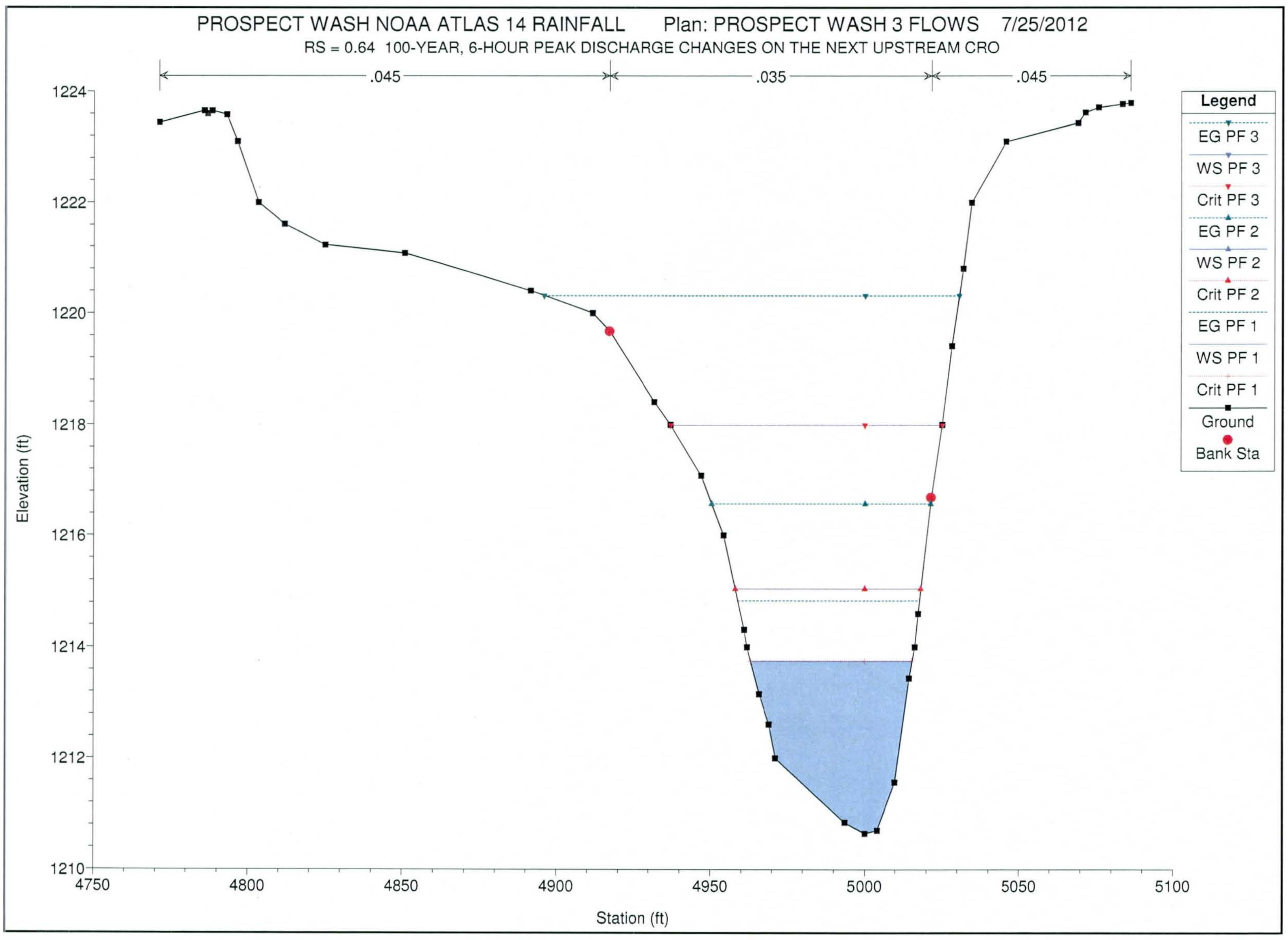

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 0.98
.038
.05
.038
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
1270
1265
1260
1255
1250
1245
4850
4900
4950
5000
5050
5100
5150
5200
Station (ft)


PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 0.9
.038
.05
.038
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

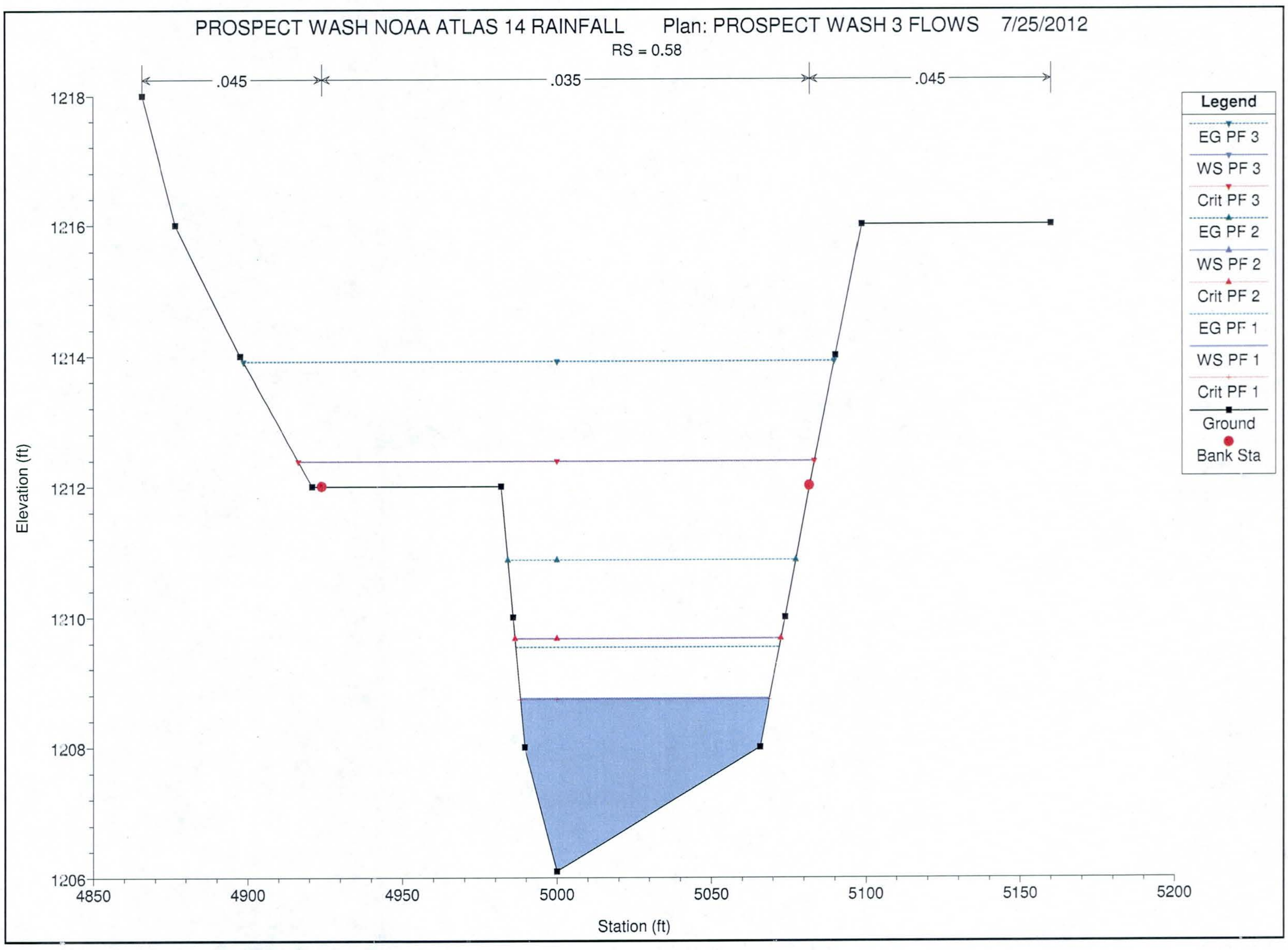

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 0.82 WATSON ROAD CROSSES PROSPECT WASH AT THIS CROSS SECTION.
.038
.05
.038
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

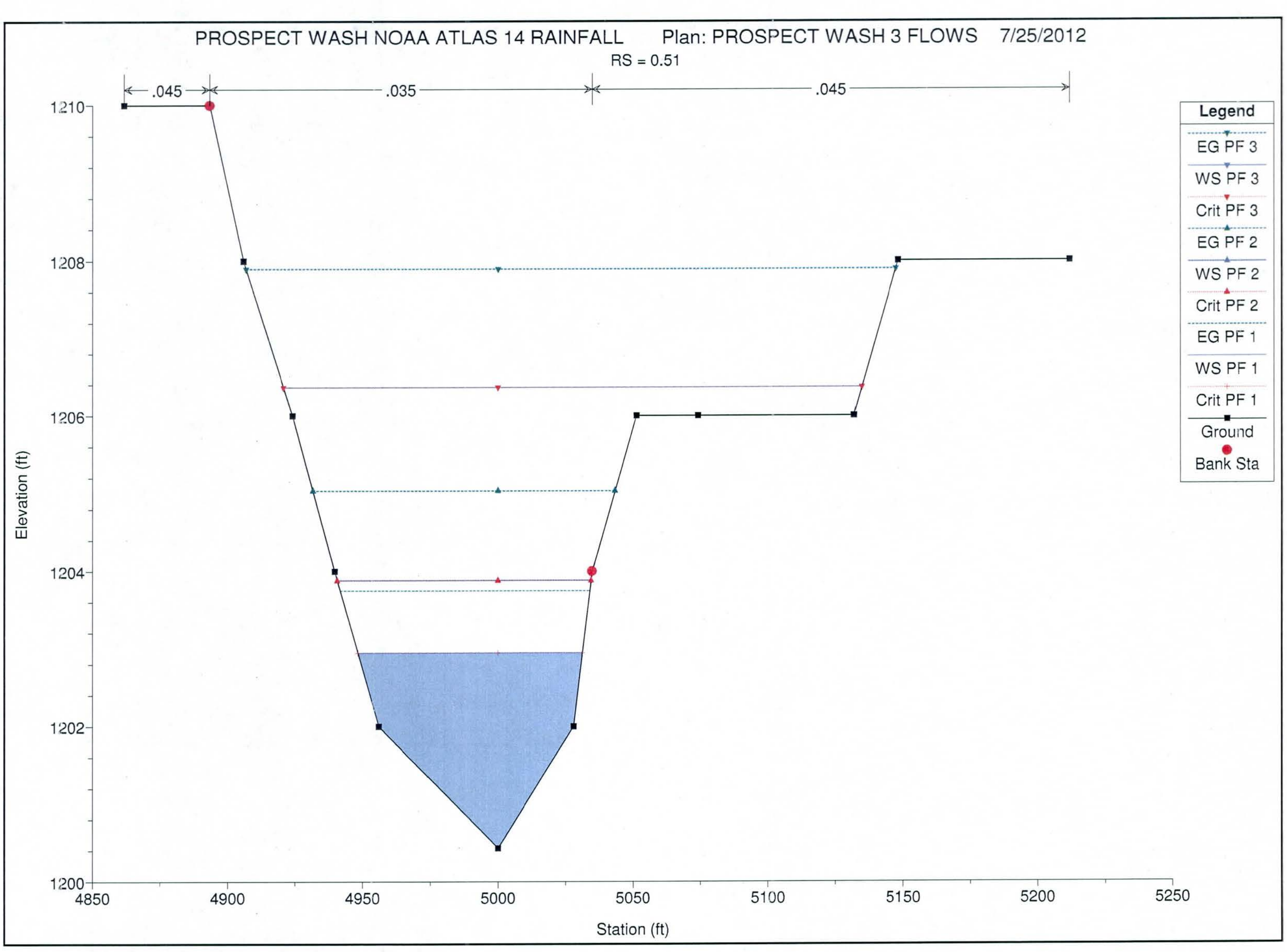


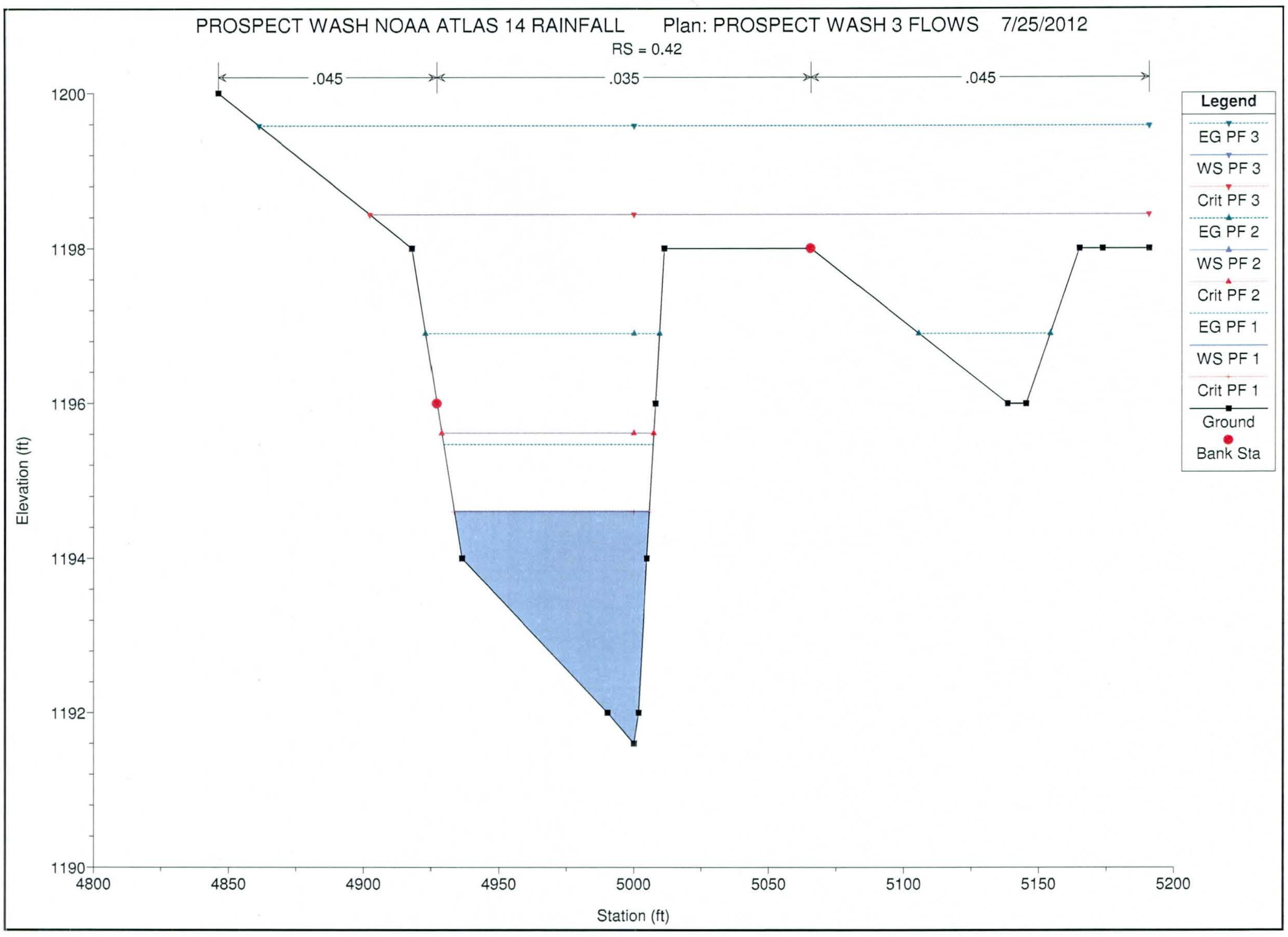
PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 0.75 THIS CROSS SECTION IS LOCATED 150 FEET NORTH OF ROOSEVELT ROAD J
.045
.035
.045
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1220
1222
1224
1226
1228
1230
1232
1234
1236
1238
4800
4850
4900
4950
5000
5050
5100
5150

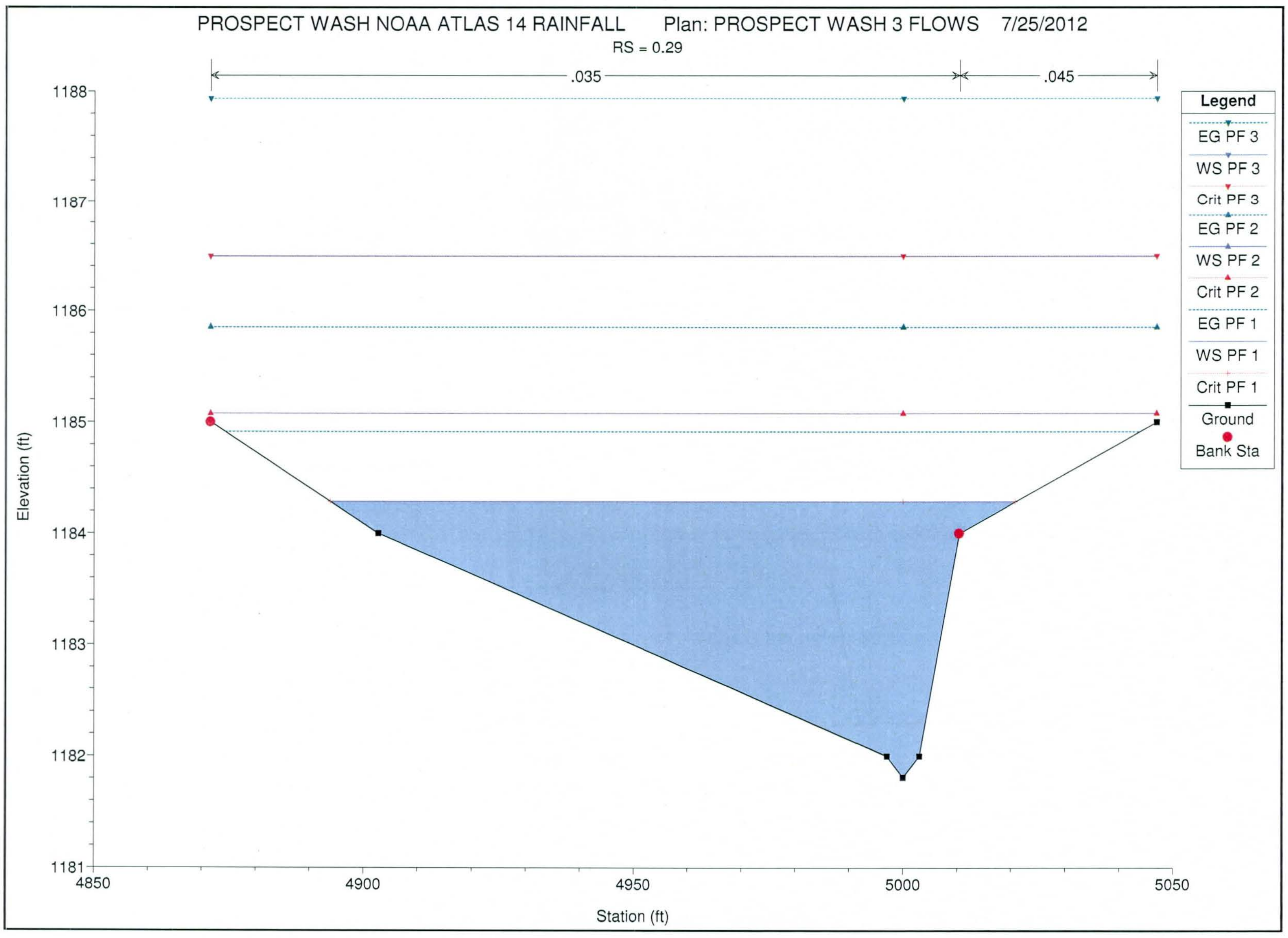


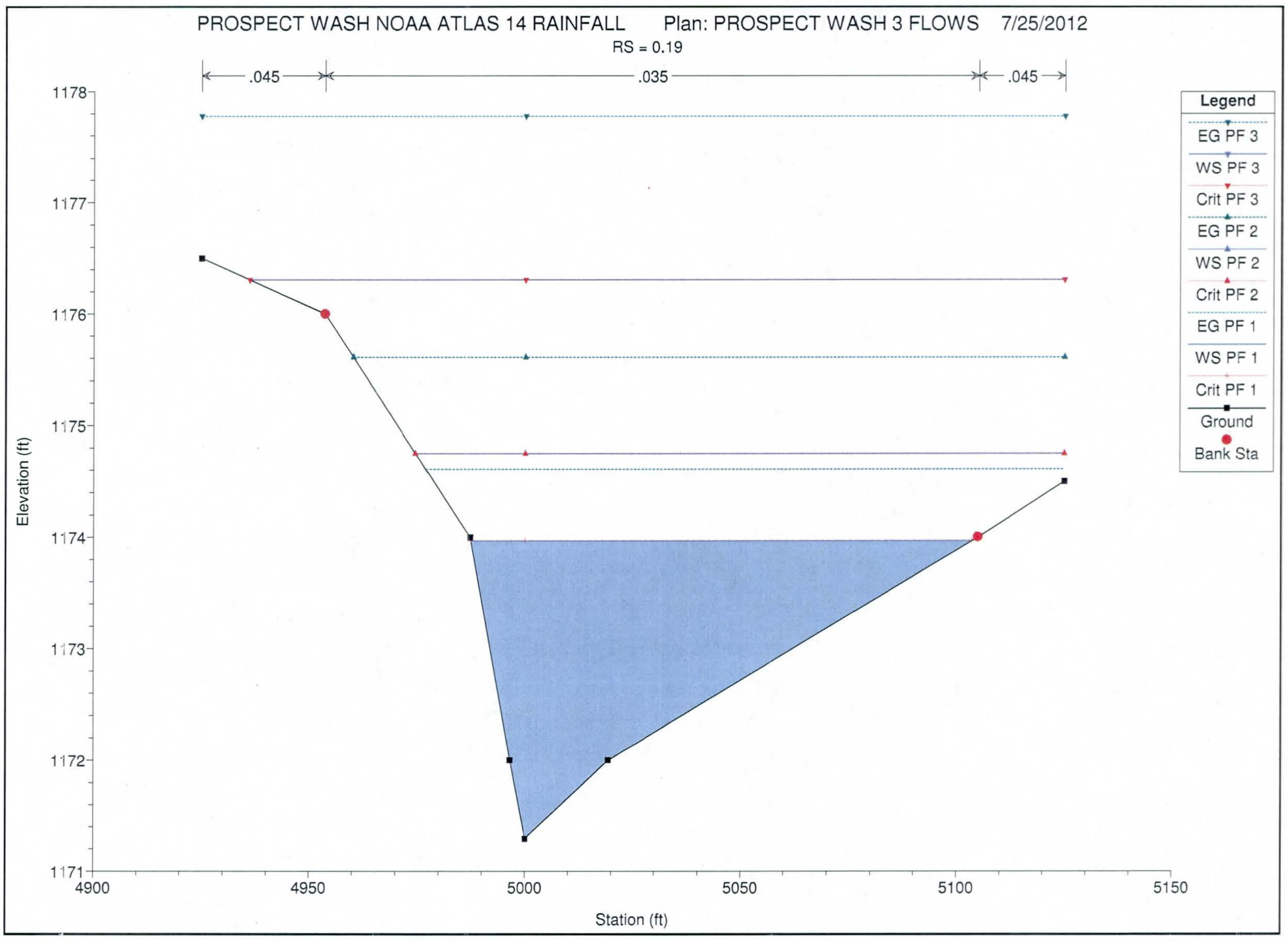
PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 0.64 100-YEAR, 6-HOUR PEAK DISCHARGE CHANGES ON THE NEXT UPSTREAM CRO
.045
.035
.045
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1210
1212
1214
1216
1218
1220
1222
1224
4750
4800
4850
4900
4950
5000
5050
5100

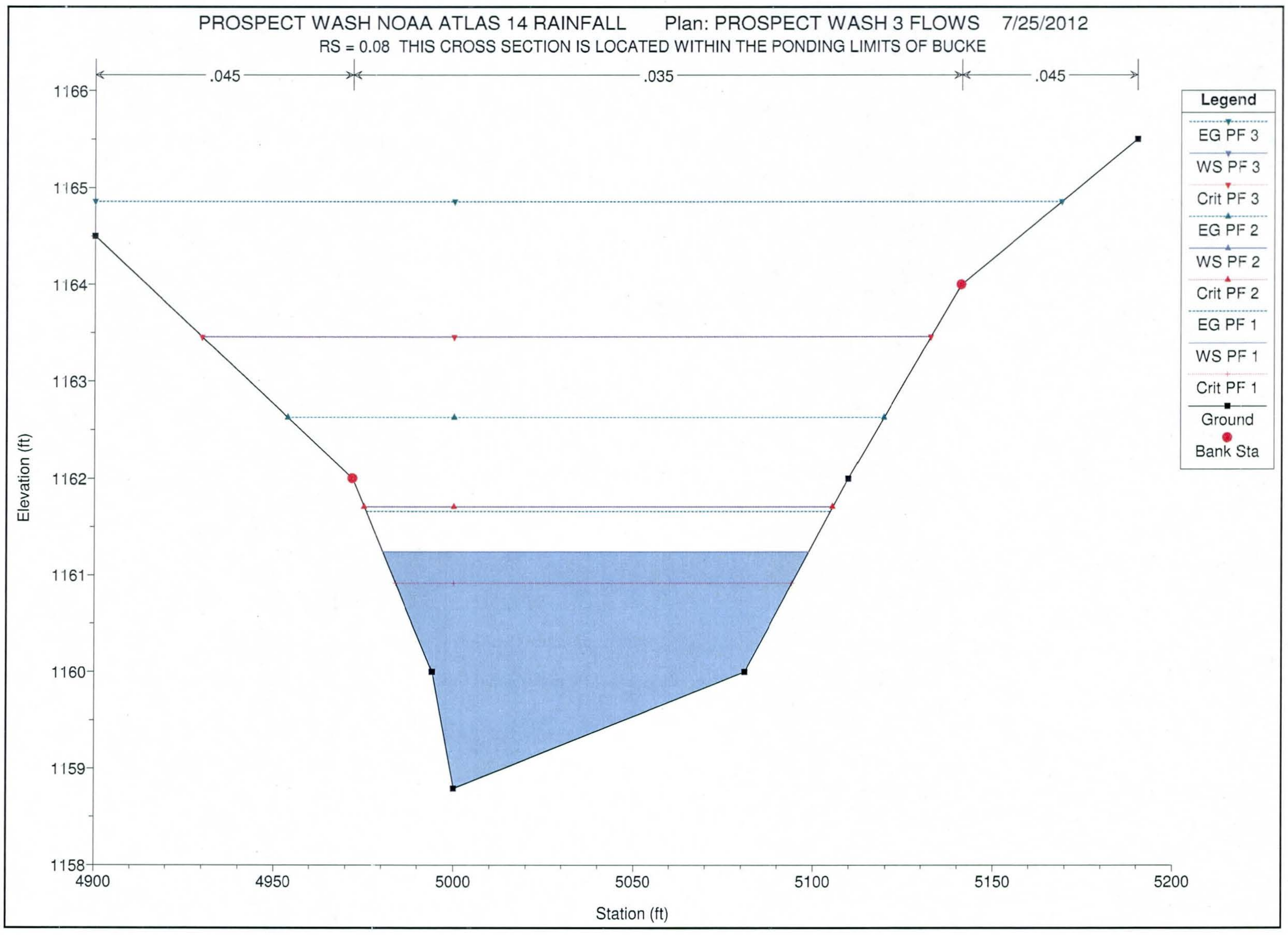

PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 0.58
.045
.035
.045
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1218
1216
1214
1212
1210
1208
1206
4850
4900
4950
5000
5050
5100
5150
5200
Station (ft)


PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 0.51
.045
.035
.045
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1210
1208
1206
1204
1202
1200
4850
4900
4950
5000
5050
5100
5150
5200
5250
Station (ft)


PROSPECT WASH NOAA ATLAS 14 RAINFALL   Plan: PROSPECT WASH 3 FLOWS   7/25/2012
RS = 0.42
.045
.035
.045
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1200
1198
1196
1194
1192
1190
4800
4850
4900
4950
5000
5050
5100
5150
5200
Station (ft)


PROSPECT WASH NOAA ATLAS 14 RAINFALL   Plan: PROSPECT WASH 3 FLOWS   7/25/2012
RS = 0.29
.035
.045
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
1188
1187
1186
1185
1184
1183
1182
1181
4850
4900
4950
5000
5050
Station (ft)


PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 0.19
.045
.035
.045
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


PROSPECT WASH NOAA ATLAS 14 RAINFALL Plan: PROSPECT WASH 3 FLOWS 7/25/2012
RS = 0.08 THIS CROSS SECTION IS LOCATED WITHIN THE PONDING LIMITS OF BUCKE
.045
.035
.045
Legend
EG PF 3
WS PF 3
Crit PF 3
EG PF 2
WS PF 2
Crit PF 2
EG PF 1
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

APPENDIX J

Prospect Wash Sedimentation Calculations

SUNRISE ENGINEERING

Skyline Fan DCR - Preliminary Prospect Wash Sedimentation Results

Alternative	Prospect Wash Station	Q, cfs	Expected Scour, ft	Rip Rap D50 (Straight Reach), ft	Rip Rap D50 (Curved Reach), ft
1	1.9	872	14	2.7	5
1	0.9	872	11	0.8	1.5
1	0.29	872	8	0.6	0.6
2	1.9	4,287	28	6	11
2	0.9	4,278	21	2	3.8
2	0.29	4,287	15	1.4	1.4
3	1.9	971	15	2.8	5.5
3	0.9	971	11	0.8	1.6
3	0.29	971	8	0.6	0.6

Town of Buckeye
Flood Control District of Maricopa County
Skyline Fan DCR
TOB Contract No. 2012-006

Gradation Test Results
Sieve test data provided by Terracon
Two soil samples sampled in Prospect Wash

	D_{50}	
S-1	1.4	mm
S-2	2.8	mm
Average:	2.1	mm

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP1	Channel Banks on Curved Reach	CROSS SECTION AT RIVER STA 1.9	-	-	-	12.86	150.00	62.43	33.00	5.23

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - RIPRAP
Page 1 **Project Reference: SKYLINE FAN DCR 3-8** 9/12/2012

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP1	Channel Banks on Curved Reach	CROSS SECTION AT RIVER STA 0.9	-	-	-	7.34	150.00	62.43	20.00	1.52

(rmRipRap.rpt)

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - RIPRAP
Project Reference: SKYLINE FAN DCR 3-08

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP1	Channel Banks on Straight Reach	CROSS SECTION AT RIVER ST 0.29	-	-	-	6.35	150.00	62.43	15.00	0.57

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - RIPRAP
Project Reference: SKYLINE FAN DCR 3-9

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP2	Channel Banks on Curved Reach	CROSS SECTION AT RIVER STA 1.9	-	-	-	18.81	150.00	62.43	33.00	11.19

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - RIPRAP
Project Reference: SKYLINE FAN DCR 3-9

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ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP2	Channel Banks on Curved Reach	CROSS SECTION AT RIVER STA 0.9	-	-	-	11.53	150.00	62.43	20.00	3.75

(rmRipRap.rpt)

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - RIPRAP
Project Reference: SKYLINE FAN DCR 3-09

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ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP2	Channel Banks on Straight Reach	CROSS SECTION AT RIVER ST 0.29	-	-	-	10.06	150.00	62.43	15.00	1.43

(rmRipRap.rpt)

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP3	Channel Banks on Curved Reach	CROSS SECTION AT RIVER STA 1.9	-	-	-	13.14	150.00	62.43	33.00	5.46

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP3	Channel Banks on Curved Reach	CROSS SECTION AT RIVER STA 0.9	-	-	-	7.55	150.00	62.43	20.00	1.61

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP3	Channel Banks on Straight Reach	CROSS SECTION AT RIVER ST 0.29	-	-	-	6.49	150.00	62.43	15.00	0.59

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP1	Channel Banks on Straight Reach	CROSS SECTION AT RIVER STA 1.9	-	-	-	12.86	150.00	62.43	33.00	2.69

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - RIPRAP
Page 1 Project Reference: SKYLINE FAN DCR 3-08 9/12/2012

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP1	Channel Banks on Straight Reach	CROSS SECTION AT RIVER STA 0.9	-	-	-	7.34	150.00	62.43	20.00	0.78

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - RIPRAP

Project Reference: SKYLINE FAN DCR 3-08

9/12/2012

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP1	Channel Banks on Straight Reach	CROSS SECTION AT RIVER ST 0.29	-	-	-	6.35	150.00	62.43	15.00	0.57

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - RIPRAP

Project Reference: SKYLINE FAN DCR 3-09

9/12/2012

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP2	Channel Banks on Straight Reach	CROSS SECTION AT RIVER STA 1.9	-	-	-	18.81	150.00	62.43	33.00	5.74

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - RIPRAP

Project Reference: SKYLINE FAN DCR 3-09

9/12/2012

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP2	Channel Banks on Straight Reach	CROSS SECTION AT RIVER STA 0.9	-	-	-	11.53	150.00	62.43	20.00	1.93

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - RIPRAP

Project Reference: SKYLINE FAN DCR 3-09

9/12/2012

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP2	Channel Banks on Straight Reach	CROSS SECTION AT RIVER ST 0.29	-	-	-	10.06	150.00	62.43	15.00	1.43

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - RIPRAP
Project Reference: SKYLINE FAN DCR 3-10

 9/12/2012

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP3	Channel Banks on Straight Reach	CROSS SECTION AT RIVER STA 1.9	-	-	-	13.14	150.00	62.43	33.00	2.80

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - RIPRAP
Project Reference: SKYLINE FAN DCR 3-10

 9/12/2012

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP3	Channel Banks on Straight Reach	CROSS SECTION AT RIVER STA 0.9	-	-	-	7.55	150.00	62.43	20.00	0.83

ID	Type	Section ID	Design Q (cfs)	Slope (ft/ft)	Width (ft)	Average Velocity (ft/s)	Specific Weight Stone (lb/cu ft)	Specific Weight Water (lb/cu ft)	Bank Angle (degrees)	D50 (ft)
PP3	Channel Banks on Straight Reach	CROSS SECTION AT RIVER ST 0.29	-	-	-	6.49	150.00	62.43	15.00	0.59

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - TOTAL SCOUR
Project Reference: SKYLINE PROSPECT 1

5/20/2013

Major Basin: 01

(B) ID: PROSPECT 0.2 — Cross Section ID: CROSS SECTION AT RIVER ST 0.29

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	1.24	1.30	1.61	State Standard Level I, 971 cfs (100-yr, 6-hr BASE CONDITIONS)
General	.85	1.30	1.11	Lacey, 971 cfs, Sediment Laden
Local		1.30		
Bedform	.55	1.30	.72	Comments
Low Flow	1.50	1.30	1.95	
Total			**5.39**	

(I) ID: PROSPECT 0.9 — Cross Section ID: CROSS SECTION AT RIVER STA 0.9

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	1.24	1.30	1.61	State Standard Level I
General	.85	1.30	1.11	Lacey
Local		1.30		
Bedform	.73	1.30	.95	Comments
Low Flow	1.50	1.30	1.95	
Total			**5.62**	

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - TOTAL SCOUR
Project Reference: SKYLINE PROSPECT 2

5/20/2013

Major Basin: 01

(B) ID: PROSPECT 0.2 — Cross Section ID: CROSS SECTION AT RIVER ST 0.29

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	1.26	1.30	1.64	State Standard Level I, 997 cfs (100-yr, 6-hr ALT 1A)
General	.98	1.30	1.27	Blench, 177 cfs, non-sediment laden
Local		1.30		
Bedform	.55	1.30	.72	Comments
Low Flow	1.50	1.30	1.95	
Total			**5.58**	

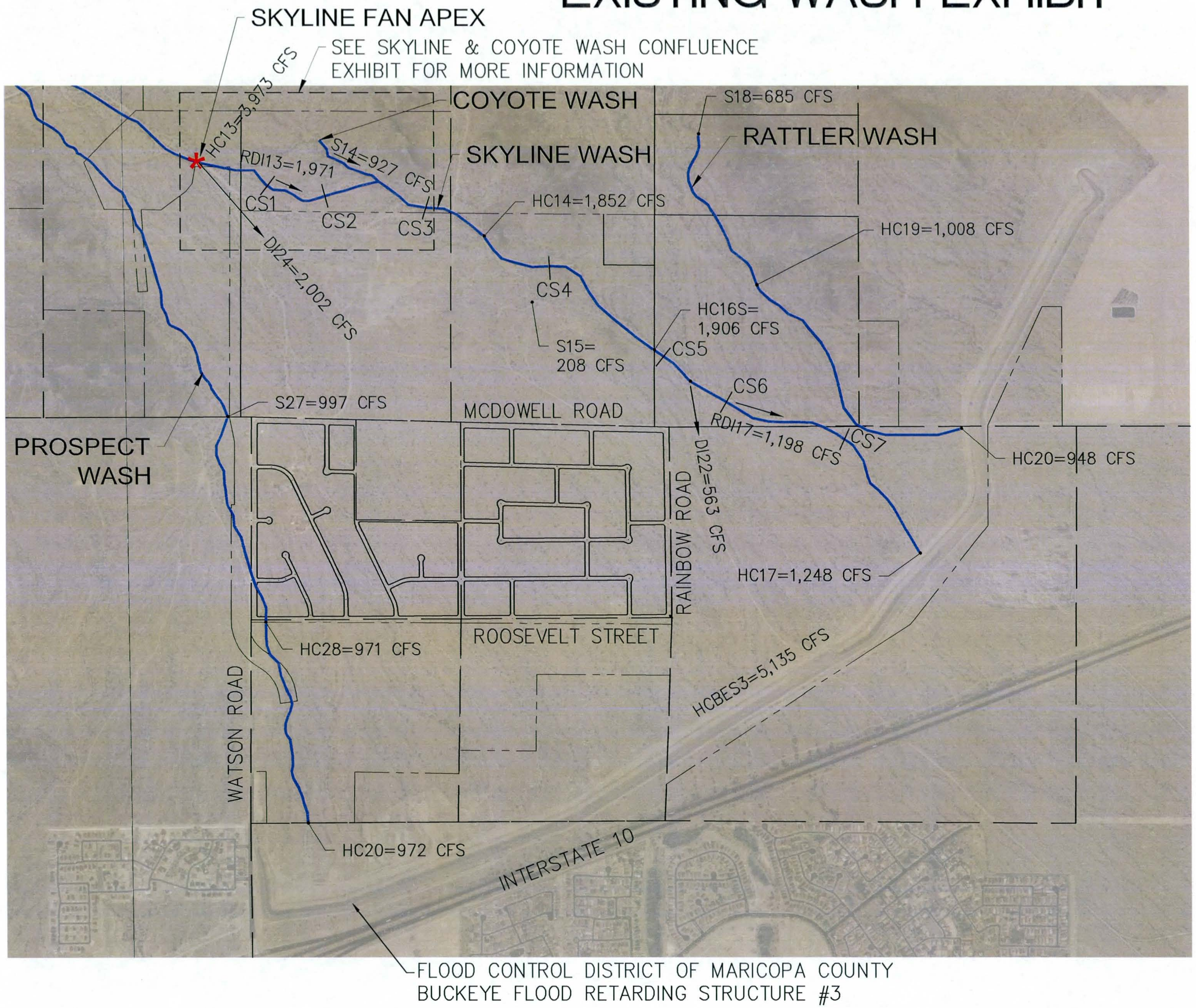
(I) ID: PROSPECT 0.9 — Cross Section ID: CROSS SECTION AT RIVER STA 0.9

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	1.26	1.30	1.64	State Standard Level I
General	1.49	1.30	1.94	Blench
Local		1.30		
Bedform	.73	1.30	.95	Comments
Low Flow	1.50	1.30	1.95	
Total			**6.48**	

APPENDIX K

Skyline Wash Hydraulic Calculations

EXISTING WASH EXHIBIT



LEGEND

CS = CROSS SECTION

HC19 = NODE NUMBER, BASE CONDITION 100-YR 24-HR EVENT

NORTH

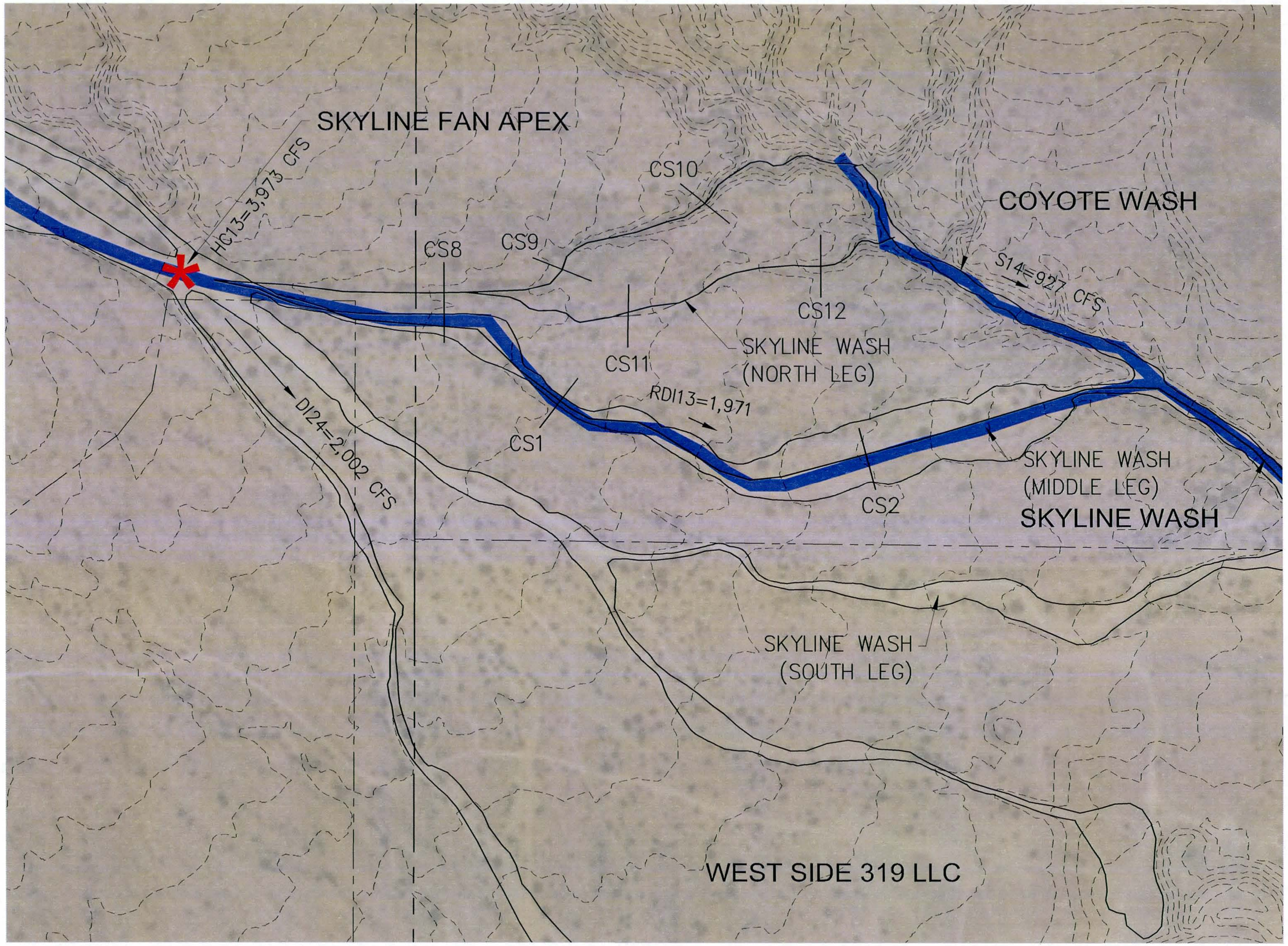
SCALE
0 750' 1500'
HORIZ: 1" = 1500'

SUNRISE ENGINEERING

2152 SOUTH VINEYARD, SUITE 123
MESA, ARIZONA 85210
TEL 480.768.8600 · FAX 480.768.8609
www.sunrise-eng.com

P:\Buckeye\04234Skyline Wash DCR\Dwg\Exhibits\Existing Wash Exhibit.dwg May 21, 2013 11:16am ccristian

EXISTING SKYLINE AND COYOTE WASH CONFLUENCE EXHIBIT



LEGEND

CS = CROSS SECTION

HC19 = NODE NUMBER,
BASE CONDITION 100-YR
24-HR EVENT

NORTH

SCALE 0 750' 1500'
HORIZ: 1" = 1500'

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P:\Buckeye\04234Skyline Wash DCR\Dwg\Exhibits\Skyline & Coyote Wash Confluence Exhibit.dwg May 21, 2013 11:15am carriston

Cross Section for CS 1

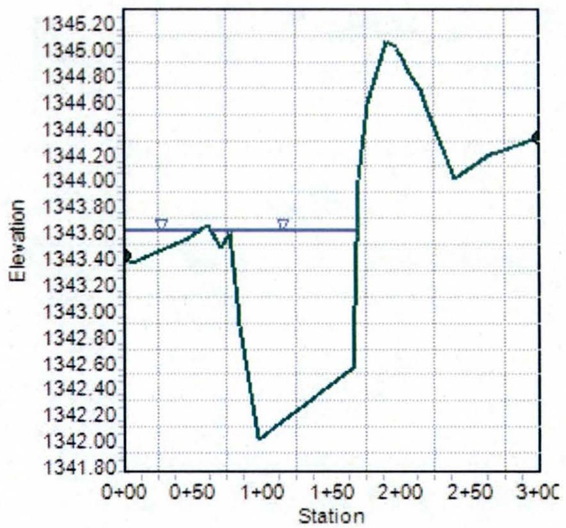
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	1.60	ft
Discharge	854.43	ft³/s

Cross Section Image



Worksheet for CS 1

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	1.60	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1343.41
0+02.17	1343.39
0+06.08	1343.36
0+46.73	1343.55
0+51.63	1343.57
0+60.79	1343.64
0+70.06	1343.47
0+76.65	1343.59
0+83.30	1342.91
0+84.08	1342.87
0+97.26	1342.00
1+65.80	1342.55
1+69.75	1344.00
1+76.31	1344.58
1+90.45	1345.06
1+96.75	1345.01
1+97.67	1345.00
2+03.10	1344.91
2+04.48	1344.87
2+06.49	1344.81
2+14.97	1344.68
2+19.61	1344.56
2+38.89	1344.00
2+66.92	1344.21
2+67.09	1344.20
3+00.00	1344.32

Roughness Segment Definitions

Worksheet for CS 1

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1343.41)	(3+00.00, 1344.32)	0.025

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	854.43	ft³/s
Elevation Range	1342.00 to 1345.06 ft	
Flow Area	118.94	ft²
Wetted Perimeter	161.69	ft
Hydraulic Radius	0.74	ft
Top Width	161.24	ft
Normal Depth	1.60	ft
Critical Depth	1.82	ft
Critical Slope	0.00940	ft/ft
Velocity	7.18	ft/s
Velocity Head	0.80	ft
Specific Energy	2.40	ft
Froude Number	1.47	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Worksheet for CS 1

GVF Output Data

Normal Depth	1.60	ft
Critical Depth	1.82	ft
Channel Slope	0.02200	ft/ft
Critical Slope	0.00940	ft/ft

Messages

Notes

Solve for max flow rate. Per Alt 1, 2, 3 models flow=0cfs.

Cross Section for CS 2

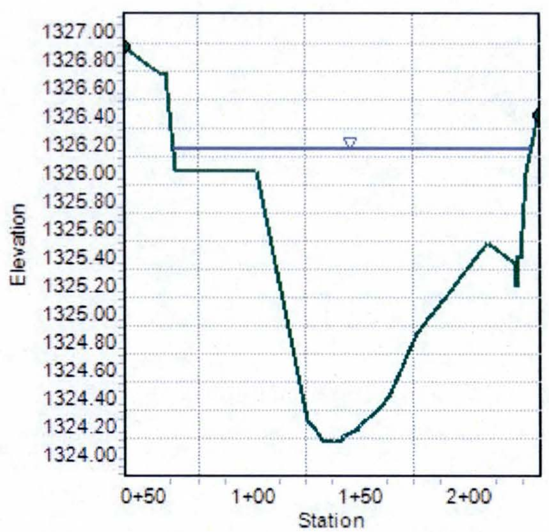
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02800	ft/ft
Normal Depth	2.07	ft
Discharge	1715.00	ft³/s

Cross Section Image



Worksheet for CS 2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02800	ft/ft
Discharge	1715.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+40.79	1326.87
0+58.80	1326.68
0+59.79	1326.69
0+64.39	1326.00
0+72.75	1326.00
0+85.25	1326.00
0+99.30	1326.00
1+02.04	1326.00
1+25.70	1324.23
1+29.42	1324.18
1+32.40	1324.10
1+38.24	1324.09
1+41.54	1324.10
1+42.50	1324.12
1+49.00	1324.18
1+49.17	1324.18
1+49.59	1324.19
1+50.00	1324.20
1+57.72	1324.31
1+59.81	1324.34
1+62.52	1324.39
1+63.18	1324.40
1+66.24	1324.53
1+76.38	1324.86
2+08.92	1325.49
2+20.85	1325.35
2+21.84	1325.19

Worksheet for CS 2

Input Data

Station (ft)	Elevation (ft)
2+22.72	1325.42
2+23.11	1325.39
2+26.36	1326.00
2+31.66	1326.43
2+32.23	1326.40

Start Station	Ending Station	Roughness Coefficient
(0+40.79, 1326.87)	(2+32.23, 1326.40)	0.025

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	2.07	ft
Elevation Range	1324.09 to 1326.87 ft	
Flow Area	169.53	ft²
Wetted Perimeter	165.26	ft
Hydraulic Radius	1.03	ft
Top Width	165.06	ft
Normal Depth	2.07	ft
Critical Depth	2.55	ft
Critical Slope	0.00807	ft/ft
Velocity	10.12	ft/s
Velocity Head	1.59	ft
Specific Energy	3.66	ft
Froude Number	1.76	

Worksheet for CS 2

Results

Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.07	ft
Critical Depth	2.55	ft
Channel Slope	0.02800	ft/ft
Critical Slope	0.00807	ft/ft

Messages

Notes

Solve for max flow rate. Per Alt 1, 2, 3 models flow=0cfs.

Cross Section for CS 3

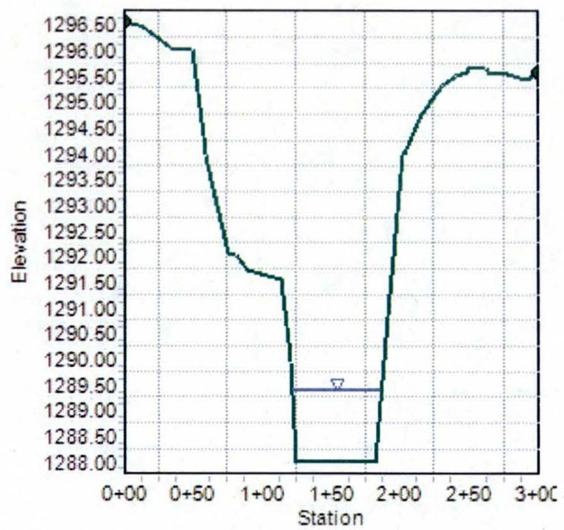
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01700	ft/ft
Normal Depth	1.39	ft
Discharge	787.00	ft³/s

Cross Section Image



Worksheet for CS 3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01700	ft/ft
Discharge	787.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1296.54
0+10.91	1296.47
0+13.55	1296.44
0+36.20	1296.00
0+49.64	1296.00
0+58.77	1294.02
0+58.86	1294.00
0+58.91	1293.99
0+58.97	1293.98
0+59.29	1293.94
0+75.29	1292.00
0+75.89	1292.00
0+76.22	1292.00
0+79.79	1292.00
0+80.65	1292.00
0+81.31	1292.00
0+89.67	1291.72
1+13.53	1291.53
1+20.68	1290.00
1+20.81	1289.92
1+24.33	1288.00
1+50.00	1288.00
1+68.34	1288.00
1+82.15	1288.00
1+87.54	1289.61
1+89.00	1290.00
1+93.07	1291.28

Worksheet for CS 3

Input Data

Station (ft)	Elevation (ft)
1+95.51	1292.00
1+99.86	1293.29
2+02.50	1294.00
2+03.41	1294.00
2+16.03	1294.75
2+31.54	1295.30
2+39.04	1295.44
2+40.95	1295.50
2+49.41	1295.58
2+50.51	1295.62
2+62.23	1295.64
2+64.93	1295.54
2+73.04	1295.55
2+92.00	1295.41
2+92.63	1295.40
3+00.00	1295.55

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.39	ft
Elevation Range	1288.00 to 1296.54 ft	
Flow Area	85.24	ft²
Wetted Perimeter	65.57	ft
Hydraulic Radius	1.30	ft
Top Width	65.01	ft
Normal Depth	1.39	ft
Critical Depth	1.75	ft
Critical Slope	0.00785	ft/ft

Worksheet for CS 3

Results

Velocity	9.23	ft/s
Velocity Head	1.32	ft
Specific Energy	2.71	ft
Froude Number	1.42	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.39	ft
Critical Depth	1.75	ft
Channel Slope	0.01700	ft/ft
Critical Slope	0.00785	ft/ft

Cross Section for CS 4

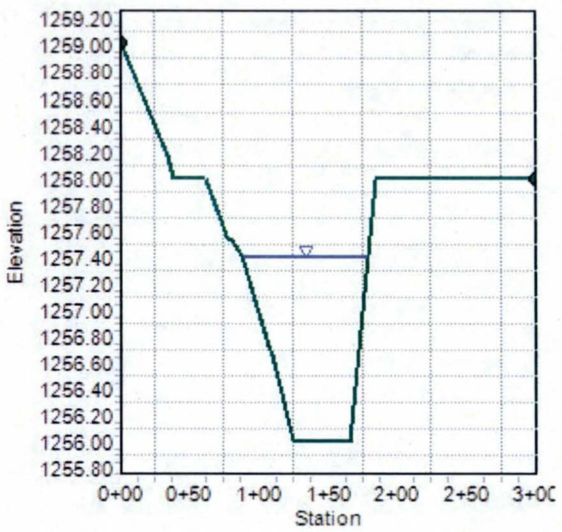
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02000	ft/ft
Normal Depth	1.39	ft
Discharge	769.00	ft³/s

Cross Section Image



Worksheet for CS 4

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02000	ft/ft
Discharge	769.00	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	1259.02
0+34.67	1258.17
0+39.04	1258.00
0+39.31	1258.00
0+39.71	1258.00
0+42.37	1258.00
0+43.33	1258.00
0+62.44	1258.00
0+77.18	1257.55
0+78.01	1257.54
0+81.54	1257.53
0+88.24	1257.41
1+03.61	1256.82
1+07.33	1256.73
1+09.82	1256.66
1+24.69	1256.00
1+25.34	1256.00
1+26.59	1256.00
1+26.82	1256.00
1+27.11	1256.00
1+50.00	1256.00
1+62.44	1256.00
1+64.12	1256.00
1+66.36	1256.00
1+67.62	1256.14
1+85.25	1258.00
1+98.83	1258.00

Worksheet for CS 4

Input Data

Station (ft)	Elevation (ft)
2+39.56	1258.00
2+46.14	1258.00
2+46.95	1258.00
2+67.79	1258.00
2+88.47	1258.00
2+88.57	1258.00
2+93.15	1258.00
3+00.00	1258.00

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.39	ft
Elevation Range	1256.00 to 1259.02 ft	
Flow Area	91.25	ft²
Wetted Perimeter	90.91	ft
Hydraulic Radius	1.00	ft
Top Width	90.81	ft
Normal Depth	1.39	ft
Critical Depth	2.04	ft
Critical Slope	0.01055	ft/ft
Velocity	8.43	ft/s
Velocity Head	1.10	ft
Specific Energy	2.50	ft
Froude Number	1.48	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft

GVF Input Data

Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.39	ft
Critical Depth	2.04	ft
Channel Slope	0.02000	ft/ft
Critical Slope	0.01055	ft/ft

Cross Section for CS 5

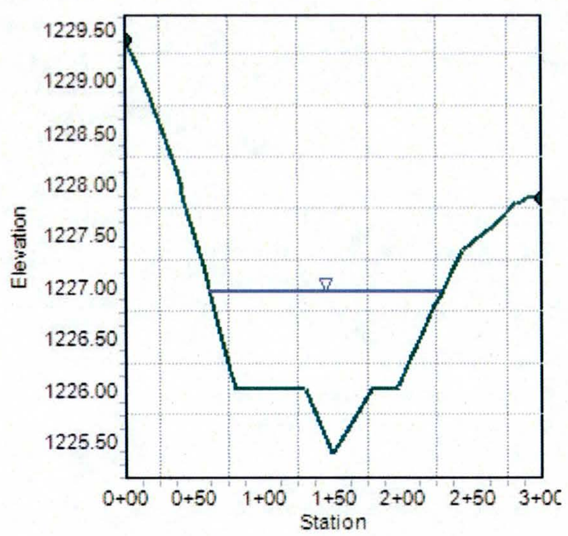
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01400	ft/ft
Normal Depth	1.57	ft
Discharge	970.00	ft³/s

Cross Section Image



Worksheet for CS 5

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01400	ft/ft
Discharge	970.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1229.38
0+07.12	1229.19
0+17.01	1228.88
0+36.70	1228.13
0+39.82	1228.00
0+42.08	1227.88
0+55.82	1227.20
0+74.69	1226.24
0+80.29	1226.00
0+99.19	1226.00
1+03.41	1226.00
1+04.57	1226.00
1+05.07	1226.00
1+17.14	1226.00
1+28.92	1226.00
1+30.08	1226.00
1+49.06	1225.38
1+50.00	1225.39
1+51.06	1225.40
1+52.83	1225.44
1+78.48	1226.00
1+80.38	1226.00
1+84.07	1226.00
1+89.95	1226.00
1+95.72	1226.00
1+95.78	1226.00
1+96.22	1226.00

Worksheet for CS 5

Input Data

Station (ft)	Elevation (ft)
1+96.87	1226.02
1+97.11	1226.03
2+06.42	1226.33
2+09.26	1226.40
2+23.74	1226.82
2+27.31	1226.89
2+34.91	1227.12
2+43.69	1227.35
2+66.15	1227.60
2+82.09	1227.81
2+82.85	1227.80
2+88.33	1227.86
2+88.85	1227.85
2+94.04	1227.87
2+94.43	1227.87
3+00.00	1227.86

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.57	ft
Elevation Range	1225.38 to 1229.38 ft	
Flow Area	149.37	ft²
Wetted Perimeter	168.41	ft
Hydraulic Radius	0.89	ft
Top Width	168.35	ft
Normal Depth	1.57	ft
Critical Depth	1.70	ft
Critical Slope	0.00916	ft/ft

Worksheet for CS 5

Results

Velocity	6.49	ft/s
Velocity Head	0.66	ft
Specific Energy	2.22	ft
Froude Number	1.22	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.57	ft
Critical Depth	1.70	ft
Channel Slope	0.01400	ft/ft
Critical Slope	0.00916	ft/ft

Cross Section for CS 6

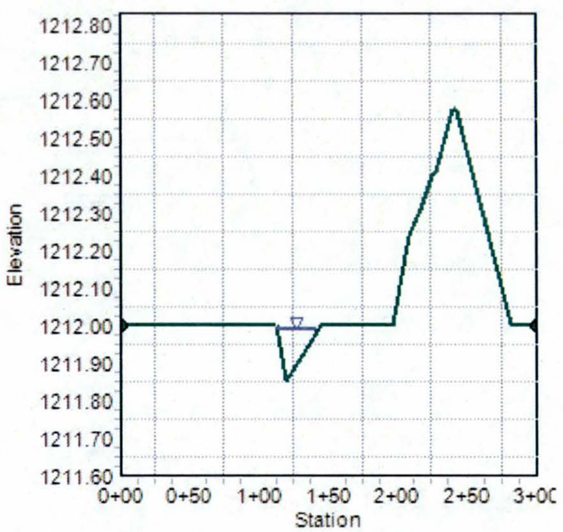
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01700	ft/ft
Normal Depth	0.14	ft
Discharge	2.70	ft³/s

Cross Section Image



Worksheet for CS 6

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01700	ft/ft
Discharge	2.70	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1212.00
0+14.18	1212.00
0+20.45	1212.00
0+21.33	1212.00
0+29.50	1212.00
0+32.64	1212.00
0+33.50	1212.00
0+33.55	1212.00
0+33.63	1212.00
0+76.76	1212.00
0+92.03	1212.00
1+05.73	1212.00
1+12.23	1212.00
1+19.54	1211.85
1+45.38	1212.00
1+50.00	1212.00
1+69.96	1212.00
1+82.10	1212.00
1+92.61	1212.00
1+97.21	1212.00
2+09.31	1212.24
2+17.72	1212.31
2+26.38	1212.40
2+28.14	1212.41
2+35.08	1212.50
2+40.21	1212.58
2+43.32	1212.57

Worksheet for CS 6

Input Data

Station (ft)	Elevation (ft)
2+81.58	1212.00
2+88.23	1212.00
2+95.13	1212.00
3+00.00	1212.00

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1212.00)	(3+00.00, 1212.00)	0.025

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.14	ft
Elevation Range	1211.85 to 1212.58 ft	
Flow Area	2.07	ft²
Wetted Perimeter	30.28	ft
Hydraulic Radius	0.07	ft
Top Width	30.28	ft
Normal Depth	0.14	ft
Critical Depth	0.13	ft
Critical Slope	0.02264	ft/ft
Velocity	1.30	ft/s
Velocity Head	0.03	ft
Specific Energy	0.16	ft
Froude Number	0.88	
Flow Type	Subcritical	

Worksheet for CS 6

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.14	ft
Critical Depth	0.13	ft
Channel Slope	0.01700	ft/ft
Critical Slope	0.02264	ft/ft

Messages

Notes

Solve for max flow rate. Per Alt 1, 2, 3 models flow=809cfs.

Cross Section for CS 7

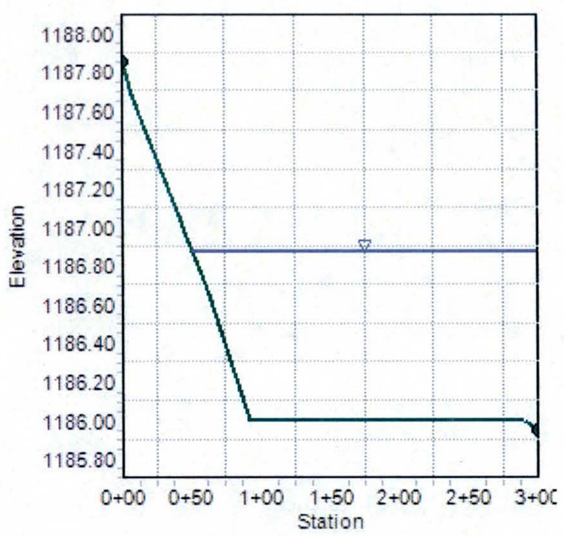
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01400	ft/ft
Normal Depth	0.92	ft
Discharge	0.00	ft³/s

Cross Section Image



Worksheet for CS 7

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01400	ft/ft
Discharge	0.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1187.85
0+07.50	1187.68
0+17.19	1187.50
0+40.80	1187.06
0+45.14	1186.97
0+56.89	1186.77
0+63.85	1186.65
0+92.49	1186.00
0+96.64	1186.00
1+02.10	1186.00
1+02.35	1186.00
1+09.37	1186.00
1+14.62	1186.00
1+29.13	1186.00
1+50.00	1186.00
1+54.01	1186.00
1+69.66	1186.00
1+79.59	1186.00
1+85.83	1186.00
1+88.25	1186.00
1+92.33	1186.00
2+13.36	1186.00
2+19.52	1186.00
2+53.04	1186.00
2+55.21	1186.00
2+88.54	1186.00
2+89.30	1186.00

Worksheet for CS 7

Input Data

Station (ft)	Elevation (ft)
2+89.35	1186.00
2+89.36	1186.00
3+00.00	1185.95

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1187.85)	(3+00.00, 1185.95)	0.025

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.92	ft
Elevation Range	1185.95 to 1187.85 ft	
Flow Area	198.68	ft²
Wetted Perimeter	250.12	ft
Hydraulic Radius	0.79	ft
Top Width	249.19	ft
Normal Depth	0.92	ft
Critical Depth	1.03	ft
Critical Slope	0.00955	ft/ft
Velocity	6.03	ft/s
Velocity Head	0.57	ft
Specific Energy	1.49	ft
Froude Number	1.19	
Flow Type	Supercritical	

Worksheet for CS 7

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.92	ft
Critical Depth	1.03	ft
Channel Slope	0.01400	ft/ft
Critical Slope	0.00955	ft/ft

Messages

Notes

Solve for max flow rate. Per Alt 1, 2, 3 models flow=809cfs.

Worksheet for CS 8

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	1.95	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	1355.58
0+05.51	1355.16
0+20.87	1354.00
0+29.11	1353.80
0+37.58	1353.33
0+38.14	1353.31
0+42.42	1353.12
0+50.84	1352.67
0+56.40	1352.74
0+64.43	1353.55
0+65.23	1353.59
0+65.88	1353.64
0+70.15	1354.00
1+19.83	1352.00
1+22.32	1351.66
1+24.79	1351.29
1+28.26	1350.77
1+33.36	1350.00
1+44.11	1348.49
1+47.60	1348.00
1+55.14	1348.24
1+65.02	1349.14
1+74.65	1350.00
1+91.96	1349.54

Roughness Segment Definitions

Input Data

(0+00.00, 1355.58)	(1+91.96, 1349.54)	0.037

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	244.50	ft³/s
Elevation Range	1348.00 to 1355.58 ft	
Flow Area	46.62	ft²
Wetted Perimeter	56.44	ft
Hydraulic Radius	0.83	ft
Top Width	55.80	ft
Normal Depth	1.95	ft
Critical Depth	1.96	ft
Critical Slope	0.02149	ft/ft
Velocity	5.24	ft/s
Velocity Head	0.43	ft
Specific Energy	2.38	ft
Froude Number	1.01	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.95	ft
Critical Depth	1.96	ft

Worksheet for CS 8

GVF Output Data

Channel Slope	0.02200	ft/ft
Critical Slope	0.02149	ft/ft

Cross Section for CS 8

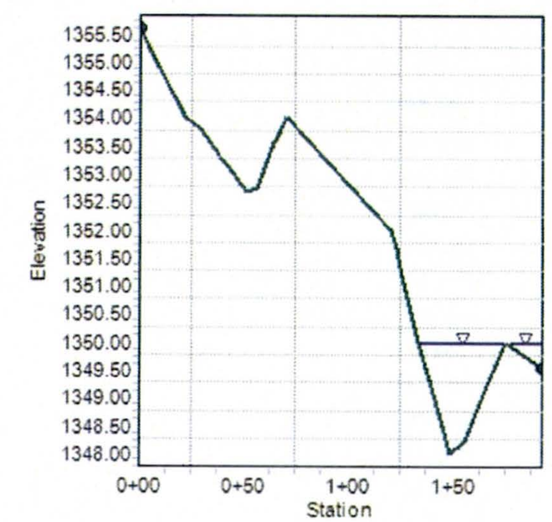
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	1.95	ft
Discharge	244.50	ft³/s

Cross Section Image



Worksheet for CS 9

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	1.98	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1351.20
0+01.72	1351.11
0+04.17	1351.01
0+12.62	1350.59
0+22.03	1350.00
0+27.93	1349.46
0+33.78	1349.21
0+50.69	1348.00
0+59.50	1347.93
0+59.55	1347.92
0+62.20	1347.63
0+67.12	1346.98
0+70.15	1346.90
0+83.80	1346.00
1+23.73	1344.83
1+31.62	1344.00
1+35.76	1343.39
1+47.88	1342.00
1+48.15	1341.97
1+48.59	1342.00
1+71.30	1343.37
1+78.85	1344.00
2+66.07	1343.47

Roughness Segment Definitions

Worksheet for CS 9

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1351.20)	(2+66.07, 1343.47)	0.037

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	264.44	ft³/s
Elevation Range	1341.97 to 1351.20 ft	
Flow Area	67.37	ft²
Wetted Perimeter	125.95	ft
Hydraulic Radius	0.53	ft
Top Width	125.28	ft
Normal Depth	1.98	ft
Critical Depth	1.95	ft
Critical Slope	0.02479	ft/ft
Velocity	3.93	ft/s
Velocity Head	0.24	ft
Specific Energy	2.22	ft
Froude Number	0.94	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.98	ft
Critical Depth	1.95	ft
Channel Slope	0.02200	ft/ft

Worksheet for CS 9

GVF Output Data

Critical Slope	0.02479	ft/ft

Cross Section for CS 9

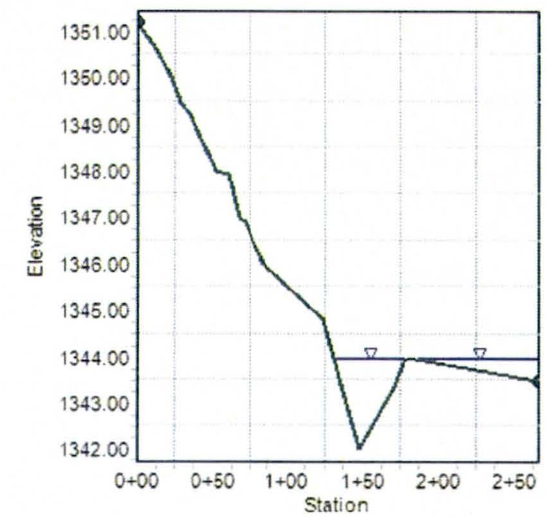
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	1.98	ft
Discharge	264.44	ft³/s

Cross Section Image



Worksheet for CS 10

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	12.00	ft
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	1340.00
0+10.63	1339.46
0+22.27	1338.94
0+42.80	1338.00
0+44.77	1337.89
0+72.82	1336.00
1+16.46	1334.48
1+19.78	1334.00
1+21.93	1333.68
1+23.31	1333.37
1+27.31	1332.60
1+29.54	1332.17
1+30.32	1332.00
1+31.31	1331.60
1+36.32	1330.00
1+38.27	1329.12
1+41.47	1328.00
1+42.67	1327.44
1+45.80	1326.00
1+49.84	1324.24
1+50.00	1324.16
1+50.32	1324.00
1+53.50	1324.24
1+56.34	1326.00
1+59.92	1327.83
1+60.25	1328.00
1+62.59	1329.31

Worksheet for CS 10

Input Data

Station (ft)	Elevation (ft)
1+63.90	1330.00
1+65.94	1331.18
1+67.38	1332.00
1+69.69	1333.16
1+71.20	1334.00
1+78.04	1334.67
1+80.34	1334.87
1+85.35	1335.36
2+07.60	1336.00
2+14.72	1335.96
2+15.67	1335.95
2+16.12	1335.94
2+18.63	1335.84
2+33.96	1335.32
2+61.44	1334.00
3+00.00	1333.68

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1340.00)	(3+00.00, 1333.68)	0.037

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	5558.44	ft^3/s
Elevation Range	1324.00 to 1340.00 ft	

Worksheet for CS 10

Results

Flow Area	536.58	ft²
Wetted Perimeter	233.97	ft
Hydraulic Radius	2.29	ft
Top Width	227.18	ft
Normal Depth	12.00	ft
Critical Depth	12.30	ft
Critical Slope	0.01507	ft/ft
Velocity	10.36	ft/s
Velocity Head	1.67	ft
Specific Energy	13.67	ft
Froude Number	1.19	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	12.00	ft
Critical Depth	12.30	ft
Channel Slope	0.02200	ft/ft
Critical Slope	0.01507	ft/ft

Cross Section for CS 10

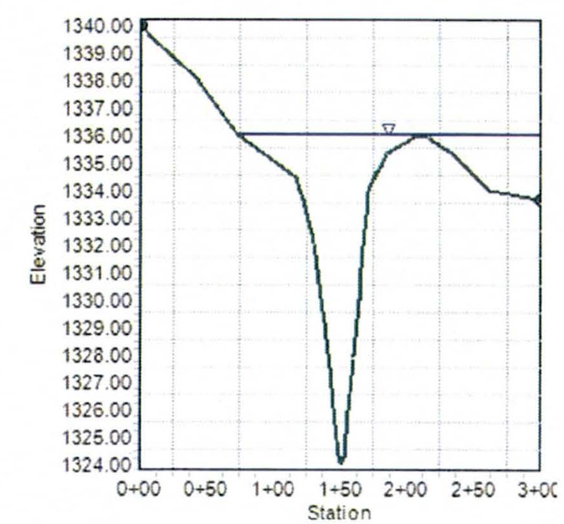
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	12.00	ft
Discharge	5558.44	ft³/s

Cross Section Image



Worksheet for CS 11

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	2.00	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1341.96
0+00.39	1342.00
0+52.18	1342.28
0+79.51	1342.21
0+87.88	1342.00
1+06.97	1341.36
1+08.46	1341.39
1+10.33	1341.27
1+15.17	1340.96
1+28.20	1340.68
1+49.61	1340.45
1+67.42	1340.27
1+74.90	1340.00
1+82.56	1340.96
1+88.07	1342.00
2+05.10	1341.97

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1341.96)	(2+05.10, 1341.97)	0.037

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method

Worksheet for CS 11

Options

Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	689.59	ft³/s
Elevation Range	1340.00 to 1342.28 ft	
Flow Area	116.61	ft²
Wetted Perimeter	117.87	ft
Hydraulic Radius	0.99	ft
Top Width	117.61	ft
Normal Depth	2.00	ft
Critical Depth	2.07	ft
Critical Slope	0.02044	ft/ft
Velocity	5.91	ft/s
Velocity Head	0.54	ft
Specific Energy	2.54	ft
Froude Number	1.05	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.00	ft
Critical Depth	2.07	ft
Channel Slope	0.02200	ft/ft
Critical Slope	0.02044	ft/ft

Cross Section for CS 11

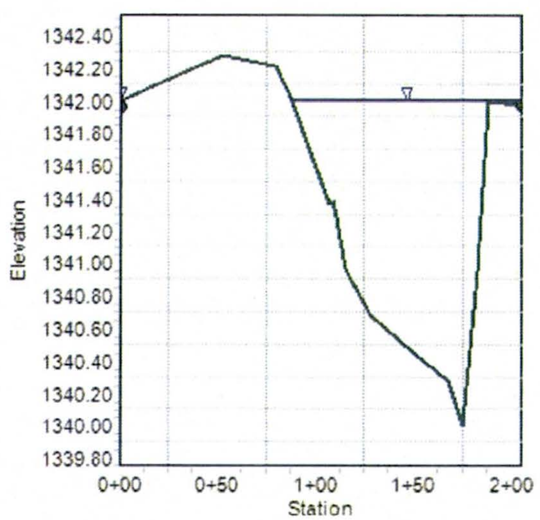
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	2.00	ft
Discharge	689.59	ft³/s

Cross Section Image



Worksheet for CS 12

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02200	ft/ft
Discharge	1971.00	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	1327.71
0+06.20	1327.74
0+07.69	1327.97
0+08.09	1328.00
0+37.89	1327.01
0+41.43	1326.00
0+48.32	1324.30
0+50.36	1324.37
0+52.12	1324.45
0+54.36	1324.78
0+63.42	1325.72
0+64.64	1325.88
0+65.39	1326.00
0+66.32	1326.10
0+66.55	1326.09
0+69.21	1326.56
0+69.56	1326.52
0+71.02	1326.74
0+71.54	1326.70
0+72.56	1326.66
0+83.77	1327.20
0+85.75	1327.13
1+08.06	1326.15
1+09.25	1326.10
1+09.84	1326.08
1+11.41	1326.00
1+30.70	1324.70

Worksheet for CS 12

Input Data

Station (ft)	Elevation (ft)
1+31.95	1324.65
1+35.15	1324.56
1+37.10	1324.00
1+42.93	1322.07
1+43.13	1322.00
1+56.87	1322.62
1+63.84	1324.00
1+67.53	1325.23
1+69.47	1326.00
1+70.84	1326.49
1+75.14	1328.00
1+77.40	1328.44
1+79.05	1328.39
2+04.71	1329.05
2+07.76	1329.01
2+13.78	1328.97
2+19.21	1328.96
2+23.48	1329.00
2+46.26	1329.33
2+50.18	1329.41
2+51.52	1329.44
2+55.17	1329.49
2+56.94	1329.52
2+67.92	1329.61
2+69.68	1329.65
2+79.86	1329.54
2+81.90	1329.46
2+88.12	1329.40
2+89.85	1329.31
2+95.41	1329.04
3+00.00	1328.98

Worksheet for CS 12

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1327.71)	(3+00.00, 1328.98)	0.037

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	4.84	ft
Elevation Range	1322.00 to 1329.65 ft	
Flow Area	219.60	ft²
Wetted Perimeter	118.73	ft
Hydraulic Radius	1.85	ft
Top Width	117.14	ft
Normal Depth	4.84	ft
Critical Depth	5.10	ft
Critical Slope	0.01637	ft/ft
Velocity	8.98	ft/s
Velocity Head	1.25	ft
Specific Energy	6.09	ft
Froude Number	1.16	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	4.84	ft

Worksheet for CS 12

GVF Output Data

Critical Depth	5.10	ft
Channel Slope	0.02200	ft/ft
Critical Slope	0.01637	ft/ft

Cross Section for CS 12

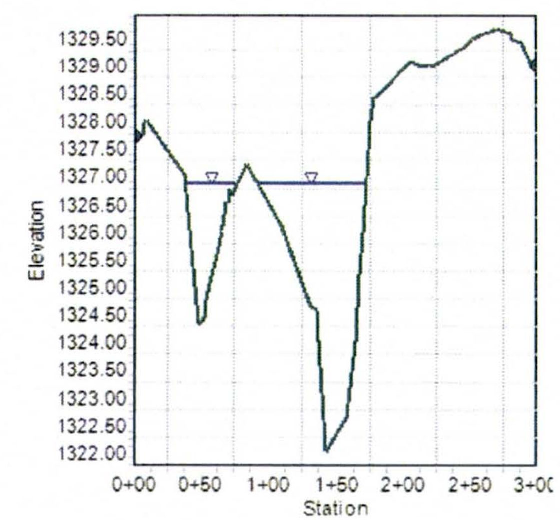
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	4.84	ft
Discharge	1971.00	ft³/s

Cross Section Image



APPENDIX L

Skyline Wash Sedimentation Calculations

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - SEDIMENT
Project Reference: SKYLINE FAN DCR 3-04

		Q (cfs)	Volume (ac-ft)	Wash Load (ac-ft)	Bed Load (ac-ft)	Total Yield (ac-ft)
ID: SKYLINE WASH	**2 Year:**	538	65.00	1.442	0.051	1.493
Return Periods for Analysis: All	**5 Year:**	1,190	112.00	3.050	0.158	3.208
	10 Year:	1,724	148.00	4.387	0.264	4.651
	25 Year:	2,459	197.00	6.282	0.440	6.722
	50 Year:	3,199	242.00	8.168	0.668	8.836
	100 Year:	3,973	290.00	10.206	0.942	11.148
	Design:	3,973	290.00	10.206	0.94	11.148
	Annual:			2.065	0.115	2.180

Town of Buckeye
Flood Control District of Maricopa County
Skyline Fan DCR
TOB Contract No. 2012-006

Soil and Land Use Data

Flood Delineation Study (FDS) FCD 96-08

Table 2: Soil and Land Use Parameters

														FDS HEC-1 Model	
Sub-basin	Area ($mile^2$)	Area by Soil Type ($mile^2$)									Area by Land Use ($mile^2$)			Impervious Area (%)	Impervious Area ($mile^2$)
		AGB	GYD	HLC	PYD	TB	3	29	98	100	Mtn	Hillside	Rural-43	RTIMP	Imp Area
S1	0.5098								0.0417	0.4681	0.5098			18	0.09176
S2	0.2198								0.0207	0.1992	0.2198			18	0.03958
S3	0.6491								0.2261	0.4231	0.6491			13	0.08440
S4	0.4077								0.1335	0.2742	0.2038	0.2038		13	0.05300
S5	0.5323								0.0042	0.5281	0.5323			20	0.10646
S6	0.2464								0.0611	0.1853	0.148	0.0984		15	0.03696
S7	0.1344								0.0553	0.0791	0.0672	0.0672		12	0.01613
S8	0.3378									0.3378	0.3378			20	0.06756
S9	0.2094								0.0329	0.1764	0.1047	0.1047		17	0.03558
S10	0.1935								0.0148	0.1787	0.174	0.0195		18	0.03483
S11	0.1682								0.0717	0.0965	0.0841	0.0841		11	0.01850
S12W	0.0905						0.0075			0.083		0.0905		18	0.01629
S12E	0.0549						0.0045			0.0504		0.0549		18	0.00988
S13	0.1736						0.0421		0.0991	0.0324		0.1736		4	0.00694
Total	3.9274						0.0541		0.7611	3.1123					0.6179
%							0.014		0.1938	0.792					15.7
Soil Erodibility Factor K							0.20		0.05	0.05	DDMSW Default				

Cover and Management Factor C

C_I	C_{II}	C_{III}	C
0.83	0.75	0.4	0.249
25%	10%	30%	
1 m		Weeds	

Town of Buckeye
Flood Control District of Maricopa County
Skyline Fan DCR
TOB Contract No. 2012-006

Gradation Test Results
Sieve test data provided by Terracon
Eight soil samples sampled in Skyline Wash

	D_{84}	D_{50}	D_{16}	D_{10}	
	4.1	0.84	0.22	0.244	
	9.1	1.15	0.25	0.396	
	10.0	1.30	0.33	0.147	
	11.0	1.30	0.35	0.156	
	34.0	2.50	0.55	0.245	
	3.9	0.93	0.29	0.196	
	7.1	1.10	0.37	0.269	
	7.1	1.15	0.41	0.269	
Average:	10.8	1.28	0.346	0.240	mm

Major Basin: 01

ID: SKYLINE 1 Cross Section ID: SKYLINE WASH X-S 1

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	1.90	1.30	2.47	State Standard Level I
General	3.26	1.30	4.24	Blench
Local		1.30		
Bedform	.59	1.30	.77	Comments
Low Flow	1.50	1.30	1.95	
Total			**9.43**	

ID: SKYLINE 2 Cross Section ID: SKYLINE WASH X-S 2

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	1.90	1.30	2.47	State Standard Level I
General	3.83	1.30	4.98	Blench
Local		1.30		
Bedform	.98	1.30	1.27	Comments
Low Flow	1.50	1.30	1.95	
Total			**10.67**	

ID: SKYLINE 5 Cross Section ID: SKYLINE WASH X-S 5

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	1.86	1.30	2.42	State Standard Level I
General	2.95	1.30	3.84	Blench
Local		1.30		
Bedform	.46	1.30	.60	Comments
Low Flow	1.00	1.30	1.30	
Total			**8.16**	

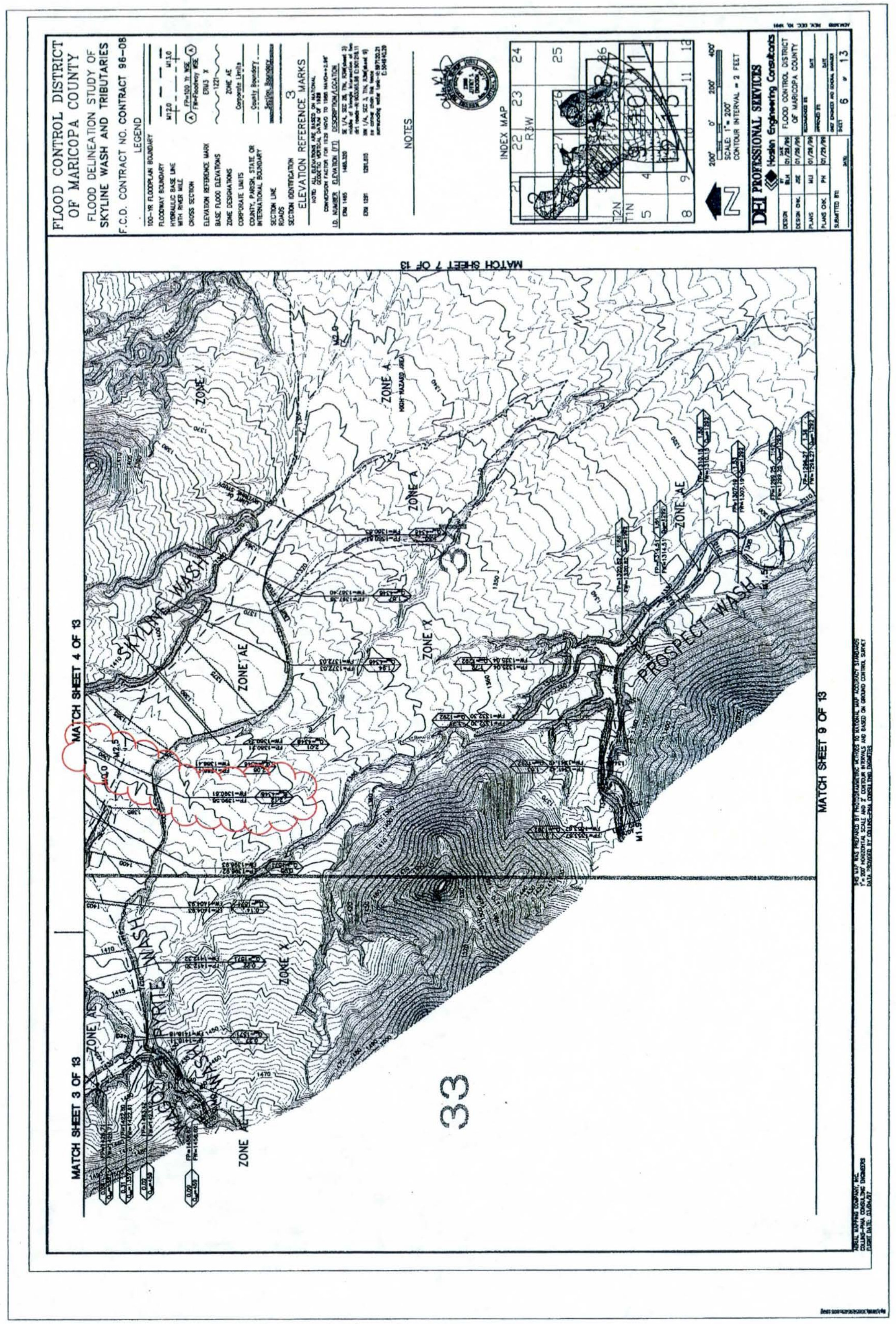
April 2007

July 2012

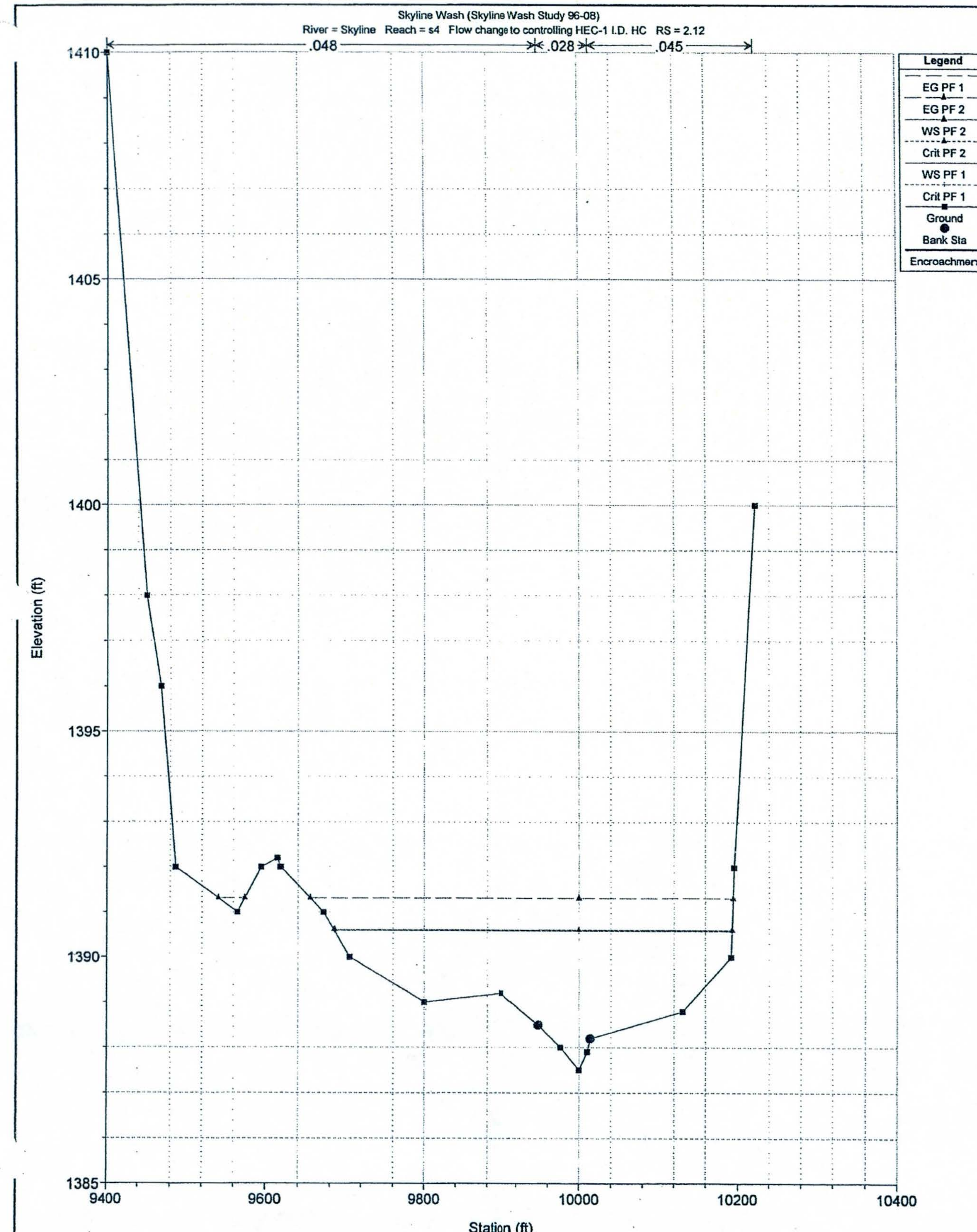
April 2007

July 2012

C	Variable	Comments
C1	Average fall height of drops from canopy.	1 meter = approximately 3 feet.
	Percent ground cover by canopy.	25%
C2	Percent of soil surface covered by mulch.	10%
C3	Root network in top soil.	30% - Selected to give middle of factor range.
	Weeds or grass	Weeds



FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
FLOOD DELINEATION STUDY OF SKYLINE WASH AND TRIBUTARIES
F.C.D. CONTRACT NO. CONTRACT 96-08
LEGEND
NOTES
INDEX MAP
MATCH SHEET 7 OF 13
MATCH SHEET 4 OF 13
MATCH SHEET 3 OF 13
MATCH SHEET 9 OF 13
SKYLINE WASH
PROSPECT WASH
PYRITE WASH
ZONE X
ZONE A
ZONE AE
33



Skyline Wash (Skyline Wash Study 96-08)
River = Skyline Reach = s4 Flow change to controlling HEC-1 I.D. HC RS = 2.12
.048
.028
.045
Legend
EG PF 1
EG PF 2
WS PF 2
Crit PF 2
WS PF 1
Crit PF 1
Ground
Bank Sta
Encroachment
Elevation (ft)
1385
1390
1395
1400
1405
1410
9400
9600
9800
10000
10200
10400
Station (ft)

Major Basin: 01
ID: RS2.12 Cross Section ID: X-S AT RIVER STA 2.12 (HC13)

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	2.89	1.30	3.76	State Standard Level I
General	4.64	1.30	6.03	Lacey
Local		1.30		
Bedform	.38	1.30	.49	Comments
Low Flow		1.30		
Total			**10.28**	

APPENDIX M

Skyline Wash Representative Flow Calculations

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - TOTAL SCOUR
Project Reference: SKYLINE WASH BASE SC

Major Basin: 01

ID: SKYLINE 1 Cross Section ID: SKYLINE WASH X-S 1, Q = 577 cfs

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	.91	1.30	1.18	State Standard Level I
General	1.66	1.30	2.16	Lacey
Local		1.30		
Bedform	.32	1.30	.42	Comments
Low Flow	1.50	1.30	1.95	
Total			**5.71**	

ID: SKYLINE 2 Cross Section ID: SKYLINE WASH X-S 2, Q = 1715 cfs

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	1.74	1.30	2.26	State Standard Level I
General	2.39	1.30	3.11	Lacey
Local		1.30		
Bedform	.88	1.30	1.14	Comments
Low Flow	1.50	1.30	1.95	
Total			**8.46**	

ID: SKYLINE 5 Cross Section ID: SKYLINE WASH X-S 5, Q = 1906 cfs

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	1.86	1.30	2.42	State Standard Level I
General	2.47	1.30	3.21	Lacey
Local		1.30		
Bedform	.46	1.30	.60	Comments
Low Flow	1.00	1.30	1.30	
Total			**7.53**	

* Non default value

Flood Control District of Maricopa County
Drainage Design Management System
RIVER MECHANICS - TOTAL SCOUR
Project Reference: SKY WASH REP FLOW

Major Basin: 01

ID: SKYLINE 1 Cross Section ID: SKYLINE WASH X-S 1, Q = 400cfs

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	.73	1.30	.95	State Standard Level I
General	1.74	1.30	2.26	Blench
Local		1.30		
Bedform	.39	1.30	.51	Comments
Low Flow	1.50	1.30	1.95	
Total			**5.67**	

ID: SKYLINE 2 Cross Section ID: SKYLINE WASH X-S 2, Q = 400cfs

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	.73	1.30	.95	State Standard Level I
General	1.87	1.30	2.43	Blench
Local		1.30		
Bedform	.40	1.30	.52	Comments
Low Flow	1.50	1.30	1.95	
Total			**5.85**	

ID: SKYLINE 5 Cross Section ID: SKYLINE WASH X-S 5, Q = 400cfs

Type	Calc (ft)	FS	Value (ft)	Method
Long Term	.73	1.30	.95	State Standard Level I
General	1.44	1.30	1.87	Blench
Local		1.30		
Bedform	.19	1.30	.25	Comments
Low Flow	1.00	1.30	1.30	
Total			**4.37**	

* Non default value

Worksheet for CS 1 n=0.037

Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	1.60	ft

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1343.41
0+02.17	1343.39
0+06.08	1343.36
0+46.73	1343.55
0+51.63	1343.57
0+60.79	1343.64
0+70.06	1343.47
0+76.65	1343.59
0+83.30	1342.91
0+84.08	1342.87
0+97.26	1342.00
1+65.80	1342.55
1+69.75	1344.00
1+76.31	1344.58
1+90.45	1345.06
1+96.75	1345.01
1+97.67	1345.00
2+03.10	1344.91
2+04.48	1344.87
2+06.49	1344.81
2+14.97	1344.68
2+19.61	1344.56
2+38.89	1344.00
2+66.92	1344.21
2+67.09	1344.20
3+00.00	1344.32

Roughness Segment Definitions

Worksheet for CS 1 n=0.037

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1343.41)	(3+00.00, 1344.32)	0.037

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Discharge	577.32	ft^3/s
Elevation Range	1342.00 to 1345.06 ft	
Flow Area	118.94	ft^2
Wetted Perimeter	161.69	ft
Hydraulic Radius	0.74	ft
Top Width	161.24	ft
Normal Depth	1.60	ft
Critical Depth	1.60	ft
Critical Slope	0.02216	ft/ft
Velocity	4.85	ft/s
Velocity Head	0.37	ft
Specific Energy	1.97	ft
Froude Number	1.00	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Worksheet for CS 1 n=0.037

GVF Output Data

Normal Depth	1.60	ft
Critical Depth	1.60	ft
Channel Slope	0.02200	ft/ft
Critical Slope	0.02216	ft/ft

Cross Section for CS 1 n=0.037

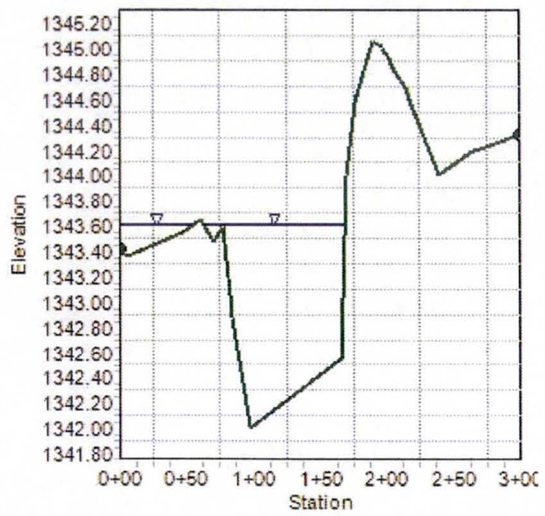
Project Description

Friction Method	Manning Formula
Solve For	Discharge

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	1.60	ft
Discharge	577.32	ft³/s

Cross Section Image



Worksheet for CS 1 - Representative Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02200	ft/ft
Discharge	400.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00.00	1343.41
0+02.17	1343.39
0+06.08	1343.36
0+46.73	1343.55
0+51.63	1343.57
0+60.79	1343.64
0+70.06	1343.47
0+76.65	1343.59
0+83.30	1342.91
0+84.08	1342.87
0+97.26	1342.00
1+65.80	1342.55
1+69.75	1344.00
1+76.31	1344.58
1+90.45	1345.06
1+96.75	1345.01
1+97.67	1345.00
2+03.10	1344.91
2+04.48	1344.87
2+06.49	1344.81
2+14.97	1344.68
2+19.61	1344.56
2+38.89	1344.00
2+66.92	1344.21
2+67.09	1344.20
3+00.00	1344.32

Roughness Segment Definitions

Worksheet for CS 1 - Representative Flow

Input Data

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1343.41)	(3+00.00, 1344.32)	0.037

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.20	ft
Elevation Range	1342.00 to 1345.06 ft	
Flow Area	74.57	ft²
Wetted Perimeter	87.25	ft
Hydraulic Radius	0.85	ft
Top Width	87.09	ft
Normal Depth	1.20	ft
Critical Depth	1.21	ft
Critical Slope	0.02097	ft/ft
Velocity	5.36	ft/s
Velocity Head	0.45	ft
Specific Energy	1.65	ft
Froude Number	1.02	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s

Worksheet for CS 1 - Representative Flow

GVF Output Data

Normal Depth	1.20	ft
Critical Depth	1.21	ft
Channel Slope	0.02200	ft/ft
Critical Slope	0.02097	ft/ft

Cross Section for CS 1 - Representative Flow

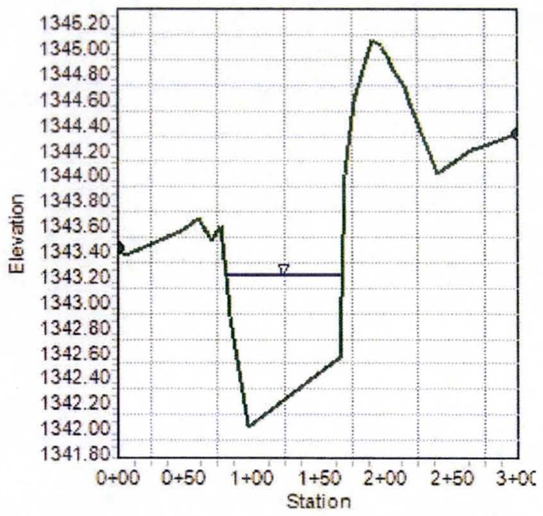
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02200	ft/ft
Normal Depth	1.20	ft
Discharge	400.00	ft³/s

Cross Section Image



Worksheet for CS 2 n-0.037

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02800	ft/ft
Discharge	1715.00	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
0+40.79	1326.87
0+58.80	1326.68
0+59.79	1326.69
0+64.39	1326.00
0+72.75	1326.00
0+85.25	1326.00
0+99.30	1326.00
1+02.04	1326.00
1+25.70	1324.23
1+29.42	1324.18
1+32.40	1324.10
1+38.24	1324.09
1+41.54	1324.10
1+42.50	1324.12
1+49.00	1324.18
1+49.17	1324.18
1+49.59	1324.19
1+50.00	1324.20
1+57.72	1324.31
1+59.81	1324.34
1+62.52	1324.39
1+63.18	1324.40
1+66.24	1324.53
1+76.38	1324.86
2+08.92	1325.49
2+20.85	1325.35
2+21.84	1325.19

Worksheet for CS 2 n-0.037

Input Data

Station (ft)	Elevation (ft)
2+22.72	1325.42
2+23.11	1325.39
2+26.36	1326.00
2+31.66	1326.43
2+32.23	1326.40

Start Station	Ending Station	Roughness Coefficient
(0+40.79, 1326.87)	(2+32.23, 1326.40)	0.037

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	2.36	ft
Elevation Range	1324.09 to 1326.87 ft	
Flow Area	217.49	ft²
Wetted Perimeter	171.11	ft
Hydraulic Radius	1.27	ft
Top Width	170.83	ft
Normal Depth	2.36	ft
Critical Depth	2.55	ft
Critical Slope	0.01767	ft/ft
Velocity	7.89	ft/s
Velocity Head	0.97	ft
Specific Energy	3.32	ft
Froude Number	1.23	

Worksheet for CS 2 n-0.037

Results

Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.36	ft
Critical Depth	2.55	ft
Channel Slope	0.02800	ft/ft
Critical Slope	0.01767	ft/ft

Cross Section for CS 2 n-0.037

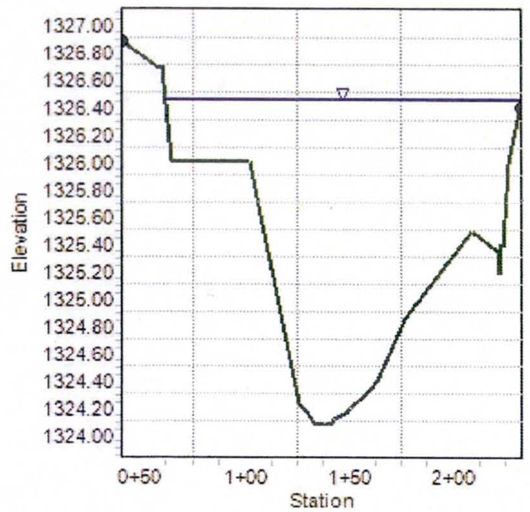
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02800	ft/ft
Normal Depth	2.36	ft
Discharge	1715.00	ft³/s

Cross Section Image



Worksheet for CS 2 - Representative Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02800	ft/ft
Discharge	400.00	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
0+40.79	1326.87
0+58.80	1326.68
0+59.79	1326.69
0+64.39	1326.00
0+72.75	1326.00
0+85.25	1326.00
0+99.30	1326.00
1+02.04	1326.00
1+25.70	1324.23
1+29.42	1324.18
1+32.40	1324.10
1+38.24	1324.09
1+41.54	1324.10
1+42.50	1324.12
1+49.00	1324.18
1+49.17	1324.18
1+49.59	1324.19
1+50.00	1324.20
1+57.72	1324.31
1+59.81	1324.34
1+62.52	1324.39
1+63.18	1324.40
1+66.24	1324.53
1+76.38	1324.86
2+08.92	1325.49
2+20.85	1325.35
2+21.84	1325.19

Worksheet for CS 2 - Representative Flow

Input Data

Station (ft)	Elevation (ft)
2+22.72	1325.42
2+23.11	1325.39
2+26.36	1326.00
2+31.66	1326.43
2+32.23	1326.40

Start Station	Ending Station	Roughness Coefficient
(0+40.79, 1326.87)	(2+32.23, 1326.40)	0.037

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.33	ft
Elevation Range	1324.09 to 1326.87 ft	
Flow Area	74.51	ft²
Wetted Perimeter	104.30	ft
Hydraulic Radius	0.71	ft
Top Width	104.19	ft
Normal Depth	1.33	ft
Critical Depth	1.41	ft
Critical Slope	0.02227	ft/ft
Velocity	5.37	ft/s
Velocity Head	0.45	ft
Specific Energy	1.78	ft
Froude Number	1.12	

Worksheet for CS 2 - Representative Flow

Results

Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.33	ft
Critical Depth	1.41	ft
Channel Slope	0.02800	ft/ft
Critical Slope	0.02227	ft/ft

Cross Section for CS 2 - Representative Flow

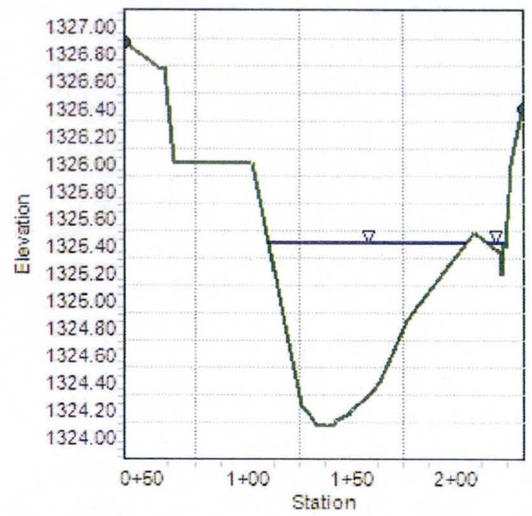
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.02800	ft/ft
Normal Depth	1.33	ft
Discharge	400.00	ft³/s

Cross Section Image



Worksheet for CS 5 n=0.037

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01400	ft/ft
Discharge	1906.00	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	1229.38
0+07.12	1229.19
0+17.01	1228.88
0+36.70	1228.13
0+39.82	1228.00
0+42.08	1227.88
0+55.82	1227.20
0+74.69	1226.24
0+80.29	1226.00
0+99.19	1226.00
1+03.41	1226.00
1+04.57	1226.00
1+05.07	1226.00
1+17.14	1226.00
1+28.92	1226.00
1+30.08	1226.00
1+49.06	1225.38
1+50.00	1225.39
1+51.06	1225.40
1+52.83	1225.44
1+78.48	1226.00
1+80.38	1226.00
1+84.07	1226.00
1+89.95	1226.00
1+95.72	1226.00
1+95.78	1226.00
1+96.22	1226.00

Worksheet for CS 5 n=0.037

Input Data

Station (ft)	Elevation (ft)
1+96.87	1226.02
1+97.11	1226.03
2+06.42	1226.33
2+09.26	1226.40
2+23.74	1226.82
2+27.31	1226.89
2+34.91	1227.12
2+43.69	1227.35
2+66.15	1227.60
2+82.09	1227.81
2+82.85	1227.80
2+88.33	1227.86
2+88.85	1227.85
2+94.04	1227.87
2+94.43	1227.87
3+00.00	1227.86

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1229.38)	(3+00.00, 1227.86)	0.037

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	2.46	ft
Elevation Range	1225.38 to 1229.38 ft	

Worksheet for CS 5 n=0.037

Results

Flow Area	328.70	ft²
Wetted Perimeter	243.92	ft
Hydraulic Radius	1.35	ft
Top Width	243.83	ft
Normal Depth	2.46	ft
Critical Depth	2.32	ft
Critical Slope	0.01831	ft/ft
Velocity	5.80	ft/s
Velocity Head	0.52	ft
Specific Energy	2.98	ft
Froude Number	0.88	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	2.46	ft
Critical Depth	2.32	ft
Channel Slope	0.01400	ft/ft
Critical Slope	0.01831	ft/ft

Cross Section for CS 5 n=0.037

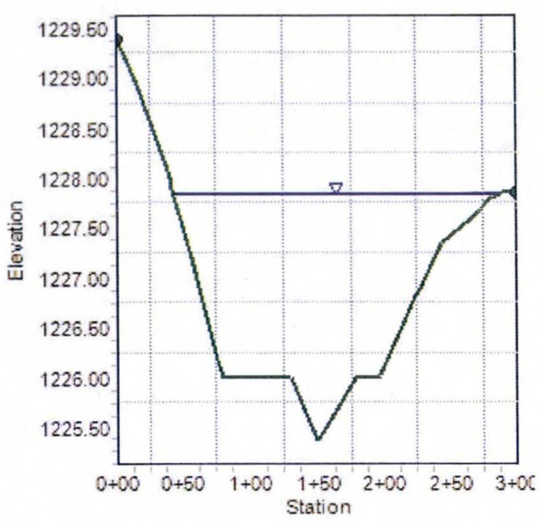
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01400	ft/ft
Normal Depth	2.46	ft
Discharge	1906.00	ft³/s

Cross Section Image



Worksheet for CS 5 - Representative Flow

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01400	ft/ft
Discharge	400.00	ft³/s
Section Definitions		

Station (ft)	Elevation (ft)
0+00.00	1229.38
0+07.12	1229.19
0+17.01	1228.88
0+36.70	1228.13
0+39.82	1228.00
0+42.08	1227.88
0+55.82	1227.20
0+74.69	1226.24
0+80.29	1226.00
0+99.19	1226.00
1+03.41	1226.00
1+04.57	1226.00
1+05.07	1226.00
1+17.14	1226.00
1+28.92	1226.00
1+30.08	1226.00
1+49.06	1225.38
1+50.00	1225.39
1+51.06	1225.40
1+52.83	1225.44
1+78.48	1226.00
1+80.38	1226.00
1+84.07	1226.00
1+89.95	1226.00
1+95.72	1226.00
1+95.78	1226.00
1+96.22	1226.00

Input Data

Station (ft)	Elevation (ft)
1+96.87	1226.02
1+97.11	1226.03
2+06.42	1226.33
2+09.26	1226.40
2+23.74	1226.82
2+27.31	1226.89
2+34.91	1227.12
2+43.69	1227.35
2+66.15	1227.60
2+82.09	1227.81
2+82.85	1227.80
2+88.33	1227.86
2+88.85	1227.85
2+94.04	1227.87
2+94.43	1227.87
3+00.00	1227.86

Start Station	Ending Station	Roughness Coefficient
(0+00.00, 1229.38)	(3+00.00, 1227.86)	0.037

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.30	ft
Elevation Range	1225.38 to 1229.38 ft	

Worksheet for CS 5 - Representative Flow

Results

Flow Area	106.89	ft²
Wetted Perimeter	152.99	ft
Hydraulic Radius	0.70	ft
Top Width	152.95	ft
Normal Depth	1.30	ft
Critical Depth	1.19	ft
Critical Slope	0.02349	ft/ft
Velocity	3.74	ft/s
Velocity Head	0.22	ft
Specific Energy	1.52	ft
Froude Number	0.79	
Flow Type	Subcritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.30	ft
Critical Depth	1.19	ft
Channel Slope	0.01400	ft/ft
Critical Slope	0.02349	ft/ft

Cross Section for CS 5 - Representative Flow

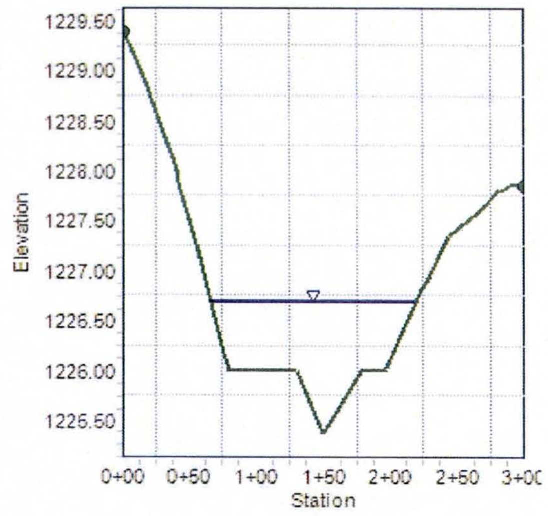
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01400	ft/ft
Normal Depth	1.30	ft
Discharge	400.00	ft³/s

Cross Section Image



APPENDIX N

Brainstorming Meeting Notes

SUNRISE ENGINEERING

MINUTES

Town of Buckeye / Flood Control District of Maricopa County

Skyline Wash DCR

Brainstorming Meeting

Date: September 24, 2012
Contract No.: 2012-006
SEI Project No. 04234

	Mtg. Item	Comment	Action By
		Task 1 Project Management	
		Task 2 Data Collection and Base Hydrology Conditions Analysis	
		Task 3 Alternative Analysis	
New Items	3.32	**Key Comments** SV- The DCR has two outcomes. 1. The DCR validates a project that can be added to the CIP and goes to design. 2. The DCR does not validate a project because of technical issues or cost. HK – Town wants to reduce O&M costs. - Parks Master Plan for regional trail head is approved. VS – Multi use trails and things in ADMP were provided for on top the basin. These uses were not allowed inside basin.	

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	3.33	**Evaluation Criteria** 1- Cost- Capital Plus O&M (EV) 2- Minimize/mitigate flood hazards (Similar to 3) 3- Reduce in area the regulatory floodplain; meet FEMA requirements (EV) 4- Public/stakeholder acceptance (EV, Plus #16) 5- Adhere to LA guidelines for ADMP (Kinder and gentler (K&G)) (DS, EV) 6- Meet the State/Federal Agencies' requirements (DS) 7- No Adverse impact to adjacent properties (minimize) (DS) 8- Implementation (EV) 9- Facilitate roadways (EV) 10- Cost share partners benefitted (EV) 11- Not negatively impact in price adjacent properties (Similar to 7, DS) 12- Minimize Safety hazards (EV, DS) 13- Impacted ownerships (Similar to 7 and 11, DS) 14- Environmental/cultural impacts (EV) 15- Meets H&H criteria (DS) 16- Political Acceptance (Similar to 4, EV) 17- Multi-use opportunity (EV)	
	3.34	**Design Criteria** 1- Free Board - No standard for regional basin, 1' acceptable per H&H Dept 1' above 100-yr design w.s. elevation - **KAG follow up w/Amir** - What happens to greater than 100-yr event? Down Skyline or down Prospect? Down Skyline is historic path, but current developments may see Prospect as historic path. 2- Lateral Erosion - Prospect wash considered a fan? Not on FEMA map, but similar to a fan - Duration of flow w/improvements in place. - Caliche level – Needs Geotech Analysis - Possible Easement over erosion set back – Monitor erosion & correct as needed.	

	3.35	**Alternatives** Alternative 1 – Big Basin – no Channel Improvement 1- B Potential 404 issues to Skyline Wash for all alternatives 2- Analyze capacity of Skyline Wash to handle residential flows for all alts. 3- 1' freeboard in basin. 4- Consistent sediment analysis w/ADMP + Annual sediment x3 +100-yr 5- C Approach ASLD regarding their requirement for discharge into prospect wash. 6- Watson & Roosevelt crossing should be one 48" pipe each. The project will only pay for the culvert crossings for the increased flow. 7- C Delete environmental remediation cost from prospect wash based on future discussion w/ASLD 8- Verify/determine capacity of Prospect wash at different locations (Done) 9- $ 10,000/Acre low for land cost 10- C Potential, where needed, hardened channel in Prospect Wash to handle scour based on monitoring of wash after project 11- Geotech analysis in Prospect Wash in channel bottom & bank (3 to 4 borings per location, 3 to 4 locations 12- B Diversion of some flow to sustain Skyline Wash, prefer stream flow or bleed off from bottom of basin, cannot be bled off top of basin. 13- A Excavation cost underestimated due to hard dig, $27/CY blasting, $15/CY ripping. 14- A Examining a different location upstream of Apex 15- A Locating west boundary of the basin with respect to Prospect Wash; Minimize outfall channel 16- A Stepping the basin 17- A Two basins one to take flow from NE & second flows from NW 18- Longer flows consistent in Prospect because of Basin (Design Issue) 19- A Feasibility of depth of basin based on existing material & bedrock 20- Refine basin maximize surface area to capture volume & minimize digging in bedrock	

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	3.35	Alternative 2 – Channel Improvement 1- Watson & Roosevelt crossing up size to handle design flows 2- Diversion structures questionable 3- 75% of Propect Wash cross sections were contained within the banks; flexibility for ASLD on developing land 4- Set an easement purchase over entire channel length & monitor erosion; possible most cost effective Alternative 3 – Smaller Basin & Channel 1- Same as #7, #9, #13, #3 Alt 1 (most of Alt 1 issues) 2- Need to be comfortable w/scour issues regardless of ASLD input 3- Monitor scour & lateral erosion Alt 2, #s 1,3,4 4- Utilize fill material from basin excavation; could be cost saving 5- Magic discharge for Prospect Wash not needing improvements New Alternative 1- Look at ADMP suggestion & base all unit costs to be the same between ADMP & DCR 1. NOAA 14 2. Delete lower 2 basins & channel to FRS 3. Outlet not prospect wash but Skyline Wash 2- Floodwalls to outlet (ADMP plan for Skyline Wash) look at residual flows in Skyline w/Alt 3 in place 3- Finalize Prospect Wash alignment, avoid multiple road crossings (Add to Alt 1,2,3) 4- 2 channel & a basin at apex ½ channel diversion to Prospect (Added Alternative)	
	3.36	Prospect Wash design criteria to be: • Long term scour controls. "Magic" flow rate and duration to match existing long term scour depth. • An easement to lateral erosion limits to be purchased. • Monitor erosion, correct as required. • Alt 1 has low flow, will low flow rates comply with the long term scour criteria? Or have another criteria or none? • As Development occurs, may encroach into easement if monitoring shows no movement or erosion protection will be provided.	**Bing to agree to**
	3.37	Prior to next meeting: • Review Geotechnical scope for caliche mapping. • Proposed boring locations • Soil sampling locations • Hans' to review alternatives with Town.	District and Hans

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	3.38	Progress Meeting Shall have the following outcome: • Consensus on Geotech scope, when to conduct and where. • Alt 4, which one to move forward with? Sunrise to develop an exhibit with all potential basin options. • Alt 2 moving forward with analysis? • Prospect Wash criteria. •	ALL
		Task 4 Recommended Alternative Analysis	
		Task 5 Design Concept Report	
		Next Submittal	
		Alternatives Analysis Submittal Meeting December 3, 2012, FCDMC	INFO
		Next Meeting Progress Meeting #5, 8:00 to 9:30a, FCDMC	INFO

The foregoing is considered to be a true and accurate record of all items discussed. Please contact the originator within 3 business days to correct any discrepancies or inconsistencies.

Sunrise Engineering Inc.

Ricky M. Holston, P.E.
Project Manager
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480-768-8600

SUNRISE ENGINEERING

SIGN-IN – Skyline Fan DCR

Brainstorming Meeting

Date: September 24, 2012
Contract No.: 2012-006
SEI Project No. 04234

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Greg Jones	FCDMC	glj@mail.maricopa.gov	GJ
Valerie Swick	FCDMC	vas@mail.maricopa.gov	VAS
Dean Ranck	"		

P:\Buckeye\04234Skyline Wash DCR\Admin\Meetings\Meeting Brainstoming Meeting SIGN IN SHEET- Skyline Wash DCR 9-24-12 .docx

New Alternative

1– Look @ ADMP suggestion & base all unit costs to be the same between ADMP & DCR.

1) NOAA 14
2) Delete lower 2 basins & channel to FRS
3) outlet not prospect wash but skyline wash

2– Floodwalls to outlet (ADMP plan for Skyline Wash) look at residual flows in Skyline w/ alt 3 in place.

3– Finalize Prospect wash alignment, avoid multiple road crossings. (Add to alt 1,2,3)

4– 2 channel & a basin at apex ½ Channel diversion to Prospect. Added Alternative

(3)

Evaluation Criteria

1– Cost – Capital plus O&M. EV

2– Minimize/mitigate flood hazards Similar to 3

3– Reduce in area the regulatory floodplain; meet FEMA requirements EV

4– Public/stakeholder acceptance EV plus #6

5– Adhere to LA guidelines from ADMP (K&G) DS EV

6– Meet the State/Federal Agencie's requirements DS

7– No Adverse impact to adjacent properties (Minimize) DS

Evaluation Criteria ②

8 - Implementation EV

9 - Facilitate roadways EV

10 - Cost share partners benefitted. EV

11 - Not negatively impact in price adjacent properties Similar to 7. DS

12 - Minimize Safety hazards EV, DS

13 - Impacted ownerships Similar to 7 & 11 DS

14 - Environmental/Cultural impacts. EV

15 - Meets H&H criteria. ~~DS~~ DS

16 - Political Acceptance Similar to 4 EV

17 - Multi-Use oppt. EV

Design Criteria

1 - Freeboard

- No Standard for regional basin
  1' acceptable per H&H Dept.

  1' above 100 yr design w.s. elevation
  * KAG follow w/Amir

2 - Lateral Erosion

- Prospect Wash considered a Fan?
  Not on FEMA, but similar to a Fan.
- Duration of flow w/ improvements in place
- Caliche level. Geotech Analysis ①

Possible Easement over Erosion setback - Monitor erosion & Correct as needed

~~Design Alt ADMP~~

~~Channel Design~~ Alternative 1

Big Basin – no Channel Impact

1B Potential 404 issues to Skyline Wash For all alternatives

2– Analyze Capacity of Skyline wash to handle residual flow for all alts.

3– 1' freeboard in basin

4– Consistent sediment analysis w/ADMP
~~Avg 3 year depth~~ + Annual sediment x3 + 100 yr

5C Approach ASLD re: their requirement for discharge into Prospect wash

6U Watson & Roosevelt Crossing Should be one 48" pipe each.

Alt 1 Continued

7C Delete environmental remediation cost from Prospect wash ~~&~~ based on future discussion w/ASLD.

8– Verify/determine capacity of Prospect wash at different locations. Done

9– $10,000/Acre low for land cost.

10C Potential hardened channel where needed; in Prospect wash to handle scour based on monitoring of wash after project.

11– Geotech analysis in Prospect wash in channel bottom & bank – 3 to 4 ~~lo~~ locations.

12B Diversion of some flow to sustain Skyline wash.

Alt 1 Cont

13A Excavation cost underestimated due to hard dig. $

14A Examining a different location upstream of Apex.

15A – Locating west boundary of the basin in respect to Prospect wash. minimize outfall channel.

16A Stepping the basin

17A Two basin's one to take flows from NE & 2nd flows from NW.

18 – Longer flows consistent in Prospect because of Basin. Design Issue

19A Feasibility of depth of basin based on existing material & bedrock.

20 – Refine basin ~~bigger a~~ maximize surface area to capture volume & minimize digging in bedrock.

Alt 2
Channel Improvement

1 – Watson & Roosevelt Xing upsize to handle design flows

2 – Diversion structures questionable.

3 – 75% was contained within the banks. ~~Improvements~~ Flexibility for ASLD on developing land.

4 – Set an easement purchase over ~~erosion~~ entire Channel length & monitor erosion. Possible most cost effective.

Alt 3

Smaller Basin & Channel.

1- Same as #7 alt 1, #9, #13, #3 > most of alt 1 issues.

2- Need to be comfortable w/ Scour issues regardless of ASLD input.

3- Monitor Scour & lateral erosion
Alt 2, #s 1, 3, 4

4- Utilize fill material from basin excavation.
Could be cost saving.

5- Magic discharge for Prospect wash not needing improvements.

APPENDIX O

Meeting Notes

SUNRISE ENGINEERING

MINUTES

Town of Buckeye / Flood Control District of Maricopa County
Skyline Wash DCR

Kick off Meeting

Date: June 19, 2012
Contract No.: 2012-006
SEI Project No. 04234

Note:
Bolded items are captured meeting statements and comments
Italicized items are Sunrise follow up
*Asterisked names required follow up

Meeting Items:

1. Project Approach
   1.1. Three pre-determined alternatives and a fourth alternative that is yet to be determined.

   1.2. Elimination of dam or dam-like structure from consideration.

   1.3. Review District's Letter dated April 14, 2001.

   1.3.1. Three pre-determined alternatives are not a whole fan solution. Where the ADMP identifies three basins for a whole fan solution.

   1.3.2. Three pre-determined alternatives do not incorporate berms.

   1.3.3. Detention basins will be designed with District and Town criteria and aesthetic treatments to blend the basin in with the surrounding landscape.
   1.3.3.1. **Fan development in Town zoning to be low density, which will also blend with existing landscape.**
   1.3.3.2. **Sunrise shall turn any proposed basins along contour to prevent 50 ft cuts at the north end.**

   1.3.4. Channels will be of a softer gentler nature, minimal lining efforts, use of drop structures, etc. ADMP recommends walled-levee corridors.
   1.3.4.1. **An example project is in Scottsdale. No basin, channel only that is amour flex grass lined with custom amour flex blocks that are larger than stock.**
   1.3.4.2. ***Dennis to supply a list and photos of similar projects. Scottsdale has very natural looking regional conveyances.**

   1.3.5. Hydrology will address peak discharge from 100-yr 6-hr or 24-hr storm event.
   1.3.5.1. **Tom Renckly asked for a Flood Response Plan (FRP) to be included in the project as a future task. The Flood Response Plan will show inundation limits and provide an early warning plan. As this is going to be a 100-yr facility that all storm flows will be routed through. Even though the facility will work as planned, the FRP goes a long way to showing the public that a greater then 100-yr event can still "flood". The need for an FRP will be noted in the DCR as a future item to be considered at construction drawing preparation. It was determined by the group that the FRP will have no impact on the alternative chosen.**

2. Project Phases
   2.1. Data Collection / Hydrology Update
   2.1.1. Data Collection
   2.1.1.1. ***Sunrise shall request project files from Eric Feldman or Jim Smith, cc Tony.**
   2.1.1.2. **Ken is working a technical memo for FRS#3 that looked at concentrated full fan flow at two different locations at the FRS. The FRS performance is not affected by these concentrated flows.**

   2.1.2. Preliminary NOAA 14 model run
   2.1.2.1. ***Li and Bing will have a side conversation regarding model.**

   2.2. Alternatives
   2.2.1. Schematic Alternatives Exhibit with preliminary NOAA 14 flow rates and volumes
   2.2.1.1. **Hans asked, what are the design criteria for natural channel and erosion setbacks. The District does not have set criteria, use the ADMP and the Lateral Erosion Draft document. The Lateral Erosion Draft document typically refers to non-alluvial fan channels, but has been recently updated to include alluvial fans. Bing to send the latest copy.**
   2.2.1.2. **Amir suggested an offline basin. The advantage is low flow sediment is not caught in a basin, sending clear water downstream. Clear water cannot be sent down stream without accounting for its erosion potential. The disadvantage to an off-line basin is the fan channel could still move creating problems with getting flow into the basin reliably.**
   2.2.1.3. **Kathryn suggested starting the channel further upstream of the Apex and turning it. This would put the channel perpendicular to the flow and catch all the flow.**
   2.2.1.4. **Dennis suggested companion channels, two channels that carry half the flow each. They can even be made to braid in and out like existing channels.**
   2.2.1.5. **Sunrise shall draft a channel criteria for the Alternatives that includes the use of the existing washes.**

   2.2.2. Existing Washes Exhibits with preliminary NOAA 14 flow rates

   2.2.3. Brainstorming Meeting Agenda
   2.2.3.1. **At next meeting the Team will bring a list of potential Alternatives to vet out.**
   2.2.3.2. ***Sunrise to begin a criteria list with which to compare and select alternatives. The list shall include, flood control, maintenance costs, capital costs, ADMP criteria.**

2.3. Recommended Alternatives Analysis

2.3.1. **Once the Recommended Alternative is selected the District will internally present the project to management as a progress report.**

2.4. DCR and Conceptual Plans Report Outline

2.4.1. 15% Conceptual Plans

2.4.2. DCR Report Outline

3. Sedimentation Analysis work plan

3.1. Work Plan

3.1.1. ***Sunrise shall forward the plan to *Tony to distribute to District.**

3.2. Sampling Locations

3.2.1. Sunrise to send dxf of sampling locations to District. *Sent*

3.2.2. Sunrise will not collect sediment samples until after Brainstorming meeting. This is to coordinate sample locations with Alternative alignments.

3.2.3. Sunrise to look into sampling at 3 to 4 feet deep. *The Geotech says 3 to 4 feet deep is no problem. They normally use a hand auger to get to depth then use a sample grabber to get the sample.*

4. Site Visit

***Tony to coordinate District personnel and let us know a few dates.**

5. Schedule

The foregoing is considered to be a true and accurate record of all items discussed. Please contact the originator within 3 business days to correct any discrepancies or inconsistencies.

Next Meeting: Tues July 17, 2012, 10:30AM, Buckhorn Mesa/Guadalupe

Sunrise Engineering Inc.

Ricky M. Holston, P.E.
Project Manager

SUNRISE ENGINEERING

SIGN-IN – Skyline Wash DCR

KICK OFF MEETING

Date: June 19, 2012
Contract No.: 2012-006
SEI Project No. 04234

NAME	COMPANY	E-MAIL
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Kristin Sayre	W.C. Scoutten	kristin@scoutten.com

AGENDA

Town of Buckeye / Flood Control District of Maricopa County

Skyline Wash DCR

Meeting #2

Date: July 17, 2012
Contract No.: 2012-006
SEI Project No. 04234

	Mtg.Item	Comment	Action By
		Task 1 Project Management	
		Task 2 Data Collection and Base Hydrology Conditions Analysis	
	2.1	Review Base Hydrology Conditions Tech Memo. -Submitted, District to reveiw	District
		Task 3 Alternative Analysis	
	3.1	List of Alternatives to vet out. -Split channel, no basin option. The biggest concern is how to split the flow reliably? District and SEI don't think it can be done reliably. Remove from list. -Flood Wall option, the walls would bring up issues with levy walls. There will have to be a balance between flood wall or erosion setbacks -	INFO
	3.2	Design Criteria -To convert an alluvial fan to inactive the following has to be done. Apex has to be controlled. Channels have to be able to convey flow. Erosion setbacks are not FEMA required. An erosion setback would show that an allowance has been made for the channel to move as a natural riverine process while still conveying the controlled flow rate.	INFO
New	3.3	Can Bing agree to inactivate an alluvial fan would allow the use of the erosion and sediment guidelines even though the channel is on a fan. Tony to schedule a meeting with Bing to review.	District
	3.4	Run preliminary sedimentation model on Skyline Wash to see what kind of erosion and lateral migration is expected at current control flow rates.	SEI
	3.5	Prior to Brainstorming meeting have email discussion to vet out channel only option.	SEI
	3.6	Circulate Brainstorming Meeting agenda The following need to be included in the meeting -Explain erosion setback vs floodplain. -Cross section exhibit w/channel and walls	SEI
	3.7	Design criteria matrix , determine cost per foot for different channel sections.	SEI
	3.8	Run Prospect Wash and Skyline Wash to determine capacity, place results in an exhibit and tables	SEI
	3.9	Erosion hazard setbacks (EHS) will allow the use of an existing channel (cost savings), while providing area for it to laterally migrate. The District cannot control an EHS, if the EHS is beyond the floodplain. The District can limit development in a floodplain. The EHS limits can be controlled via flow and/or channel slope. EHS limits are 3:1 or 6:1 from scour depth up to surface. 6:1 if no historical single-event lateral erosion distance is available from rectified aerial photos. 3:1 if the single-event lateral erosion distance is available and is added to the computation of lateral erosion distance.	INFO
		Task 4 Recommended Alternative Analysis	
		Task 5 Design Concept Report	
		Next Submittal	
		Alternatives Analysis Submittal Meeting December 3, 2012, FCDMC	INFO
		Next Meeting Site Visit July 30, 2012, 7:30a, invite sent out to District staff, not Hans or Ricky. Brainstorming Meeting September 18, 2012, 10:30a, FCDMC	INFO

The foregoing is considered to be a true and accurate record of all items discussed. Please contact the originator within 3 business days to correct any discrepancies or inconsistencies.

Sunrise Engineering Inc.

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SUNRISE ENGINEERING

SIGN-IN – Skyline Wash DCR

Meeting #2

Date: July 17, 2012
Contract No.: 2012-006
SEI Project No. 04234

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SUNRISE ENGINEERING

SIGN-IN – Skyline Wash DCR

Meeting #2

Date: July 17, 2012
Contract No.: 2012-006
SEI Project No. 04234

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SUNRISE ENGINEERING

MINUTES

Town of Buckeye / Flood Control District of Maricopa County

Skyline Wash DCR

Meeting #3

Date: July 30, 2012
Contract No.: 2012-006
SEI Project No. 04234

	Mtg. Item	Comment	Action By
		Task 1 Project Management	
		Task 2 Data Collection and Base Hydrology Conditions Analysis	
		Task 3 Alternative Analysis	
New	3.10	Sediment Analysis -Sediment approach #2 (clear water, pivot point for equilibrium slope spaced 500' assumed drop structures) is good, assuming a basin is installed and clear water as conveyed downstream. -Sediment #3 (State Standard, sediment laden water) approach is good for no basin and sediment flow.	INFO
	3.11	Skyline Wash Setbacks -If apex is controlled then we can use engineering judgment to apply erosion setbacks to Skyline Wash. -The same issues relating to lateral erosion setbacks that apply to Prospect Wash appear to apply to Skyline Wash (refer to 3.17, below).	INFO
	3.12	-2'-3' boulders on fan got there via high flow and/or debris flows. -Any kind of ponding in a basin will drop this out. This kind of debris flow is what will fill a channel, causing it to move (alluvial fan process).	INFO
	3.13	Erosion setback is floodway line of main channel edge.	INFO
	3.14	-Basin has to have enough volume to capture large sediment event. -A basin at the apex is understood to capture all sediment and debris and to discharge clear water. -A sediment basin, located upstream from and immediately adjacent to the detention basin, may serve to concentrate sediment and debris and reduce the extent of required maintenance.	INFO
	3.15	Channel only option -Lots of maintenance with channel only due to amount of sediment that is transported and deposited. -Make sure there are no pooling areas that could drop sediment and fill channel. -The feasibility of reliably capturing flow absent a basin or levees merits further examination. -The distribution of sediment and debris into the channel could cause avulsion.	INFO
	3.16	Work with Town to find funds or other avenues to maintain the basin.	INFO
	3.17	Prospect Wash -Has high capacity. This is suspect because typical channel in Maricopa County is under capacity. -May have been part of the fan 1000's of years ago. - Since the wash is in close proximity to the fan and may have been an active part of the fan at one time, indicates that the methodology for estimating lateral erosion setbacks for a riverine environment may not be applicable. 3 Improvements 3 scenarios: -No change to channel -Add over bank areas to gain capacity -Full channel improvements Design criteria: -Can cut extra benches for flow capacity don't need to show stable in new area just move erosion setback line to new floodway or channel edge. -Prospect can have steep side slopes and they are stable due to caliche sides. -Erosion setback can be justified because side slopes are caliche vs. alluvium. -Side slope revetment of existing side slopes is preferred over constructed channel -Cannot let sediment accumulate in channel. -Use rip-rap revetment in side slopes in gaps between caliche. Both longitudinally along channel and vertically. -Use rip-rap toe protection. -The estimation of the lateral erosion setback line from either the boundary of the existing floodway or the boundary of an excavated overbank area should be clarified. -The estimation of lateral erosion setbacks based on the presence of caliche and cementitious soils may be problematic due to the non-homogenous nature of those formations and the difficultly in identifying where those formations are present. -A portion of Prospect Wash has been used extensively for firearms practice and will require remediation.	INFO
	3.18	Geotechnical -May have to amend future Geotech study to find caliche level in Prospect Wash. -Ask Terracon about finding caliche vs. bedrock with seismic refraction survey.	SEI
		Task 4 Recommended Alternative Analysis	
		Task 5 Design Concept Report	

SUNRISE ENGINEERING

		Next Submittal	
		Alternatives Analysis Submittal Meeting December 3, 2012, FCDMC	INFO
		Next Meeting Brainstorming Meeting September 24, 2012, 1:00 to 4:00p, FCDMC	INFO

The foregoing is considered to be a true and accurate record of all items discussed. Please contact the originator within 3 business days to correct any discrepancies or inconsistencies.

Sunrise Engineering Inc.

Ricky M. Holston, P.E.
Project Manager
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SUNRISE ENGINEERING

SIGN-IN – Skyline Wash DCR

Meeting #2

Date: July 17, 2012
Contract No.: 2012-006
SEI Project No. 04234

7/30 MEETING #1

NAME	COMPANY	E-MAIL	INITIALS	
Ricky Holston	Sunrise Engineering	rholston@sunrise-eng.com	RH	RH
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Scott Vogel	FCDMC	csv@mail.maricopa.gov		
Tom Renckly	FCDMC	trr@mail.maricopa.gov		
Bing Zhao	FCDMC	biz@mail.maricopa.gov	Bing Zhao	BZ
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Shimin Li	FCDMC	ShiminLi@mail.maricopa.gov	[illegible]	SL
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Harry Cooper	FCDMC	harryCooper@mail.maricopa.gov		
Woody Scoutten	W.C. Scoutten	woody@scoutten.com		

SUNRISE ENGINEERING

MINUTES

Town of Buckeye / Flood Control District of Maricopa County

Skyline Wash DCR

Meeting #4

Date: August 27, 2012
Contract No.: 2012-006
SEI Project No. 04234

	Mtg. Item	Comment	Action By
		Task 1 Project Management	
		Task 2 Data Collection and Base Hydrology Conditions Analysis	
		Task 3 Alternative Analysis	
New	3.19	The District has to have design criteria that will ensure the design will not fail thus ensuring the public's safety.	INFO
	3.20	Sunrise to work up a caliche exploration scope. This scope could include a Geotech walking Prospect Wash and mapping limits of caliche, some core samples and testing to determine caliche strength. -Hans likes Ken Euge. -Bing, requested 6 borings, 3 in the bottom of Prospect Wash and three behind the side slopes.	SEI
	3.21	The District was in agreement that further geotechnical exploration for caliche could be pushed to final design. The report would need to include recommendations for the final design team. Cost estimates need to include a range of costs based on no caliche to some amount of caliche the Team agrees to.	INFO
	3.22	Terracon the Geotechnical Engineer said via email the results of the seismic refraction survey will only be reliable to the top of a hard layer. This layer can be caliche or bed rock. -There was discussion to forgo the seismic refraction survey which is scheduled to be completed after the Brainstorming Meeting. The Team decided to keep the survey as it would give depths to hard dig whether it is caliche or bed rock.	INFO
	3.23	Scott questioned what is more important to know the basin constraints or the geotechnical and hydraulic limits of Prospect wash. -The limits of Prospect Wash drive the basin size, the more flow Prospect is capable of, the smaller the basin. It is in the scope to obtain soil samples in Prospect Wash that will allow Sunrise to hone in on scour potential. Coming into the Brainstorming meeting Sunrise will run a scour analysis on Prospect Wash using the ADMP soil data. This will give a ball park estimate of the erosion potential of Prospect Wash at different flow rates. -The basin design is driven by the depth to bedrock/hard dig, and downstream channel invert. The seismic refraction study will determine depth to hard dig. Channel invert will be worked out in Alternative Analysis.	INFO
	3.24	Scott conveyed that the Brainstorming meeting and the DCR process must first have a 50,000 ft level of costs to see if a particular alternative stands out. Then that alternative can be honed in on.	INFO
	3.25	State Land will give an drainage easement and flowage easement for Prospect Wash and basin. This will allow State Land to include the easement area in density calcs within the Town. The Town will accept the easement in the short term but long term they want the easement to convey to an HOA for future maintenance.	
	3.26	No erosion setback required if channel revetment is added. There are various options of placing rip rap at channel edge, at erosion set back line or somewhere in between and the revetment can be launchable rip rap. See Bings Bank Protection cross sections, attached. Bing to send original point power file to Sunrise for use at Brainstorming meeting. **Received file.** -Launchable rip rap provides protection for the intended water coarse and also the fan if a channel starts cutting from the back side.	INFO
	3.27	In areas where rip rap will be installed behind channel sides between gaps in caliche. The rip rap must be installed so there are no gaps. This means, bring rip rap in to channel bank and edge of caliche.	INFO
	3.28	SEI to send geotechnical sampling points exhibit to Tony. Tony to circulate at District.	SEI
	3.29	Town thinks Alianto solution is a channel only on a fan. CVL did design. -Bing to get with Lynn Thomas and send over report. **Received report. It's a channel only option, but it is not at the apex.**	INFO
	3.30	Brainstorming Meeting Agenda Exhibit List 1. Cost Analysis for 3 Alternatives. This shall include cost table for rip rap revetment $perLF for all three rip rap placement options and launchable rip rap and lateral erosion setback only cost. 2. Maps 3. Channel cross sections 4. Hydrology and hydraulics exhibits 5. Schematic map w/ peak flows and volumes. 6. FEMA Map with current floodplain and benefit area and secondary washes that will not be intercepted into a basin. 7. Ownership Map Additional comments to arrive via email.	INFO
	3.31	All exhibits, hydrology data, cost estimates shall be sent to Hans and Tony for review 9/7.	SEI

		Task 4 Recommended Alternative Analysis	
		Task 5 Design Concept Report	
		Next Submittal	
		Brainstorming Meeting Exhibits, Hydrology Data, Scour, and Cost Estimates – September 7, 2012 Alternatives Analysis Submittal Meeting December 3, 2012, FCDMC	INFO
		Next Meeting Brainstorming Meeting September 24, 2012, 1:00 to 4:00p, FCDMC	INFO

The foregoing is considered to be a true and accurate record of all items discussed. Please contact the originator within 3 business days to correct any discrepancies or inconsistencies.

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SIGN-IN – Skyline Wash DCR

Meeting #4

Date: August 27, 2012
Contract No.: 2012-006
SEI Project No. 04234

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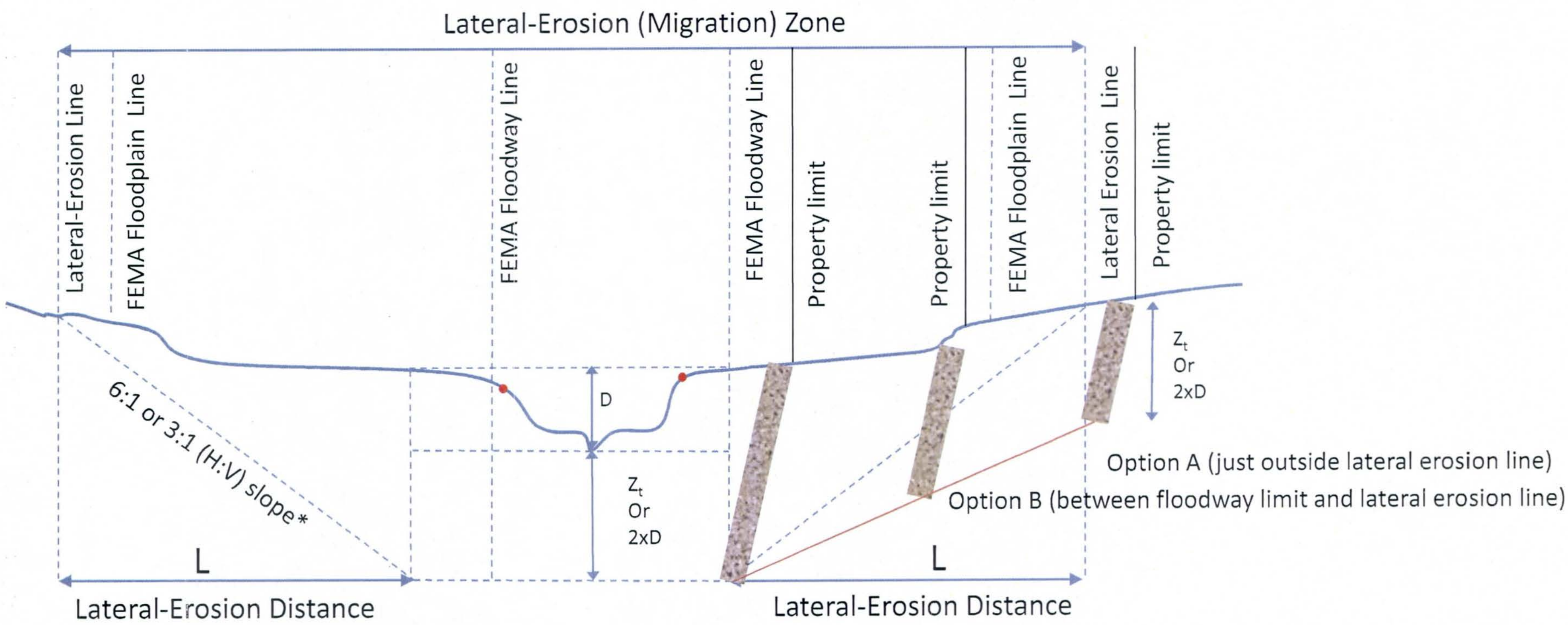
Conventional riprap bank protection to scour depth Zt.



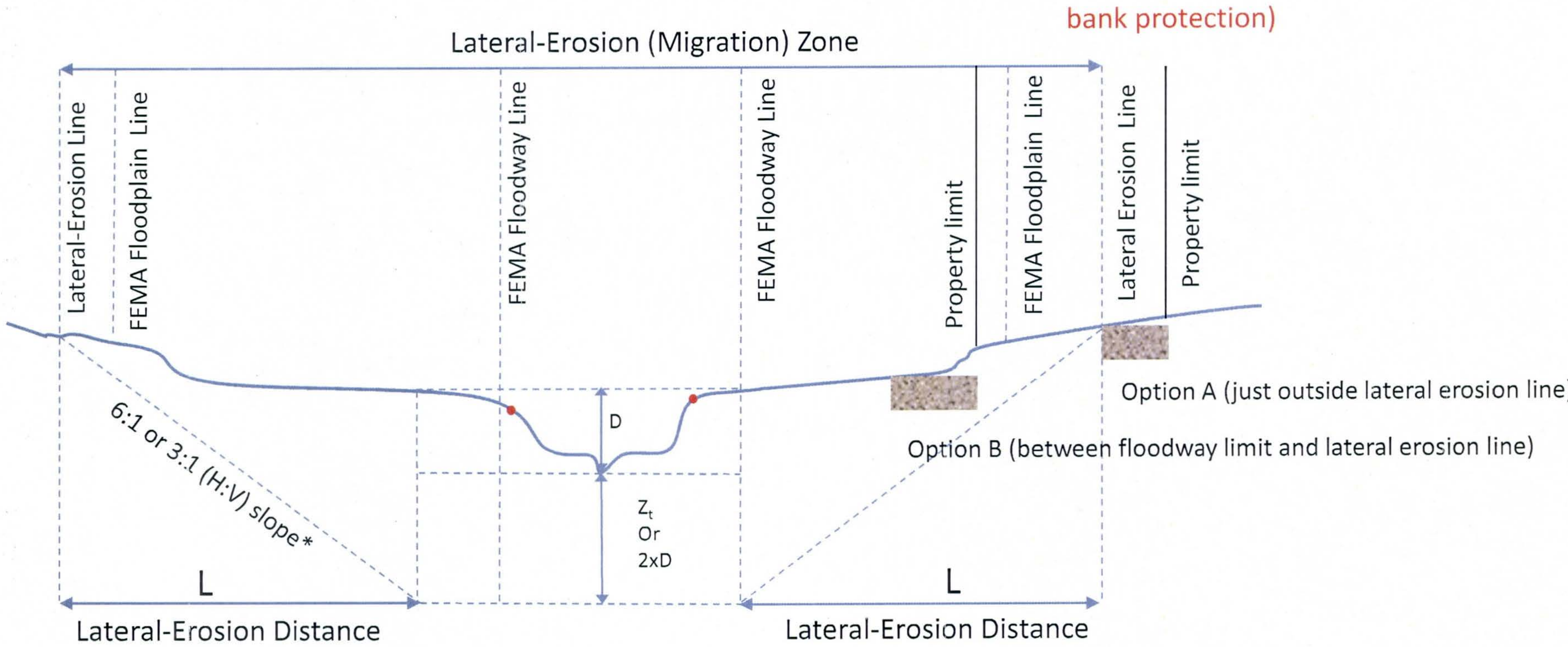
- Main-channel bank stations

*: 6:1 if no historical single-event lateral erosion distance is available from rectified aerial photos.
3:1 if the single-event lateral erosion distance is available from rectified aerial photos and is added to the computation of lateral erosion distance.

Z_t: scour depth

D: main channel depth measured from the intersection point between the highest FEMA floodway line and ground elevation. Use a higher FEMA floodway elevation on the banks to draw a horizontal line to intersect the ground elevation.

Launchable riprap
(see 6.5.6 Toe Protection
in 1996 Hydraulics Manual)
The required volume is 1.5 times the required volume for conventional riprap bank protection)



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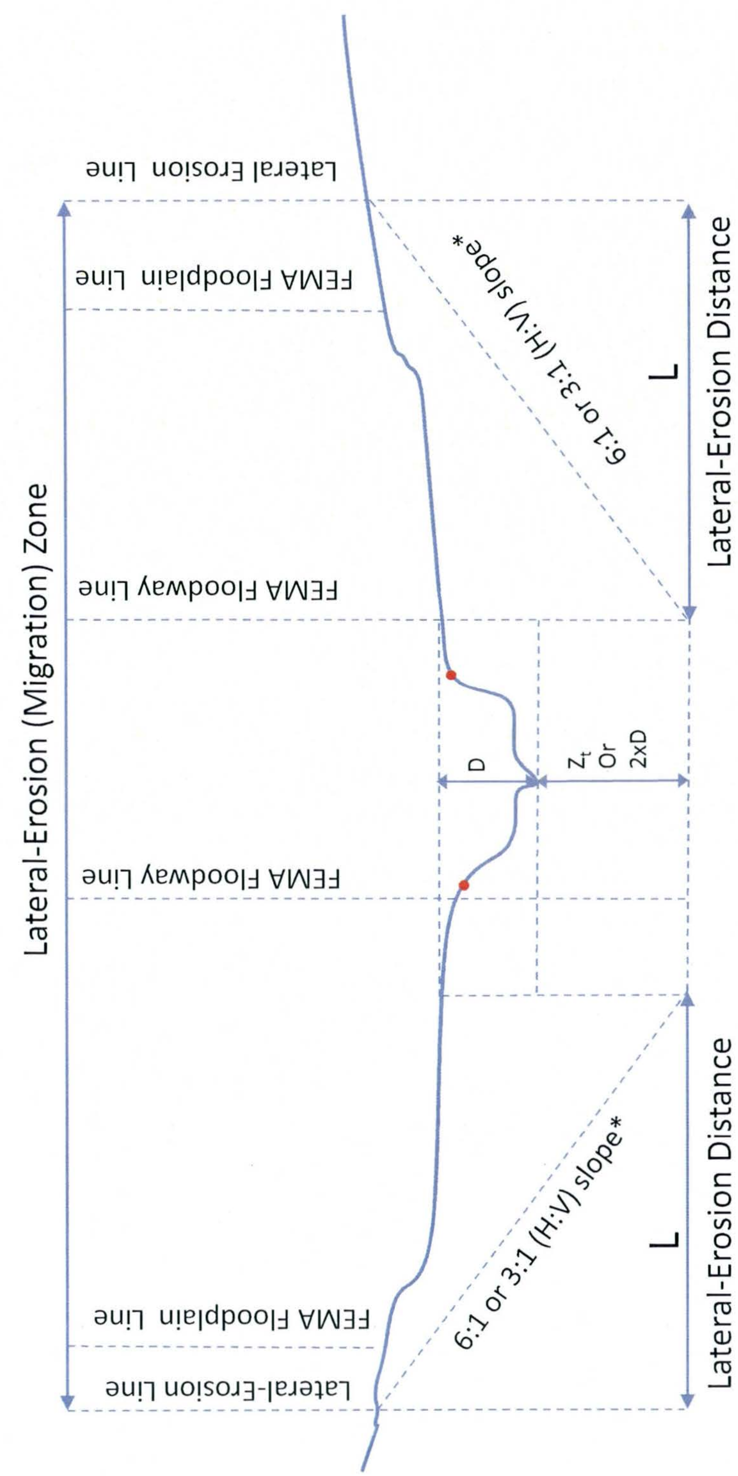

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Z_t: scour depth

D: main channel depth measured from the intersection point between the highest FEMA floodway line and ground elevation. Use a higher FEMA floodway elevation on the banks to draw a horizontal line to intersect the ground elevation.

Note: if a channel is to be excavated to gain more flow capacity, a new floodway limit needs to be determined. Either the new floodway limit or a new channel bank will be used as the starting point for measuring the lateral-erosion distance, whichever gives a larger zone.

SUNRISE ENGINEERING

MINUTES

Town of Buckeye / Flood Control District of Maricopa County

Skyline Wash DCR

Meeting #5

Date: October 4, 2012
Contract No.: 2012-006
SEI Project No. 04234

	Mtg. Item	Comment	Action By
		Task 1 Project Management	
		Task 2 Data Collection and Base Hydrology Conditions Analysis	
		Task 3 Alternative Analysis	
	3.34	• Regional basin criteria confirmed, one foot of freeboard • Excess discharge (above 100-yr design event) needs to continue down historic path. In this case if Prospect is being used as basin outlet, flows greater then 100-yr event must go down Skyline Wash in its historic path.	INFO
	3.38	Progress Meeting Shall have the following outcome: • Consensus on Geotech scope, when to conduct and where. • Alt 4, which one to move forward with? Sunrise to develop an exhibit with all potential basin options. • Alt 2 moving forward with analysis? • Prospect Wash criteria. •	ALL
	3.39	Consensus on Geotech scope, when to conduct and where. • Consensus was to use borings. • Create exhibit for routing and approval for seismic refraction testing. • Geotech will be conducted per the original scope and schedule. Seismic now, borings are opinional for later.	Sunrise
	3.40	Alt 4, which one to move forward with? Sunrise to develop an exhibit with all potential basin options. • Wait on Alt 4.	INFO
	3.41	Alt 2 moving forward with analysis? • Keep in report to demonstrate decision.	INFO

	3.42	Prospect Wash criteria -Gant Yasanayake site visit -Erosion setback and monitoring • Team to revisit, monitoring and erosion setbacks at Nov 5 meeting. -Flow rate or scour?	District
	3.43	Residual Floodplain, will the wash leave Skyline with only Coyote Wash? • Demonstrate to FEMA? Containment is critical and can be demonstraited. • Need to be cautious of routing through apex, will get FEMA ears perked up. • Need "next steps" in conclusion of DCR that residual floodplain will need to be delineated.	INFO
	3.44	State Trust Land Strategy • District wants game plan put toeather. • Meeting w/ STL happens after maps for testing (geotech) • The meeting will only talk about a basin with discharge to Prospect characterized as "bleed-off".	Town
	3.45	Cost Estimates • Eliminate box culvert cost for Roosevelt crossings • Excavation cost, may be too high. • Land cost may be low, use $30k/acre	Sunrise
		Task 4 Recommended Alternative Analysis	
		Task 5 Design Concept Report	
		Next Submittal	
		Alternatives Analysis Submittal Meeting December 3, 2012, FCDMC	INFO
		Next Meeting Progress Meeting #6, Nov 5, 1:00 to 2:00p, FCDMC	INFO

The foregoing is considered to be a true and accurate record of all items discussed. Please contact the originator within 3 business days to correct any discrepancies or inconsistencies.

Sunrise Engineering Inc.

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SIGN-IN – Skyline Wash DCR

Meeting #5

Date: October 4, 2012
Contract No.: 2012-006
SEI Project No. 04234

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SUNRISE ENGINEERING

MINUTES

Town of Buckeye / Flood Control District of Maricopa County

Skyline Wash DCR

Meeting #6

Date: November 5, 2012
Contract No.: 2012-006
SEI Project No. 04234

This meeting will define a clear scope for Sunrise to move forward with the Alternatives Analysis.

	Mtg. Item	Comment	Action By
		Task 1 Project Management	
		Task 2 Data Collection and Base Hydrology Conditions Analysis	
		Task 3 Alternative Analysis	
	3.46	**Alternative 1 – All Basin** All Basin - To be analyzed by Sunrise in Alternatives Analysis. -177 cfs is an acceptable discharge but will also need to look at total drain time for vector control concerns. **The Town requested if a 36-hr drain down is obtainable to reasonably adjust the flow rate accordingly.** -Basin drain down times of greater than 36 hours will require additional maintenance costs to treat as required. -Revise cost estimate unit prices. -Earthwork for 245ac-ft basin is now 1.2 million CY.	SEI to calc 36-hr drainage down.
	3.47	**Alternative 2 – All Channel** Similar level of analysis that has already been completed - Minimal additional work for Alternative Analysis. - Scott suggested that this stay on the list of alternatives but does not require a detailed analysis to show that given the wash improvement criteria. **-No further analysis. Include in Alternatives Report.**	SEI to summarize in Alternatives Analysis

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	3.48	**Alternative 3 – Channel/Basin** - Before further analysis needs to determine what flow rate and volume of flow would be acceptable to send down Prospect Wash without any further improvements to Prospect Wash. -If 177 cfs (or other flowrate) from the All Basin alternative is the maximum allowed then this option may need no further analysis as it will compound many of the costs of All Basin and All Channel. **-Revise Alternative to two outfalls, no improvements to natural washes, Prospect and Skyline. Flow rates will be the low flow ~177cfs for Prospect and Skyline will be determined.** **-Skyline allowable no improvement flow rate will be the "representative" flow. Flow rate where channel is at equilibrium.** **-Did ADMP have grade control structures in upper reach, north of McDowell?** **-Send e-mail w/ revised Alternative description.**	SEI to send email with Alt revisions.
	3.49	**Alternative 4** - 4A. Two separate basins that collect the flow north of the Apex that may reduce flow to both Prospect and Skyline Washes - 4B. Compare to ADMP proposed solution - reduction in scope from what was previously thought if we go this route - 4C. Two tiered basins with two outlets to Prospect Wash and Skyline Wash. The tiered basins would try to minimize excavation beyond volume required. Two outlets is to maximize outlet flow to reduce basin size. **Determine allowable flow to Skyline Wash.** **-A tiered two basin approach is acceptable, but in another project the berm separating the basins was excavated, recompacted, and had a central drain installed.** **-Send e-mail w/ revised Alternative description.**	SEI to send email with Alt revisions.
	3.50	State Land Meeting -Agenda -invitees	
New Items	3.51	Schedule progress meeting for Nov 21. At this meeting have Alt 1-4 descriptions and exhibits portion of Alternatives Analysis for Town and District review prior to completing Alternatives Analysis scheduled for Dec 3.	SEI
	3.52	Plot hydrographs for each Alternative on same graph. Call out drain down times of each. Less than 100-yr storms events were requested. We only have hydrographs for the 100-yr, 24-hr event. All other events would require running the model with that rainfall. We can convert peak flow rates with the District's standard storm event ratio graph.	SEI
	3.53	Does the floodplain delineation include Skyline Wash all the way to FRS #3? No it does not. The detailed study stops at the apex.	INFO
	3.54	Why did ADMP use flood walls in the upper reaches of Skyline Wash? The ADMP used 10-ft contour mapping. At that resolution Skyline Wash is flat, it does not show up as an incised flowline.	INFO
		Task 4 Recommended Alternative Analysis	
		Task 5 Design Concept Report	

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		Next Submittal	
		Alternatives Analysis Submittal Meeting November 21, 2012, FCDMC	INFO
		Next Meeting Progress Meeting #6, Nov 5, 1:00 to 2:00p, FCDMC	INFO

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Sunrise Engineering Inc.

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SUNRISE ENGINEERING

SIGN-IN – Skyline Wash DCR

Meeting #6

Date: November 5, 2012
Contract No.: 2012-006
SEI Project No. 04234

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SUNRISE ENGINEERING

AGENDA

Town of Buckeye / Flood Control District of Maricopa County

Skyline Wash DCR

Meeting #7

Date: November 20, 2012
Contract No.: 2012-006
SEI Project No. 04234

This meeting Sunrise to move forward with the Alternatives Analysis.

	Mtg. Item	Comment	Action By
		Task 1 Project Management	
		Task 2 Data Collection and Base Hydrology Conditions Analysis	
		Task 3 Alternative Analysis	
New Items	3.55	Sunrise shall present descriptions, and cost estimates of Alternatives 1 thru4 for to generate comments for drafting of the Alternative Analysis Tech Memo.	
	3.56	Finalize Soil Sampling Locations – **OK**	SEI
	3.57	Finalize extent of seismic refraction survey **Add Alt 1 and Alt 4 outlines to exhibit. Resend. District to review Tuesday afternoon and forward to Gant @ MCDOT. Gant to review Wednesday morning. Leaving Sunrise time to set points for staking lines on Wednesday afternoon.**	SEI
	3.58	Strategize for pending ASLD meeting **-Hans to setup, invite Tony, Scott Vogal, and Bob Steven's (District Environmental Agent)** **-Meeting will be set when Alternatives are set.** **-Han's to present the Alternatives to State Land.** **-Ask about Prospect Wash environmental mitigation.** **-Verify purchase of State Land includes dirt, the project will not have to pay for export.**	Town
	3.59	Discuss the potential effect of the DCR on Phase 1 of the Skyline Regional Park currently under preparation by Kimley Horn.	

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	3.60	**Skyline Wash Low Flow** -What is appropriate flow to Skyline Wash? Determined by verifying the design flow rate stays within channel banks and does not cause worse scour condition. Check existing wash scour at bank full with "Lacey" equation (sediment laden). Check design flow scour using "Blench" equation. -Is discharge in Skyline Wash controlled? Kathryn says FEMA does not have requirements for downstream channel. Just requires the apex be controlled. Bing, says with basin in place controlling apex, Skyline Wash can be considered riverine and analysis and be conveyance capacity and scour. -Can Coyote Wash be considered a riverine channel? Kathryn to look for a report that provided guidance on the this. If Coyote Wash is considered riverine then it can be analyzed as such, and sediment will be carried downstream or drop out in smaller amounts. If it is considered alluvial then, it can be considered to evolve, by dropping sediment and jumping to a new alignment. -Skyline Wash will eventually get a floodplain study done, and an erosion setback based on new flow rates. The erosion setback will be considered a no cost item at this time.	SEI
	3.61	**Alt 4 – Dual Basin** -The minimum separation between the basins per Tom Renckly is 100 feet. Provided the existing material is competent and will not be susceptible to piping. -If existing channel is to be used to convey flow between basins, the channel must be armored for clear water scour. -This Alternative did not save significant money on the last round of cost estimates. This alternative will be placed on hold, until the hydrology of the twin low flow pipes is completed to see if the cost savings warrants the extra work.	INFO
	3.62	**Alternative Renaming** Modified Alt 3, single basin, dual low flow pipes will be changed to Alt 1B. Alt 1 will be changed to Alt 1A Alt 3 will be carried as presented in the Brainstorming meeting without further analysis in the DCR.	INFO
	3.63	**Basin Water Depths** Are there restrictions on ponded water depth? District believes no restrictions exist. Typical over 5 foot water depth requires a fence are development standards and do not apply to regional projects. Verify by investigating County Manuals and Town's standards.	SEI
		Task 4 Recommended Alternative Analysis	
		Task 5 Design Concept Report	
		Next Submittal	
		Alternatives Analysis, TBD based on Seismic Refraction results. Update schedule and send to project team.	INFO
		Next Meeting Alternatives Analysis Submittal Meeting, Dec 3, 1:00p to 2:30p, FCDMC	INFO

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SUNRISE ENGINEERING

SIGN-IN – Skyline Wash DCR

Meeting #7

Date: November 20, 2012
Contract No.: 2012-006
SEI Project No. 04234

NAME	COMPANY	E-MAIL	INITIALS
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SUNRISE ENGINEERING

AGENDA

Town of Buckeye / Flood Control District of Maricopa County

Skyline Wash DCR

Meeting #8

Date: February 7, 2013
Contract No.: 2012-006
SEI Project No. 04234

This meeting Sunrise to move forward with the Alternatives Analysis.

	Mtg. Item	Comment	Action By
		Task 1 Project Management	
		Task 2 Data Collection and Base Hydrology Conditions Analysis	
		Task 3 Alternative Analysis	
New Items	3.64	1. Alternatives: • Alt 1A, 245ac-ft, 15' deep, single outlet to Prospect Wash (Q~177cfs) • Alt 1B, 215ac-ft, 10' deep, dual outlet, Prospect Wash (Q~177cfs), Skyline Wash (Q~354cfs) • Alt 2 Channel • Alt 3 Channel and Basin 2. Send Hans Landscape Standards • Aesthetic treatment policy – Harry to send • Basin and channel guidelines – Harry to send 3. Include contractor discussions regarding earthwork 4. Can the project be sent out to a contractor for a bid? Tony will ask around. 5. State land likes leases, Siphon Draw is leased. 6. District to talk about lease or purchase. 7. Separate investment for basin take and access road. 8. Estimate to assume purchase of land, including access road. 9. Discussion regarding flow path or greater than 100-year event. Hans feels state land would be encumbered by large event in Skyline Wash. 10. Outlet needs to be more than 48" pipe. 11. Check basin side slopes U.S. ADMP 12. Berm up 40' buffer around basin, 5'-7'. 13. Show basin outline on residual floodplain exhibit. 14. Typical cross-section. 15. Construction water trucking cost. 16. Send sketched up outlet and exhibit to Hans by Monday. 17. Put inlet on map.	
	3.65	Representative Flow in Skyline Wash, 400 cfs	
	3.66	Seismic Refraction Report	
	3.67	Inlet Structure	Town
	3.68	Alternatives Analysis Table of Contents Review	
		Task 4 Recommended Alternative Analysis	
		Task 5 Design Concept Report	
		Next Submittal	
		Alternatives Analysis, 2/15/13	INFO
		Next Meeting Alternatives Analysis Comment Resolution Meeting / Alternative Selection Meeting, Mar 11, 8:15a to 9:30a, FCDMC	INFO

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SUNRISE ENGINEERING

SIGN-IN – Skyline Wash DCR

Meeting #8

Date: February 7, 2013
Contract No.: 2012-006
SEI Project No. 04234

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Harry Cooper	FCDMC	harryCooper@mail.maricopa.gov	[illegible]
Woody Scoutten	W.C. Scoutten	woody@scoutten.com	
Greg Potter	Sunrise Engineering	gpotter@sunrise-eng.com	

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AGENDA

Town of Buckeye / Flood Control District of Maricopa County

Skyline Wash DCR

Meeting #9 Recommended Alternatives Selection Meeting

Date: May 14, 2013
Contract No.: 2012-006
SEI Project No. 04234

This meeting is to get Alternatives finalized so Sunrise can move forward with the Alternatives Analysis.

	Mtg. Item	Comment	Action By
		Task 1 Project Management	
		Task 2 Data Collection and Base Hydrology Conditions Analysis	
		Task 3 Alternative Analysis	
	3.69	Address outstanding Alternatives Analysis Comments -Skyline Wash sediment yield -Inlet structure **-Send sketch on thoughts** -Outlet structure **-Assume back to back 100-yr event to size emergency outlet.** -Town of Buckeye requirements that will require approval from Public Works Director -Cost Estimate items -36-hr Draindown	
	3.70	Select Recommended Alternative. -Selection will be done via email. Team decided to wait until ASLD review to see if they had comments that would change the outcome.	
		Task 4 Recommended Alternative Analysis	
	4.1	Review Recommended Alternative Analysis scope of work.	
		Task 5 Design Concept Report	

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		Next Submittal	
		Recommended Alternative Alternatives Analysis, 6/24/13	INFO
		Next Meeting TBA, FCDMC	INFO

The foregoing is considered to be a true and accurate record of all items discussed. Please contact the originator within 3 business days to correct any discrepancies or inconsistencies.

Sunrise Engineering Inc.

Ricky M. Holston, P.E.
Project Manager
rholston@sunrise-eng.com
480-768-8600

SUNRISE ENGINEERING

SIGN-IN – Skyline Wash DCR

Meeting #9 Recommended Alternatives Selection Meeting

Date: **May 14, 2013**
Contract No.: **2012-006**
SEI Project No. **04234**

NAME	COMPANY	E-MAIL	INITIALS
Ricky Holston	Sunrise Engineering	rholston@sunrise-eng.com	RH
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Hans Koppenhoefer	Town of Buckeye	veconsultantsllc@gmail.com	HK
Anthony Beuche	FCDMC	AnthonyBeuche@mail.maricopa.gov	ATB
Dennis Holcomb	FCDMC	dbh@mail.maricopa.gov	
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Scott Vogel	FCDMC	csv@mail.maricopa.gov	CSV
Tom Renckly	FCDMC	trr@mail.maricopa.gov	
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Harry Cooper	FCDMC	harryCooper@mail.maricopa.gov	HC
Woody Scoutten	W.C. Scoutten	woody@scoutten.com	
Greg Potter	Sunrise Engineering	gpotter@sunrise-eng.com	
GARY SHAPIRO	FCD	GHS@MAIL.MARICOPA.GOV	[illegible]
Bob Stevens	FCD	rhs@mail.maricopa.gov	

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AGENDA

Town of Buckeye / Flood Control District of Maricopa County

Skyline Wash DCR

Meeting #10 ASLD Meeting #2

Date: June 6, 2013
Contract No.: 2012-006
SEI Project No. 04234

This meeting is to get Alternatives finalized so Sunrise can move forward with the Alternatives Analysis.

	Mtg. Item	Comment	Action By
	1	Review ASLD Staff Comments a. Support Letter/Memo **- Commissioner has offered conditional support for the project. ASLD is generally in support of Alternative 1A. ASLD will provide a signed support letter of the DCR will be provided at DCR completion. ASLD shared that the Commissioner is in support of the project. Additional information will be needed to finalize the support letter.** b. Engineering/Technical Comments – **See #4 for ASLD comments.** c. Other Questions/Concerns **-Floodplain benefit is only one part of the many components required for a developable land package.** **-ASLD has a plan for land disposition. ASLD staff will review and let us know when these lands are planned to go to auction.**	
	2	Update ASLD on 6/4/13 Town Council Workshop Session regarding area **Town Council was supportive of all the things going on around Skyline Fan. The Council next steps are to focus on the trail head.**	

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	3	Share Infrastructure Plans for the Area with ASLD a. Roads i. Watson Road **Watson Road from Van Buren to McDowell is planned to be built as part of a paved dirt road project (large portion federally funded)** ii. McDowell Parkway **McDowell Parkway is developer driven and will be on the Roosevelt Road alignment where it crosses Watson Road.** b. Sewer **The Town's General Plan is 0-1 DU/AC and may support that these may be septic. South of Roosevelt Road the General Plan has areas that could be 3-5 DU/AC and these areas may have an opportunity to be serviced by Sundance Wastewater Treatment Plant.** c. Water **The area may be serviced by Sundance Water Treatment Plant. A tank and pump station is likely to deliver water to all parts of the fan. A second water source connection may be required that provided water from the Airport system from the east.** d. Dry Utilities **No dry utilities in area. Will have to be installed as development moves through.**	
	4	Consensus on Recommended Alternative **ASLD provided the following comments, bold are the discussion highlights.** **ASLD supports Alternative 1A.** 1. Regional structure should be purchased. **-The basin is a liability for ASLD.** **-The purchase will require auction.** **-Basin outlet pipe and appurtenances will require easements to preserve future uses.** 2. Details of proposed offsite infrastructure still not provided (water, wastewater, road network, dry utilities) **-Updated see #3 above.** **-Provide letter to ASLD summarizing the planning efforts to date.** **-Forward any engineering information to Manny so he can verify the planning efforts correspond with ASLD visions.** 3. How is this off-site drainage system and Watson Rd. being paid for? **- ASLD may be amenable to pro-rata cost share dependent on the cost share estimate to ASLD. When the project was first initiated in 2010, ASLD was told that they would not be responsible for any off-site drainage infrastructure costs.** **-Provide cost share estimate to ASLD.**	SEI SEI

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		4. Cost estimates for future drainage crossings at McDowell and Roosevelt **-A box culvert for the Prospect Wash crossing of Watson Road has been included in the pave dirt road application. It is just the portion costs for a two lane road.** 5. On-site drainage of adjacent parcels to the drainage channel should be included in design (waiver of onsite requirements) **-TOB to consider** 6. Who will be responsible for O&M and how will it be funded? **-TOB is currently working through O&M plan but anticipates that adjacent developers/HOAs will be required to maintain. The Town has a requirement for a Parkway Improvement District to be recorded as part of their approval process (final plat). This would allow a tax to be levied for maintenance in the event that the HOA/developer does not maintain the property.** - Additional information will be provided to ASLD regarding O&M costs and which parcels would be responsible. The responsibility of O&M should be with the parcels removed from the alluvial fan flooding. - Through any future IGA(s) for design and construction, the District will require that the Town be responsible in perpetuity for the maintenance of the constructed project. If the Town were to delegate the duty to perform the maintenance to others through development agreements or by other means, the Town would continue to bear the responsibility that the necessary maintenance is performed. The IGA(s) would not be superseded by any subsequent agreements. 7. Flows > 100 yr should be discharged via skyline (existing outfall location) and have drainage easement as recommended by report. **-ASLD can't charge for discharge to natural wash unless the wash is improved.** **-An easement will be required for pipes to Prospect Wash.** **- No easement will be required for flows to the downstream Prospect Wash** 8. Design of dam and channel should also be routed through ASLD Natural Resource Office. **-No need to submit anything, this project did not consider dams.** 9. 404 permit related issues need to be provided to us prior to Corps submittal (preliminary JDs, 404 permit submittal if needed) **-Any submittals to the Corps shall be on behalf of ASLD. ASLD needs to look at and approve prior to submittal.**	Hans

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		10. The Watson Road ROW application for BLM Park access is currently on hold pending ASLD receipt of a signed 'pre-appraisal letter', an arc survey, and a native plant survey as requested from the Town Engineer's office. **-James updated Hans regarding TOB Watson Road project status.**	
	5	Review Schedule	
	6	Questions/Comments	

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SIGN-IN – Skyline Wash DCR

Meeting #10 ASLD Meeting #2

Date: June 6, 2013
Contract No.: 2012-006
SEI Project No. 04234

NAME	COMPANY	E-MAIL	INITIALS
Ricky Holston	Sunrise Engineering	rholston@sunrise-eng.com	X
Hans Koppenhoefer	Town of Buckeye	veconsultantsllc@gmail.com	X
Scott Vogel	FCDMC	csv@mail.maricopa.gov	X
Ruben Ojeda	ASLD	ROjeda@azland.gov	X
Marc Edelman	ASLD	medelman@azland.gov	X
Manny Patel	ASLD	mpatel@azland.gov	X
Michelle Green	ASLD	mgreen@azland.gov	X
James Rees	ASLD	jrees@azland.gov	X

AGENDA

Town of Buckeye / Flood Control District of Maricopa County

Skyline Wash DCR

Meeting #11

Date: July 10, 2013
Contract No.: 2012-006
SEI Project No. 04234

This meeting is to get Alternatives finalized so Sunrise can move forward with the Alternatives Analysis.

	Mtg. Item	Comment	Action By
	1	Recommended Alternatives Analysis – Cost Estimate 1. Inlet spillway configuration and size and depth of rip-rap **-Ok to design with "Simplified Design Guidelines for Riprap Subjected to Overtopping Flow"** 2. Bank protection upstream of inlet spillway **-Extend inlet structure to west to mitigate lateral migration that may occur. Study further in final design.** 3. Elimination of potential bypass of flow at maintenance road **-Remove maintenance road on east side of basin and revise inlet layout.** 4. Erosion protection of downstream top of slope (outlet spillway) **-Velocity is low, just put some rock down for ground cover and erosion protection.** 5. Low-flow pipe alignment **-Note in DCR to review alternative alignments that may shorten pipe.** 6. Low-flow outlet structure configuration **-District provided headwall w/ trash rack and trench drain detail for outlet, and costs.**	
	2	Recommended Alternatives Analysis – Waiver of Town Standards 1. Basin drain-down time 2. Depth from basin bottom to the 100-year water surface elevation 3. Fencing type and height 4. Form of waiver **Letter from Sunrise to Woody with acknowledgment box at bottom of letter for Woody to sign.**	

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	3	Public Meeting Preparation 1. Response from Town from review of draft brochure text 2. Submittal of draft brochure graphic **-Use generalized map for graphic. Will need graphic with no text. No aerial. Send as jpeg.** **-Use whole fan graphic without basin.** **-Will need both exhibits for exhibit boards for talking points.** 3. Status of other critical path tasks **-Tony ok with mailing list boundaries.**	
	4	Stakeholder Involvement 1. Confirm meeting with Bob Fisher tentatively scheduled for 1:00 pm on 07.10.13 at the District – **Meeting was scheduled for 2:00p.**	
	5	Town Manager Coordination 1. Pending letter from Town Manager to District CE/GM **-Letter sent out July 10 to Tim Philips.** 2. Meeting in early August to discuss the results of the DCR and the next steps leading to project final design and construction **-Meeting to involve Tim Philips, Steve Cleveland and Woody Scoutten, to discuss IGA and Town's availability of funds.**	
	6	IGA 1. Anticipated availability of Town funding for design and construction **-Project does not have to be reprioritized once DCR is completed.** **-DCR will have to be completed and resolution passed prior to adding to District 5-year CIP.** **-Advisory board and Board of Supervisor's must authorize the District Management to put the project onto the 5-year CIP.** **-IGA can be completed once the project is on the 5-year CIP** 2. Anticipated date at which time Town will request preparation of the IGA	

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	7	Final Design and Construction Timeline <u>Project Authorization – Approximately 9 months</u> • Resolution • IGA <u>Design Phase – Approximately 18 to 24 months</u> • Consultant Selection • Scoping and Contracting • Final Design • Environmental Permitting • Right-of-Way Acquisition <u>Bid Phase and Construction Phase – Approximately 18 months</u> • Contractor Selection • Contracting • Construction	

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SUNRISE ENGINEERING

SIGN-IN – Skyline Wash DCR

Meeting #11

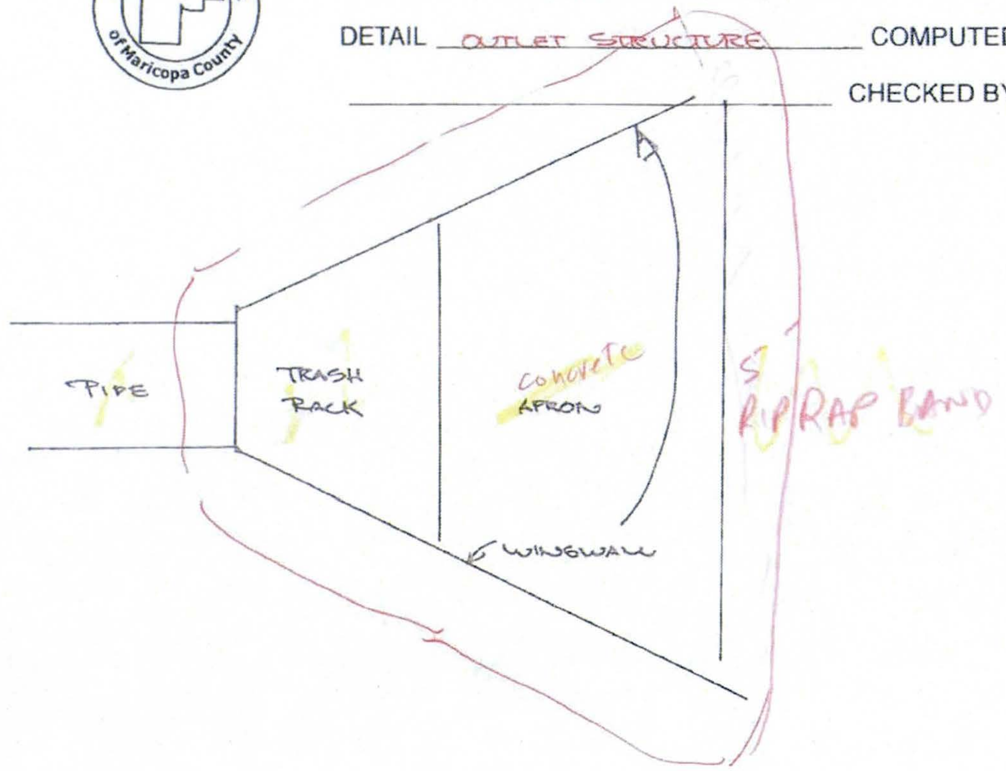
Date: July 10, 2013
Contract No.: 2012-006
SEI Project No. 04234

NAME	COMPANY	E-MAIL	INITIALS
Ricky Holston	Sunrise Engineering	rholston@sunrise-eng.com	X
Maurico Iacuelli	W.C. Scoutten	Mauricio@scoutten.com	X
Hans Koppenhoefer	Town of Buckeye	veconsultantsllc@gmail.com	X
Anthony Beuche	FCDMC	AnthonyBeuche@mail.maricopa.gov	X

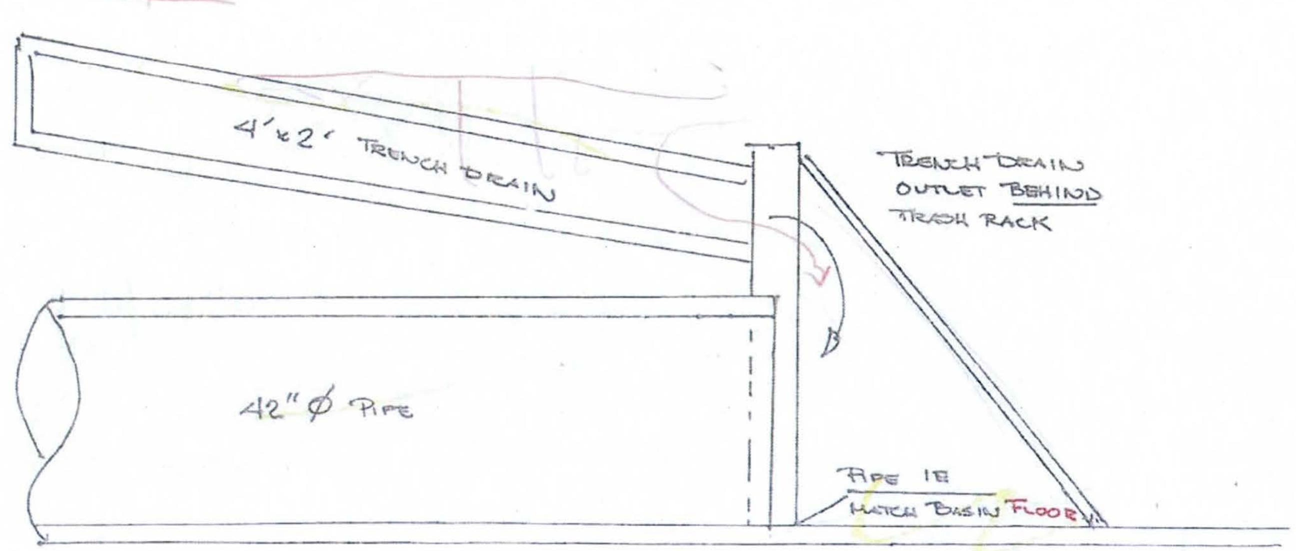
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

PROJECT SKYLINE FAN DRC PAGE ____ OF ____
DETAIL OUTLET STRUCTURE COMPUTED ________ DATE ____
CHECKED BY ________ DATE ____

KTB
07.02.13



$20,000 HEADWALL, WINGWALLS, APRON & TRENCH DRAIN
$6,000 TRASH RACK WITH HATCH
$5,000 SAFETY RAIL
$31,000



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AGENDA

Town of Buckeye / Flood Control District of Maricopa County

Skyline Wash DCR

Meeting #12 Stakeholder Meeting

Date: July 10, 2013
Contract No.: 2012-006
SEI Project No. 04234

This meeting is to get Alternatives finalized so Sunrise can move forward with the Alternatives Analysis.

	Mtg. Item	Comment	Action By
	1	**Presented Alternatives Analysis to project stakeholders in attendance.** -Announced Alternative 1A was selected as Recommended Alternative -The meeting was information only.	
	2	-No questions from Ms. Lagarde representing Mr. Webner	
	3	-Mr Fisher expressed he would like the export dirt placed on his land. -Mr Fisher declined to contribute to design or construction of the project at this time.	

The foregoing is considered to be a true and accurate record of all items discussed. Please contact the originator within 3 business days to correct any discrepancies or inconsistencies.

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SUNRISE ENGINEERING

SIGN-IN – Skyline Wash DCR

Meeting #12 Stakeholder Meeting

Date: July 10, 2013
Contract No.: 2012-006
SEI Project No. 04234

NAME	COMPANY	E-MAIL	INITIALS
Ricky Holston	Sunrise Engineering	rholston@sunrise-eng.com	X
Maurico Iiacuelli	W.C. Scoutten	Mauricio@scoutten.com	X
Hans Koppenhoefer	Town of Buckeye	veconsultantsllc@gmail.com	X
Anthony Beuche	FCDMC	AnthonyBeuche@mail.maricopa.gov	X
Robert Fisher		602-861-5824	X
Lat J Celmins	Margrave Celmins PC	lcelmins@mclawfirm.com	X
Lynne Lagarde	Earl, Curley & Lagarde, P.C.	llagarde@ecllaw.com	X

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SIGN-IN – Skyline Wash DCR

Meeting #~~10~~ ~~ASLD~~ STAKEHOLDER MEETING Meeting ~~#2~~

Date: ~~June 6~~ July 10, 2013
Contract No.: 2012-006
SEI Project No. 04234

NAME	COMPANY	E-MAIL	INITIALS
Ricky Holston	Sunrise Engineering	rholston@sunrise-eng.com	X RH
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Scott Vogel	FCDMC	csv@mail.maricopa.gov	X CSV
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Marc Edelman	ASLD	medelman@azland.gov	X
Manny Patel	ASLD	mpatel@azland.gov	X
Michelle Green	ASLD	mgreen@azland.gov	X
James Rees	ASLD	jrees@azland.gov	X
Robert Forbes			
LAT J. CELMINS			
Lynne Lagarde			
MAURICIO IACUELLI	TOWN OF BUCKEYE	MAURICIO@SCOUTTOWN.COM	
TONY BEUCHÉ	FCD	ANTHONYBEUCHE@MAIL.MARICOPA.GOV	

APPENDIX P

Recommended Alternative Inlet, Outlet & Overflow Weir Calculations

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Skyline Fan DCR
Inlet Structure Riprap Sizing

Constants

Description		Units
Q	3973.00	cfs
	112.49	m^3/s
Angle of Repose of Material, Φ	42.00	°
Discharge Coefficient, C	2.27	english
Discharge Coefficient, C	1.57	SI
Coefficient of Uniformity, C_u	1.95	
Procity, n_p	0.45	
Specific Gravity of Riprap, G_s	2.65	
Specific Gravity of Water, G_w	1.00	

Rip Rap Sizing, Tier 1

Step	Description	Tier 1, Interation 1			
	Overtopping Discharge, Q	3973.00	cfs	112.49	m3/s
	Embankment Length, L	727.00	ft	221.58	m
	Overtopping Unit Discharge, q	5.46	cfs/ft	**0.51**	m3/s/m
	Embankment Slope, S	0.25	ft/ft	0.25	m/m
1	Overtopping Depth, H	1.80	ft	0.47	m
2	Design Curve, $D_{50}\ Cu^{0.25}$	0.72		0.22	
	Minimum Rock Diameter,Calculated from Curves, D_{50}	0.61	ft	0.19	m
3	Interstitial Velocity, v_i	1.12	fps	0.34	m/s
	Average Velocity, v_{ave}	0.50	fps	0.15	m/s
4	Average Depth of Water, y	10.87	ft	3.31	m
	Depth Check	y > 2D50		y > 2D50	
5	Depth of Water to not Cause Critical Shear Stress, h	0.22	ft	0.07	m
6	Manning's Roughness Coef., n	0.031		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	1.96	cfs/ft	0.18	m3/s/m
	Velocity Over Rock	8.73	fps	2.65	m/s
8	Unit Discharge through Riprap, q_2	3.50	cfs/ft	0.33	m3/s/m
	Unit Discharge Over Rock	1.96	cfs/ft	0.18	m3/s/m
9	Riprap Interstitial Flow Depth, h_2	6.97	ft	2.13	m
	Depth Check	1.2y > 4D50		1.2y > 4D50	
Step	**Description**	**Tier 1, Interation 2**			
10	**Trial Rock Diameter, D_{50}**	1.00	ft	0.30	m
5	Depth of Water to not Cause Critical Shear Stress, h	0.37	ft	0.11	m
6	Manning's Roughness Coef., n	0.034		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	4.11	cfs/ft	0.41	m3/s/m
8	Unit Discharge through Riprap, q_2	1.35	cfs/ft	0.09	m3/s/m
3	Interstitial Velocity, v_i	1.43	fps	0.15	m/s
	Average Velocity, v_{ave}	0.64	fps	0.07	m/s
	Velocity Over Rock	11.19	fps	3.70	m/s
9	Riprap Interstitial Flow Depth, h_2	2.10	ft	0.04	m
	Depth Check	1.2y < 4D50		1.2y < 4D50	

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Skyline Fan DCR
Inlet Structure Riprap Sizing

Constants

Description		Units
Q	3973.00	cfs
	112.49	m^3/s
Angle of Repose of Material, Φ	42.00	°
Discharge Coefficient, C	2.27	english
Discharge Coefficient, C	1.57	SI
Coefficient of Uniformity, C_u	1.95	
Procity, n_p	0.45	
Specific Gravity of Riprap, G_s	2.65	
Specific Gravity of Water, G_w	1.00	

Rip Rap Sizing, Tier 2

Step	Description	Tier 2, Interation 1			
	Overtopping Discharge, Q	3973.00	cfs	112.49	m3/s
	Embankment Length, L	749.97	ft	228.58	m
	Overtopping Unit Discharge, q	5.30	cfs/ft	**0.49**	m3/s/m
	Embankment Slope, S	0.25	ft/ft	0.25	m/m
1	Overtopping Depth, H	1.76	ft	0.46	m
2	Design Curve, $D_{50}\ Cu^{0.25}$	0.72		0.22	
	Minimum Rock Diameter,Calculated from Curves, D_{50}	0.61	ft	0.19	m
3	Interstitial Velocity, v_i	1.12	fps	0.34	m/s
	Average Velocity, v_{ave}	0.50	fps	0.15	m/s
4	Average Depth of Water, y	10.53	ft	3.21	m
	Depth Check	y > 2D50		y > 2D50	
5	Depth of Water to not Cause Critical Shear Stress, h	0.22	ft	0.07	m
6	Manning's Roughness Coef., n	0.031		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	1.96	cfs/ft	0.18	m3/s/m
	Velocity Over Rock	8.73	fps	2.65	m/s
8	Unit Discharge through Riprap, q_2	3.34	cfs/ft	0.31	m3/s/m
9	Riprap Interstitial Flow Depth, h_2	6.64	ft	2.03	m
	Depth Check	1.2y > 4D50		1.2y > 4D50	
Step	**Description**	**Tier 2, Interation 2**			
10	**Trial Rock Diameter, D_{50}**	1.00	ft	0.30	m
5	Depth of Water to not Cause Critical Shear Stress, h	0.37	ft	0.11	m
6	Manning's Roughness Coef., n	0.034		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	4.11	cfs/ft	0.41	m3/s/m
8	Unit Discharge through Riprap, q_2	1.18	cfs/ft	0.08	m3/s/m
3	Interstitial Velocity, v_i	1.43	fps	0.14	m/s
	Average Velocity, v_{ave}	0.64	fps	0.06	m/s
	Velocity Over Rock	11.19	fps	3.70	m/s
9	Riprap Interstitial Flow Depth, h_2	1.84	ft	0.04	m
	Depth Check	1.2y < 4D50		1.2y < 4D50	

SUNRISE ENGINEERING

Skyline Fan DCR
Inlet Structure Riprap Sizing

Constants

Description		Units
Q	3973.00	cfs
	112.49	m^3/s
Angle of Repose of Material, Φ	42.00	°
Discharge Coefficient, C	2.27	english
Discharge Coefficient, C	1.57	SI
Coefficient of Uniformity, C_u	1.95	
Procity, n_p	0.45	
Specific Gravity of Riprap, G_s	2.65	
Specific Gravity of Water, G_w	1.00	

Rip Rap Sizing, Tier 3

Step	Description	Tier 3, Interation 1			
	Overtopping Discharge, Q	3973.00	cfs	112.49	m3/s
	Embankment Length, L	755.17	ft	230.16	m
	Overtopping Unit Discharge, q	5.26	cfs/ft	**0.49**	m3/s/m
	Embankment Slope, S	0.25	ft/ft	0.25	m/m
1	Overtopping Depth, H	1.75	ft	0.46	m
2	Design Curve, D_{50} $Cu^{0.25}$	0.72		0.22	
	Minimum Rock Diameter,Calculated from Curves, D_{50}	0.61	ft	0.19	m
3	Interstitial Velocity, v_i	1.12	fps	0.34	m/s
	Average Velocity, v_{ave}	0.50	fps	0.15	m/s
4	Average Depth of Water, y	10.46	ft	3.19	m
	Depth Check	y > 2D50		y > 2D50	
5	Depth of Water to not Cause Critical Shear Stress, h	0.22	ft	0.07	m
6	Manning's Roughness Coef., n	0.031		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	1.96	cfs/ft	0.18	m3/s/m
	Velocity Over Rock	8.73	fps	2.65	m/s
8	Unit Discharge through Riprap, q_2	3.30	cfs/ft	0.31	m3/s/m
9	Riprap Interstitial Flow Depth, h_2	6.56	ft	2.01	m
	Depth Check	1.2y > 4D50		1.2y > 4D50	
Step	**Description**	**Tier 3, Interation 2**			
10	**Trial Rock Diameter, D_{50}**	1.00	ft	0.30	m
5	Depth of Water to not Cause Critical Shear Stress, h	0.37	ft	0.11	m
6	Manning's Roughness Coef., n	0.034		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	4.11	cfs/ft	0.41	m3/s/m
8	Unit Discharge through Riprap, q_2	1.15	cfs/ft	0.07	m3/s/m
3	Interstitial Velocity, v_i	1.43	fps	0.10	m/s
	Average Velocity, v_{ave}	0.64	fps	0.15	m/s
	Velocity Over Rock	11.19	fps	3.70	m/s
9	Riprap Interstitial Flow Depth, h_2	1.78	ft	0.04	m
	Depth Check	1.2y < 4D50		1.2y < 4D50	

SUNRISE ENGINEERING

Skyline Fan DCR
Inlet Structure Riprap Sizing

Constants

Description		Units
Q	3973.00	cfs
	112.49	m^3/s
Angle of Repose of Material, Φ	42.00	°
Discharge Coefficient, C	2.27	english
Discharge Coefficient, C	1.57	SI
Coefficient of Uniformity, C_u	1.95	
Procity, n_p	0.45	
Specific Gravity of Riprap, G_s	2.65	
Specific Gravity of Water, G_w	1.00	

Rip Rap Sizing, Tier 4

Step	Description	Tier 4, Interation 1			
	Overtopping Discharge, Q	3973.00	cfs	112.49	m3/s
	Embankment Length, L	755.54	ft	230.28	m
	Overtopping Unit Discharge, q	5.26	cfs/ft	**0.49**	m3/s/m
	Embankment Slope, S	0.25	ft/ft	0.25	m/m
1	Overtopping Depth, H	1.75	ft	0.46	m
2	Design Curve, D_{50} $Cu^{0.25}$	0.72		0.22	
	Minimum Rock Diameter,Calculated from Curves, D_{50}	0.61	ft	0.19	m
3	Interstitial Velocity, v_i	1.12	fps	0.34	m/s
	Average Velocity, v_{ave}	0.50	fps	0.15	m/s
4	Average Depth of Water, y	10.46	ft	3.19	m
	Depth Check	y > 2D50		y > 2D50	
5	Depth of Water to not Cause Critical Shear Stress, h	0.22	ft	0.07	m
6	Manning's Roughness Coef., n	0.031		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	1.96	cfs/ft	0.18	m3/s/m
	Velocity Over Rock	8.73	fps	2.65	m/s
8	Unit Discharge through Riprap, q_2	3.30	cfs/ft	0.31	m3/s/m
9	Riprap Interstitial Flow Depth, h_2	6.56	ft	2.00	m
	Depth Check	1.2y > 4D50		1.2y > 4D50	
Step	**Description**	**Tier 4, Interation 2**			
10	**Trial Rock Diameter, D_{50}**	1.00	ft	0.30	m
5	Depth of Water to not Cause Critical Shear Stress, h	0.37	ft	0.11	m
6	Manning's Roughness Coef., n	0.034		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	4.11	cfs/ft	0.41	m3/s/m
8	Unit Discharge through Riprap, q_2	1.15	cfs/ft	0.07	m3/s/m
3	Interstitial Velocity, v_i	1.43	fps	0.10	m/s
	Average Velocity, v_{ave}	0.64	fps	0.15	m/s
	Velocity Over Rock	11.19	fps	3.70	m/s
9	Riprap Interstitial Flow Depth, h_2	1.78	ft	0.04	m
	Depth Check	1.2y < 4D50		1.2y < 4D50	

SUNRISE ENGINEERING

Skyline Fan DCR
Inlet Structure Riprap Sizing

Constants

Description		Units
Q	3973.00	cfs
	112.49	m^3/s
Angle of Repose of Material, Φ	42.00	°
Discharge Coefficient, C	2.27	english
Discharge Coefficient, C	1.57	SI
Coefficient of Uniformity, C_u	1.95	
Procity, n_p	0.45	
Specific Gravity of Riprap, G_s	2.65	
Specific Gravity of Water, G_w	1.00	

Rip Rap Sizing, Tier 5

Step	Description	Tier 5, Interation 1			
	Overtopping Discharge, Q	3973.00	cfs	112.49	m3/s
	Embankment Length, L	757.03	ft	230.73	m
	Overtopping Unit Discharge, q	5.25	cfs/ft	**0.49**	m3/s/m
	Embankment Slope, S	0.25	ft/ft	0.25	m/m
1	Overtopping Depth, H	1.75	ft	0.46	m
2	Design Curve, $D_{50}\,Cu^{0.25}$	0.72		0.22	
	Minimum Rock Diameter,Calculated from Curves, D_{50}	0.61	ft	0.19	m
3	Interstitial Velocity, v_i	1.12	fps	0.34	m/s
	Average Velocity, v_{ave}	0.50	fps	0.15	m/s
4	Average Depth of Water, y	10.44	ft	3.18	m
	Depth Check	y > 2D50		y > 2D50	
5	Depth of Water to not Cause Critical Shear Stress, h	0.22	ft	0.07	m
6	Manning's Roughness Coef., n	0.031		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	1.96	cfs/ft	0.18	m3/s/m
	Velocity Over Rock	8.73	fps	2.65	m/s
8	Unit Discharge through Riprap, q_2	3.29	cfs/ft	0.31	m3/s/m
9	Riprap Interstitial Flow Depth, h_2	6.54	ft	2.00	m
	Depth Check	1.2y > 4D50		1.2y > 4D50	
Step	**Description**	**Tier 5, Interation 2**			
10	**Trial Rock Diameter, D_{50}**	1.00	ft	0.30	m
5	Depth of Water to not Cause Critical Shear Stress, h	0.37	ft	0.11	m
6	Manning's Roughness Coef., n	0.034		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	4.11	cfs/ft	0.41	m3/s/m
8	Unit Discharge through Riprap, q_2	1.14	cfs/ft	0.07	m3/s/m
3	Interstitial Velocity, v_i	1.43	fps	0.10	m/s
	Average Velocity, v_{ave}	0.64	fps	0.15	m/s
	Velocity Over Rock	11.19	fps	3.70	m/s
9	Riprap Interstitial Flow Depth, h_2	1.76	ft	0.04	m
	Depth Check	1.2y < 4D50		1.2y < 4D50	

SUNRISE ENGINEERING

Skyline Fan DCR
Inlet Structure Riprap Sizing

Constants

Description		Units
Q	3973.00	cfs
	112.49	m^3/s
Angle of Repose of Material, Φ	42.00	°
Discharge Coefficient, C	2.27	english
Discharge Coefficient, C	1.57	SI
Coefficient of Uniformity, C_u	1.95	
Procity, n_p	0.45	
Specific Gravity of Riprap, G_s	2.65	
Specific Gravity of Water, G_w	1.00	

Rip Rap Sizing, Tier 6

Step	Description	Tier 6 , Interation 1			
	Overtopping Discharge, Q	3973.00	cfs	112.49	m3/s
	Embankment Length, L	761.98	ft	232.24	m
	Overtopping Unit Discharge, q	5.21	cfs/ft	**0.48**	m3/s/m
	Embankment Slope, S	0.25	ft/ft	0.25	m/m
1	Overtopping Depth, H	1.74	ft	0.46	m
2	Design Curve, $D_{50}\,Cu^{0.25}$	0.72		0.22	
	Minimum Rock Diameter,Calculated from Curves, D_{50}	0.61	ft	0.19	m
3	Interstitial Velocity, v_i	1.12	fps	0.34	m/s
	Average Velocity, v_{ave}	0.50	fps	0.15	m/s
4	Average Depth of Water, y	10.37	ft	3.16	m
	Depth Check	y > 2D50		y > 2D50	
5	Depth of Water to not Cause Critical Shear Stress, h	0.22	ft	0.07	m
6	Manning's Roughness Coef., n	0.031		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	1.96	cfs/ft	0.18	m3/s/m
	Velocity Over Rock	8.73	fps	2.65	m/s
8	Unit Discharge through Riprap, q_2	3.25	cfs/ft	0.30	m3/s/m
9	Riprap Interstitial Flow Depth, h_2	6.47	ft	1.98	m
	Depth Check	1.2y > 4D50		1.2y > 4D50	
Step	**Description**	**Tier 6 , Interation 2**			
10	**Trial Rock Diameter, D_{50}**	1.00	ft	0.30	m
5	Depth of Water to not Cause Critical Shear Stress, h	0.37	ft	0.11	m
6	Manning's Roughness Coef., n	0.034		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	4.11	cfs/ft	0.41	m3/s/m
8	Unit Discharge through Riprap, q_2	1.10	cfs/ft	0.07	m3/s/m
3	Interstitial Velocity, v_i	1.43	fps	0.09	m/s
	Average Velocity, v_{ave}	0.64	fps	0.15	m/s
	Velocity Over Rock	11.19	fps	3.70	m/s
9	Riprap Interstitial Flow Depth, h_2	1.71	ft	0.04	m
	Depth Check	1.2y < 4D50		1.2y < 4D50	

SUNRISE ENGINEERING

Skyline Fan DCR
Inlet Structure Riprap Sizing

Constants

Description		Units
Q	3973.00	cfs
	112.49	m^3/s
Angle of Repose of Material, Φ	42.00	°
Discharge Coefficient, C	2.27	english
Discharge Coefficient, C	1.57	SI
Coefficient of Uniformity, C_u	1.95	
Procity, n_p	0.45	
Specific Gravity of Riprap, G_s	2.65	
Specific Gravity of Water, G_w	1.00	

Rip Rap Sizing, Tier 7

Step	Description	Tier 7, Interation 1			
	Overtopping Discharge, Q	3973.00	cfs	112.49	m3/s
	Embankment Length, L	775.42	ft	236.34	m
	Overtopping Unit Discharge, q	5.12	cfs/ft	**0.48**	m3/s/m
	Embankment Slope, S	0.25	ft/ft	0.25	m/m
1	Overtopping Depth, H	1.72	ft	0.45	m
2	Design Curve, $D_{50}\ Cu^{0.25}$	0.72		0.22	
	Minimum Rock Diameter,Calculated from Curves, D_{50}	0.61	ft	0.19	m
3	Interstitial Velocity, v_i	1.12	fps	0.34	m/s
	Average Velocity, v_{ave}	0.50	fps	0.15	m/s
4	Average Depth of Water, y	10.19	ft	3.11	m
	Depth Check	y > 2D50		y > 2D50	
5	Depth of Water to not Cause Critical Shear Stress, h	0.22	ft	0.07	m
6	Manning's Roughness Coef., n	0.031		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	1.96	cfs/ft	0.18	m3/s/m
	Velocity Over Rock	8.73	fps	2.65	m/s
8	Unit Discharge through Riprap, q_2	3.16	cfs/ft	0.29	m3/s/m
9	Riprap Interstitial Flow Depth, h_2	6.29	ft	1.92	m
	Depth Check	1.2y > 4D50		1.2y > 4D50	
Step	**Description**	**Tier 7, Interation 2**			
10	**Trial Rock Diameter, D_{50}**	1.00	ft	0.30	m
5	Depth of Water to not Cause Critical Shear Stress, h	0.37	ft	0.11	m
6	Manning's Roughness Coef., n	0.034		0.031	
7	Manning's Eq. Unit Discharge Over Riprap, q_1	4.11	cfs/ft	0.41	m3/s/m
8	Unit Discharge through Riprap, q_2	1.01	cfs/ft	0.06	m3/s/m
3	Interstitial Velocity, v_i	1.43	fps	0.09	m/s
	Average Velocity, v_{ave}	0.64	fps	0.14	m/s
	Velocity Over Rock	11.19	fps	3.70	m/s
9	Riprap Interstitial Flow Depth, h_2	1.57	ft	0.03	m
	Depth Check	1.2y < 4D50		1.2y < 4D50	

Culvert Designer/Analyzer Report
Skyline - Emergency Overflow Weir

Component:Weir

Hydraulic Component(s): Roadway					
Discharge	3,973.00	cfs	Allowable HW Elevation	1,359.77	ft
Roadway Width	50.00	ft	Overtopping Coefficient	3.04	US
Low Point	1,358.00	ft	Headwater Elevation	1,359.77	ft
Discharge Coefficient (Cr)	3.04		Submergence Factor (Kt)	1.00	
Tailwater Elevation	-9,999.00	ft			

Sta (ft)	Elev. (ft)
0.00	1,358.00
98.00	1,358.00
100.00	1,359.00
1,700.00	1,359.00

Average velocity of discharge over weir
V=Q/A
A=1.77' x 98' + 0.77' x 1,700'-98'=1,407sf
V=3,973cfs / 1,407sf = 2.8 fps

Worksheet for RCC/PCC

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.25000	ft/ft
Bottom Width	727.00	ft
Discharge	3973.00	ft³/s

Results

Normal Depth	0.27	ft
Flow Area	193.77	ft²
Wetted Perimeter	727.53	ft
Hydraulic Radius	0.27	ft
Top Width	727.00	ft
Critical Depth	0.98	ft
Critical Slope	0.00332	ft/ft
Velocity	20.50	ft/s
Velocity Head	6.53	ft
Specific Energy	6.80	ft
Froude Number	7.00	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.27	ft
Critical Depth	0.98	ft
Channel Slope	0.25000	ft/ft
Critical Slope	0.00332	ft/ft

Worksheet for 12" Half burried RipRap

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.069	
Channel Slope	0.25000	ft/ft
Bottom Width	727.00	ft
Discharge	3973.00	ft³/s

Results

Normal Depth	0.67	ft
Flow Area	484.49	ft²
Wetted Perimeter	728.33	ft
Hydraulic Radius	0.67	ft
Top Width	727.00	ft
Critical Depth	0.98	ft
Critical Slope	0.07020	ft/ft
Velocity	8.20	ft/s
Velocity Head	1.05	ft
Specific Energy	1.71	ft
Froude Number	1.77	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.67	ft
Critical Depth	0.98	ft
Channel Slope	0.25000	ft/ft
Critical Slope	0.07020	ft/ft

Worksheet for 12" Half burried RipRap

Messages

Notes

Velocity check with rock half burreid in sediment.

Worksheet for 12" RipRap

Project Description

Friction Method	Manning Formula	
Solve For	Normal Depth	

Input Data

Roughness Coefficient	0.078	
Channel Slope	0.25000	ft/ft
Bottom Width	727.00	ft
Discharge	3973.00	ft³/s

Results

Normal Depth	0.72	ft
Flow Area	521.50	ft²
Wetted Perimeter	728.43	ft
Hydraulic Radius	0.72	ft
Top Width	727.00	ft
Critical Depth	0.98	ft
Critical Slope	0.08971	ft/ft
Velocity	7.62	ft/s
Velocity Head	0.90	ft
Specific Energy	1.62	ft
Froude Number	1.59	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.72	ft
Critical Depth	0.98	ft
Channel Slope	0.25000	ft/ft
Critical Slope	0.08971	ft/ft

SIMPLIFIED DESIGN GUIDELINES FOR RIPRAP SUBJECTED TO OVERTOPPING FLOW

By Kathleen H. Frizell[1], James F. Ruff[2], and Subhendu Mishra[3]

Abstract

Riprap, or some type of rockfill, is commonly used to prevent erosion of the downstream face of dams during rainfall events. Often, it is expected to be able to protect a dam during small overtopping events. It is generally an inexpensive method proposed to provide stability while rehabilitating dams expected to overtop. Rock channels may also be used as spillways for releases from dams. River restoration projects often use riprap drop structures to prevent degradation of the channel invert.

Previous large-scale testing by Reclamation and Colorado State University produced initial guidelines for designing steep riprap slopes subjected to overtopping. Additional test data from 1997 have been incorporated into this previous work allowing verification of initial design guidelines. Input from embankment dam designers has prompted investigation into simplification of the initial guidelines into a more "user-friendly" form. The errors introduced by assuming a generic coefficient of uniformity, D_{60}/D_{10}, to eliminate determinating three rock sizes, have been computed and use of a safety factor specified. This will produce less concern about obtaining the specified rock gradation during inspection of an existing or construction of a new riprap overlay.

Another important aspect of the design is establishing the use of the guidelines over the full range of riprap slopes. Overtopping flow on embankments with slopes less than or equal to 0.25 (4H:1V) covers the riprap. For slopes greater than 0.25, the overtopping flow must be contained within the layer of riprap for stability, although an insignificant amount of highly-aerated water splashes and cascades over the top of the riprap. The design guidelines specify procedures to deal with both slope situations to provide the designer confidence in using the guidelines.

The new criteria are suggested for use by the dam safety community to both evaluate the capability of riprap on existing dams and for designing new small riprap-covered embankments to safely pass small magnitude overtopping flows. Evaluating the capability of the riprap protection on an existing dam to pass overtopping flow without failure is also the first step in a risk assessment dealing with the possibility of dam breach and eventual failure.

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A brief summary of suggested new riprap design criteria for protecting embankments during overtopping are presented. The paper will illustrate the use of the design information by presenting the design of a stable riprap cover for a small embankment dam.

Background

Riprap, or zone 3 rockfill, is the most common cover material for embankment dams, including those owned by Reclamation. Often engineers need to know the riprap will provide adequate protection should the dam overtop. However, flow hydraulics on steep embankment slopes protected with riprap cannot be analyzed by standard flow and sediment transport equations. Reclamation currently takes a relatively conservative stance on the stability of a riprap armored embankment dam subjected to overtopping [1]. Other fairly recent investigations have resulted in empirical riprap design criteria based upon small scale testing on mild slopes and the assumption that uniform flow equations can be applied to these cases [2,3].

Predicting riprap stone sizes from these previous works produces widely varying results. Overestimating of the stone size needed to protect a dam can lead to excessive costs during construction of the project. Underestimating the stone size can lead to catastrophic failure of the dam and loss of life.

Introduction

There continues to be a need for a reliable method to predict riprap stone sizes for the flow conditions associated with dam overtopping. To address this need, a multi-year program to develop design criteria for riprap subjected to overtopping flows is being funded by Reclamation's Dam Safety and Research and Technology Development Programs. The program has two main objectives:

- Perform large scale testing of riprap on a steep slope.
- Determine criteria for riprap size and layer thickness needed to protect an embankment dam during overtopping.

These objectives have been met by the completion of three test programs with large size riprap on a 2:1 slope, comparison with other experimental data, and compilation of the results into proposed new criteria for riprap size and layer thickness to provide adequate protection during overtopping. The results of the 1994 and 1995 test programs were reported at the 1997 Association of State Dam Safety Officials (ASDSO) conference [4]. This paper discusses the final tests and presents the modifications made to the previously given riprap design criteria.

Test Program

Test programs with large riprap were completed in the Overtopping Facility at CSU in Fort Collins CO during 1994, 1995, and 1997. The test facility, instrumentation, data acquired, and results are described in the following sections, with emphasis on the 1997 tests and results.

Facility

The test facility consists of a concrete head box, chute, and tail box. The chute is 3 m wide and has a 15 m vertical drop on a 2:1 (H:V) slope (Figure 1). The walls of the flume are 1.5 m high and extend the full length of the chute. Plexiglass windows, 1 m by 1 m, are located near the crest brink, mid-point, and toe of the flume along one wall. Water is supplied by a 0.9 m diameter pipe from Horsetooth Reservoir. The supply pipe diffuses into the head box below a broad flat crest that replicates overtopping conditions. The facility has a maximum discharge capacity of about 4.5 m^3/s, which includes an additional 0.8 m^3/s added by a pump that recirculates flow from the tail box to the head box.

Instrumentation and Data Acquisition

The facility provided the opportunity to gather important data regarding flow through large size riprap. The visual observations provided information on the aeration, interstitial flow, stone movement, and the failure mechanism on the slope. Discharge and head data were collected for each test. In addition, the flow depth and interstitial flow velocities were recorded at up to four stations down the flume slope.

Interstitial flow velocities were recorded by using a salt injector and two conductivity probes at each of the stations down the slope. The velocities were obtained by injecting salt water into the flow and measuring the time until the wave front arrived at each of the downstream probes.

Depth was measured using water manometers inserted through the floor of the flume into a tower attached normal to the floor. The normal depth of solid water flowing interstitially between the rocks, was recorded, not the highly aerated flow skimming the surface.

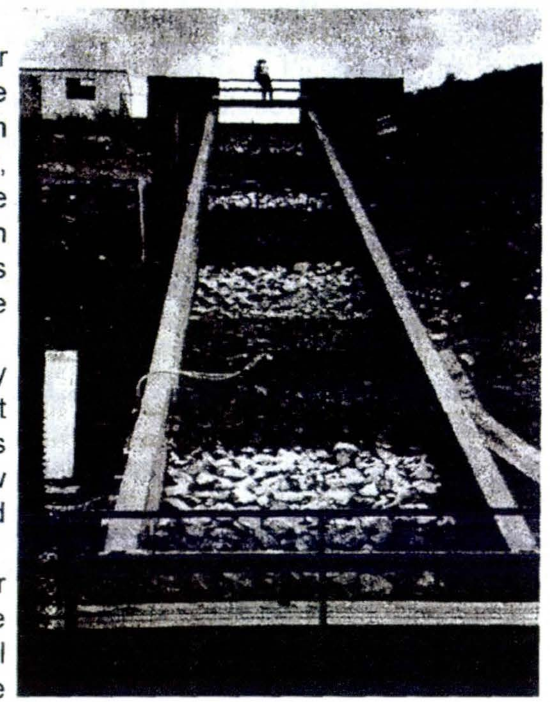

Figure 1. - Embankment overtopping research facility with riprap protection. Each 1.5 m wide band of rock was painted a different color to assist with observations of rock movement during the 1997 tests. (fig1.bmp)

Riprap Characteristics

The riprap test sections covered the full width of the chute and were placed over typical bedding material. Angle iron ribs were installed across the chute floor to retain the bedding on the slope. The angle iron was bolted to the chute with a 12 mm space underneath to provide a flow path at the chute surface. An open frame retaining wall was located at the downstream end of the test section to hold the toe in place. The riprap layers were placed by dumping.

Tests were first conducted in 1994. The first test section consisted of large riprap with D_{50} of 386 mm placed 0.6-m-thick over a 203-mm-thick gravel bedding material. The riprap layer extended 18 m down the slope from the crest and ended on the slope. The riprap size was selected based upon extrapolation of previous design equations [2]. The bedding layer thickness and size were designed according to standard Reclamation criteria.

The riprap tests performed in 1995 utilized the first test bed with a second, 0.6 m thick layer of relatively uniformly graded rock with D_{50} of 655 mm, placed over the existing material. Most rocks were dumped into the flume; however, because of the rock size, some hand readjustment was necessary to even out the surface and avoid damaging the instrumentation. The bedding and riprap material from the previous tests basically became the bedding material for the larger riprap of the 1995 tests.

The 1997 tests utilized the results of the previous tests to check the design curves. The previous rock material was removed from the flume and bedding with a D_{50} of 48.3 mm and riprap with a D_{50} of 271 mm was installed. The bedding and riprap covered the entire flume slope and extended 1.8 m horizontally at the toe of the slope, as per embankment dam designer recommendations. The 1997 riprap gradation is shown in Figure 2. The surface layer of riprap shown in Figure 1 is painted different colors in stripes 1.5 m wide to provide visual evidence of movement.

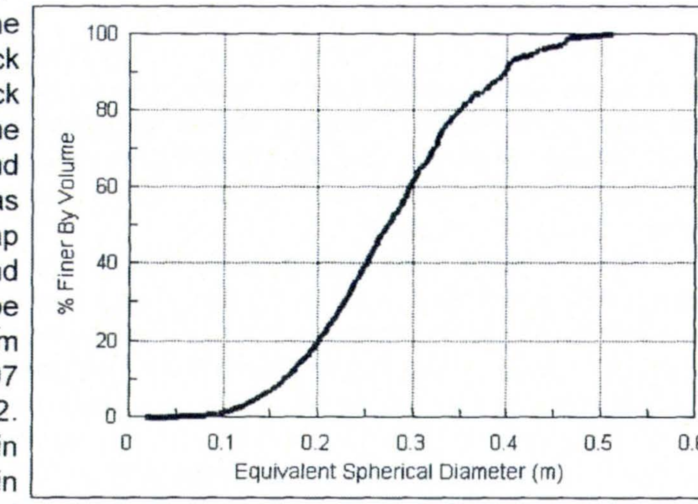

Figure 2. - Gradation curve for 1997 tests. (97grad.wpg)

Riprap Flow Conditions

Flow conditions through riprap covering an embankment are a function of the rock size distribution, embankment slope, and discharge. Flow conditions were well documented by making observations from the surface and through the side windows located at the crest brink, mid point, and near the toe of the riprap slope.

During low flow conditions, the flow comes over the flat concrete crest and dives down into the riprap layer. There is no flow visible over the surface of the rock layer and the flow is entirely interstitial. Viewing from the side windows indicated that the flow was very aerated, with even a few bubbles in the bedding layer. The flow was extremely turbulent with eddies forming behind some rocks and jets impinging on others. Failure of the riprap layer would be unlikely during these low flow conditions because the water level is well below the top layer of the riprap.

As the flow increases, the flow intermittently cascades over the surface then penetrates into the riprap layer. Continual increase in the discharge results in forces that will eventually lift or move surface rocks from the protective layer. During this phase small rocks begin moving on the surface, but failure has not occurred.

Figure 3 shows the flow conditions over the riprap protected embankment in the 1997 tests. The majority of the flow is interstitial in spite of the very large amount of spray and splash observed during these tests.

Interstitial Velocities, Flow Depth, and Discharge Relationships

The velocity at a given depth in the rock layer and down the slope is relatively constant for a wide range of discharges, provided that the flow is purely interstitial. During the 1997 riprap tests, the average interstitial velocity was about 0.7 m/s in the riprap layer and about 0.5 m/s in the bedding layer. The average flow depth in the riprap layer during the tests was below the top of the layer at failure on this steep 2:1 slope. The interstitial velocity is used later to determine the thickness of the required riprap layer with respect to the depth of flow before failure.

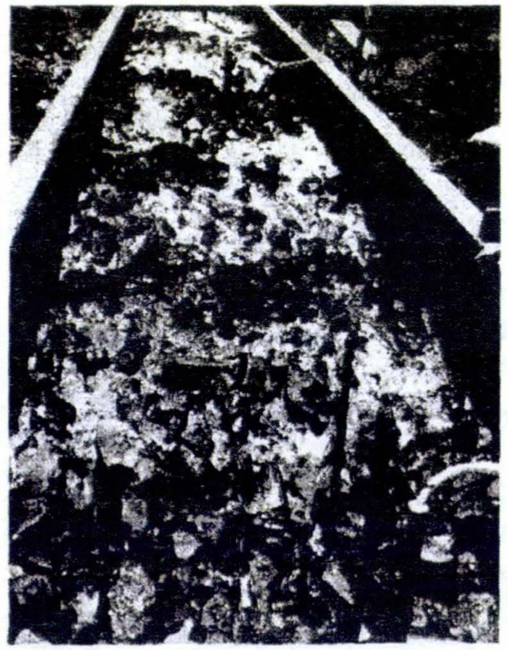

Figure 3. - Overall view, looking down the slope, of the 1997 riprap material with q=0.09 $m^3/s/m$. The pipes extending through the riprap were used to measure interstitial velocities. (Fig3.bmp)

Failure

Prior to failure of the riprap slope, many individual stones moved or readjusted locations throughout the test period. Movement of these stones is referred to as incipient motion. Channelization occurs, with rock movement and well-developed flow paths forming over the surface of the rock, prior to failure of the slope. Failure of the riprap slope was defined as removal or dislodgement of enough material to expose the bedding material. Failure of the riprap layer occurred with the measured solid water depth still below the surface of the rock layer. Highly aerated water consistently flows over the surface of the riprap, but represents only a small portion of the flow and is not measurable by water manometers. This became a very important observation for later determination of riprap layer thickness.

In the 1997 tests, a large hole formed in the riprap layer exposing the bedding layer at a distance 12.1 m down the slope from the crest. The riprap layer was considered to have failed at a unit discharge of 0.20 $m^3/s/m$. Many stones had repositioned or had been removed until, at failure, the bedding layer underneath the larger stones was exposed in several locations. The definition of failure is one reason for discrepancies when comparing data from various investigators.

Design Criteria

Data gathered during the tests performed under this program provided information on larger size rock on steeper slopes than previous test programs. The task was then to verify existing riprap design equations for overtopped embankments or to develop new design guidelines.

Design Procedure to Predict Stable Stone Size

A new design procedure to predict median stone size for a protective riprap layer has been developed from the test program and compilation of data from previous investigations [2,4,5,6]. A set of curves shown in Figure 4 for different embankment slopes combines the rock properties of the riprap material, discharge, and embankment slope. Each curve represents the point of incipient failure for a particular embankment slope, S, for a design unit discharge, q, and median stone size, D_{50}. C_u on the y-axis is the coefficient of uniformity of the material which is the ratio of the material D_{60} to D_{10}. The curves on figure 4 are based on the riprap material having an angle of internal friction, Φ, of 42°. The design curves combine empirical data with accepted sediment transport equations and are not simply a best fit of the data. A safety factor is not included in the graph, but left to the judgement of the designer to apply as needed.

Further investigation of the data used to determine these design curves can lead to some simplification of the design, such as eliminating the coefficient of stability, C_s, from previous design information [4]. Plotting the data with the design curves on linear axes shows that there is little difference in D_{50} when the embankment slope is 0.1 or less. Also, determination of the coefficient of uniformity is often difficult. This can lead to concerns by the designer trying to identify rock sizes for use with the design procedure. A sensitivity analysis was performed by varying the coefficient of uniformity from 1.5 to 2.1 and found to produce a ±5 percent difference in the computed median stone size.

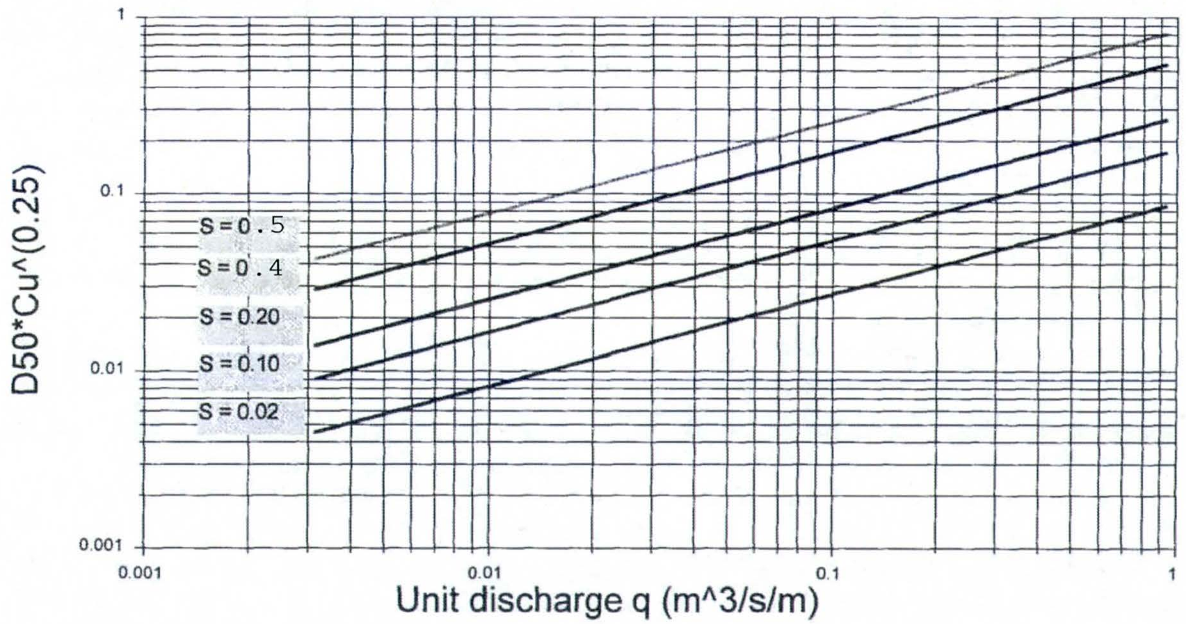

Figure 4. - Design curves to size riprap protection on embankments of various slopes. These curves represent the point of incipient failure as described previously. No safety factor has been included. (Fig4.wpd)

Riprap Layer Thickness

Thickness of protective riprap layers generally is specified as a minimum of twice the D_{50} or equal to the D_{100} size rock in the layer. Interstitial velocity data obtained from the test program, combined with data from previous tests conducted at CSU [2], has produced an analytical approach to determining the required riprap layer thickness. The following non-dimensional relationship has been developed between the interstitial velocity, the median stone size, slope, and the coefficient of uniformity:

$$\frac{v_i}{\sqrt{gD_{50}}} = 2.48S^{0.58}C_u^{-2.22}$$

Where: v_i = interstitial velocity (m/s)
D_{50} is initially determined from the design curves of Figure 4
g = gravitational constant (9.81 m/s^2)
S = embankment slope
and C_u= coefficient of uniformity = D_{60}/D_{10}

This approach uses the interstitial velocity, v_i, porosity, n_p, and continuity to determine the appropriate riprap layer thickness, t. The average velocity, v_{ave} can be determined using the porosity and the interstitial flow velocity determined from $v_{ave}= v_i n_p$. The average flow depth, y, is then determined from continuity using the design unit discharge and the average velocity, $y=q/v_{ave}$. The required thickness, t, of the riprap layer is determined using this flow depth and observations about the relationship between the embankment slope, the median rock size, D_{50}, and the subsequent allowable surface flow.

First some "rules of thumb" regarding riprap layer thickness; 1) the minimum thickness of the riprap layer is $2D_{50}$, 2) the maximum practical limit is $4D_{50}$. A methodology has been developed to determine the appropriate riprap layer thickness based upon the interstitial flow depth and embankment slope.

If the average water depth, y, is less than $2D_{50}$, then the flow is entirely interstitial and the D_{50} stone size is satisfactory for the design discharge. If not, then a portion of the discharge is flowing over the riprap and a larger stone size and/or a thicker layer would be required to accommodate the entire flow depth.

In general, for steeper slopes, the majority of the flow will be interstitial (as was the case with our tests) and the $2D_{50}$ criteria will be met with possibly a few iterations on the D_{50} rock size. However, this is not always the case. At milder slopes, less than 0.25, water has been observed to flow through and over smaller size riprap [2] and will approach the practical placement limit of $4D_{50}$. In cases where the embankment slope is less than 0.25 and the flow depth, y, exceeds the $2D_{50}$ criteria, an estimate of the flow depth and discharge that can safely pass over the riprap surface must determined. The surface flow depth is determined using standard flow equations for the flow over rough surfaces, and Manning's and Shield's equations, to assure that flow over the surface will not exceed the critical shear stress for the design D_{50}. Manning's n value is determined from the equation $n=0.0414D_{50}^{1/6}$ based upon previous experimental data [2] and the initial design D_{50}. This surface flow is subtracted from the total flow to determine the interstitial discharge and depth that meets the $2D_{50}$ to $4D_{50}$ thickness criteria.

This analytical approach to determining the thickness of the riprap layer provides a design where the riprap layer is at the point of failure for the design discharge. The difficulty of any design using riprap is the quality control of the rock material properties, size and gradation. For large riprap sizes, specifications are easily written, but from a practical standpoint, it is difficult to verify the riprap properties at the site. A factor of safety may be applied by the designer, as necessary. For example, if the design is for the probable maximum flood, no factor of safety may be required. However, if the design is for the 100-year flood over the service spillway, a factor of safety may be required based on agency policy or experience or judgement of the designer.

Toe Treatment

The riprap protection tested in 1994 and 1995 stopped on the slope with an open frame wall to hold the material in place. Designers expressed concern that perhaps the toe would be the weak point in the design and that the riprap should extend down the entire slope to a horizontal toe berm. As a result, bedding and riprap were placed horizontally at the toe of the slope with a berm equal to twice the riprap layer thickness placed parallel to the slope over the toe. The riprap failed on the slope first with no noticeable movement of the toe treatment throughout the test program. After failure on the slope had occurred the berm thickness over the toe was progressively reduced to equal the slope thickness. Rock movement occurred but no failure of the toe. These tests included flows with and without tailwater over the toe.

The riprap on the slope was then stabilized by covering the rock with anchored wire mesh and the discharge increased to determine the point of incipient failure for the toe. However, in spite of the stabilizing procedure, the rock at the crest dislodged and was removed down to the floor of the flume, causing failure of the entire slope such that testing of the toe could not continue. No specific guidelines are given, but clearly riprap on the slope is less stable and will be the point of failure, not the toe protection.

Design Example

The following design example illustrates the use of the proposed method for sizing stable riprap on a typical embankment dam slope. Computations for the median stone size and minimal thickness of the protective riprap layer are shown in metric or S.I. units. Flood and embankment properties that are known or assumed are listed in the following table:

Property	Parameter	Value
Overtopping discharge	Q	65 m^3/s
Embankment length	L	304.8 m
Overtopping unit discharge	q	0.213 $m^3/s/m$
Angle of repose of material	ϕ	42°

Property	Parameter	Value
Embankment crest width	W	6.1 m
Discharge coefficient	C	1.57
Embankment slope	S	23% or 0.23
Embankment angle	$\propto$	13°
Coefficient of uniformity	C_u	1.95
Porosity	n_p	0.45
Specific gravity of riprap	G_s	2.65
Specific gravity of water	G_w	1.00

Step 1: Many designers like to know the depth of the overtopping discharge, therefore, the overtopping depth, H, is found using:

$$Q = CLH^{1.5}$$

$$H = (Q/CL)^{2/3} = \left(\frac{65}{1.57 \times 304.8}\right)^{0.67} = 0.262\ m$$

Step 2: Find the median rock diameter, D_{50}, from the design curves (0.213 $m^3/s/m$ and an embankment slope of 0.23),

$$D_{50} C_u^{0.25} = 0.14 \qquad D_{50} = 0.12\ m$$

Step 3: Find the interstitial velocity, v_i.

$$\frac{v_i}{\sqrt{(g D_{50})}} = 2.48\, C_u^{-2.22}\, S^{0.58}$$

$$v_i = 2.48(0.23)^{0.58}(1.95)^{-2.22}\sqrt{9.81(0.12)} = 0.26\ m/s$$

From v_i, find the average velocity, v_{ave} using

$$v_{ave} = v_i * n_p = 0.26 * 0.45 = 0.12\ m/s$$

Step 4: Determine the average depth of water, y, at the point of incipient failure of the riprap,

$$y = q/v_{ave} = 1.78\ m$$

Check to see if the average depth, y, is less than, or equal to $2D_{50}$, in which case the design is complete and the design depth of riprap is $2D_{50}$. If not, then the embankment slope and practical limitations on overall placement thickness of $4D_{50}$ will determine the next steps taken. If the slope is less than or equal to 0.25, proceed with step 5 to determine the amount of the flow that can safely flow over the riprap surface. If the slope is greater than 0.25, go to step 10, and choose a larger D_{50} size for performing further iterations.

$$y = 1.78\ m > 0.24\ m = 2D_{50}$$

Slope = 0.23, so proceed to step 5

Step 5: Find the depth of water, h, that can flow over the surface of the riprap without causing critical shear stress [7],

$$0.97\, h\, S = 0.06(G_s - G_w) D_{50} \tan(\phi)$$

Using the appropriate values of the parameters, and solving for h,

$$h = \frac{0.06\,(2.65 - 1.00)\,(0.12)(0.900)}{0.97\,(0.23)} = 0.048\ m$$

Step 6: Calculate Manning's roughness coefficient, n,

$$n = 0.0414\, D_{50}^{1/6} \qquad n = 0.0414(0.12)^{1/6} = 0.029$$

Step 7: Calculate the unit discharge, q_1, that can flow over the riprap layer from Manning's equation,

$$q_1 = \frac{1}{n} h^{1.67} S^{1/2} = 0.10\ m^3/s/m$$

Step 8: Calculate the unit discharge, q_2, flowing through the riprap,

$$q_2 = q - q_1 = 0.21 - 0.10 = 0.11\ m^3/s/m$$

Step 9: Determine the interstitial flow depth through the riprap,

$$h_2 = \frac{q_2}{V_{ave}} = 0.92\ m \geq 4D_{50} = 0.48\ m$$

At this point, because the interstitial flow depth, h_2, is greater than $4D_{50}$, the stone size must be increased, therefore, go to step 10.

Step 10: Increase D_{50} by 10%. The new D_{50} is now 0.13 m.

Other iterations, with 10 percent increases in D_{50}, are presented in the following table until the interstitial depth of water is less than the chosen limit of placement thickness of the riprap layer:

Step	Parameter	1st iteration D_{50} = 0.13 m		2nd iteration D_{50}=0.14 m		3rd iteration D_{50}=0.154 m	
		Value	Comments	Value	Comments	Value	Comments
5	h (m)	0.052		0.056		0.062	
6	n	0.029		0.03		0.03	
7	q_1 (m^3/s/m)	0.117		0.13		0.152	
8	q_2 (m^3/s/m)	0.096		0.083		0.061	
9	v_i (m/s)	0.271	use Step 3	0.281	use Step 3	0.295	use Step 3
	v_{ave} (m/s)	0.122	use Step 3	0.13	use Step 3	0.133	use Step 3
	h_2 (m)	0.786	$>4D_{50}$=0.52	0.638	$>4D_{50}$=0.56	0.466	$<4D_{50}$=0.62

After the third iteration, the portion of the flow, q_2, and depth, h_2, that is carried interstitially is less than $4D_{50}$, therefore, the required thickness, t, of the riprap layer is:

$$t = 4D_{50} = 4 \times 0.154 = 0.62\ m$$

Thus, the required median stone size at the point of incipient failure is 0.154 m for this discharge and slope. A factor of safety should be applied, as necessary.

Conclusions

Design criteria for large riprap are presented. The design provides a means to determine the point of incipient failure of the riprap for a given overtopping unit discharge and the required thickness of $2D_{50}$ or $4D_{50}$ based on the slope of the embankment, the interstial flow, and surface flow. The riprap layer thickness should never be less than $2D_{50}$. There should be a well-graded bedding layer with a specified D_{50} under the riprap layer. A filter cloth (geotextile) or filter layer should be placed under the riprap if there is no bedding layer. Riprap with the designed D_{50} should be placed on top of the bedding layer.

The riprap thickness criterion is based upon the surface flow not causing critical shear stress and the remainder of the flow passing through the riprap with a thickness of $2D_{50}$ to $4D_{50}$. The median stone size determined from the proposed design curves computes the size at which incipient failure is estimated to begin. The design requires an iterative procedure involving the design D_{50} and the riprap layer thickness for a given design unit discharge. The riprap layer thickness will be given as an integer multiple of D_{50} such as $2D_{50}$, $3D_{50}$, or $4D_{50}$. A factor of safety can be provided by the design engineer to meet specific applications. The design criteria can be used for new designs and to evaluate the adequacy of riprap protection on existing dams.

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[2] Abt, S. R., Kahattak, M. S., Nelson, J. D., Ruff, J. F., Wittler, R. J., Lagrone, D. L., Lee, D. W., and Hinkle, N. E., "Development of Riprap Design Criteria by Riprap Testing in Flumes: Phases I and II," Colorado State University, Oak Ridge National Laboratory, May 1987 and September 1988.

[3] Mason, P.J. and K. Arumugam, "Free jet scour below dams and flip buckets," ASCE J. Hydr. Engr., Vol. 111, No. 2., pp. 220-236, 1985.

[4] Frizell, K.H., J.F. Ruff, and S, Mishra, "New riprap design criteria to prevent embankment dam failure during overtopping." Proc. ASDSO Dam Safety '97, Pittsburg, PA. September 8, 1997.

[5] Wittler, R., "Mechanics of Riprap in Overtopping Flow," Ph.D. dissertation, Civil Engineering Department, Colorado State University, 1994.

[6] Robinson, K., Rice, C., and Kadavy, K., "Stability of Rock Chutes," ASCE Proceedings Water Resources Engineering, pp. 1476-1480, 1995.

[7] Julien, P.Y., "Erosion and Sedimentation," Cambridge University Press, pp 128-129.

APPENDIX Q

Recommended Alternative Conceptual Plans

SKYLINE FAN DCR

REGIONAL RETENTION BASIN CONCEPTUAL PLANS

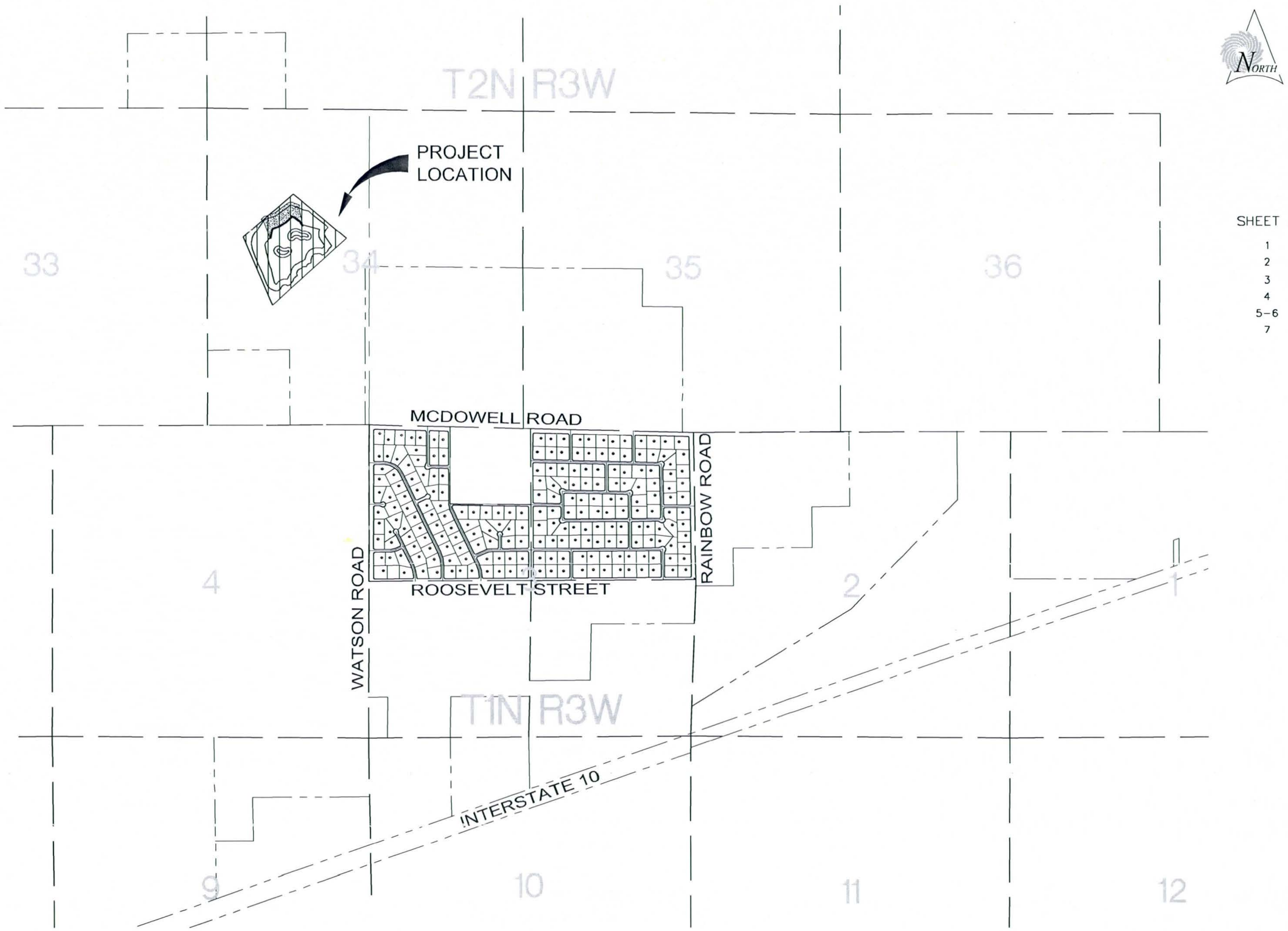
15% CONCEPTUAL PLANS

OWNER

TOWN OF BUCKEYE
530 EAST MONROE AVENUE
BUCKEYE, AZ 85326
CONTACT: MAURICIO IACUELLI, P.E.
PHONE: (623)547-4661

ENGINEER

SUNRISE ENGINEERING, INC.
2152 VINEYARD, SUITE 123
MESA, AZ 85210
CONTACT: RICKY M. HOLSTON, P.E.
PHONE: (480) 768-8600
FAX: (480) 768-8609



VICINITY MAP
NOT TO SCALE

SHEET INDEX

Know what's below. Call before you dig. 1-800-782-5348

REV NO.	COMMENT	DATE

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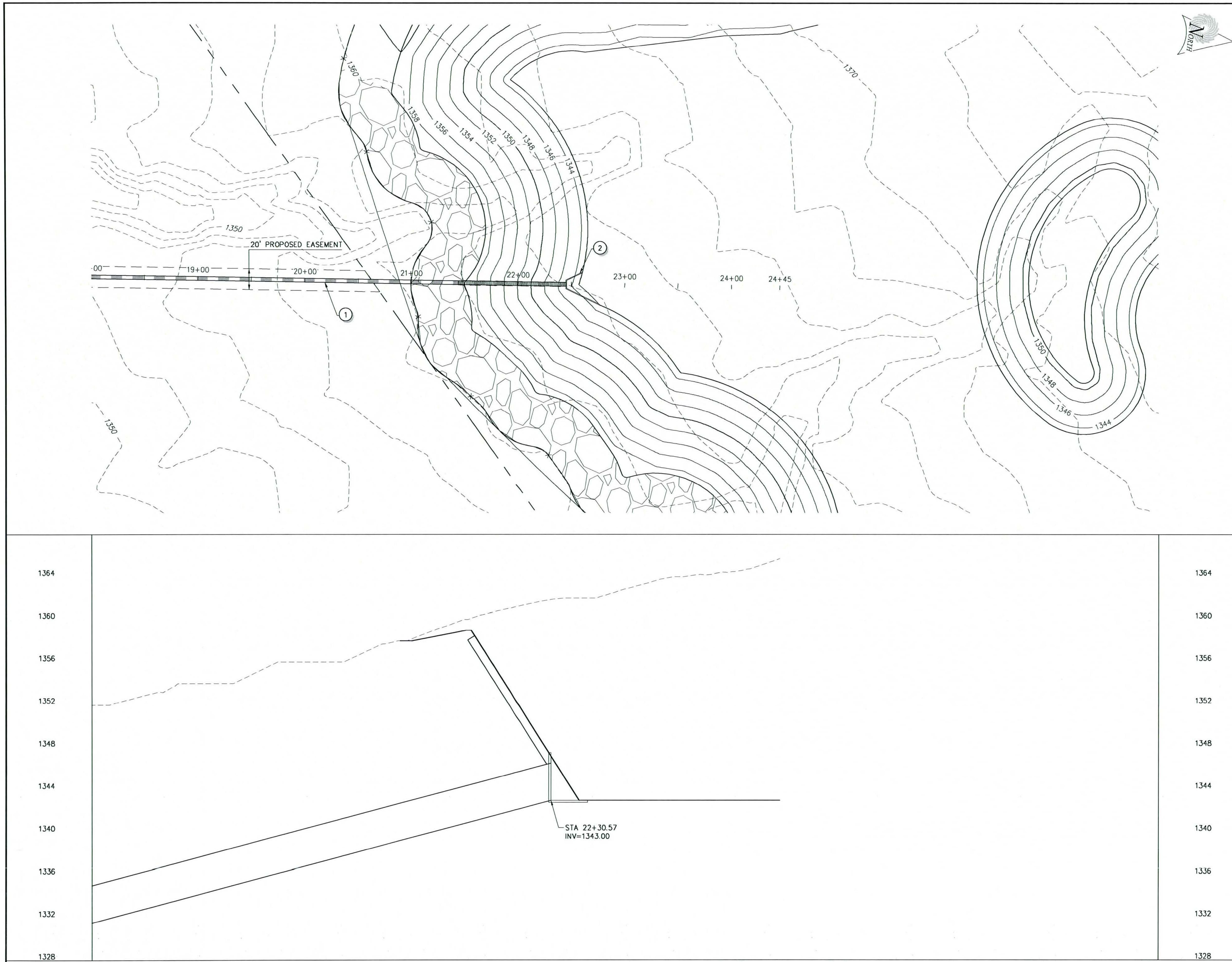
2152 SOUTH VINEYARD, SUITE 123
MESA, ARIZONA 85210
TEL 480.768.8600 · FAX 480.768.8609
www.sunrise-eng.com

TOWN OF BUCKEYE

SKYLINE FAN DCR
REGIONAL RETENTION BASIN CONCEPTUAL PLANS
COVER

SEI NO.	DESIGNED	DRAWN	CHECKED	SHEET NO.	
04234	CRC	SLF		1 of 7	COV



CONSTRUCTION NOTES

1. 42" RGRCP STORM DRAIN PIPE
2. OUTLET STRUCTURE PER DETAIL D ON DWG DT
3. HEADWALL
4. RIP RAP, D_{50} AND THICKNESS AS NOTED ON PLAN

15% CONCEPTUAL PLANS

SCALE
0 100' 200'
HORIZ: 1" = 100'
VERT: 1" = 4'

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REGIONAL RETENTION BASIN CONCEPTUAL PLANS
STORM DRAIN PLAN & PROFILE

SEI NO.	DESIGNED	DRAWN	CHECKED	SHEET NO.	
04234	CRC	SLF		6 of 7	SD2

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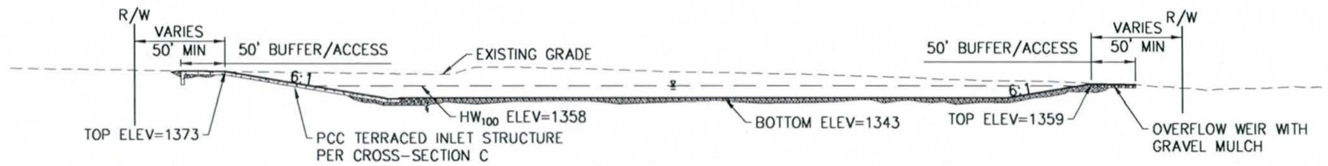

A CROSS-SECTION
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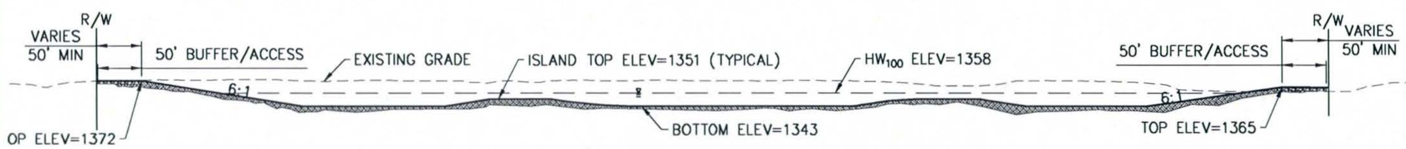
VERT: 1" = 1'



B CROSS-SECTION
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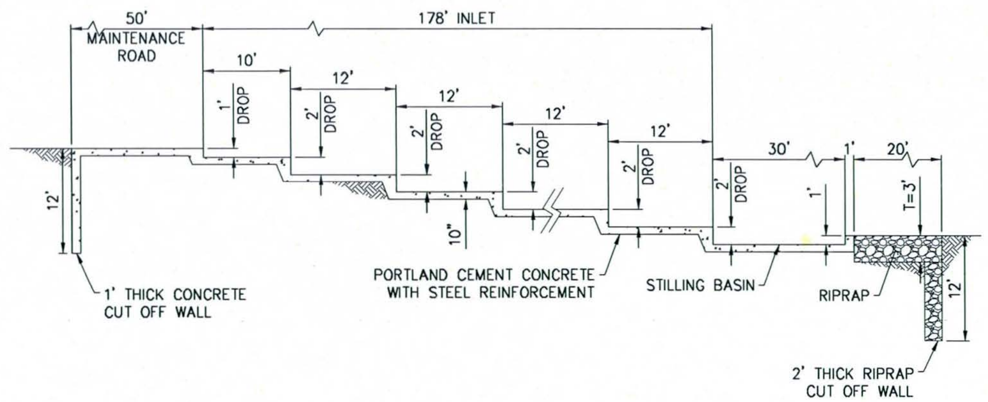
VERT: 1" = 1'



C CROSS-SECTION - PCC STEPPED INLET STRUCTURE
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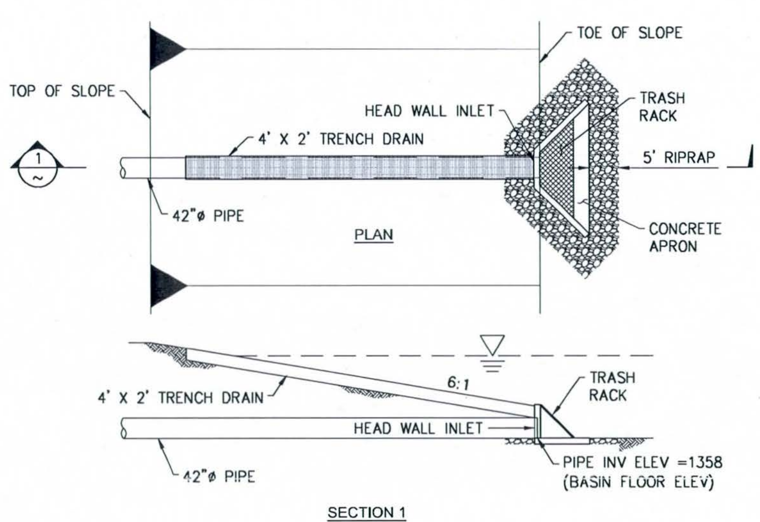

D DETAIL - BASIN OUTLET STRUCTURE
SCALE: 1" = 15'

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TOWN OF BUCKEYE

SKYLINE FAN DCR
REGIONAL RETENTION BASIN CONCEPTUAL PLANS
DETAILS

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APPENDIX R

Public Meeting Comments

Skyline Fan Design Concept Report
COMMENTS

PUBLIC MEETING

August 22, 2013

Name: Maria Sachs

Address: 19702 W. Medlock Dr. Litchfield Park #2

Phone Number: ____________ E-mail: mariasachs1@yahoo.com

Please provide your comments on the project presented in the meeting.

I agree with this project

I would like to see this project get started as soon as possible!

Meeting Survey

1. How did you learn about this meeting?

☐ Newspaper ☒ Mailer ☐ Friend/Neighbor ☐ Signage/Other ________

Please check the level of importance you feel applies to each of the items listed below.

	Very Unsatisfied	Unsatisfied	Somewhat Satisfied	Satisfied	Very Satisfied
2. How satisfied were you with the **helpfulness** of the staff members?	☐	☐	☐	☐	☒
3. How satisfied were you with the **knowledge** of the staff members on the topic of the meeting?	☐	☐	☐	☐	☒
4. How satisfied were you with the **professionalism** of the staff members?	☐	☐	☐	☐	☒
5. How satisfied were you with the **information** you received?	☐	☐	☐	☐	☒

Please submit this comment sheet at the meeting or send to PIO, Flood Control District of Maricopa County, 2801 W. Durango St., Phoenix, AZ 85009; gantwegner@mail.maricopa.gov; or fax (602) 506-4389.

Skyline Fan Design Concept Report

Public Meeting – August 22, 2013 – Buckeye Town Hall, Buckeye, Arizona

SIGN IN SHEET

This sign-in sheet will be saved as one of the documents related to the project.

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