APPENDIX L

Drainage Plans

L.1 Conceptual Drainage Plan

L.2 Drainage Erosion and Sediment Control Plan

APPENDIX L.1

Conceptual Drainage Plan

Conceptual Drainage Study
for
BEACON SOLAR ENERGY PROJECT
Kern County
California

Prepared for:
WorleyParsons
2330 East Bidwell Suite 150
Folsom, CA 95630

February, 2008
Project No. 6199-01-07

CARLTON
Engineering Inc.

Table of Contents

INDEX OF TABLES AND FIGURES ..... **II**

I. PROJECT INTRODUCTION: **1**

II. OBJECTIVE: **1**

III. SUMMARY: **2**

IV. HYDROLOGY: **2**

A. RAINFALL 3
B. SOILS 3
C. HYDROLOGIC LOSSES 4
D. EXISTING CONDITIONS: 4
1. SUBCATCHMENT 1S – Above State Route 14 ..... *5*
2. SUBCATCHMENT 3S – Above Rail Road *6*
3. SUBCATCHMENT 5S – West of Dry Wash (Pine Tree Creek) *6*
4. SUBCATCHMENT 6S – East of Dry Wash (Pine Tree Creek) *6*
E. PROPOSED CONDITIONS 6
1. SUBCATCHMENT 8S – West of Rerouted Dry Wash/East of Rail Road 9
2. SUBCATCHMENT 9S– East of Rerouted Dry Wash (Including Dry Wash) *9*
3. SUBCATCHMENT 10S – North Section *9*
4. SUBCATCHMENT 13S – Evaporation Ponds *10*

V. HYDRAULICS **11**

A. SUMMARY 11
B. DESIGN CONSIDERATIONS 11
1. DESIGN STORM FREQUENCY *11*
2. DESIGN STORM DURATION *11*
3. MINOR LOSSES *11*
C. OPEN CHANNEL STUDY OF PINE TREE CREEK DRY WASH CHANNEL 11

VI. APPENDIX A: EXISTING CONDITIONS **14**

VII. APPENDIX B: PROPOSED CONDITIONS **15**

VIII. APPENDIX C: REFERENCES **35**

IX. APPENDIX D: HYDRAULICS **45**

Index of Tables and Figures

Figure 1: Location Map iii
Figure 2: Vicinity Map iv
Table 1: Summary of Peak Flows at Point of Interest-Downstream Project Pine Tree Crk (7P) 2
Table 2: Summary of Soil NRCS Soil Map 3

Figure 1: Location Map

Figure 2: Vicinity Map

I. PROJECT INTRODUCTION:

The Beacon Solar Energy Project is located in the Fremont Valley on approximately 2,330 acres adjacent to State Route 14 (Midland Trail), north of California City in Kern County, California (Figures 1 & 2). The site is bounded by State Route 14 to the west, and undeveloped land to the north, east and south. Railroad tracks operated by Southern Pacific Railroad run north/south, bisecting the western portion of the site. The project includes construction of a solar power plant, which will generate approximately 250 Megawatts of power using solar thermal technology. In conjunction with the power plant, an administration building, a warehouse, and a paved access road from State Route 14 to the central power block will be constructed. The site is located over the Cantil Valley Fault (Garlock West Fault).

Based on Flood Hazard Maps prepared by the Federal Emergency Management Agency (FEMA) a 100 year flood zone crosses the central portion of the site, trending northeast along the alignment of Pine Tree Creek dry wash. Off-site drainage comes from the El Paso Mountains to the southwest. Pine Tree Creek is similar to other streams in the area, it discharges from well defined, steep canyons, but tends to spread out into a number of poorly defined drainage channels on the valley floor. This is evident from the topographic survey of the project site (provided by Lars Andersen).

The proposed improvements will realign the dry wash to follow the southern and eastern property boundaries. The outlet of the rerouted dry wash will be designed and constructed to return the flow from a channelized flow into sheet flow, which mimics the existing dry wash channel.

Major grading is necessary because of design constraints involved in constructing the solar panel arrays. In approximate numbers, 4.3 million cubic yards of material will be excavated and balanced on site (see the conceptual grading plan located in Appendix B).

This conceptual drainage report addresses drainage patterns associated with the onsite development of the solar plant, and existing and proposed drainage flows through and around the development.

II. OBJECTIVE:

This report outlines the hydraulic and hydrologic conditions associated with the development of approximately 2,330 acres of desert shrub range. The information and calculations presented in this report follow the requirements of Kern County through use of the methodology outlined in the “Kern County Hydrology Manual” and “Kern County Division Four Standards for Drainage”.

Anticipated increases in storm water runoff due to conversion of existing pervious soils to compacted and impervious surfaces will be mitigated through use of an onsite detention area. Preliminary sizing of the onsite detention area is located in Appendix B.

The existing dry wash (Pine Tree Creek) will be relocated around the proposed solar array facility. The relocated dry wash channel will be sized to contain the 100 year water surface within the channel with appropriate freeboard per the Kern County Division Four Standards for Drainage.

III. SUMMARY:

Pre- and Post-development flow to the point of interest has been calculated and summarized in Table 1A below.

Table 1: Summary of Peak Flows at Point of Interest-Downstream Project Pine Tree Crk (7P)

	Peak Flow			
	Pre-Development		Post-Development*	
Storm Duration	10-year	100-year	10-year	100-year
24-hour	48.6 cfs	175.8 cfs	48.5 cfs	175.5 cfs

*Per Requirements from the Kern County Hydrology Manual

IV. HYDROLOGY:

The hydrologic analysis was performed and analyzed as set forth in the Kern County Hydrology Manual. USDA Natural Resources Conservation Service (SCS) Technical Release 55 (TR-55) is used to assign curve numbers (CN) in calculating runoff. TR-55 is also used to compute time of concentration, or the time it takes for runoff to travel from the most hydraulically distant part of the watershed to the point of reference downstream. Time of concentration is based on sheet flow, shallow concentrated flows, and channel flow.

The components of storm drain systems include swales, drain inlets, pipes, and detention structures. It is anticipated that the Beacon Solar Energy Project will predominately use ditches and channels to convey runoff through and around the project. The design of each component must take into account the worst-case scenario. For onsite ditches, this occurs during a short duration event, resulting in high peak flow (cubic feet per second). The rational method will be utilized for this calculation. A longer duration (24-hour), less intense storm will produce the greatest volume and should be used in designing detention structures. The SCS Unit Hydrograph Method will be used for this calculation.

Onsite ditches and channels were sized using Manning's Equation and Bently Flowmaster (Service Pack 3, 2005) computer program. Detention structures are sized using the SCS Synthetic Unit Hydrograph method (Technical Release 20, TR-20). For detention, calculations were performed with HydroCAD version 8.50 (HydroCAD Software Solutions), which incorporates the methodologies described above. HydroCAD is a Computer Aided Design system used for modeling the hydrology and hydraulics of storm water runoff. It is based largely on the hydrology techniques developed by the Soil Conservation Service (SCS/NRCS), combined with other hydrology and hydraulics calculations. For a given rainfall event, these techniques are used to generate hydrographs throughout a watershed.

A. RAINFALL

Mean annual rainfall for the project site is 5.3 inches per year (USGS). Using the figures in the Hydrology Manual, the rainfall depth is 1.10 inches for the 2-year storm, 1.97 inches for the 10-year storm, and 3.25 inches for the 100-year storm (Appendix C). As the elevation of the project site is above 1,640 feet (project site varies from 2,026 to 2,257 feet), the SCS Type IA storm temporal distribution will be used.

B. SOILS

Soil classification is made using data from the SCS Soil Survey for Kern County, California, Southeastern Part (Appendix C). The soil in the project site is classified as Arizo Gravelly Loamy Sand, Hydrologic Soil Group (HSG) A; Cajon Loamy Sand, HSG A; Cajon Gravelly Loamy Sand, HSG A; Jawbone Gravelly Loamy Sand, HSG D; and Rosamond Clay Loam (Saline-Alkali), HSG C. Kleinfelder, who is preparing the final Geotechnical Engineering Study for the project, was contacted and confirmed the soil types listed above to be consistent with the NRCS Soil Map.

The table below lists the soil classification number, and description of the soils permeability.

Table 2: Summary of Soil NRCS Soil Map

Kern County NRCS Soil Map, Southeastern Part			
NRCS Map Number	Map Unit Name	Permeability Description	Permeability (Inches per Hour)
104	Arizo Gravelly Loamy Sand	Very Rapid	More than 20 inches

114	Cajon Loamy Sand	Rapid	6.0 to 20 inches
116	Cajon Gravelly Loamy Sand	Rapid	6.0 to 20 inches
148	Jawbone Gravelly Loamy Sand	Rapid	6.0 to 20 inches
172	Rosamond Clay Loam	Moderately Slow	0.2 to 0.6 inch

C. HYDROLOGIC LOSSES

With the hydrologic soil group established, hydrologic losses can be computed using SCS runoff curve numbers (CN) found by using the TR-55 runoff curve numbers (see Appendix C). The subcatchment areas and associated curve numbers are input into HydroCAD, which calculates a weighted CN and total area in computing runoff. The hydrologic cover type was assumed to be Desert Shrub and a hydrologic density, or the percent of the ground surface covered by the crown canopy of live plants and trees, was assumed to be POOR with a vegetative cover ranging from 0 to 20%.

D. EXISTING CONDITIONS:

A pre-construction drainage shed map (DS1, page 15 and DS2, page 16) was prepared to estimate the historical flow to Node 7P. The calculations of the 10- and 100-year storm flows for the pre-development conditions are summarized in Appendix A. The total water shed area draining to the site at Node 7P is approximately 83.2 square miles. State Route 14 and the Southern Pacific Rail Road bisect the watershed. Drainage crossing locations were estimated using aerial photos from Google Earth. The crossing locations are identified on shed map DS2. The size of the existing crossing structure is unknown at this time. We've assumed flow is unimpeded at each crossing. This assumption is conservative because it does not take into account any storage or reduction in peak flows that may be associated with an undersized crossing structure. There is one identified onsite drainage crossing of the railroad identified on the shed map. The watershed area to this crossing location is approximately 937 acres. The majority of the offsite drainage area passes through the site along the Pine Tree Creek dry wash.

The 10 and 100-year storm flows were determined using the SCS unit hydrograph procedure (also known as the TR-20 runoff method). The SCS unit hydrograph method generates a runoff hydrograph by the following basic steps:

1) A rainfall distribution is selected which indicates how the storm depth will be distributed over time. For the purposes of this report, a SCS Type IA 24 hour storm distribution will be used.

2) The design storm depth is determined from rainfall intensity duration frequency (I-D-F) curves from Kern County Hydrology Manual Rainfall Isohyet Map and the Point Precipitation Frequency Estimates from NOAA Atlas 14 (see Appendix C). Combined with the rainfall distribution, this specifies the total rainfall depth at all times during the storm.

3) Based on the Time-of-Concentration the storm is divided into small segments of equal duration. For each segment, the SCS runoff equation and the average Curve Number are used to determine the portion of that segment that will appear as runoff.

4) A Unit Hydrograph (or a hydrograph of a storm dropping one inch of runoff on the entire basin) in conjunction with the Time-of-Concentration, is used to determine how the runoff from a single segment is distributed over time. The result is a complete runoff hydrograph for a single segment.

5) Individual hydrographs are added together for all segments in the storm, yielding the complete runoff hydrograph for the storm.

Due to the complexity of the SCS unit hydrograph method and analyzing detention requirements, the computer program HydroCAD will be utilized. The backup calculations are located at the end of this report in Appendix A.

Existing condition watershed sub areas are depicted on shed map DS2 (Appendix A) and are summarized below. The calculated peak runoff will be used as a target flow in the post-development condition.

1. SUBCATCHMENT 1S – Above State Route 14

a) SUB AREA A1

Soil Name – 148 Jawbone gravelly loamy sand, Desert Shrub Range, Poor, HSG D, CN 88 (207.3 acres).

b) SUB AREA A2

Soil Name – 104 Arizo gravelly loamy sand, Desert Shrub Range, Poor, HSG A, CN 63 (340.7 acres).

2. SUBCATCHMENT 3S – Above Rail Road

a) SUB AREA B1

Soil Name – 104 Arizo gravelly loamy sand and 114 Cajon loamy sand, Desert Shrub Range, Poor, HSG A, CN 63 (389.4 acres).

3. SUBCATCHMENT 5S – West of Dry Wash (Pine Tree Creek)

a) SUB AREA C1

Soil Name – 172 Rosamond clay loam, Desert Shrub Range, Poor, HSG C, CN 85 (353.3 acres).

b) SUB AREA C2

Soil Name – 104 Arizo gravelly loamy sand and 114 Cajon loamy sand, Desert Shrub Range, Poor, HSG A, CN 63 (700.8 acres).

4. SUBCATCHMENT 6S – East of Dry Wash (Pine Tree Creek)

a) SUB AREA D1

Soil Name – 172 Rosamond clay loam, Desert Shrub Range, Poor, HSG C, CN 85 (397.6 acres).

b) SUB AREA D2

Soil Name – 114 Cajon loamy sand and 116 Cajon gravelly loamy sand, Desert Shrub Range, Fair, HSG A, CN 63 (537.8 acres).

It should be noted that the flows through the Pine Tree Creek dry wash were not added to the drainage calculations in Appendix A. It is assumed that the flow through the dry wash in the existing and proposed flow rate will remain unchanged by the project development.

E. PROPOSED CONDITIONS

The Kern County Hydrology Manual suggests restricting the area to use the rational method to 640 acres and less. The post construction drainage areas for each shed are less than 640 acres and the rational method will be used to size the onsite drainage swales to contain the 10- and 100-year rainfall events. One exclusion to this rule is the onsite water sheds D

(Node 17S, see DS4 page 51). The watershed entering the site at the rail road drainage crossing identified above (described in section D—Existing Conditions) is greater than 640 acres (approximately 1168.4 acres), and therefore, the SCS Unit Hydrograph Method will be used to size this channel.

The 10- and 100-year storm flows were determined using the Rational Method, Q=CIA, where C is the Runoff Coefficient, I is the Intensity (inches/hour) and A is the area (in acres).

Rainfall intensity, I, was derived from rainfall intensity duration frequency (I-D-F) curves from NOAA Atlas 14 Point Precipitation Frequency Estimates (see Appendix C). The Runoff Coefficient, C, is shown in Appendix B for each post development watershed.

The Beacon Solar Energy Project is shown on the attached site plan (provided by WorleyParsons) and on the Conceptual Grading Plan (prepared by Carlton Engineering). Both plans are located in Appendix B. The development will consist of a 24' wide paved access road, which will connect the solar power block to State Route 14. A new Administration Building and Warehouse will also be constructed.

The power block is located in the approximate geographic center of the solar array field. The power block covers approximately 13.1 acres and is approximately 39% impervious.

The Solar Collector Assembly Area (SCAA) will contain a paved access road and assembly building. According to WorleyParsons, the assembly area is temporary and will be removed after construction of the facility. For purposes of this conceptual drainage study, the SCAA area will not be used in the calculations of post development runoff.

The post development curve numbers were increased approximately 3% from the existing condition curve numbers due to the minimal increase in impervious area from the development as described above.

Each of the solar panel mirrors will freely drain and will be assumed pervious. The solar panel field is divided up into "design cubes". Each "design cube" is 2,050 linear feet by 1,180 linear feet. Within each design cube there are eighty, 489 linear feet long solar panels. Each solar panel has thirteen support footings, measuring two feet in diameter each (40.9 square feet). Therefore, each design cube contains approximately 3,270 square feet of impervious solar panel footings, making each design cube approximately 0.14% impervious.

Approximately 26.6 acres has been identified as evaporation ponds to be constructed as a part of this project. The evaporation ponds will be considered retention basins with no outlet. Uphill drainage will be routed around the evaporation ponds. Rain falling directly on the ponds will be retained and evaporated, and will not be used in the calculation of the post development runoff totals.

A detention area will be required to restrict the flows from the north section of the site (see watershed DS3 in Appendix B). The construction of the solar field will transform existing surface flow (sheet, shallow channel flow) to a single concentrated point of discharge. In order to reduce the overall project peak post-development flows to pre-development runoffs, a detention basin will gravity drain to the east to Pine Tree Creek.

The proposed detention area (identified as node 11P in the HydroCAD printouts located in Appendix B) is located within Rosamond Clay Loam as identified by the SCS Maps. An infiltration factor of 0.2 inches per hour was assumed for the basin. The basin's watershed is approximately 374 acres (see attached shed map DS3 in Appendix B). The time of concentration for the developed watershed was determined to be 133.2 minutes (based on sheet flow + shallow concentrated flow + channel flow). Kern County requires the detention basin be sized for the Intermediate Storm Duration Discharge (10 year) five-day runoff hydrograph.

From the Point Precipitation Frequency Estimates from NOAA Atlas 14 in Appendix C, the interpolated 10-year, 5-day rainfall depth is 2.59 inches. The peak 10-year, 5-day flow into the detention area was determined to be 20.4 cfs. The design storm volume was determined to be 3.1 acre-ft. At the north east side of the detention area, a 40' wide trapezoidal weir (2:1 side slopes) will serve as an outlet for the detention structure. During the 10-year, 5-day storm event, the trapezoidal weir will limit the runoff to the pre-development level (7.8 cfs). For the 100- year, 24-hour event, the trapezoidal weir will limit the runoff to the pre-development level (35.5 cfs). The detention area will completely drain within seven days, as required by Kern County. For larger storms than the 10-year, 5-day event, the runoff will flow over the top of the earthen berms through a concrete lined overflow weir structure. The peak water surface depth within the detention area will be approximately 5.0 inches, storing approximately 12.6 acre-ft. The trapezoidal weir will flow to Pine Tree Creek dry wash.

Pine Tree Creek dry wash will be rerouted to follow the project's southern and eastern property boundaries. Per the Kern County Division Four Standards for Drainage, the realigned dry wash will be sized to convey the

Capital Storm Design Discharge (100 year) event. The realigned dry wash will be a trapezoidal channel having 3:1 side slopes with a minimum bottom width of 345 feet and minimum depth of 8 feet. By constructing a channel with this shape, the minimum freeboard of one foot above the water surface will be obtained. Due to the existing, poorly defined dry wash channel (sheet flow through portions of the dry wash) the channel outlet will be designed to return the flow from a concentrated flow into sheet flow.

Shed map DS3 (Appendix B) depicts the post-development conditions and drainage patterns and are summarized as follow:

1. SUBCATCHMENT 8S – West of Rerouted Dry Wash/East of Rail Road

a) SUB AREA E1

Soil Name – 114 Cajon loamy sand and 116 Cajon gravelly loamy sand, Desert Shrub Range, Poor, HSG A, CN 65 (1031.4 acres).

b) SUB AREA E2

Soil Name – 172 Rosamond clay loam, Desert Shrub Range, Poor, HSG C, CN 87 (94.8 acres).

2. SUBCATCHMENT 9S– East of Rerouted Dry Wash (Including Dry Wash)

a) SUB AREA F1

Soil Name – 114 Cajon loamy sand, Desert Shrub Range, Poor, HSG A, CN 63 (293.6 acres).

b) SUB AREA F2

Soil Name – 172 Rosamond clay loam, Desert Shrub Range, Poor, HSG C, CN 85 (208.9 acres).

3. SUBCATCHMENT 10S – North Section

a) SUB AREA G1

Soil Name – 114 Cajon loamy sand, Desert Shrub Range, Poor, HSG A, CN 65 (16.3 acres).

b) SUB AREA G2

Soil Name – 172 Rosamond clay loam, Desert Shrub Range, Poor, HSG C, CN 87 (357.8 acres).

4. SUBCATCHMENT 13S – Evaporation Ponds

a) SUB AREA H1

Soil Name – 114 Cajon loamy sand, Desert Shrub Range, Poor, HSG A, CN 63 (26.6 acres).

It should be noted that the flows through the Pine Tree Creek dry wash were not added to the drainage calculations in Appendix A. It is assumed that the flow through the dry wash in the existing and proposed conditions will remain unaffected by the project development.

F. PINE TREE CREEK ANALYSIS

The scope of this conceptual drainage study did not include a detailed study of the flows in Pine Tree Creek dry wash. As previously mentioned, the drainage area at Point of Interest 7P is approximately 83.2 square miles. The 1986 FEMA Flood Insurance Study of Kern County, California Unincorporated Areas Table 2 Summary of Discharges identifies several drainage sheds within Kern County that are both larger and smaller than this project's watershed. This project is located within one of these studied areas. Pine Tree Creek drains northeast from the site, to Jawbone Canyon Wash. The FEMA study analyzed Jawbone Canyon Wash at a point approximately 2 miles northeast of point 7P where the Wash crosses Munsey Road (see shed map DS1). At this location, the 100-year peak flow in Jawbone Canyon Wash is identified as 36,000 cfs, with a total contributing watershed of 280.4 square miles.

Obtaining a conservative estimated flow for Pine Tree Creek was accomplished by plotting these similar drainage basins onto a graph and interpolating the data to determine a design flow that will remain within the conservative estimated flow of this study. The graph is located in Appendix A.

Based on the data points on the graph, and assuming that the sampled watersheds are similar to this basin (ie. shape, vegetation cover, soil, elevation, length, urbanization), then the conservative estimated flows anticipated for Pine Tree Creek range from 14,000 to 20,000 cfs. The rerouted Pine Tree Creek dry wash channel will be designed to carry these flows.

V. HYDRAULICS

A. SUMMARY

Ditches and channels were designed using open channel flow criteria outlined in the Kern County Division Four Standards for Drainage. Design criteria can be reviewed in Appendix D.

B. DESIGN CONSIDERATIONS

1. DESIGN STORM FREQUENCY

Per the Kern County Division Four Standards for Drainage, the constructed drainage system is designed to convey the Capital Storm Design Discharge (CSDD) 100-year event with the water surface elevation contained within all ditches and channels.

2. DESIGN STORM DURATION

The goal in storm drain design is to convey the maximum peak flow for a given design storm. This involves choosing a storm with the same duration as the time of concentration for the watershed (critical duration). In our case, the minimum time of concentration equals 100 minutes. As the storm flow is passed down the collection system, the time of concentration at each point downstream of the headwater sheds will increase according to shed minimum time of concentration plus travel time in pipes.

3. MINOR LOSSES

A Manning's roughness coefficient n value of 0.022 was assumed for the clean excavated ditches within the project site. A Manning's n value of 0.035 was assumed for the rerouted dry wash (Pine Tree Creek). This will allow for a stone covered channel bottom and weed covered banks. This assumed n value will take into account revegetation of the dry wash with native plant species. See Appendix D for roughness coefficient backup data.

C. OPEN CHANNEL STUDY OF PINE TREE CREEK DRY WASH CHANNEL

The program Flowmaster by Bently was used to determine the water surface and velocity in the realigned channel. For purposes of this report, two channel section locations were analyzed in the dry wash: one section along the east flowing channel at the southern property line, and one along the north flowing channel adjacent to the eastern property line. We

assumed for these channels that the depth of flow achieves a condition known as normal depth, and is assumed constant along the length of the channel. See Appendix D for Flowmaster calculations of the dry wash channel.

Input Variables
Flows:
Based on a previous FEMA Flood Insurance Study, as described above, the 100-year peak discharge storm flow in the Pine Tree Creek Dry Wash is estimated to be between 14,000 and 20,000 cfs.

Channel Geometry and Alignment:
The Dry Wash channel is designed with maximum 3:1 side slopes and a minimum channel bottom of 345 feet. The minimum channel centerline curve in constructed channels is three times the top width of the design water surface.

Channel Slope and Roughness:
The rerouted Dry Wash will slope from a minimum of 0.5% to a maximum of 1.4%. Channel roughness was taken from Table 3 Summary of Roughness Coefficients in the FEMA Flood Insurance Study Kern County, California Unincorporated Areas Volume 1. The roughness for the Jawbone Canyon Wash for the Channel "n" value ranges between 0.030-0.045.

Channel Depth and Velocity:
The depth of flow for the portion of the rerouted dry wash channel that is at 0.5% for the 14,000 to 20,000 cfs flow range is 4.7 to 5.9 feet while the velocity ranges between 8.2 fps to 9.4 fps (see Appendix D).

The depth of flow for the portion of the rerouted dry wash channel that is at 1.4% for the 14,000 to 20,000 cfs flow range is 3.5 to 4.3 feet while the velocity ranges between 11.3 to 13.0 fps (see Appendix D).

For final construction documents for the project it is our recommendation that a detailed study be prepared to calculate the water surface elevation using a computer program such as the United States Army Corps HEC-RAS, or an equivalent.

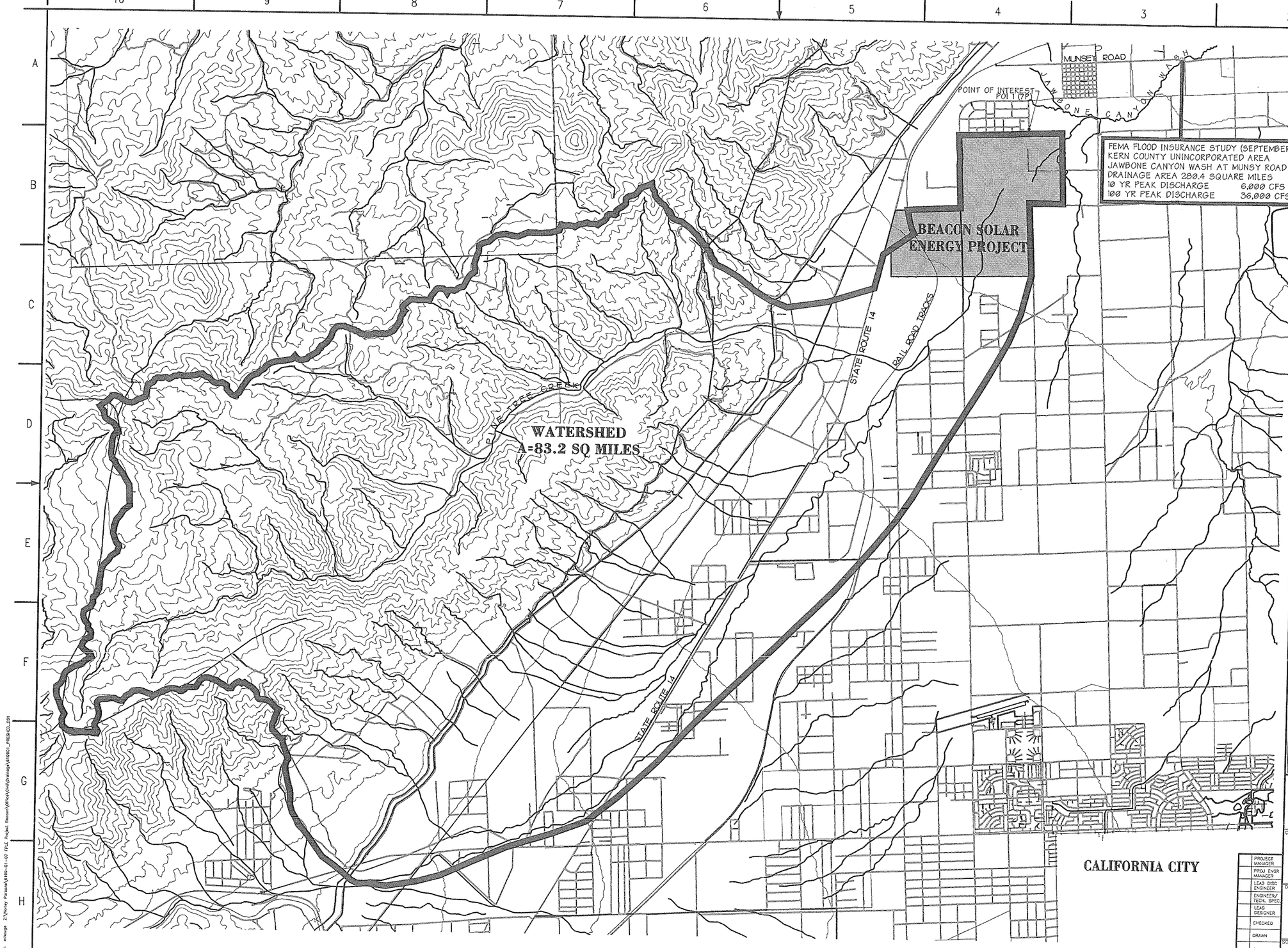
Erosion:
Due to the high water velocities (8.2 to 13.0 fps) as indicated above, the channel may require additional erosion control measures (ie. rip-rap, blanket, etc.). Per Figure 2 – *"Size of stone that will resist displacement for various velocities and side slopes"* in Appendix D, the rip-rap will range

in size between No. 2 Backing Class to Light Class (see Caltrans Standard Specification Section 72 for specification of class type). The rip-rap shall be placed along the channel floor and up the channel sides to estimated water depth.

Final erosion control measures in the channel shall also take into account the scour potential of the native soil. This information should be included in the geotechnical report during final detailed design.

Outlet:
Due to the nature of the existing dry wash spreading out into poorly defined drainages on the valley floor, the outlet of the rerouted dry wash will return the channelized flow back into sheet flow. The channel will transition from a well-defined trapezoidal channel to a wide channel that will convert the concentrated flow into sheet flow.

VI. APPENDIX A: EXISTING CONDITIONS



WORKING DRAWING DATE 02/20/2008 REV

PRELIMINARY STATUS	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE		
APPROVED STATUS	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE		

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH. SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER	

Zero Harm — Leadership, No Incidents, Safe Behavior

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
P.E. _____ STATE _____
C.E. NO. _____ DATE _____

REAL DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT
CARLTON Engineering Inc.
3883 Ponderosa Road, Shingle Springs, CA 95682
Voice 530.677.5515 Fax 530.677.6845

PRELIMINARY
NOT FOR CONSTRUCTION

WorleyParsons
resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR
ENERGY PROJECT

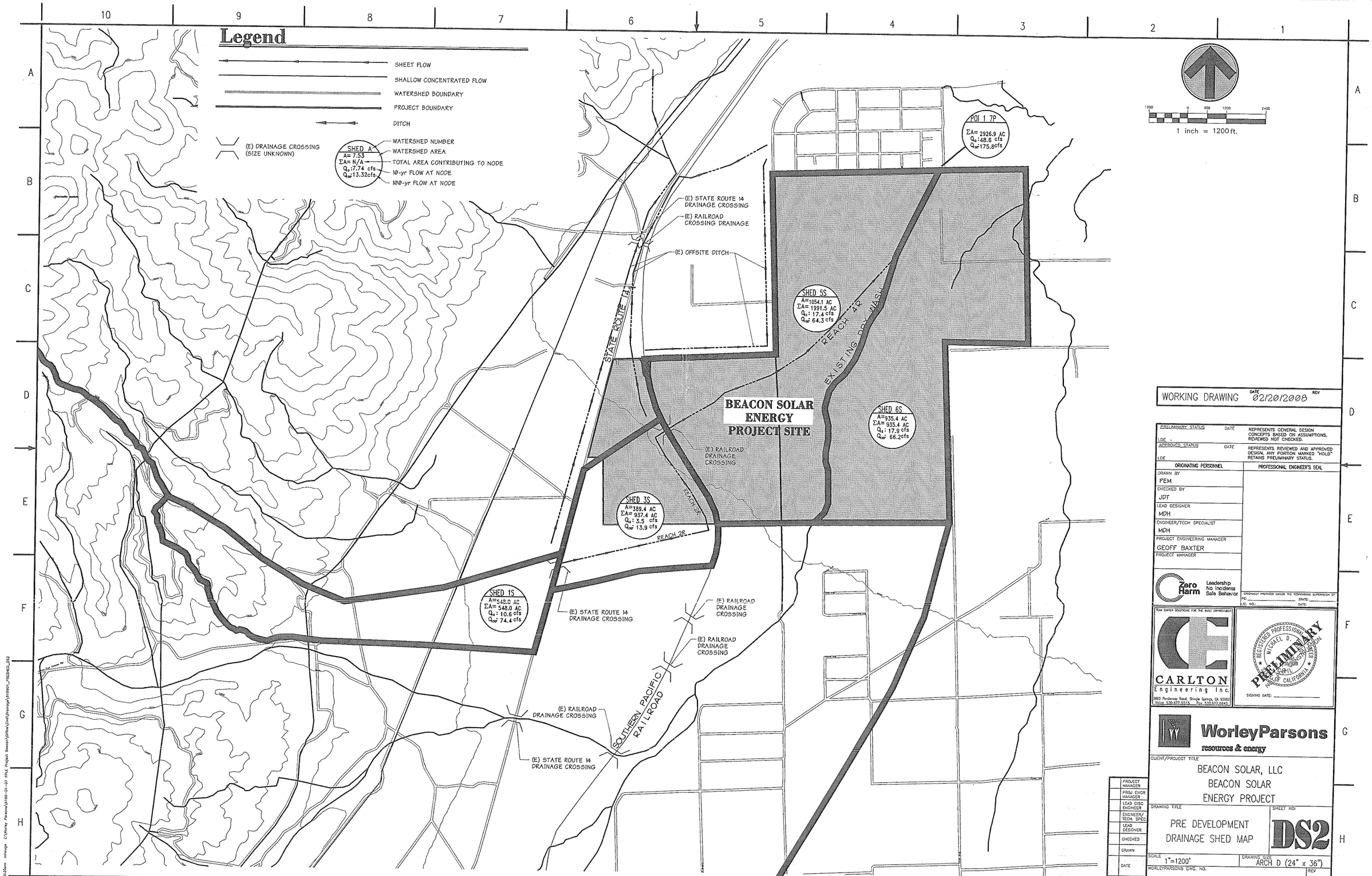
DRAWING TITLE
PRE-DEVELOPMENT
DRAINAGE SHED MAP

SHEET NO: DS1

SCALE 1" = 3000'
DRAWING SIZE ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.
REV A

PROJECT MANAGER	
PROJ ENGR MANAGER	
LEAD DISC ENGINEER	
ENGINEER/ TECH. SPEC	
LEAD DESIGNER	
CHECKED	
DRAWN	
DATE	
REV	

FAC PIPING I & C ELECT MECH CIVIL STRUC



WORKING DRAWING DATE 02/20/2008 REV

PRELIMINARY STATUS	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LOE		
APPROVED STATUS	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LOE		

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER	

Zero Harm — Leadership, No Incidents, Safe Behavior

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE: STATE:
LIC. NO.: DATE:

TEAM DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT
CARLTON Engineering Inc.
3583 Pendersen Road, Shingle Springs, CA 95682
Voice 530.677.5515 Fax 530.677.6645

REGISTERED PROFESSIONAL ENGINEER MICHAEL D. MCGRAW CIVIL STATE OF CALIFORNIA
PRELIMINARY
SIGNING DATE:

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT

DRAWING TITLE
PRE DEVELOPMENT DRAINAGE SHED MAP

SHEET NO: DS2

SCALE 1"=1200' | DRAWING SIZE ARCH D (24" x 36")
WORLEYPARSONS DWG. NO. | REV A

PROJECT MANAGER
PROJ ENGR MANAGER
LEAD DISC ENGINEER
ENGINEER/ TECH. SPEC.
LEAD DESIGNER
CHECKED
DRAWN
DATE
REV

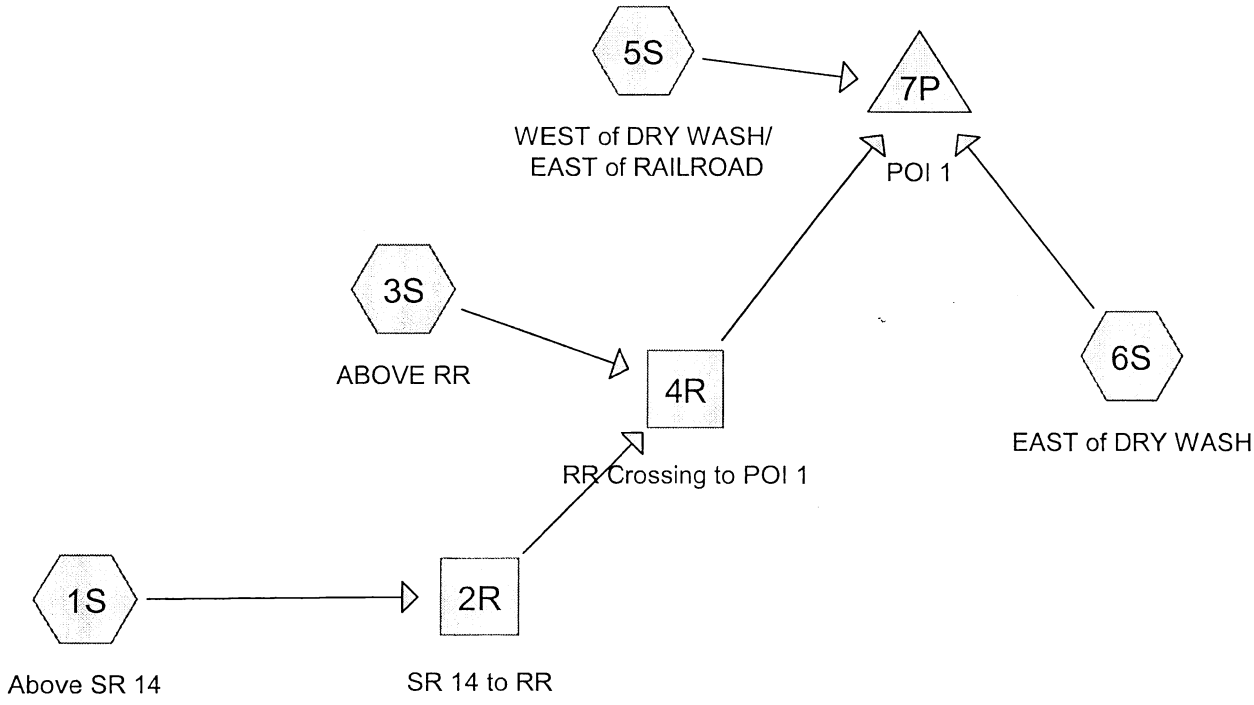
FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC

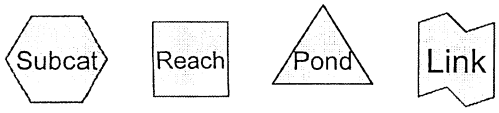
16

PRE CONSTRUCTION

Q_{10} = 48.6 CFS

Q_{100} = 175.8 CFS





Drainage Diagram for PRE
Prepared by Carlton Engineering, Inc, Printed 01/08/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1,968.700	63	Desert shrub range, Poor, HSG A (1S,3S,5S,6S)
750.900	85	Desert shrub range, Poor, HSG C (5S,6S)
207.300	88	Desert shrub range, Poor, HSG D (1S)
2,926.900		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
1,968.700	HSG A	1S, 3S, 5S, 6S
0.000	HSG B	
750.900	HSG C	5S, 6S
207.300	HSG D	1S
0.000	Other	
2,926.900		**TOTAL AREA**

Time span=3.00-24.00 hrs, dt=0.05 hrs, 421 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Above SR 14 Runoff Area=548.000 ac 0.00% Impervious Runoff Depth>0.27"
Flow Length=13,530' Tc=29.5 min CN=72 Runoff=10.55 cfs 12.468 af

Subcatchment 3S: ABOVE RR Runoff Area=389.400 ac 0.00% Impervious Runoff Depth>0.09"
Flow Length=8,690' Tc=32.0 min CN=63 Runoff=3.52 cfs 2.951 af

Subcatchment 5S: WEST of DRY WASH/ Runoff Area=1,054.100 ac 0.00% Impervious Runoff Depth>0.19"
Flow Length=10,700' Slope=0.0120 '/' Tc=169.8 min CN=70 Runoff=17.42 cfs 16.782 af

Subcatchment 6S: EAST of DRY WASH Runoff Area=935.400 ac 0.00% Impervious Runoff Depth>0.23"
Flow Length=11,600' Slope=0.0120 '/' Tc=188.2 min CN=72 Runoff=17.86 cfs 18.044 af

Reach 2R: SR 14 to RR Avg. Depth=0.68' Max Vel=3.83 fps Inflow=10.55 cfs 12.468 af
n=0.030 L=8,590.0' S=0.0180 '/' Capacity=296.80 cfs Outflow=10.54 cfs 11.521 af

Reach 4R: RR Crossing to POI 1 Avg. Depth=0.19' Max Vel=1.43 fps Inflow=13.95 cfs 14.472 af
n=0.030 L=10,560.0' S=0.0116 '/' Capacity=97.06 cfs Outflow=13.76 cfs 9.950 af

Pond 7P: POI 1 Inflow=48.55 cfs 44.775 af
Primary=48.55 cfs 44.775 af

Total Runoff Area = 2,926.900 ac Runoff Volume = 50.244 af Average Runoff Depth = 0.21"
100.00% Pervious = 2,926.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Above SR 14

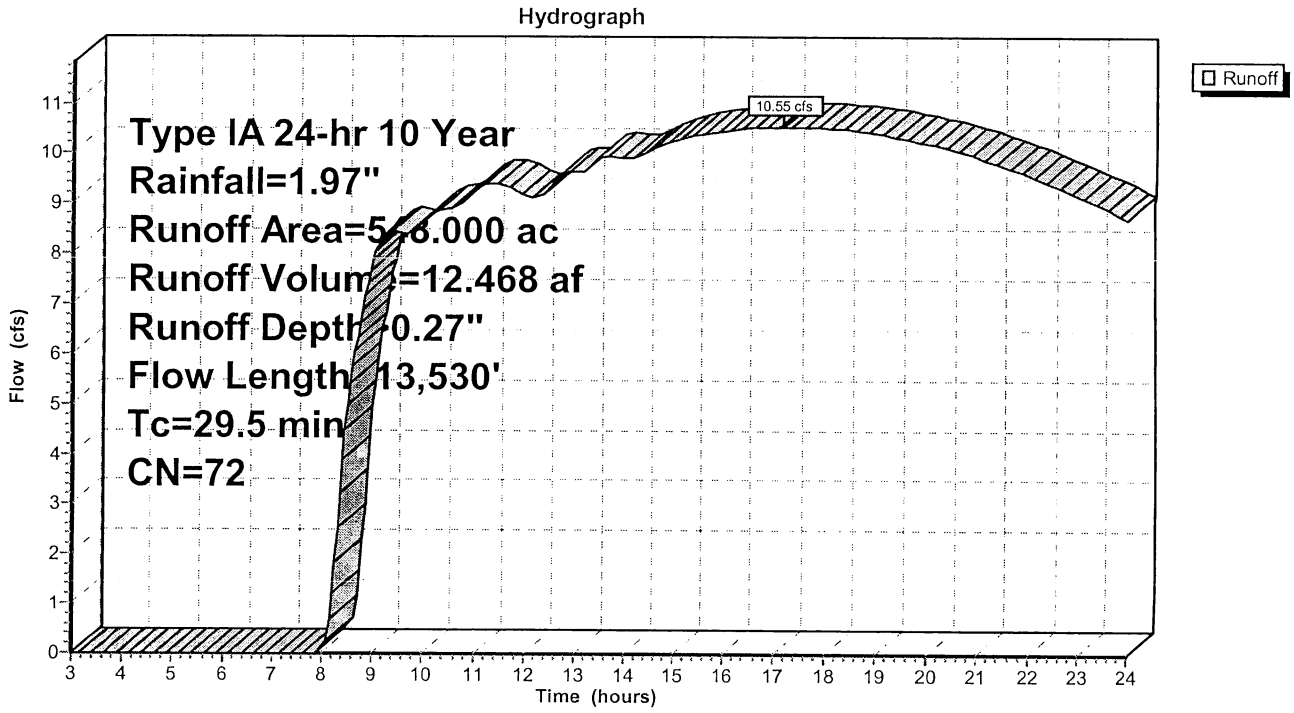
Runoff = 10.55 cfs @ 17.18 hrs, Volume= 12.468 af, Depth> 0.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
207.300	88	Desert shrub range, Poor, HSG D
340.700	63	Desert shrub range, Poor, HSG A
548.000	72	Weighted Average
548.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	200	0.0940	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
12.0	8,350	0.0940	11.59	115.90	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.0	4,980	0.0400	7.56	75.60	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
29.5	13,530	Total			

Subcatchment 1S: Above SR 14



Summary for Subcatchment 3S: ABOVE RR

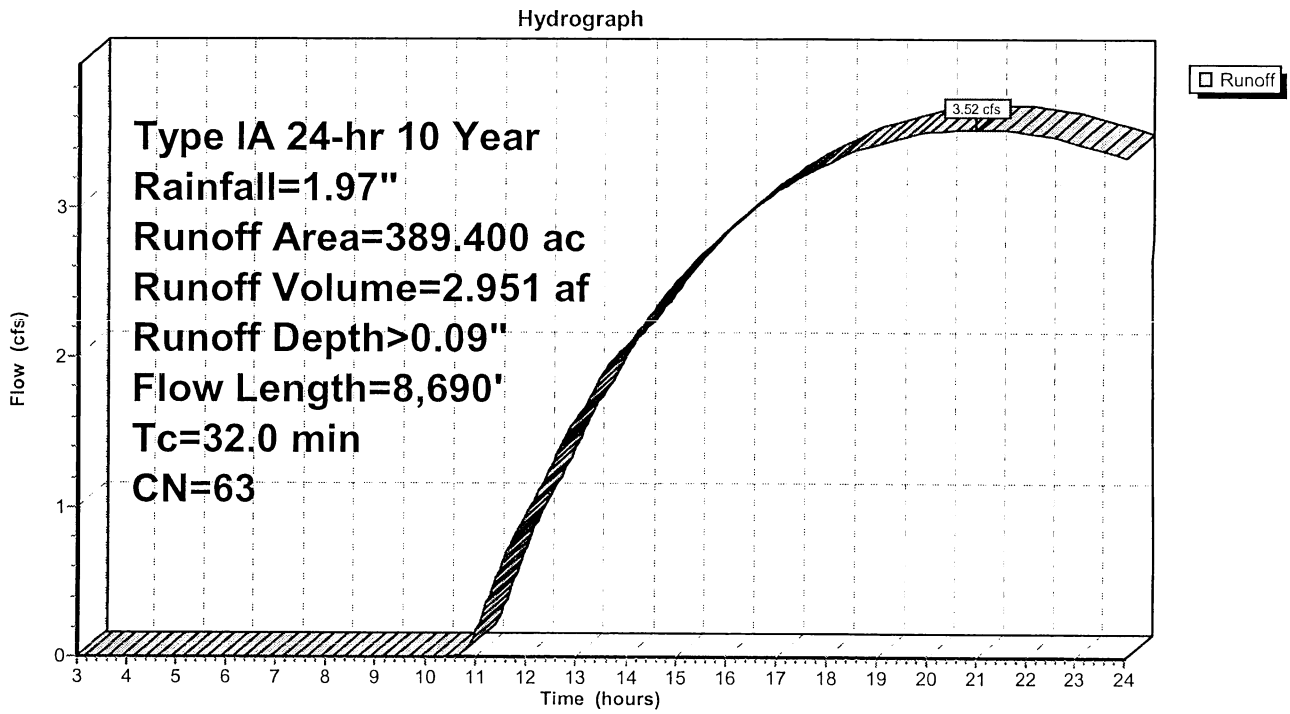
Runoff = 3.52 cfs @ 20.97 hrs, Volume= 2.951 af, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
389.400	63	Desert shrub range, Poor, HSG A
389.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0200	0.36		**Sheet Flow,** n= 0.030 P2= 1.10"
16.1	5,180	0.0200	5.35	53.46	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.3	3,410	0.0150	5.01	75.12	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030
32.0	8,690	Total			

Subcatchment 3S: ABOVE RR



Summary for Subcatchment 5S: WEST of DRY WASH/ EAST of RAILROAD

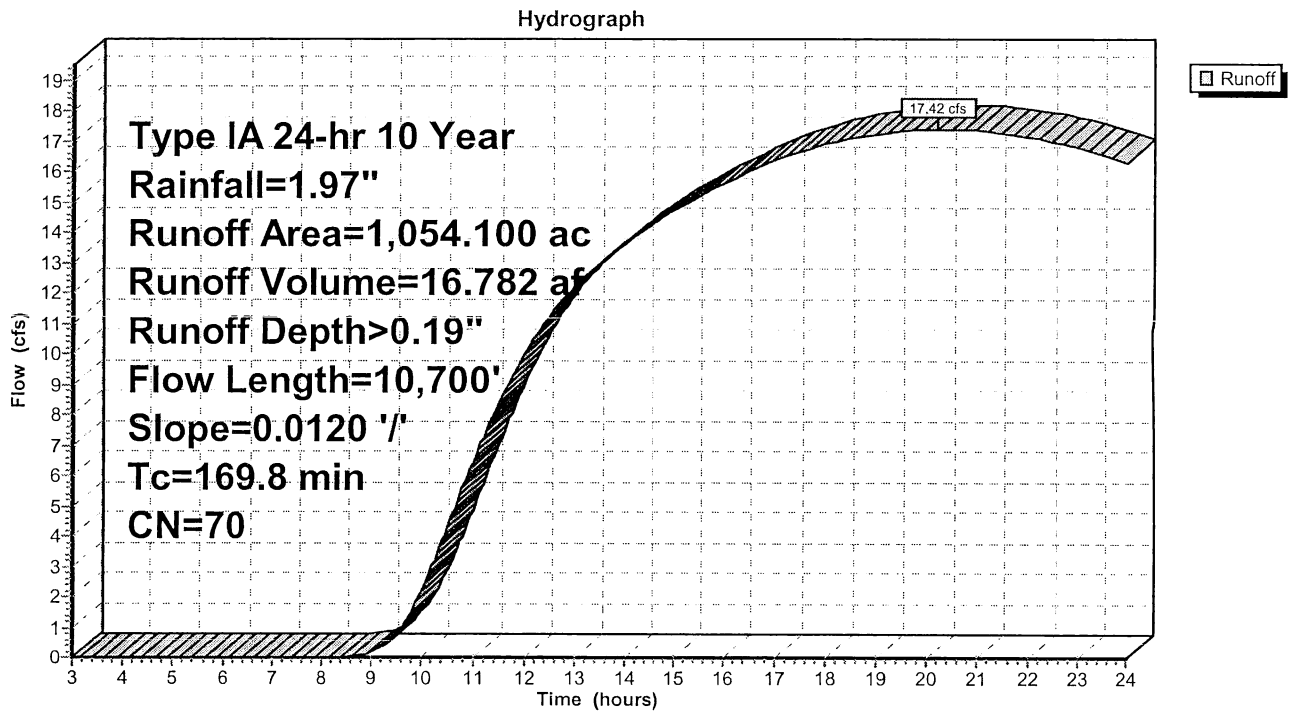
Runoff = 17.42 cfs @ 20.19 hrs, Volume= 16.782 af, Depth> 0.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
353.300	85	Desert shrub range, Poor, HSG C
700.800	63	Desert shrub range, Poor, HSG A
1,054.100	70	Weighted Average
1,054.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0120	0.20		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
161.3	10,600	0.0120	1.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
169.8	10,700	Total			

Subcatchment 5S: WEST of DRY WASH/ EAST of RAILROAD



Summary for Subcatchment 6S: EAST of DRY WASH

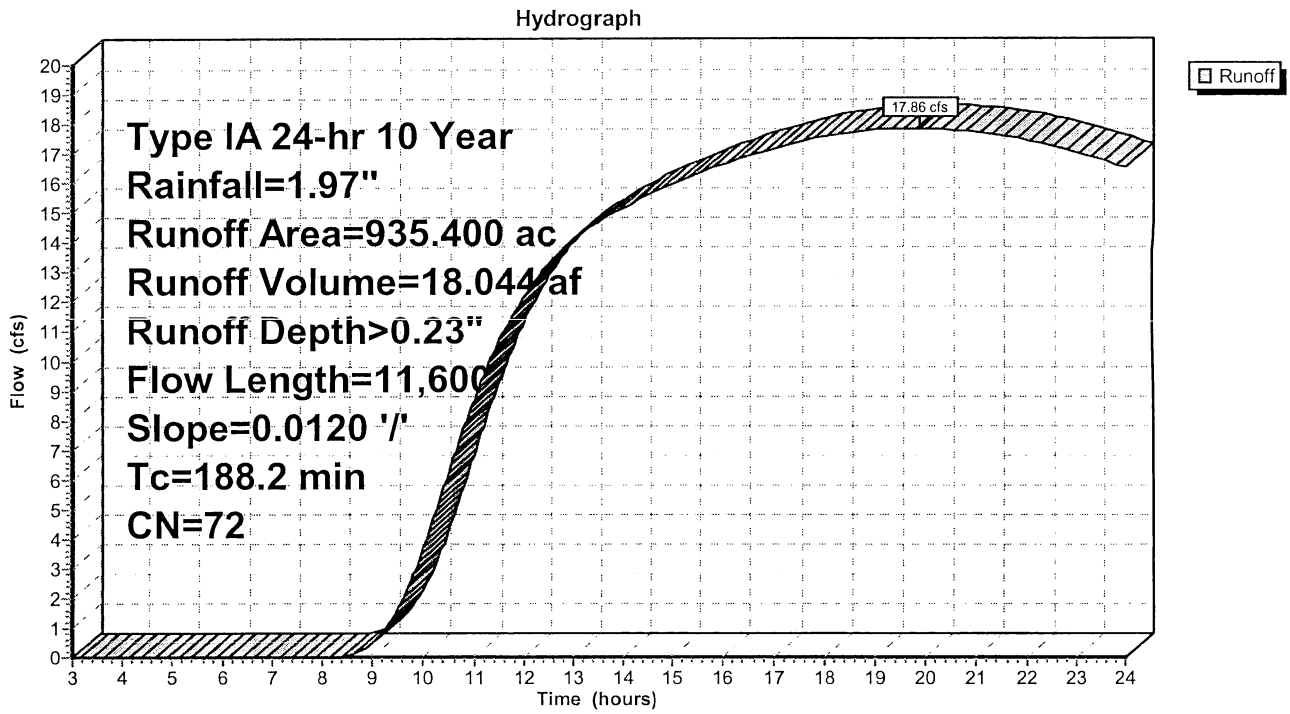
Runoff = 17.86 cfs @ 19.86 hrs, Volume= 18.044 af, Depth> 0.23"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
397.600	85	Desert shrub range, Poor, HSG C
537.800	63	Desert shrub range, Poor, HSG A
935.400	72	Weighted Average
935.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	200	0.0120	0.22		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
173.4	11,400	0.0120	1.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
188.2	11,600	Total			

Subcatchment 6S: EAST of DRY WASH



Summary for Reach 2R: SR 14 to RR

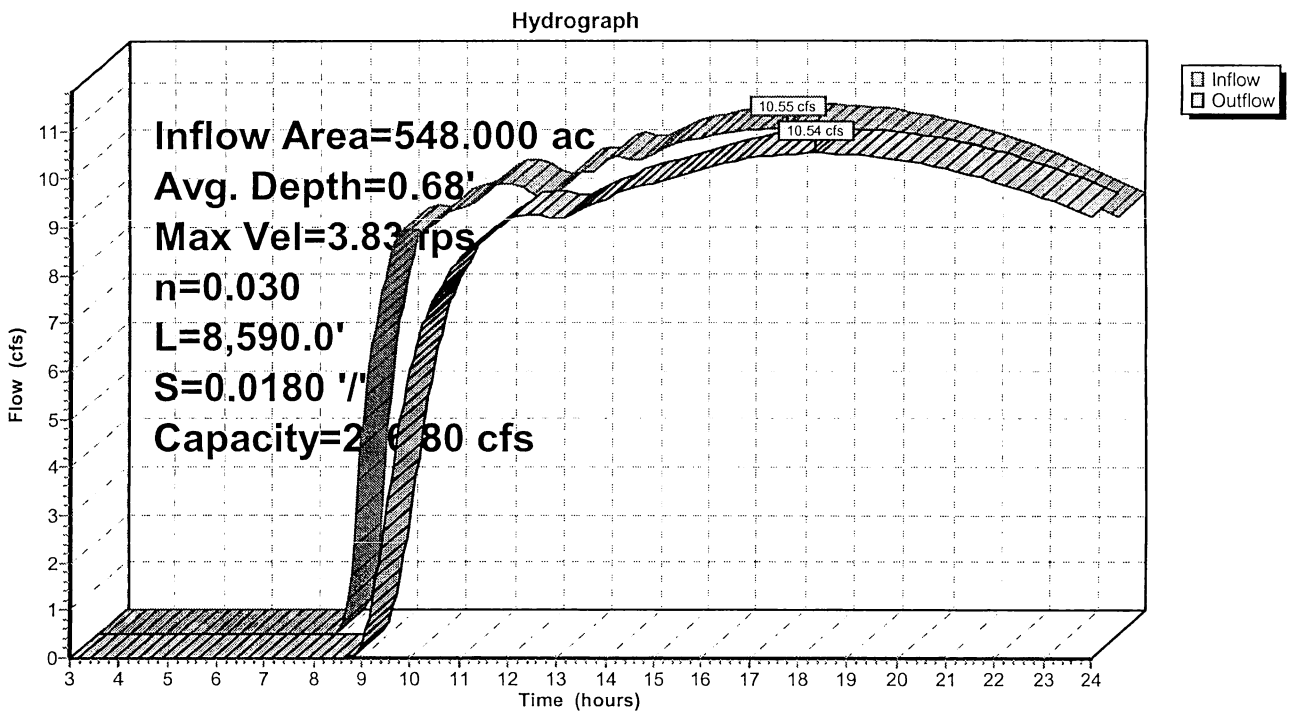
Inflow Area = 548.000 ac, 0.00% Impervious, Inflow Depth > 0.27" for 10 Year event
Inflow = 10.55 cfs @ 17.18 hrs, Volume= 12.468 af
Outflow = 10.54 cfs @ 18.35 hrs, Volume= 11.521 af, Atten= 0%, Lag= 70.0 min

Routing by Stor-Ind+Trans method, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.83 fps, Min. Travel Time= 37.4 min
Avg. Velocity = 3.59 fps, Avg. Travel Time= 39.9 min

Peak Storage= 23,658 cf @ 17.71 hrs, Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 296.80 cfs

2.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 8,590.0' Slope= 0.0180 '/'
Inlet Invert= 2,326.75', Outlet Invert= 2,172.00'

Reach 2R: SR 14 to RR



Summary for Reach 4R: RR Crossing to POI 1

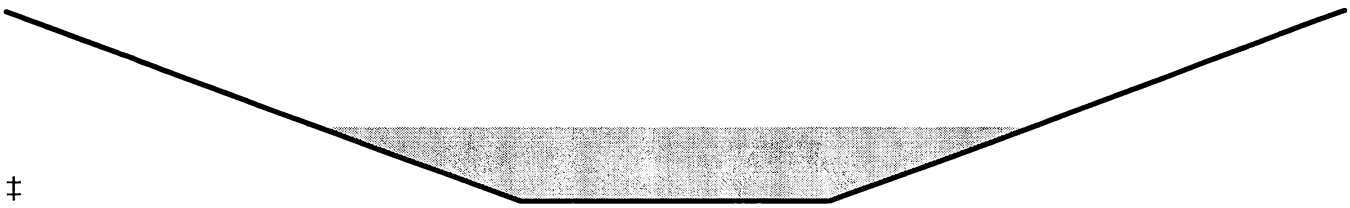
[61] Hint: Exceeded Reach 2R outlet invert by 0.19' @ 20.85 hrs

Inflow Area = 937.400 ac, 0.00% Impervious, Inflow Depth > 0.19" for 10 Year event
Inflow = 13.95 cfs @ 19.28 hrs, Volume= 14.472 af
Outflow = 13.76 cfs @ 22.92 hrs, Volume= 9.950 af, Atten= 1%, Lag= 218.1 min

Routing by Stor-Ind+Trans method, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.43 fps, Min. Travel Time= 122.9 min
Avg. Velocity = 1.20 fps, Avg. Travel Time= 146.4 min

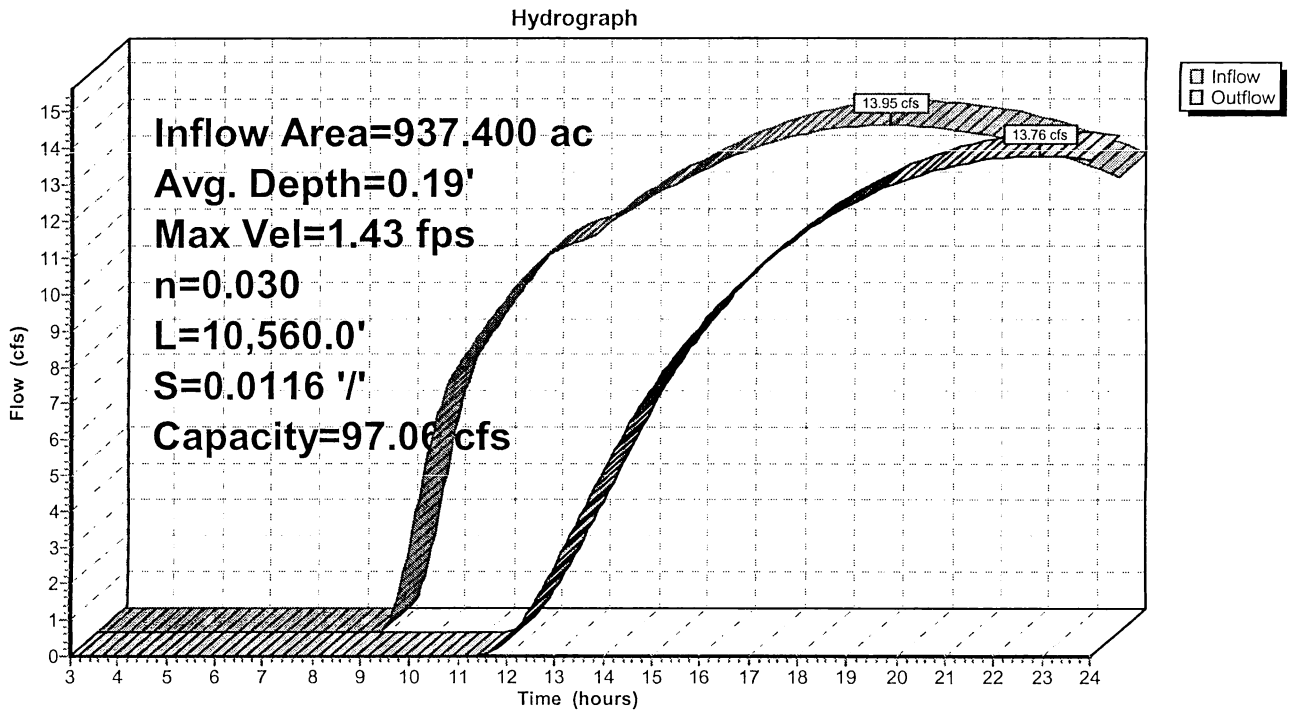
Peak Storage= 101,479 cf @ 20.87 hrs, Average Depth at Peak Storage= 0.19'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 97.06 cfs

30.00' x 0.50' deep channel, n= 0.030
Side Slope Z-value= 100.0 '/' Top Width= 130.00'
Length= 10,560.0' Slope= 0.0116 '/'
Inlet Invert= 2,172.00', Outlet Invert= 2,050.00'



‡

Reach 4R: RR Crossing to POI 1



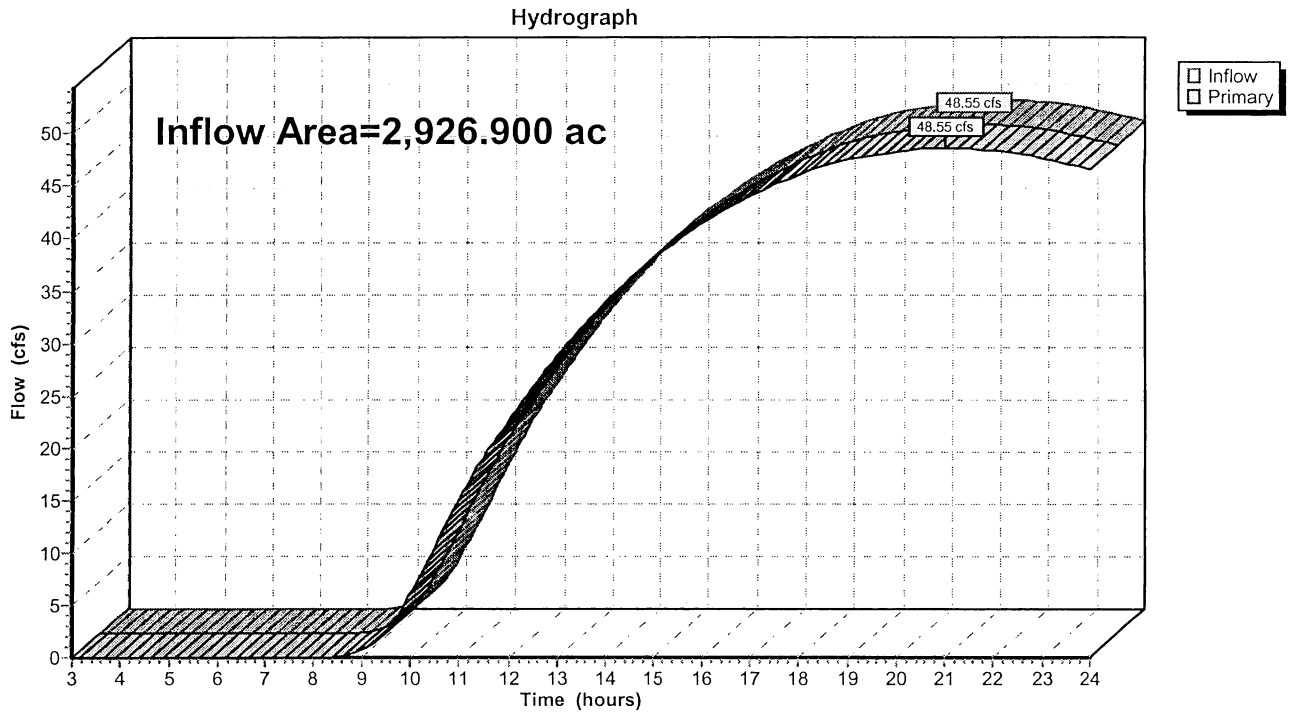
Summary for Pond 7P: POI 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,926.900 ac, 0.00% Impervious, Inflow Depth > 0.18" for 10 Year event
Inflow = 48.55 cfs @ 20.98 hrs, Volume= 44.775 af
Primary = 48.55 cfs @ 20.98 hrs, Volume= 44.775 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs

Pond 7P: POI 1



Time span=3.00-24.00 hrs, dt=0.05 hrs, 421 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Above SR 14 Runoff Area=548.000 ac 0.00% Impervious Runoff Depth>0.94"
Flow Length=13,530' Tc=29.5 min CN=72 Runoff=74.42 cfs 43.110 af

Subcatchment 3S: ABOVE RR Runoff Area=389.400 ac 0.00% Impervious Runoff Depth>0.53"
Flow Length=8,690' Tc=32.0 min CN=63 Runoff=13.95 cfs 17.154 af

Subcatchment 5S: WEST of DRY WASH/ Runoff Area=1,054.100 ac 0.00% Impervious Runoff Depth>0.75"
Flow Length=10,700' Slope=0.0120 '/' Tc=169.8 min CN=70 Runoff=64.31 cfs 66.277 af

Subcatchment 6S: EAST of DRY WASH Runoff Area=935.400 ac 0.00% Impervious Runoff Depth>0.84"
Flow Length=11,600' Slope=0.0120 '/' Tc=188.2 min CN=72 Runoff=66.16 cfs 65.314 af

Reach 2R: SR 14 to RR Avg. Depth=1.52' Max Vel=6.00 fps Inflow=74.42 cfs 43.110 af
n=0.030 L=8,590.0' S=0.0180 '/' Capacity=296.80 cfs Outflow=59.56 cfs 41.425 af

Reach 4R: RR Crossing to POI 1 Avg. Depth=0.37' Max Vel=2.03 fps Inflow=73.11 cfs 58.579 af
n=0.030 L=10,560.0' S=0.0116 '/' Capacity=97.06 cfs Outflow=49.41 cfs 49.426 af

Pond 7P: POI 1 Inflow=175.75 cfs 181.017 af
Primary=175.75 cfs 181.017 af

Total Runoff Area = 2,926.900 ac Runoff Volume = 191.856 af Average Runoff Depth = 0.79"
100.00% Pervious = 2,926.900 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Above SR 14

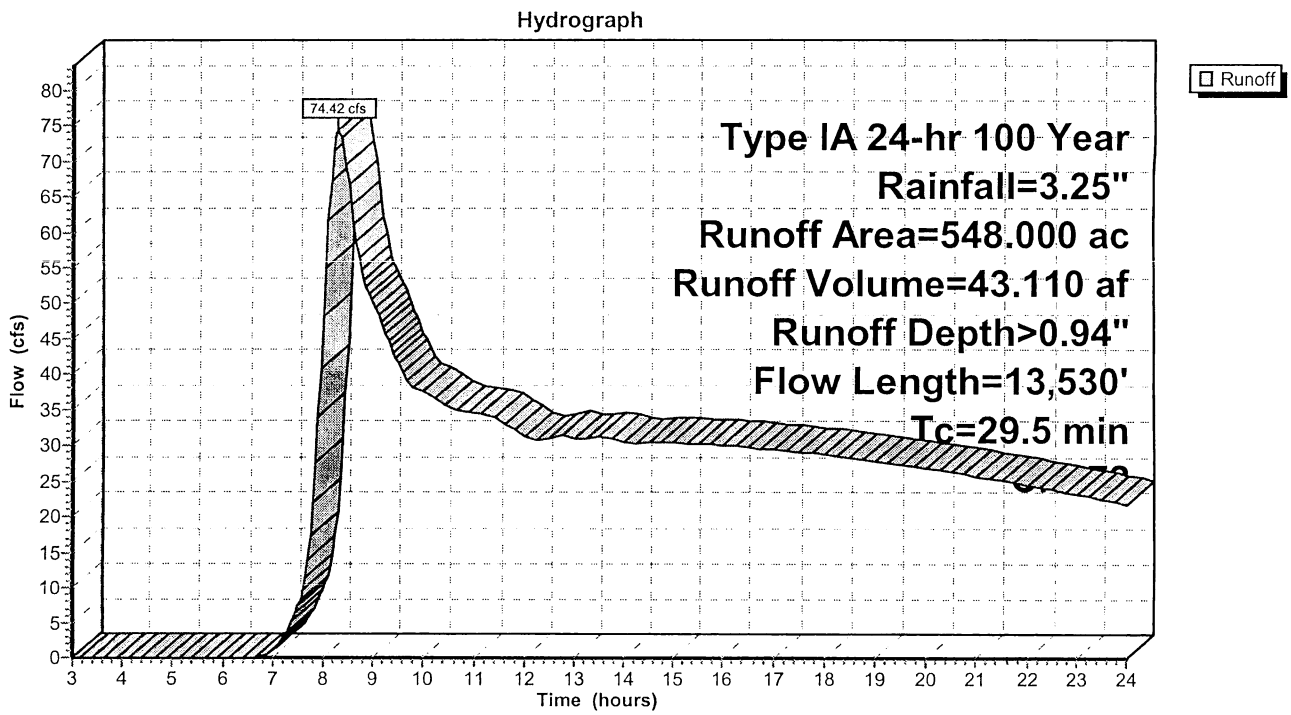
Runoff = 74.42 cfs @ 8.30 hrs, Volume= 43.110 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
207.300	88	Desert shrub range, Poor, HSG D
340.700	63	Desert shrub range, Poor, HSG A
548.000	72	Weighted Average
548.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	200	0.0940	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
12.0	8,350	0.0940	11.59	115.90	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.0	4,980	0.0400	7.56	75.60	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
29.5	13,530	Total			

Subcatchment 1S: Above SR 14



Summary for Subcatchment 3S: ABOVE RR

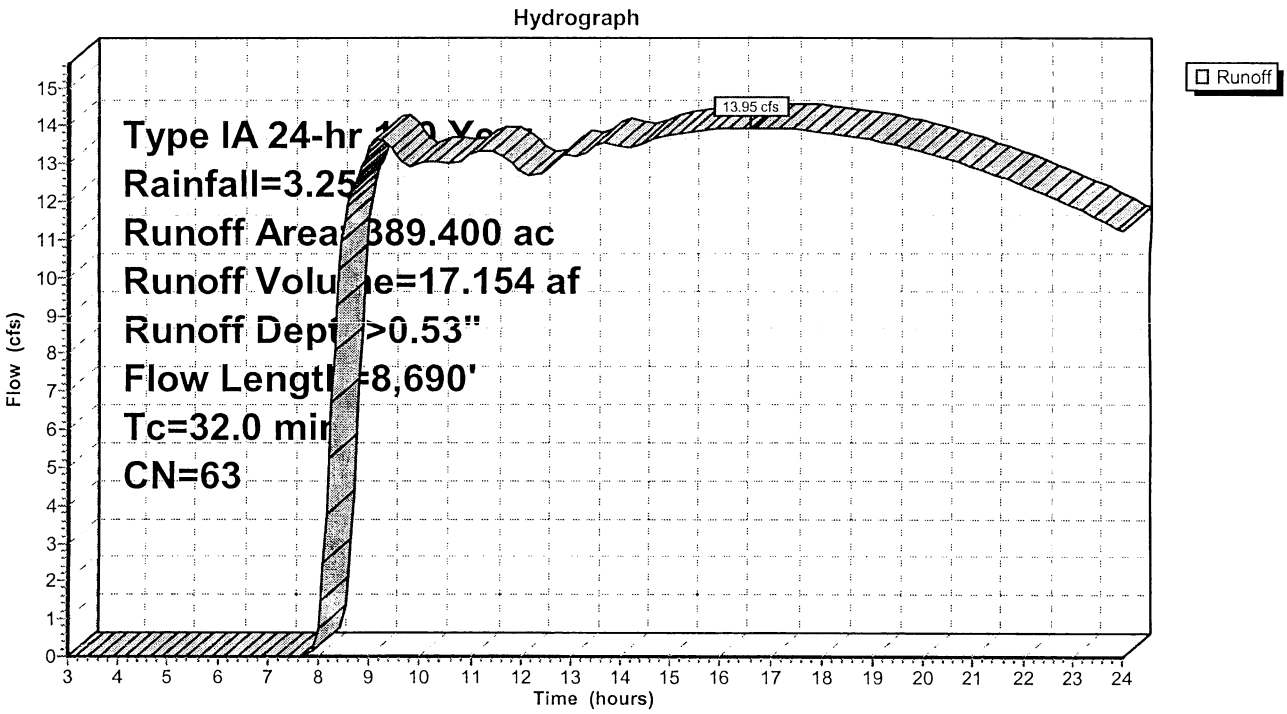
Runoff = 13.95 cfs @ 16.59 hrs, Volume= 17.154 af, Depth> 0.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
389.400	63	Desert shrub range, Poor, HSG A
389.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0200	0.36		**Sheet Flow,** n= 0.030 P2= 1.10"
16.1	5,180	0.0200	5.35	53.46	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.3	3,410	0.0150	5.01	75.12	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030
32.0	8,690	Total			

Subcatchment 3S: ABOVE RR



Summary for Subcatchment 5S: WEST of DRY WASH/ EAST of RAILROAD

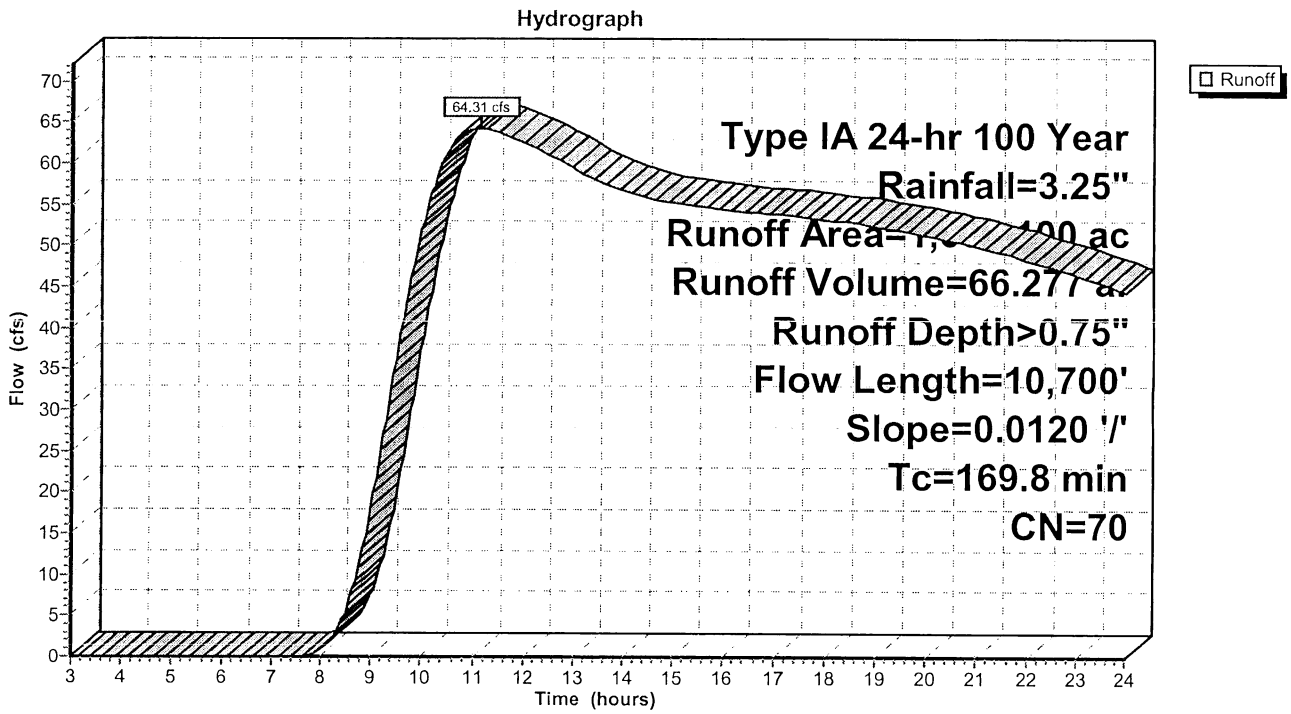
Runoff = 64.31 cfs @ 11.13 hrs, Volume= 66.277 af, Depth> 0.75"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
353.300	85	Desert shrub range, Poor, HSG C
700.800	63	Desert shrub range, Poor, HSG A
1,054.100	70	Weighted Average
1,054.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.5	100	0.0120	0.20		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
161.3	10,600	0.0120	1.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
169.8	10,700	Total			

Subcatchment 5S: WEST of DRY WASH/ EAST of RAILROAD



Summary for Subcatchment 6S: EAST of DRY WASH

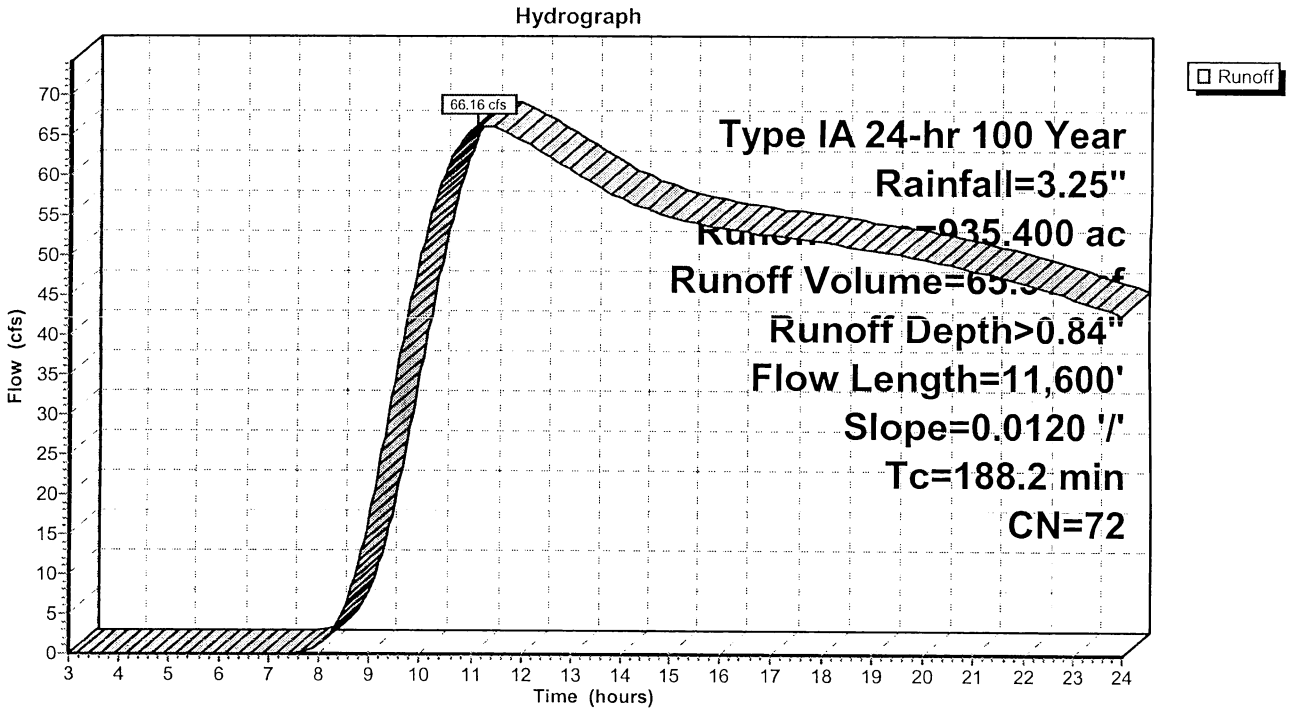
Runoff = 66.16 cfs @ 11.10 hrs, Volume= 65.314 af, Depth> 0.84"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
397.600	85	Desert shrub range, Poor, HSG C
537.800	63	Desert shrub range, Poor, HSG A
935.400	72	Weighted Average
935.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
14.8	200	0.0120	0.22		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
173.4	11,400	0.0120	1.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps
188.2	11,600	Total			

Subcatchment 6S: EAST of DRY WASH



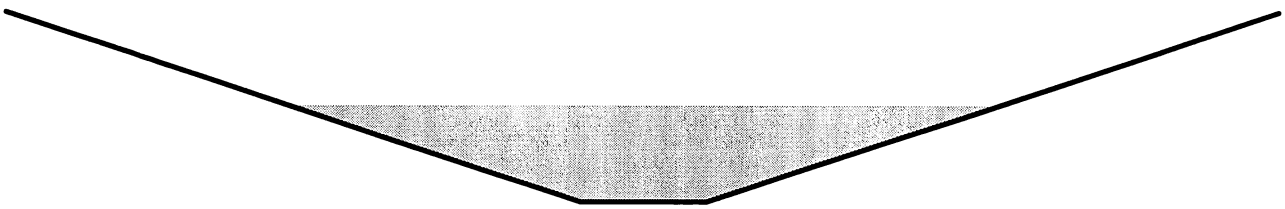
Summary for Reach 2R: SR 14 to RR

Inflow Area = 548.000 ac, 0.00% Impervious, Inflow Depth > 0.94" for 100 Year event
Inflow = 74.42 cfs @ 8.30 hrs, Volume= 43.110 af
Outflow = 59.56 cfs @ 9.03 hrs, Volume= 41.425 af, Atten= 20%, Lag= 43.8 min

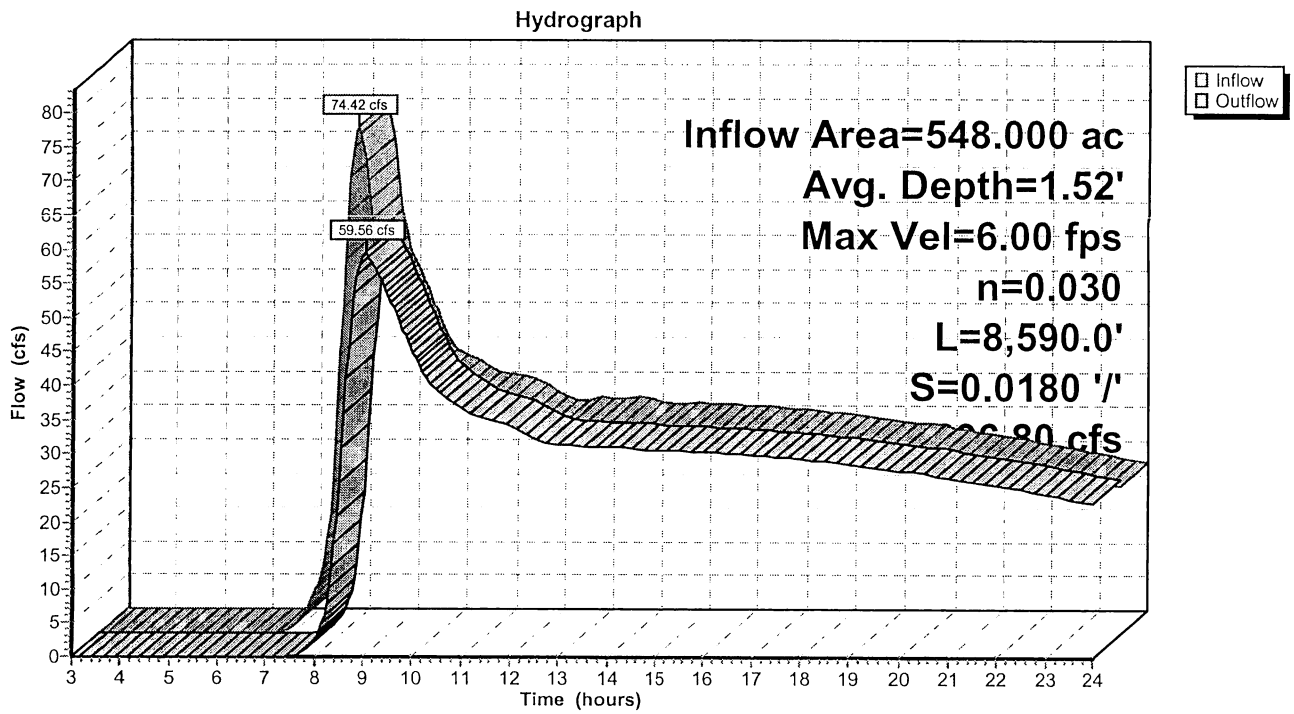
Routing by Stor-Ind+Trans method, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.00 fps, Min. Travel Time= 23.9 min
Avg. Velocity = 4.83 fps, Avg. Travel Time= 29.6 min

Peak Storage= 85,311 cf @ 8.63 hrs, Average Depth at Peak Storage= 1.52'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 296.80 cfs

2.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 8,590.0' Slope= 0.0180 '/'
Inlet Invert= 2,326.75', Outlet Invert= 2,172.00'



Reach 2R: SR 14 to RR



Summary for Reach 4R: RR Crossing to POI 1

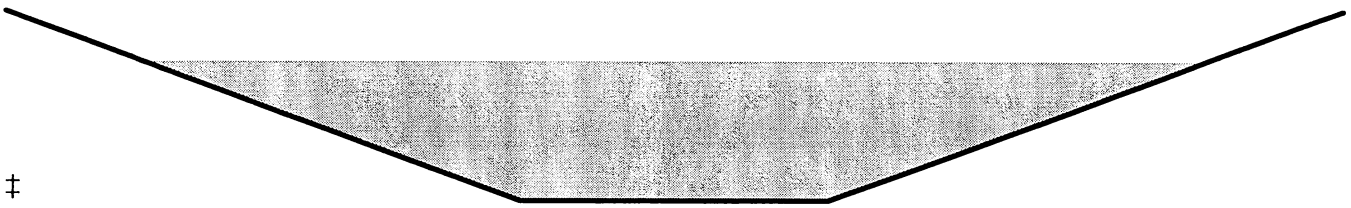
[61] Hint: Exceeded Reach 2R outlet invert by 0.37' @ 11.15 hrs

Inflow Area = 937.400 ac, 0.00% Impervious, Inflow Depth > 0.75" for 100 Year event
Inflow = 73.11 cfs @ 9.04 hrs, Volume= 58.579 af
Outflow = 49.41 cfs @ 12.57 hrs, Volume= 49.426 af, Atten= 32%, Lag= 211.8 min

Routing by Stor-Ind+Trans method, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.03 fps, Min. Travel Time= 86.6 min
Avg. Velocity = 1.81 fps, Avg. Travel Time= 97.1 min

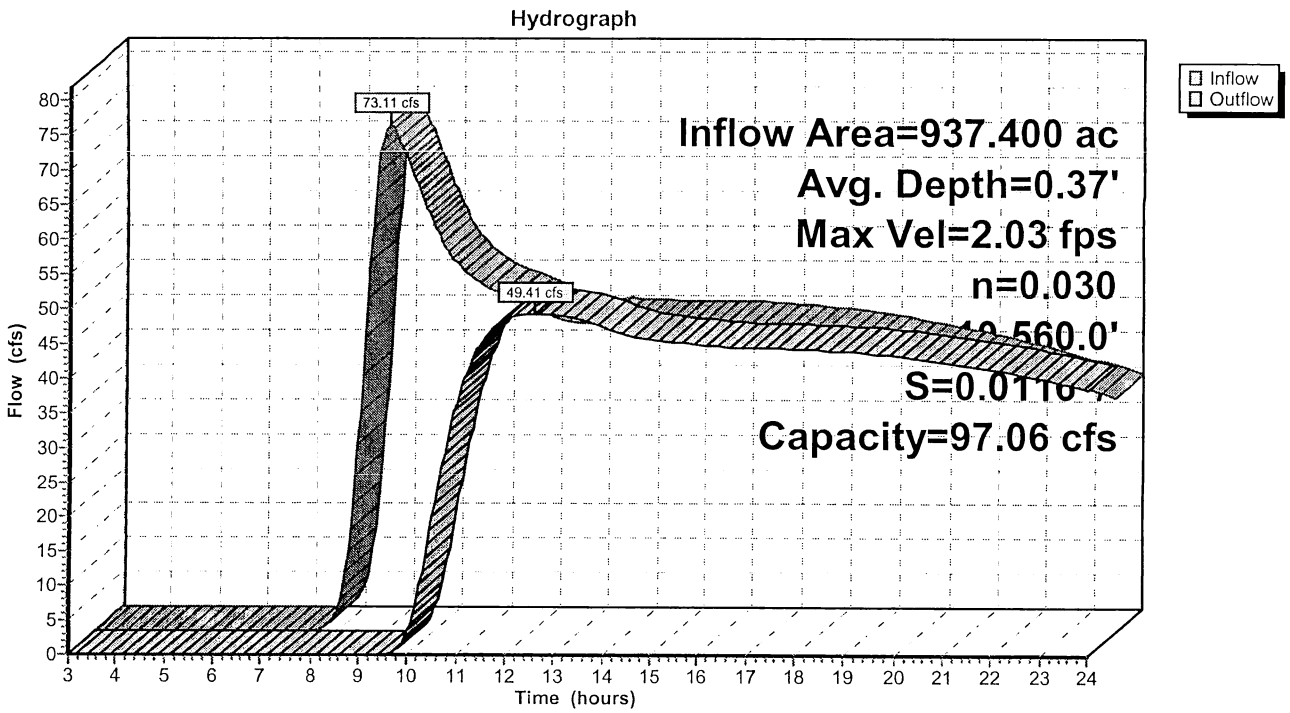
Peak Storage= 256,718 cf @ 11.13 hrs, Average Depth at Peak Storage= 0.37'
Bank-Full Depth= 0.50', Capacity at Bank-Full= 97.06 cfs

30.00' x 0.50' deep channel, n= 0.030
Side Slope Z-value= 100.0 '/' Top Width= 130.00'
Length= 10,560.0' Slope= 0.0116 '/'
Inlet Invert= 2,172.00', Outlet Invert= 2,050.00'



‡

Reach 4R: RR Crossing to POI 1



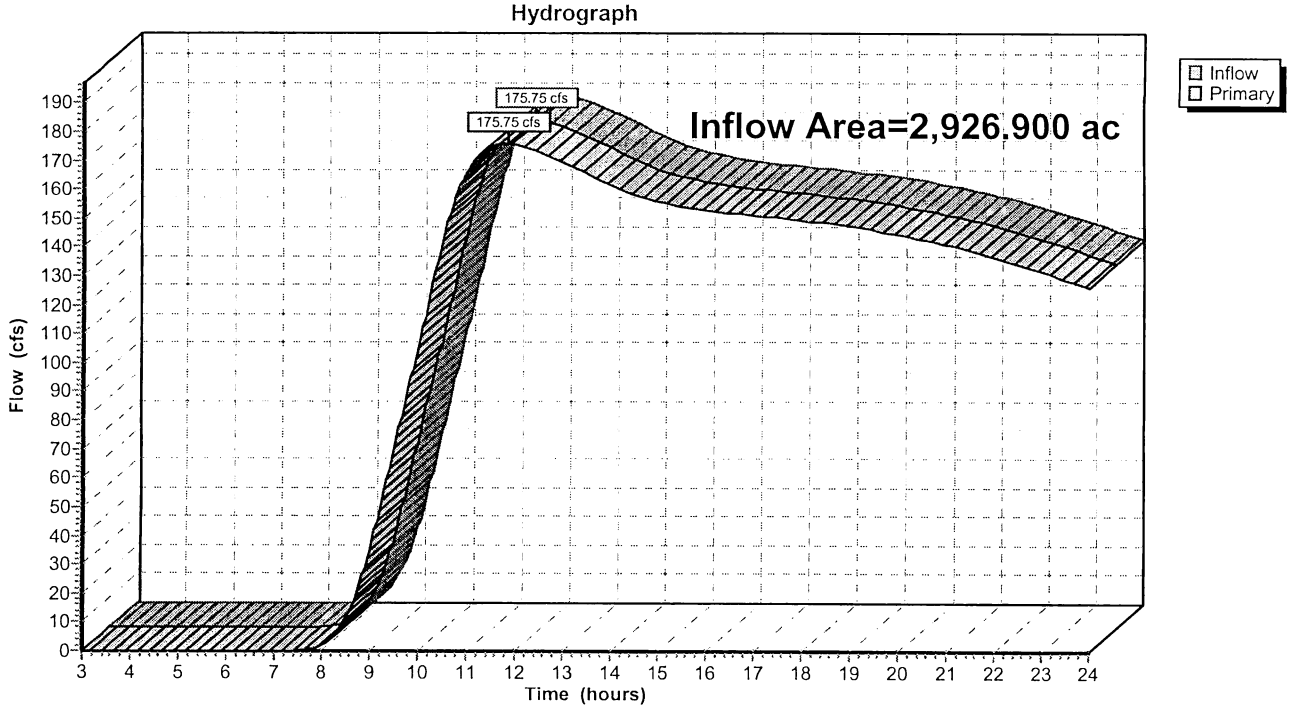
Summary for Pond 7P: POI 1

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,926.900 ac, 0.00% Impervious, Inflow Depth > 0.74" for 100 Year event
Inflow = 175.75 cfs @ 11.83 hrs, Volume= 181.017 af
Primary = 175.75 cfs @ 11.83 hrs, Volume= 181.017 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 3.00-24.00 hrs, dt= 0.05 hrs

Pond 7P: POI 1

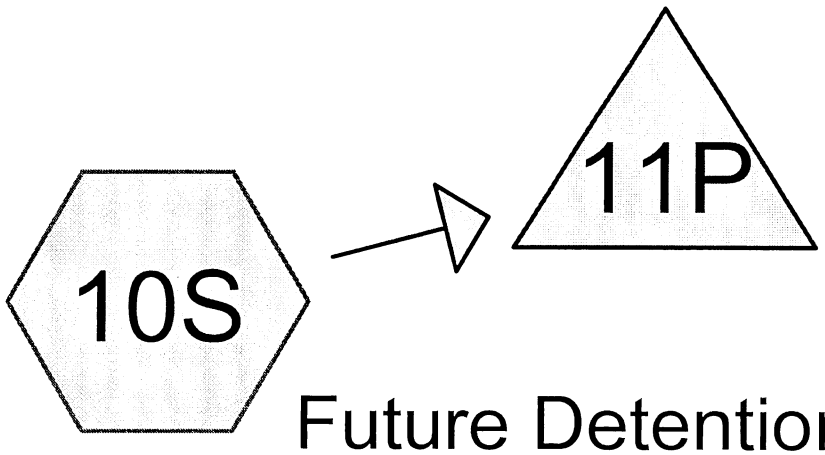


PRE - CONSTRUCTION

10YR 5 DAY Q = 17.5CFS

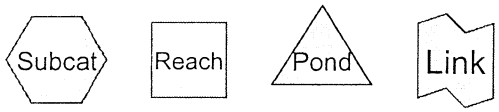
10YR 24HR Q = 25.8CFS

100YR 24HR Q = 73.5CFS



Future Detention Area

NORTH SECTION



Drainage Diagram for PRE - North-without Detention Area
Prepared by Carlton Engineering, Inc, Printed 01/10/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
16.300	63	Desert shrub range, Poor, HSG A (10S)
357.800	85	Desert shrub range, Poor, HSG C (10S)
374.100		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
16.300	HSG A	10S
0.000	HSG B	
357.800	HSG C	10S
0.000	HSG D	
0.000	Other	
374.100		**TOTAL AREA**

Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth=1.19"
Flow Length=9,425' Tc=133.2 min CN=84 Runoff=17.49 cfs 36.980 af

Pond 11P: Future Detention Area
Inflow=17.49 cfs 36.980 af
Primary=17.49 cfs 36.980 af

Total Runoff Area = 374.100 ac Runoff Volume = 36.980 af Average Runoff Depth = 1.19"
100.00% Pervious = 374.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 10S: NORTH SECTION

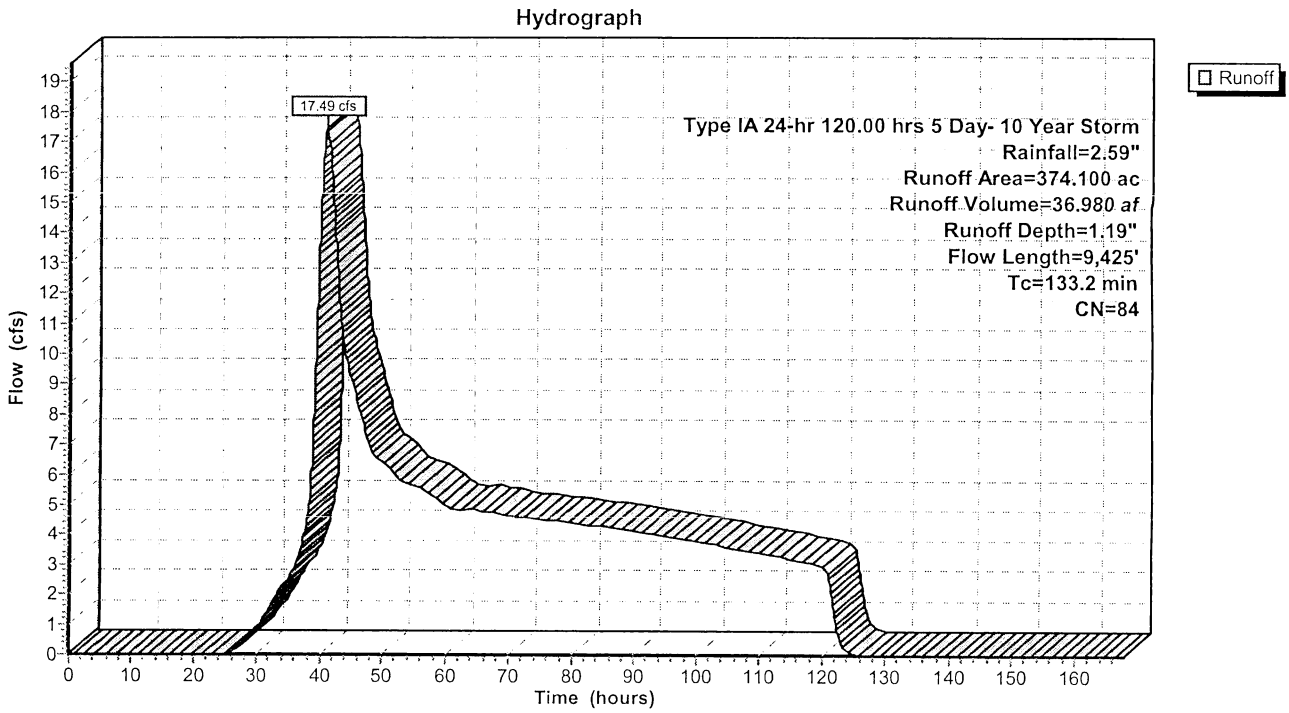
Runoff = 17.49 cfs @ 41.01 hrs, Volume= 36.980 af, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type IA 24-hr 120.00 hrs 5 Day- 10 Year Storm Rainfall=2.59"

Area (ac)	CN	Description
16.300	63	Desert shrub range, Poor, HSG A
357.800	85	Desert shrub range, Poor, HSG C
374.100	84	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



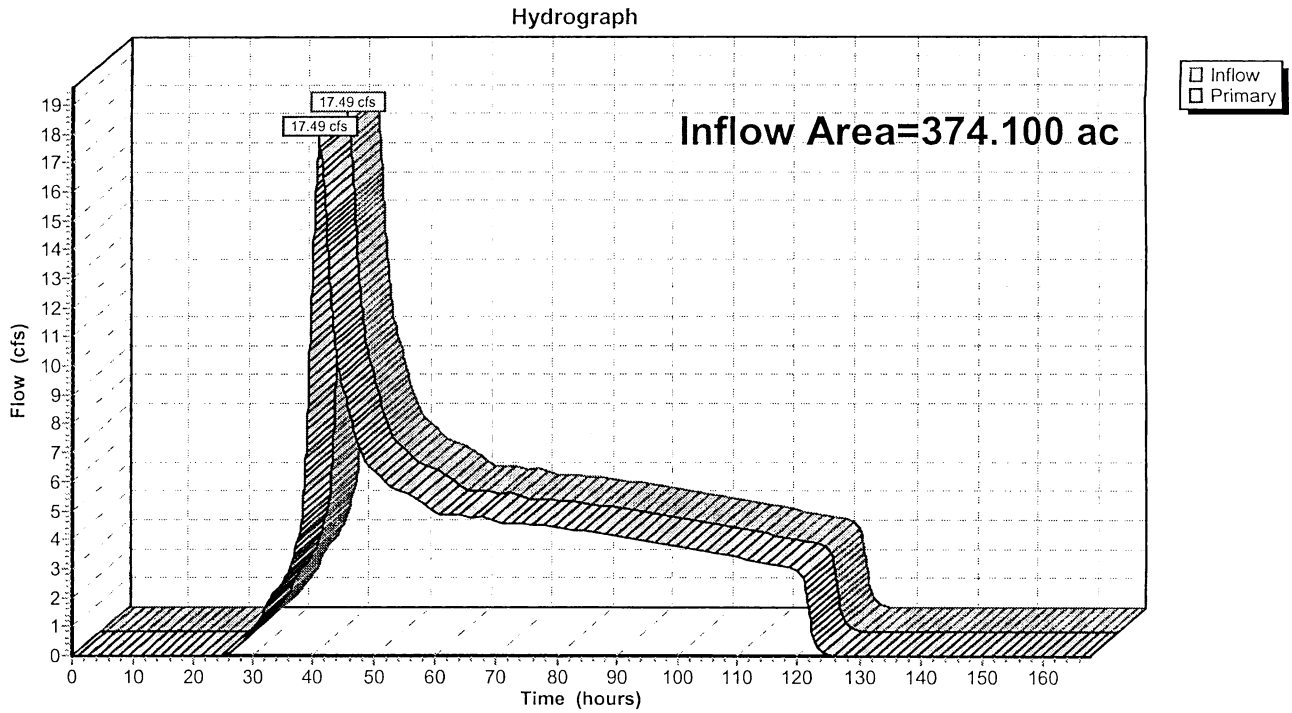
Summary for Pond 11P: Future Detention Area

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 374.100 ac, 0.00% Impervious, Inflow Depth = 1.19" for 5 Day- 10 Year Storm event
Inflow = 17.49 cfs @ 41.01 hrs, Volume= 36.980 af
Primary = 17.49 cfs @ 41.01 hrs, Volume= 36.980 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Pond 11P: Future Detention Area



Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth=0.72"
Flow Length=9,425' Tc=133.2 min CN=84 Runoff=25.78 cfs 22.531 af

Pond 11P: Future Detention Area Inflow=25.78 cfs 22.531 af
Primary=25.78 cfs 22.531 af

Total Runoff Area = 374.100 ac Runoff Volume = 22.531 af Average Runoff Depth = 0.72"
100.00% Pervious = 374.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 10S: NORTH SECTION

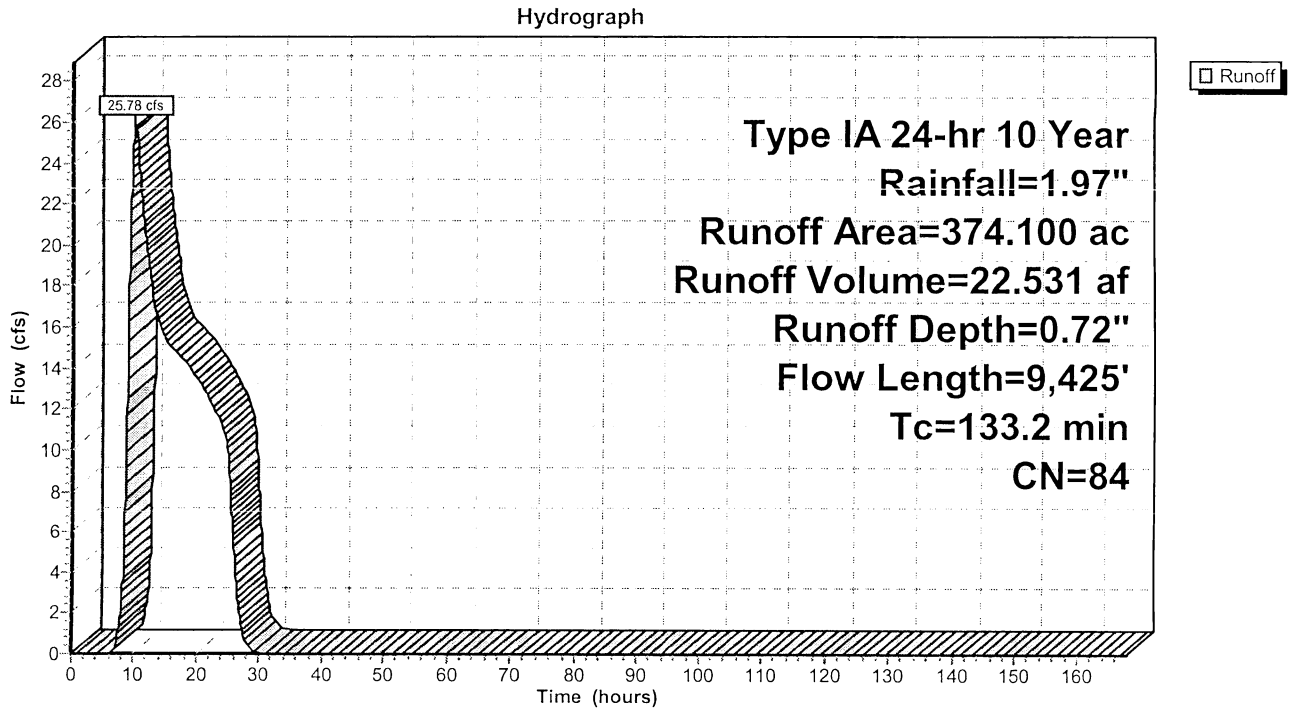
Runoff = 25.78 cfs @ 9.95 hrs, Volume= 22.531 af, Depth= 0.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
16.300	63	Desert shrub range, Poor, HSG A
357.800	85	Desert shrub range, Poor, HSG C
374.100	84	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



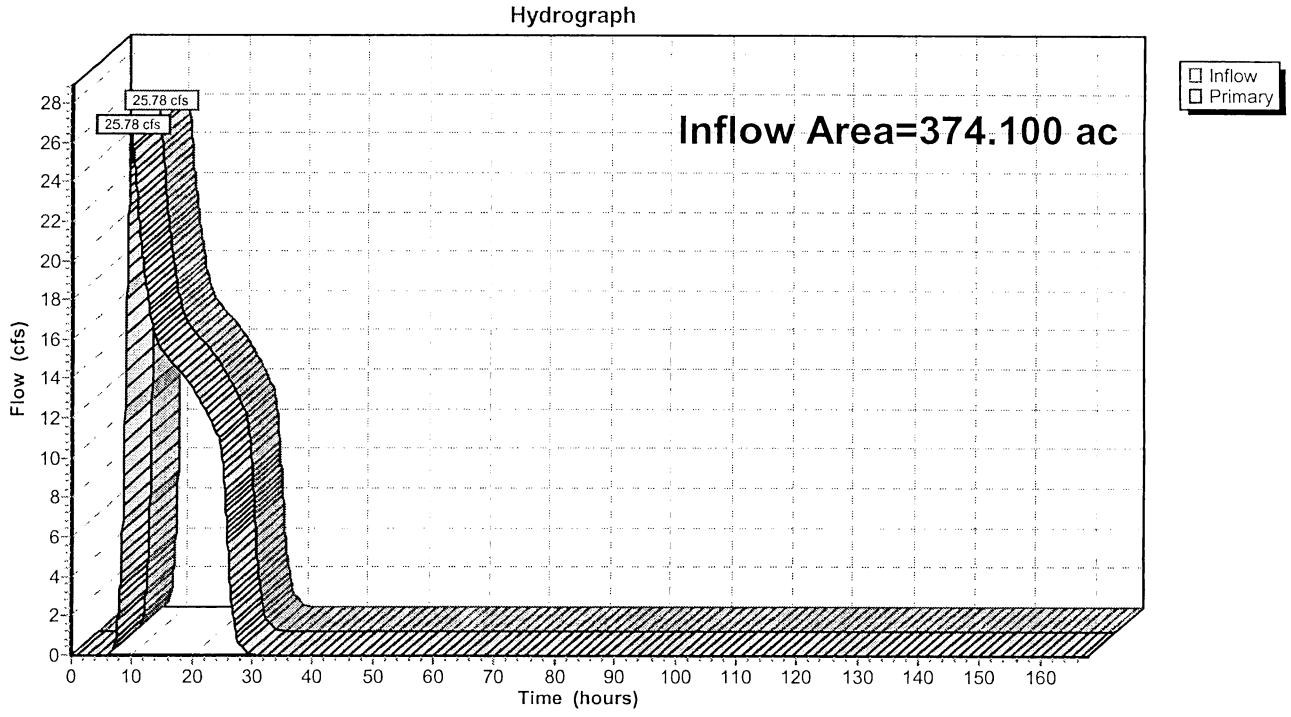
Summary for Pond 11P: Future Detention Area

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 374.100 ac, 0.00% Impervious, Inflow Depth = 0.72" for 10 Year event
Inflow = 25.78 cfs @ 9.95 hrs, Volume= 22.531 af
Primary = 25.78 cfs @ 9.95 hrs, Volume= 22.531 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

Pond 11P: Future Detention Area



Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth=1.72"
Flow Length=9,425' Tc=133.2 min CN=84 Runoff=73.48 cfs 53.755 af

Pond 11P: Future Detention Area
Inflow=73.48 cfs 53.755 af
Primary=73.48 cfs 53.755 af

Total Runoff Area = 374.100 ac Runoff Volume = 53.755 af Average Runoff Depth = 1.72"
100.00% Pervious = 374.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 10S: NORTH SECTION

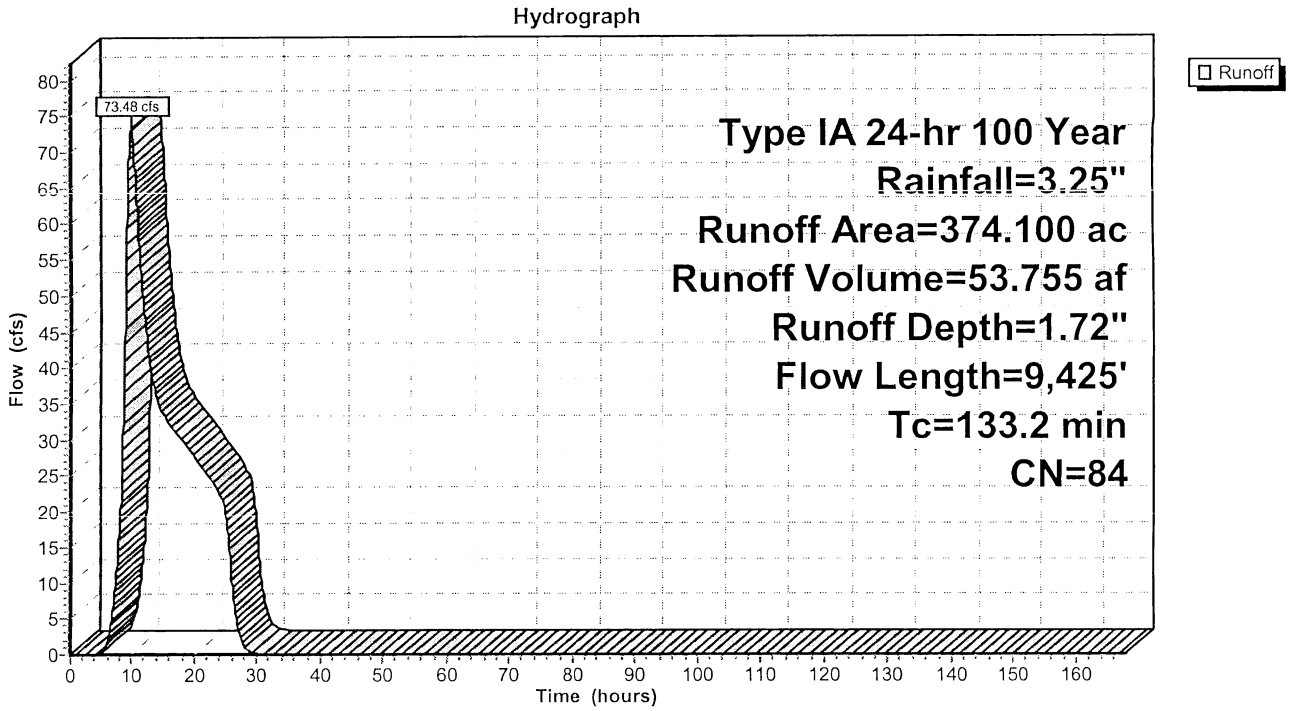
Runoff = 73.48 cfs @ 9.77 hrs, Volume= 53.755 af, Depth= 1.72"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
16.300	63	Desert shrub range, Poor, HSG A
357.800	85	Desert shrub range, Poor, HSG C
374.100	84	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



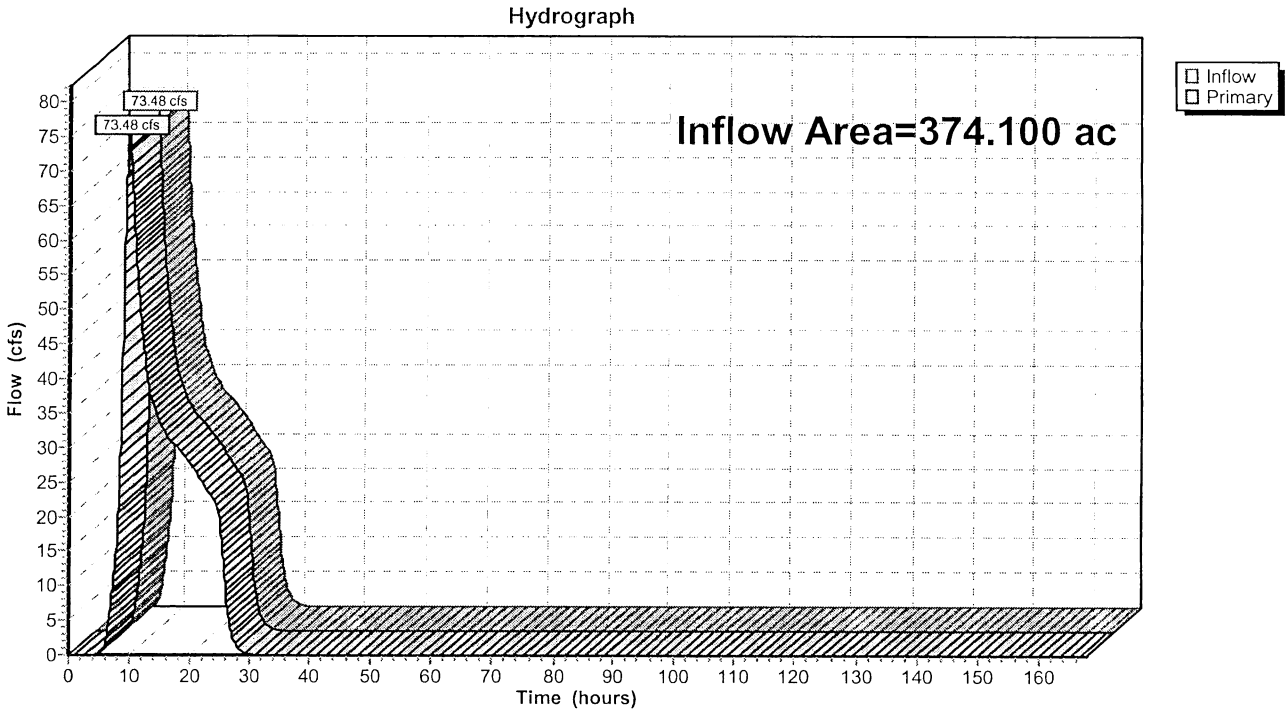
Summary for Pond 11P: Future Detention Area

[40] Hint: Not Described (Outflow=Inflow)

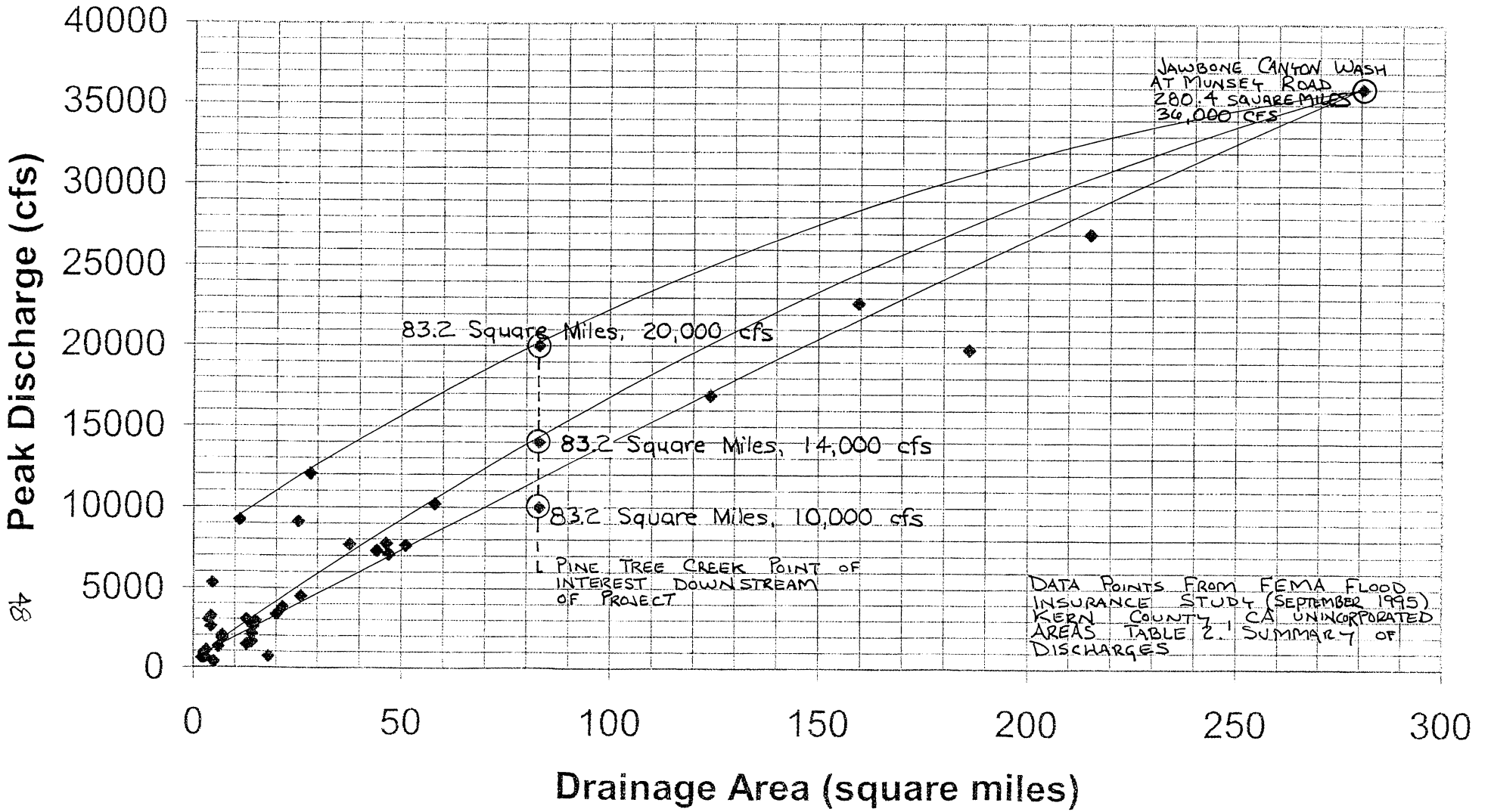
Inflow Area =	374.100 ac,	0.00% Impervious,	Inflow Depth =	1.72"	for 100 Year event	
Inflow =	73.48 cfs @	9.77 hrs,	Volume=	53.755 af		
Primary =	73.48 cfs @	9.77 hrs,	Volume=	53.755 af,	Atten= 0%,	Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs

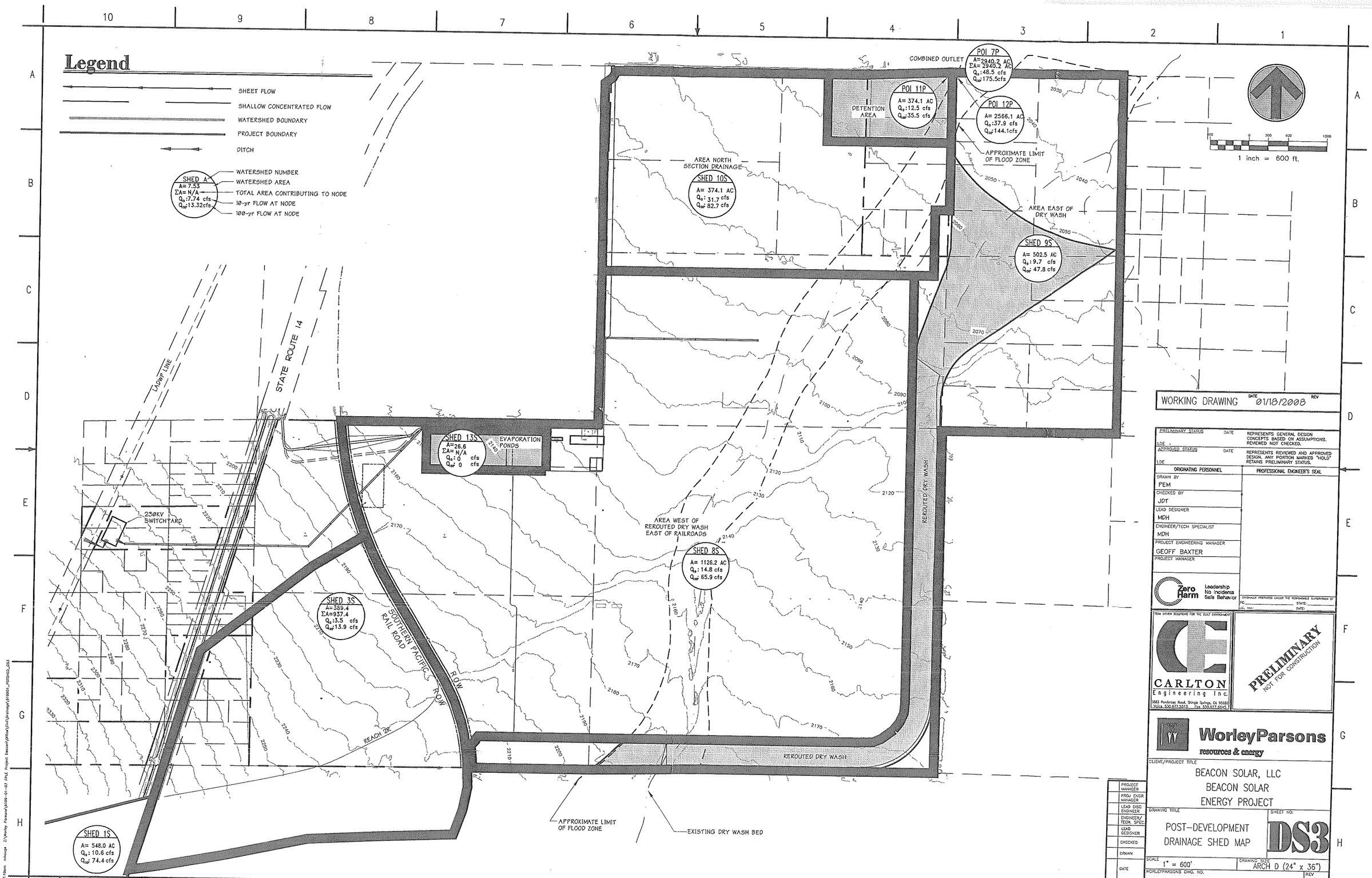
Pond 11P: Future Detention Area



Summary of 100 Yr Discharges



VII. APPENDIX B: PROPOSED CONDITIONS



WORKING DRAWING DATE 01/18/2008 REV

PRELIMINARY STATUS	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE		
APPROVED STATUS	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE		

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER	

Zero Harm — Leadership, No Incidents, Safe Behavior

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF: PE: STATE: EXP. DATE: DATE:

TEAM DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT
CARLTON Engineering Inc.
3083 Prudentes Road, Shingle Springs, CA 95682
Voice 530.677.5515 Fax 530.677.6545

PRELIMINARY NOT FOR CONSTRUCTION

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR
ENERGY PROJECT

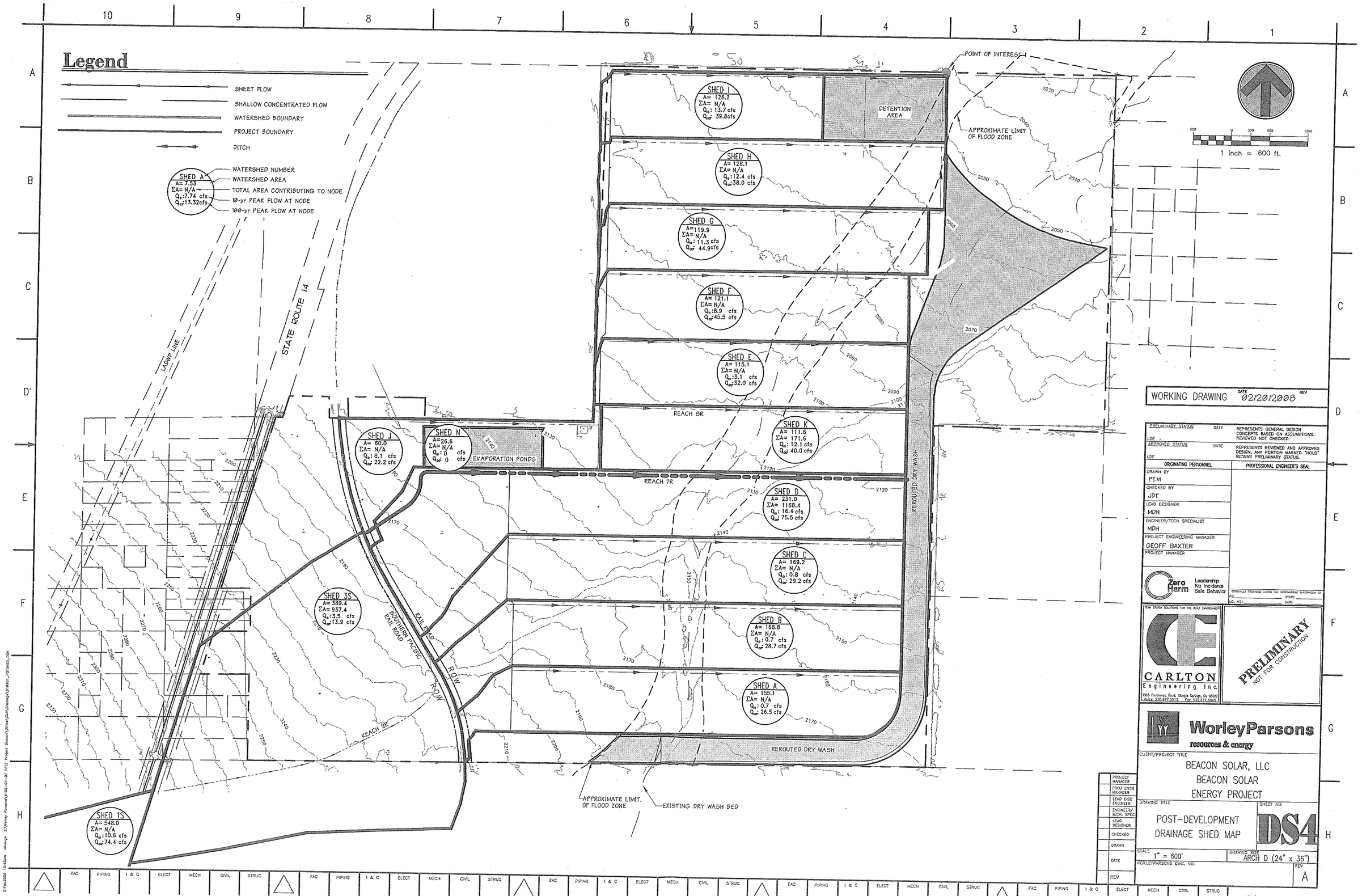
DRAWING TITLE
POST-DEVELOPMENT DRAINAGE SHED MAP

SHEET NO: DS3

SCALE 1" = 600'
DRAWING SIZE ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.
REV A

PROJECT MANAGER	
PROJ ENGR MANAGER	
LEAD DISC ENGINEER	
ENGINEER/ TECH. SPEC	
LEAD DESIGNER	
CHECKED	
DRAWN	
DATE	
REV	

FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC



WORKING DRAWING DATE 02/20/2008 REV

PRELIMINARY STATUS	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE		
APPROVED STATUS	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE		

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER	

Zero Harm — Leadership, No Incidents, Safe Behavior

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF PE: STATE: LIC. NO.: DATE:

TEAM DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT
CARLTON Engineering Inc.
3883 Ponderosa Road, Shingle Springs, CA 95682
Voice: 530.677.5515 Fax: 530.677.6645

PRELIMINARY NOT FOR CONSTRUCTION

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT

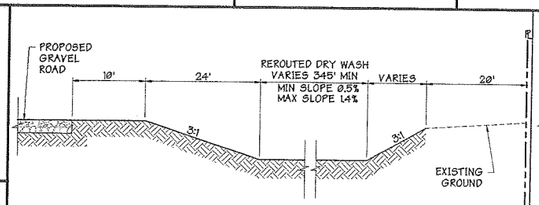
DRAWING TITLE
POST-DEVELOPMENT DRAINAGE SHED MAP

SHEET NO: DS4

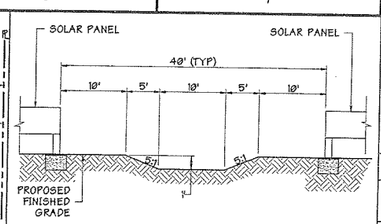
SCALE 1" = 600'
DRAWING SIZE ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.
REV A

PROJECT MANAGER	
PROJ ENGR MANAGER	
LEAD DISC ENGINEER	
ENGINEER/ TECH. SPEC	
LEAD DESIGNER	
CHECKED	
DRAWN	
DATE	
REV	

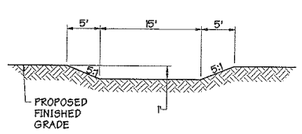
FAC | PIPING | I & C | ELECT | MECH | CIVIL | STRUC



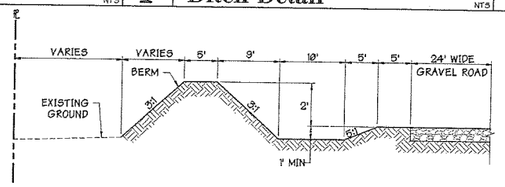
Rerouted Dry Wash NTS **1**



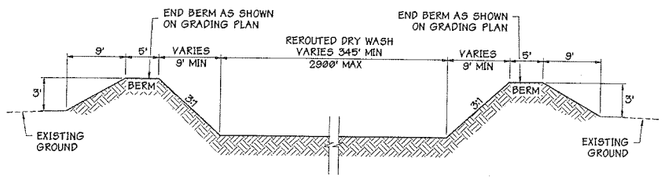
Ditch Detail NTS **2**



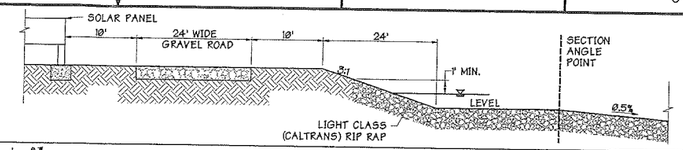
Ditch Detail NTS **3**



Berm NTS **4**



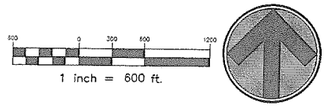
Rerouted Dry Wash Channel Outlet NTS **5**

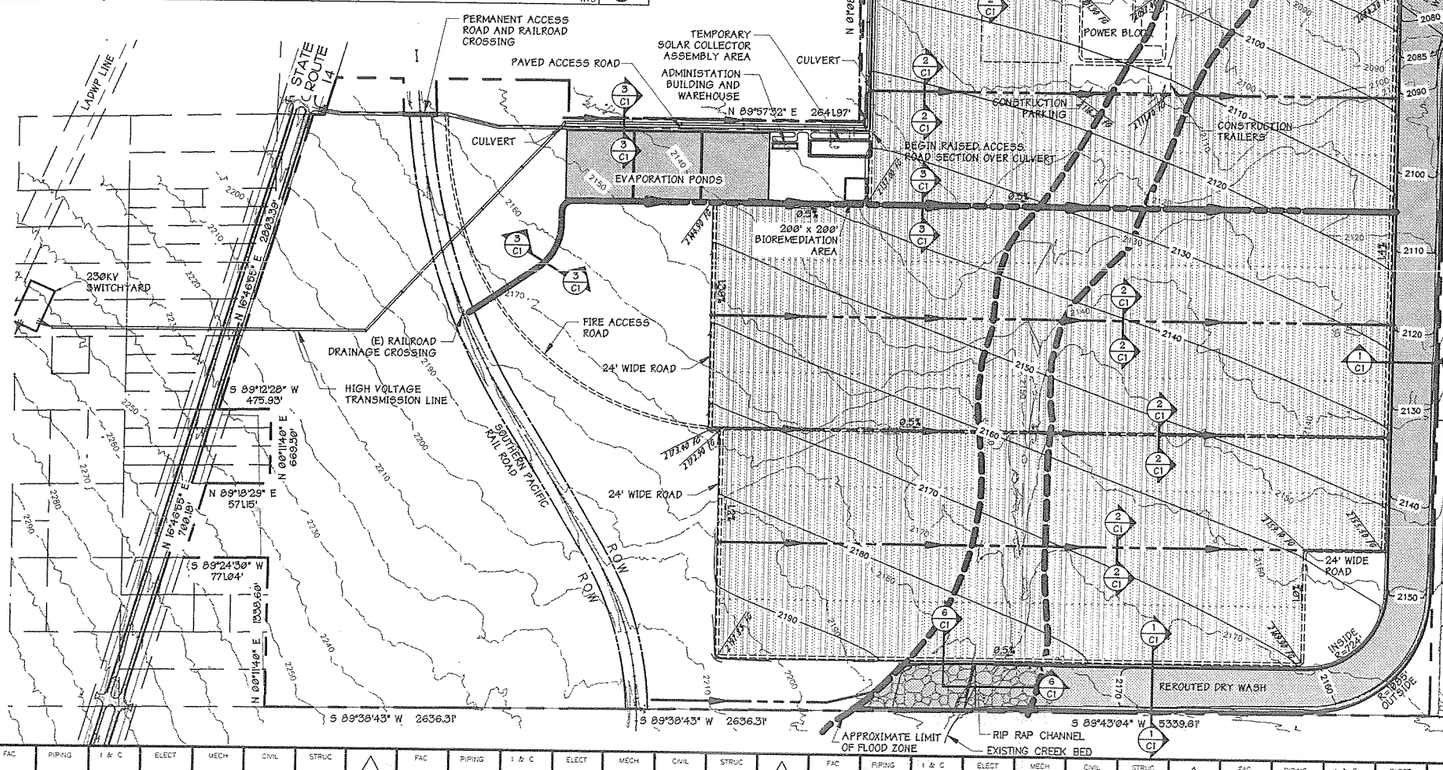


Ditch Detail NTS **6**

DATE	CUT (YARDS)	FILL (YARDS)	TOTAL (YARDS)
01-16-2008	5,160,000	4,830,000	330,000 CUT *

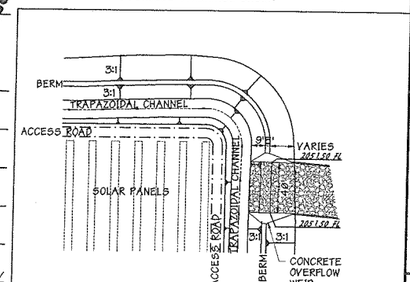
* ASSUMES SHRINK OF APPOXIMATELY 7% BASED ON RELATIVE COMPACTION OF 90 PERCENT OF MAXIMUM DENSITY PER ASTM D1577





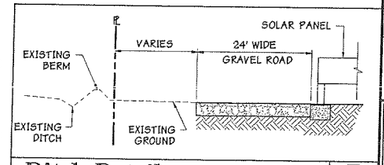
General Notes

1. ALL SLOPES ARE 3:1 UNLESS OTHERWISE SHOWN

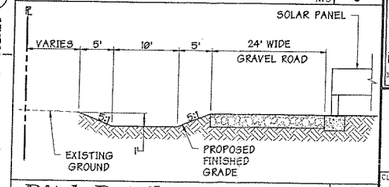


Enlarged Area NTS **7**

WORKING DRAWING DATE 02/21/2008 REV



Ditch Detail NTS **7**



Ditch Detail NTS **8**

PRELIMINARY STATUS	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
LDE		
APPROVED STATUS	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.
LDE		

ORIGINATING PERSONNEL	PROFESSIONAL ENGINEER'S SEAL
DRAWN BY: PEM	
CHECKED BY: JDT	
LEAD DESIGNER: MDH	
ENGINEER/TECH SPECIALIST: MDH	
PROJECT ENGINEERING MANAGER: GEOFF BAXTER	
PROJECT MANAGER	

Zero Harm — Leadership, No Incidents, Safe Behavior

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF PE: STATE: LIC. NO.: DATE:

TEAM DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT

CARLTON Engineering Inc.
3883 Pontoness Road, Shingle Springs, CA 95682
Phone: 530.677.5514 Fax: 530.677.8665

PRELIMINARY NOT FOR CONSTRUCTION

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT

DRAWING TITLE
CONCEPTUAL GRADING PLAN

SHEET NO. C1

SCALE 1" = 600' | DRAWING SIZE ARCH D (24" x 36")

WORLEYPARSONS DWG. NO. | REV A

PROJECT MANAGER	
PROJ ENGR MANAGER	
LEAD DISC ENGINEER	
ENGINEER/ TECH. SPEC.	
LEAD DESIGNER	
CHECKED	
DRAWN	
DATE	
REV	

FAC PIPING I & C ELECT MECH CIVIL STRUC

52

N

N 645014.93
E 1993976.58

N 644991.77
E 2001903.42

14

LADWP 500 KV LINE

LADWP 230 KV LINE

ROW

ROW

MIDLAND TRAIL
STATE ROUTE 14

SOUTHERN PACIFIC
RAIL ROAD TRACKS

SOLAR COLLECTOR
ASSEMBLY
FABRICATION AREA

ADMINISTATION
BUILDING AND
WAREHOUSE

200' x 200'
BIOREMEDIATION AREA

PAVED ACCESS ROAD

POWER BLOCK

CONST TRAILERS

CONST PARKING

LAYDOWN AREA

EVAPORATION PONDS

PROPERTY LINE

PL

HIGH VOLTAGE
TRANSMISSION LINE

ROW

ROW

PL

ROW

ROW

PL

LADWP LINE

14

N 634126.01
E 1988563.99

500 0 500 1000 1500 2000 2500

SCALE IN FEET

Edd

J. FOSTER

GEOFF BAXTER

Zero Harm
Leadership
No Incidents
Safe Behavior

WorleyParsons
resources & energy

BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT

GENERAL ARRANGEMENT
SITE PLAN

1" = 600'

ARCH D (24" x 36")

FPLS-0-SK-111-002-001

E

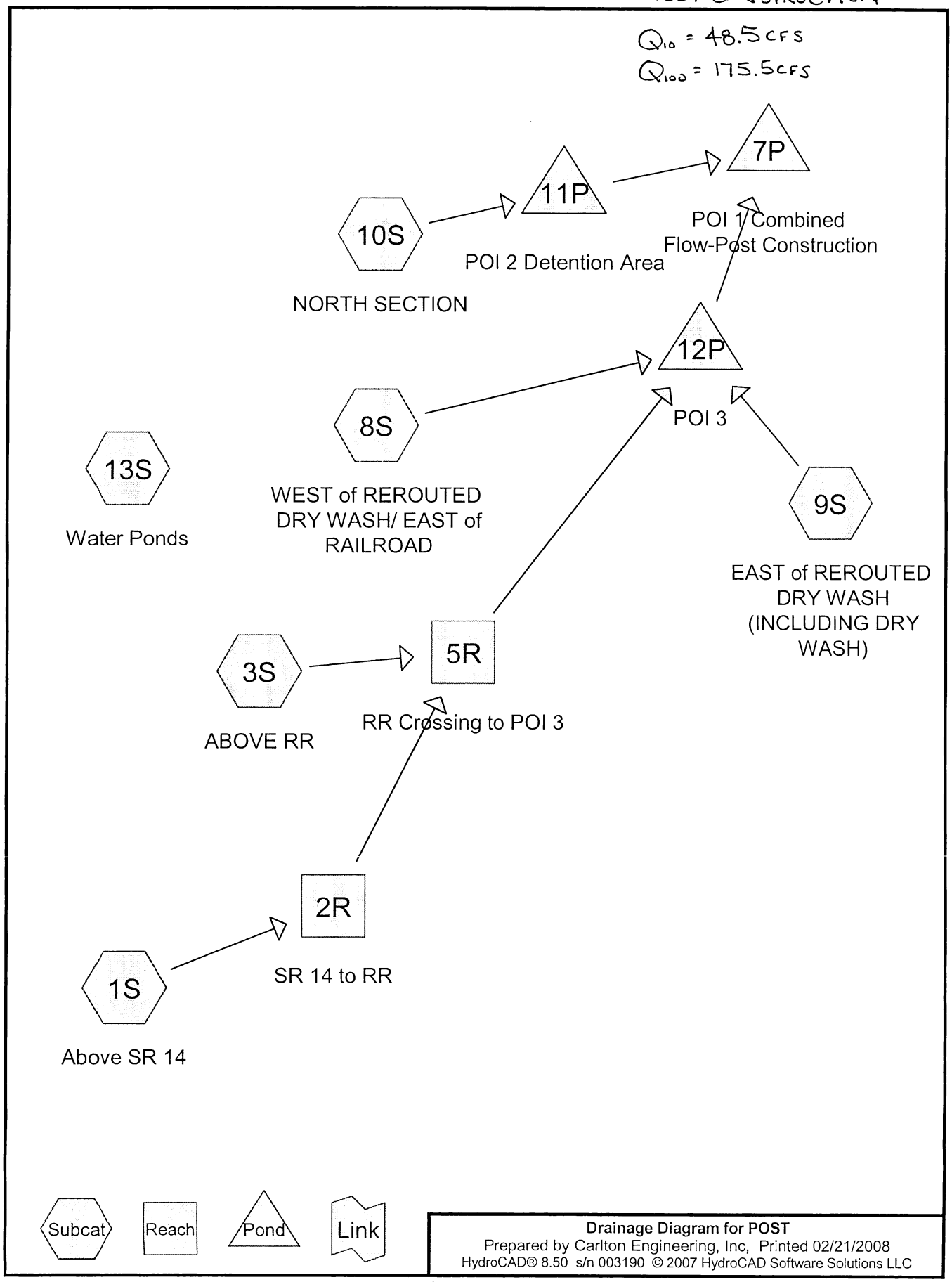
ISSUED FOR REVIEW

12/10/09 AND ELD

DWG-FILE: FPLS-0-SK-111-002-001.dwg

POST CONSTRUCTION

Q_{10} = 48.5 CFS
Q_{100} = 175.5 CFS



Drainage Diagram for POST
Prepared by Carlton Engineering, Inc, Printed 02/21/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1,050.300	63	Desert shrub range, Poor, HSG A (1S,3S,9S,13S)
1,047.700	65	Desert shrub range, Poor, HSG A (8S,10S)
208.900	85	Desert shrub range, Poor, HSG C (9S)
452.600	87	Desert shrub range, Poor, HSG C (8S,10S)
207.300	88	Desert shrub range, Poor, HSG D (1S)
2,966.800		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
2,098.000	HSG A	1S, 3S, 8S, 9S, 10S, 13S
0.000	HSG B	
661.500	HSG C	8S, 9S, 10S
207.300	HSG D	1S
0.000	Other	
2,966.800		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Above SR 14 Runoff Area=548.000 ac 0.00% Impervious Runoff Depth>0.27"
Flow Length=13,530' Tc=29.5 min CN=72 Runoff=10.55 cfs 12.468 af

Subcatchment 3S: ABOVE RR Runoff Area=389.400 ac 0.00% Impervious Runoff Depth>0.09"
Flow Length=8,690' Tc=32.0 min CN=63 Runoff=3.52 cfs 2.951 af

Subcatchment 8S: WEST of REROUTED Runoff Area=1,126.200 ac 0.00% Impervious Runoff Depth>0.15"
Flow Length=8,935' Tc=54.2 min CN=67 Runoff=14.77 cfs 14.519 af

Subcatchment 9S: EAST of REROUTED Runoff Area=502.500 ac 0.00% Impervious Runoff Depth>0.26"
Flow Length=5,350' Slope=0.0120 '/' Tc=81.4 min CN=72 Runoff=9.67 cfs 10.888 af

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth>0.76"
Flow Length=9,425' Tc=133.2 min CN=86 Runoff=31.73 cfs 23.837 af

Subcatchment 13S: Water Ponds Runoff Area=26.600 ac 0.00% Impervious Runoff Depth>0.09"
Flow Length=100' Slope=0.0150 '/' Tc=7.8 min CN=63 Runoff=0.24 cfs 0.209 af

Reach 2R: SR 14 to RR Avg. Depth=0.68' Max Vel=3.83 fps Inflow=10.55 cfs 12.468 af
n=0.030 L=8,590.0' S=0.0180 '/' Capacity=296.80 cfs Outflow=10.54 cfs 11.521 af

Reach 5R: RR Crossing to POI 3 Avg. Depth=0.41' Max Vel=3.02 fps Inflow=13.95 cfs 14.472 af
n=0.022 L=15,850.0' S=0.0077 '/' Capacity=238.77 cfs Outflow=13.88 cfs 11.281 af

Pond 7P: POI 1 Combined Flow-Post Construction Inflow=48.50 cfs 49.659 af
Primary=48.50 cfs 49.659 af

Pond 11P: POI 2 Detention Area Peak Elev=2,051.71' Storage=4.670 af Inflow=31.73 cfs 23.837 af
Discarded=6.10 cfs 7.495 af Primary=12.54 cfs 12.970 af Outflow=18.65 cfs 20.466 af

Pond 12P: POI 3 Inflow=37.90 cfs 36.689 af
Primary=37.90 cfs 36.689 af

Total Runoff Area = 2,966.800 ac Runoff Volume = 64.871 af Average Runoff Depth = 0.26"
100.00% Pervious = 2,966.800 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Above SR 14

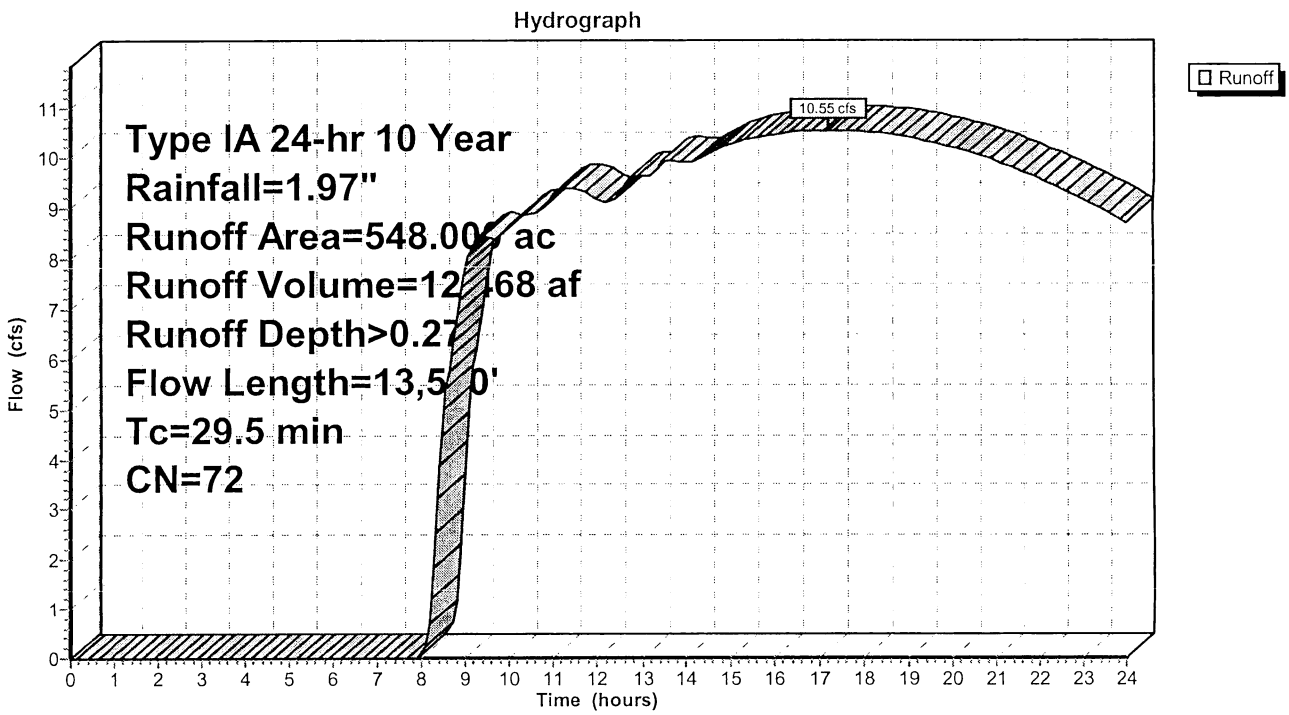
Runoff = 10.55 cfs @ 17.18 hrs, Volume= 12.468 af, Depth> 0.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
207.300	88	Desert shrub range, Poor, HSG D
340.700	63	Desert shrub range, Poor, HSG A
548.000	72	Weighted Average
548.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	200	0.0940	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
12.0	8,350	0.0940	11.59	115.90	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.0	4,980	0.0400	7.56	75.60	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
29.5	13,530	Total			

Subcatchment 1S: Above SR 14



Summary for Subcatchment 3S: ABOVE RR

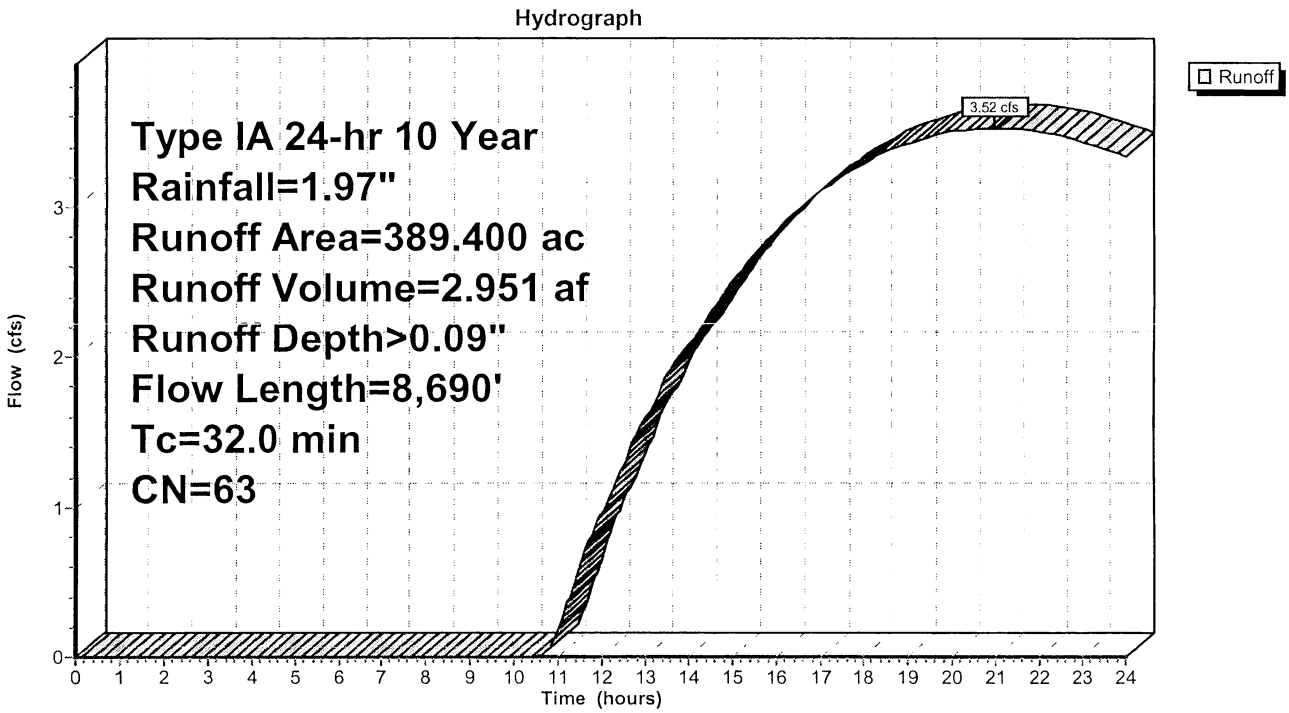
Runoff = 3.52 cfs @ 20.97 hrs, Volume= 2.951 af, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
389.400	63	Desert shrub range, Poor, HSG A
389.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0200	0.36		**Sheet Flow,** n= 0.030 P2= 1.10"
16.1	5,180	0.0200	5.35	53.46	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.3	3,410	0.0150	5.01	75.12	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030
32.0	8,690	Total			

Subcatchment 3S: ABOVE RR



Summary for Subcatchment 8S: WEST of REROUTED DRY WASH/ EAST of RAILROAD

Desert Shrub Range, poor, A Area=1255.6
Subtract Water Pond area=53.9 acres
Total Desert Shrub Range poor A Area=1201.7 acres

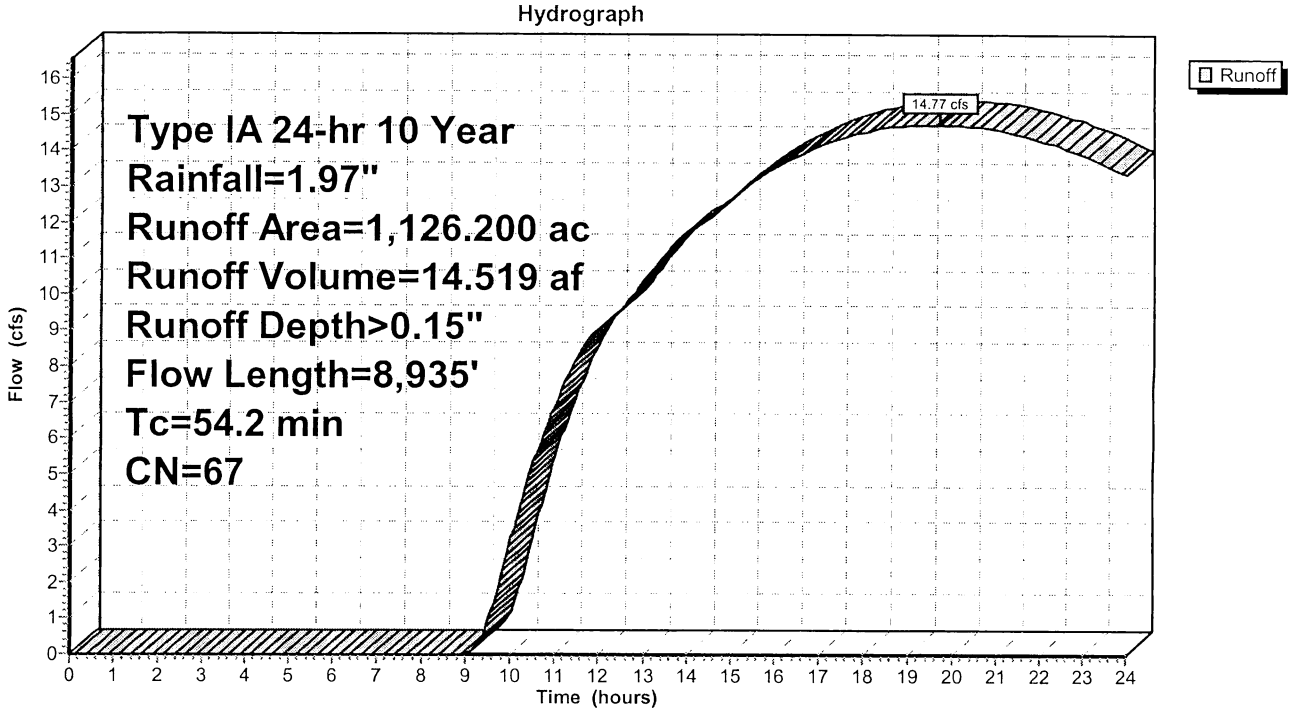
Runoff = 14.77 cfs @ 19.70 hrs, Volume= 14.519 af, Depth> 0.15"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
94.800	87	Desert shrub range, Poor, HSG C
1,031.400	65	Desert shrub range, Poor, HSG A
1,126.200	67	Weighted Average
1,126.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
6.9	725	0.0120	1.76		**Shallow Concentrated Flow, Unpaved** Unpaved Kv= 16.1 fps
35.7	7,810	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
5.9	100	0.0300	0.28		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
54.2	8,935	Total			

Subcatchment 8S: WEST of REROUTED DRY WASH/ EAST of RAILROAD



Summary for Subcatchment 9S: EAST of REROUTED DRY WASH (INCLUDING DRY WASH)

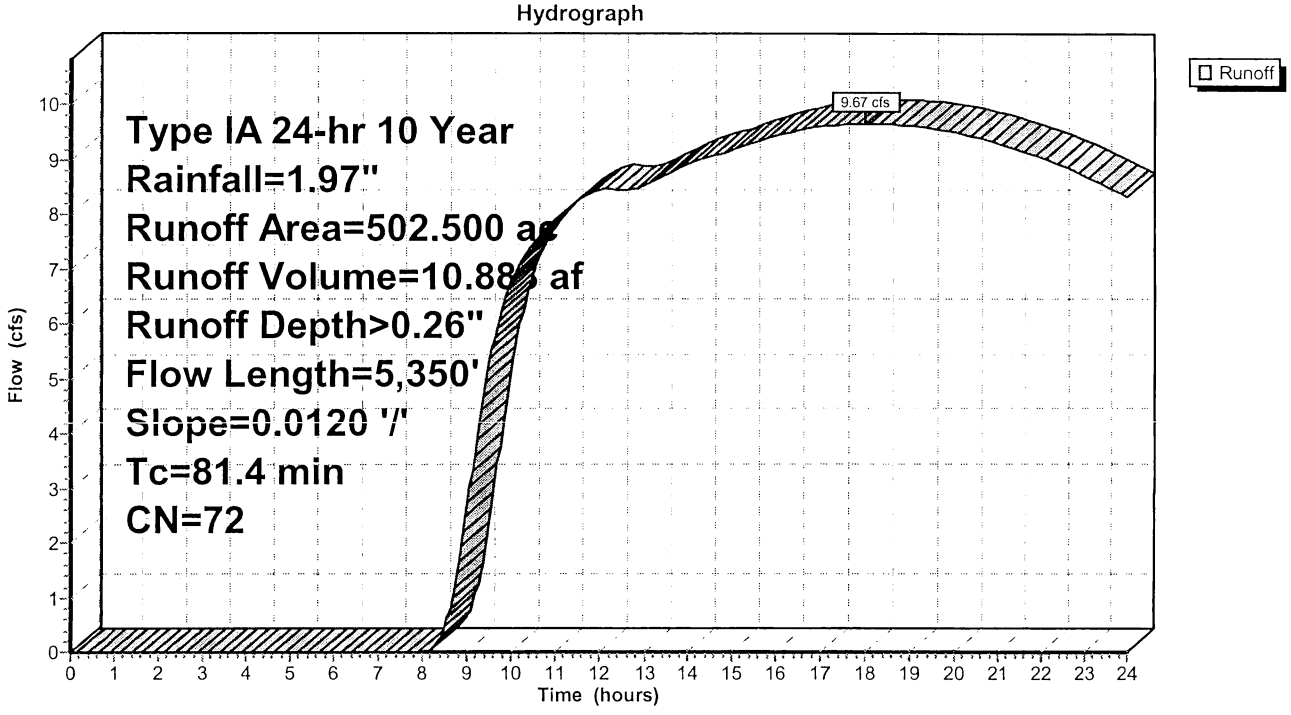
Runoff = 9.67 cfs @ 18.00 hrs, Volume= 10.888 af, Depth> 0.26"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
208.900	85	Desert shrub range, Poor, HSG C
293.600	63	Desert shrub range, Poor, HSG A
502.500	72	Weighted Average
502.500		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
81.4	5,350	0.0120	1.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps

Subcatchment 9S: EAST of REROUTED DRY WASH (INCLUDING DRY WASH)



Summary for Subcatchment 10S: NORTH SECTION

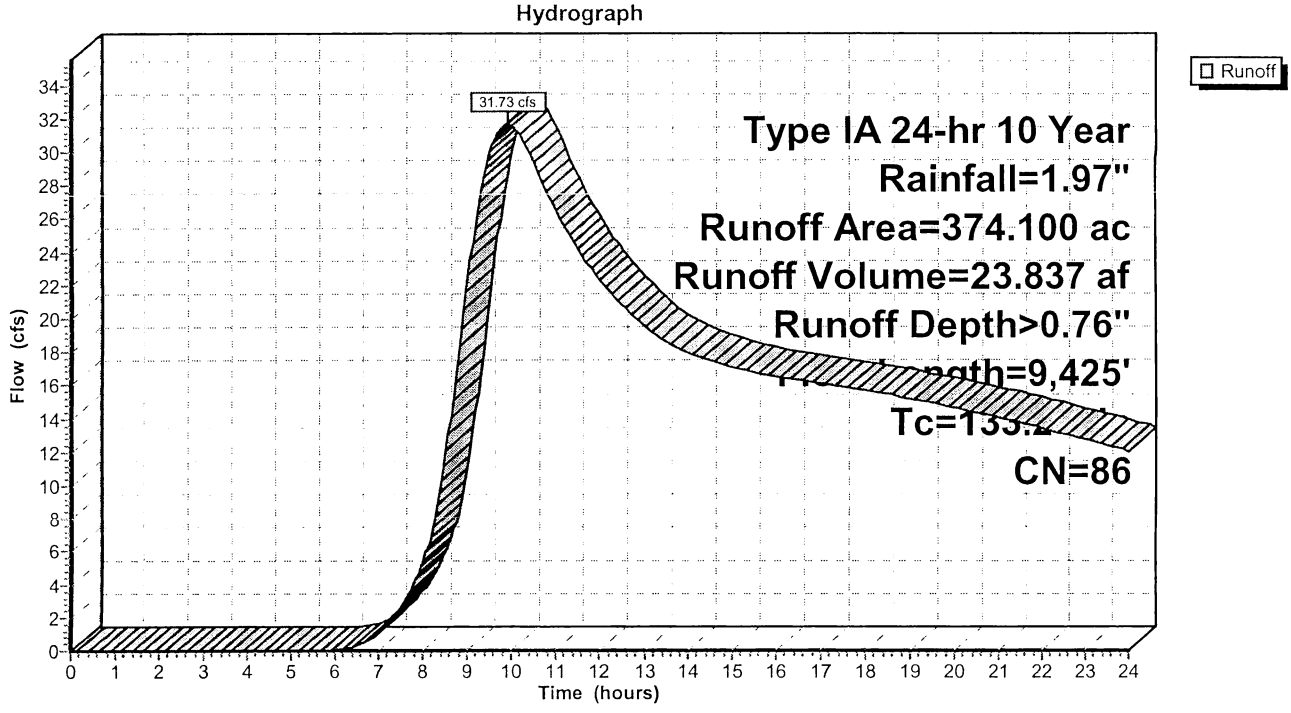
Runoff = 31.73 cfs @ 9.91 hrs, Volume= 23.837 af, Depth> 0.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
16.300	65	Desert shrub range, Poor, HSG A
357.800	87	Desert shrub range, Poor, HSG C
374.100	86	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



Summary for Subcatchment 13S: Water Ponds

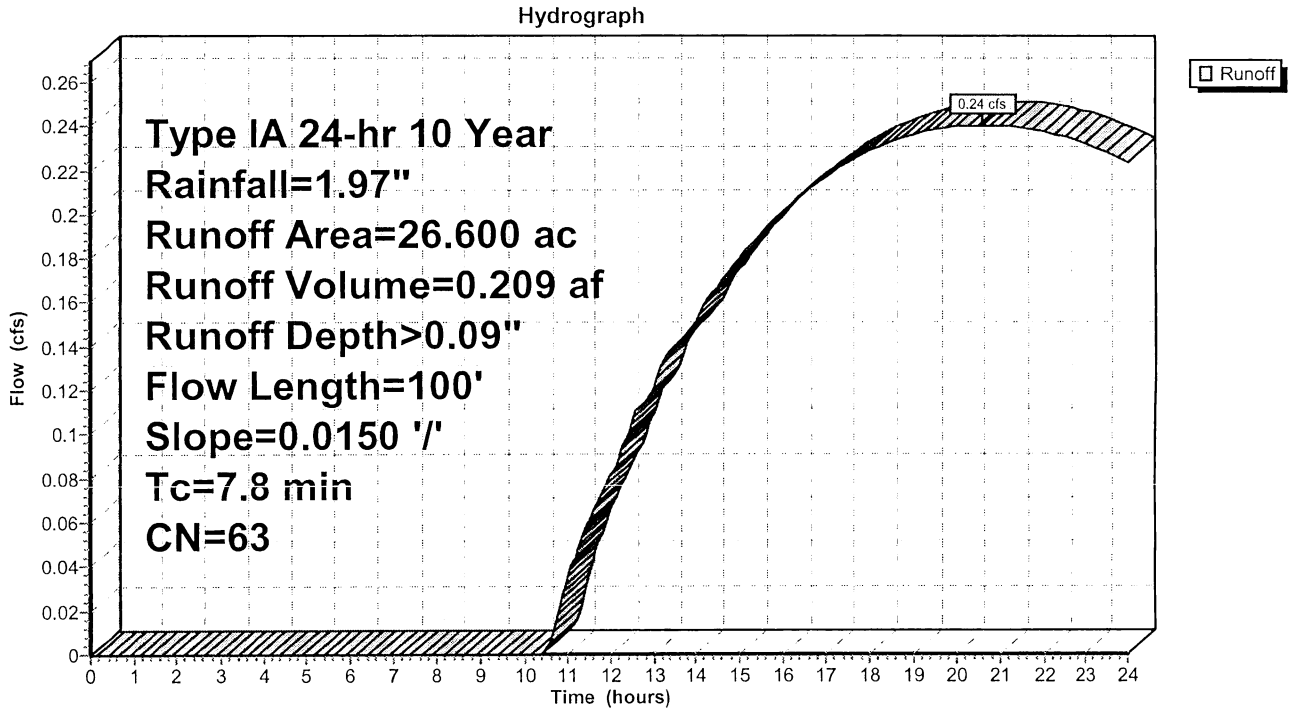
Runoff = 0.24 cfs @ 20.59 hrs, Volume= 0.209 af, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
26.600	63	Desert shrub range, Poor, HSG A
26.600		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0150	0.21		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"

Subcatchment 13S: Water Ponds



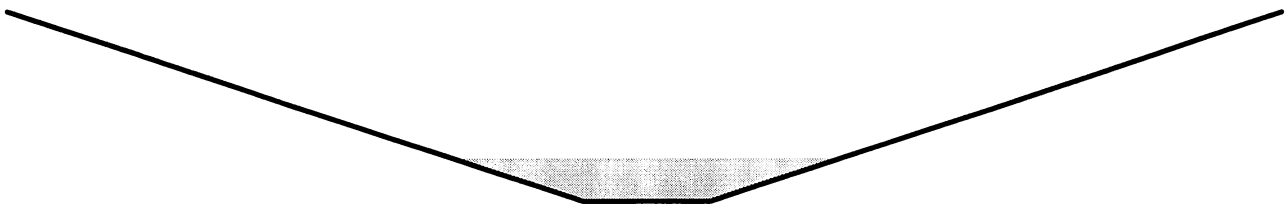
Summary for Reach 2R: SR 14 to RR

Inflow Area = 548.000 ac, 0.00% Impervious, Inflow Depth > 0.27" for 10 Year event
Inflow = 10.55 cfs @ 17.18 hrs, Volume= 12.468 af
Outflow = 10.54 cfs @ 18.35 hrs, Volume= 11.521 af, Atten= 0%, Lag= 70.0 min

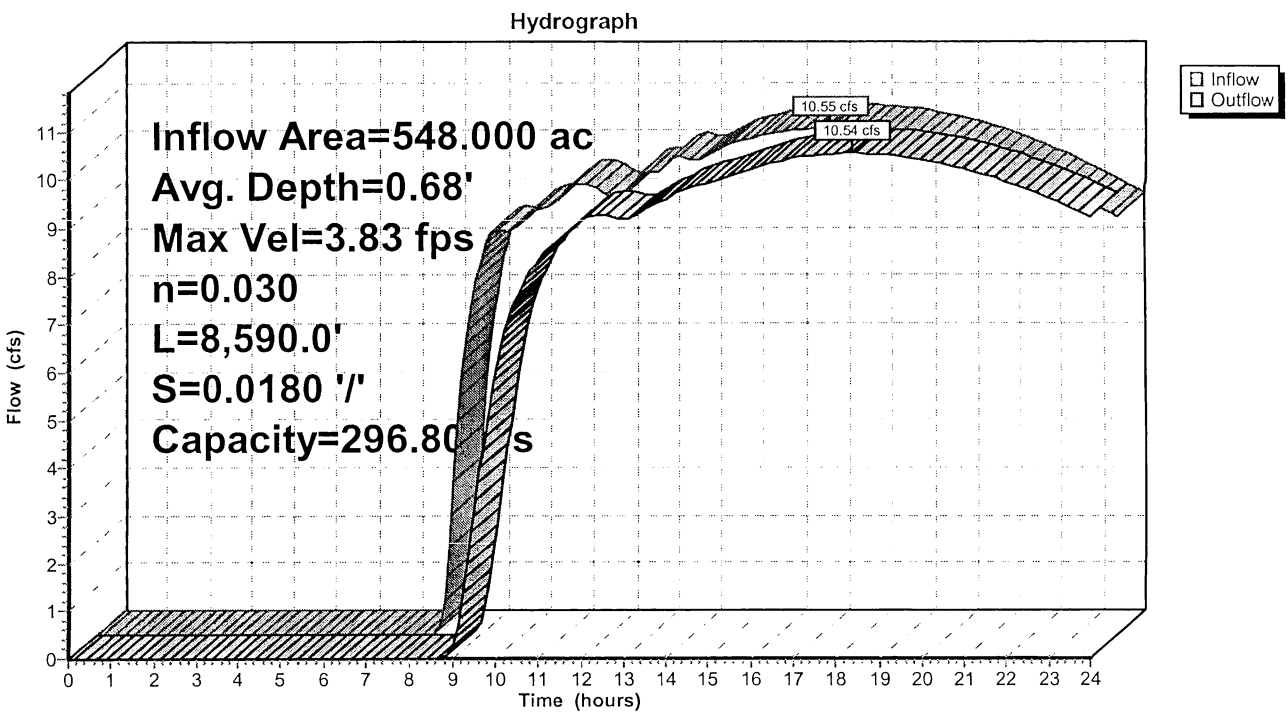
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.83 fps, Min. Travel Time= 37.4 min
Avg. Velocity = 3.59 fps, Avg. Travel Time= 39.9 min

Peak Storage= 23,658 cf @ 17.71 hrs, Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 296.80 cfs

2.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 8,590.0' Slope= 0.0180 '/'
Inlet Invert= 2,326.75', Outlet Invert= 2,172.00'



Reach 2R: SR 14 to RR



Summary for Reach 5R: RR Crossing to POI 3

[61] Hint: Exceeded Reach 2R outlet invert by 0.41' @ 20.25 hrs

Inflow Area = 937.400 ac, 0.00% Impervious, Inflow Depth > 0.19" for 10 Year event
Inflow = 13.95 cfs @ 19.28 hrs, Volume= 14.472 af
Outflow = 13.88 cfs @ 21.70 hrs, Volume= 11.281 af, Atten= 1%, Lag= 145.3 min

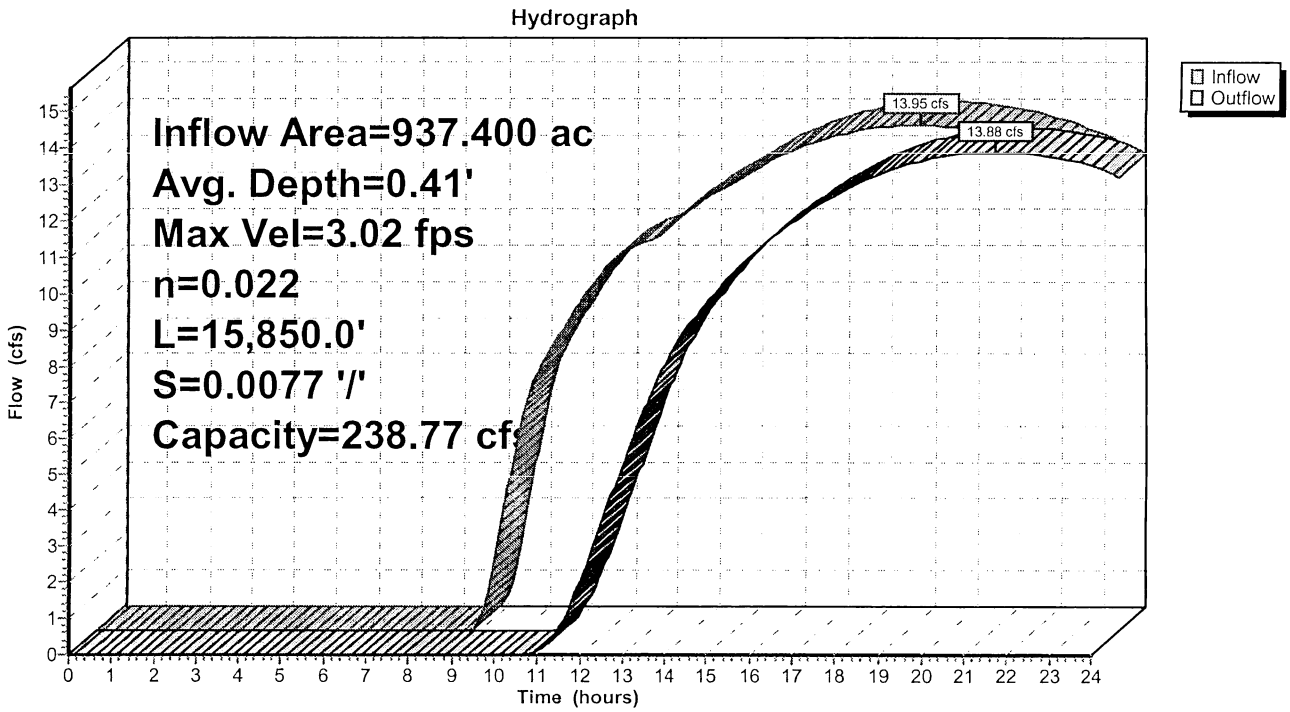
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.02 fps, Min. Travel Time= 87.3 min
Avg. Velocity = 2.56 fps, Avg. Travel Time= 103.3 min

Peak Storage= 72,712 cf @ 20.25 hrs, Average Depth at Peak Storage= 0.41'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 238.77 cfs

10.00' x 2.00' deep channel, n= 0.022
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 15,850.0' Slope= 0.0077 '/'
Inlet Invert= 2,172.00', Outlet Invert= 2,050.00'

‡

Reach 5R: RR Crossing to POI 3



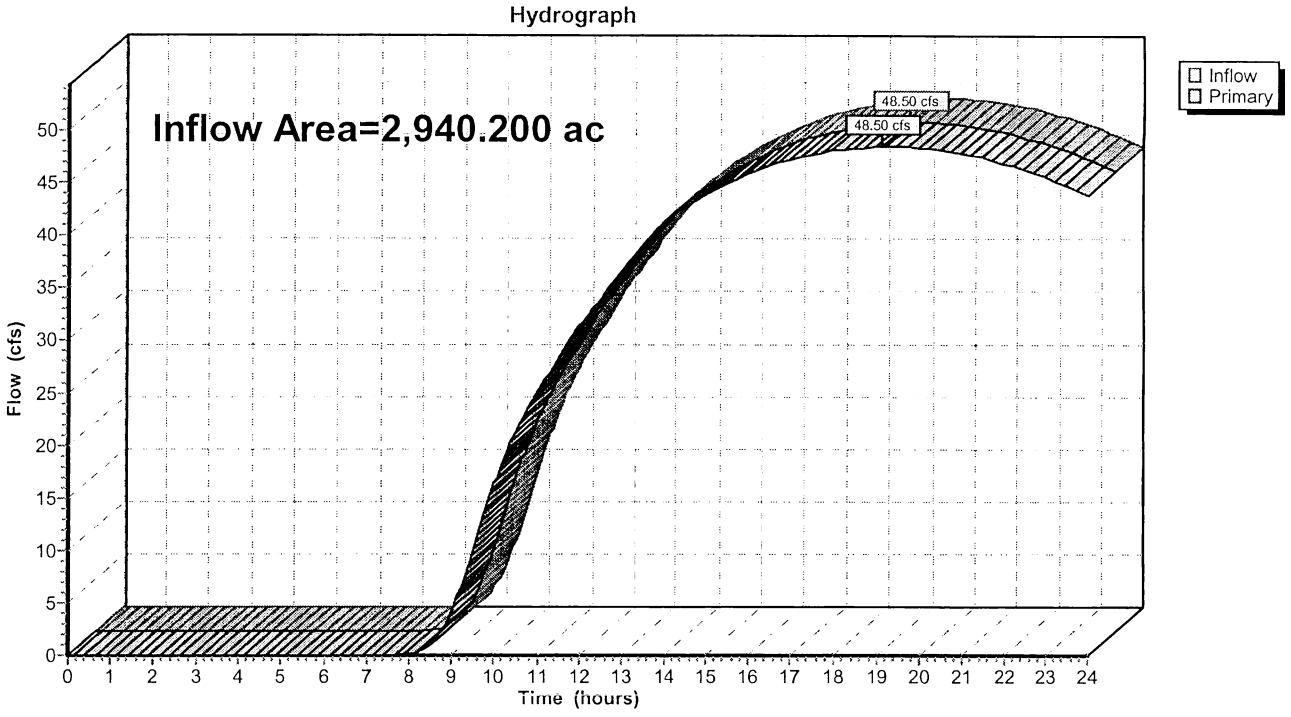
Summary for Pond 7P: POI 1 Combined Flow-Post Construction

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,940.200 ac, 0.00% Impervious, Inflow Depth > 0.20" for 10 Year event
Inflow = 48.50 cfs @ 19.10 hrs, Volume= 49.659 af
Primary = 48.50 cfs @ 19.10 hrs, Volume= 49.659 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 7P: POI 1 Combined Flow-Post Construction



Summary for Pond 11P: POI 2 Detention Area

Inflow Area =	374.100 ac,	0.00% Impervious,	Inflow Depth >	0.76"	for 10 Year event
Inflow =	31.73 cfs @	9.91 hrs,	Volume=	23.837 af	
Outflow =	18.65 cfs @	13.46 hrs,	Volume=	20.466 af,	Atten= 41%, Lag= 213.3 min
Discarded =	6.10 cfs @	13.46 hrs,	Volume=	7.495 af	
Primary =	12.54 cfs @	13.46 hrs,	Volume=	12.970 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2,051.71' @ 13.46 hrs Surf.Area= 30.272 ac Storage= 4.670 af

Plug-Flow detention time= 159.5 min calculated for 20.466 af (86% of inflow)
Center-of-Mass det. time= 86.0 min (985.3 - 899.3)

Volume	Invert	Avail.Storage	Storage Description
#1	2,051.50'	44.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

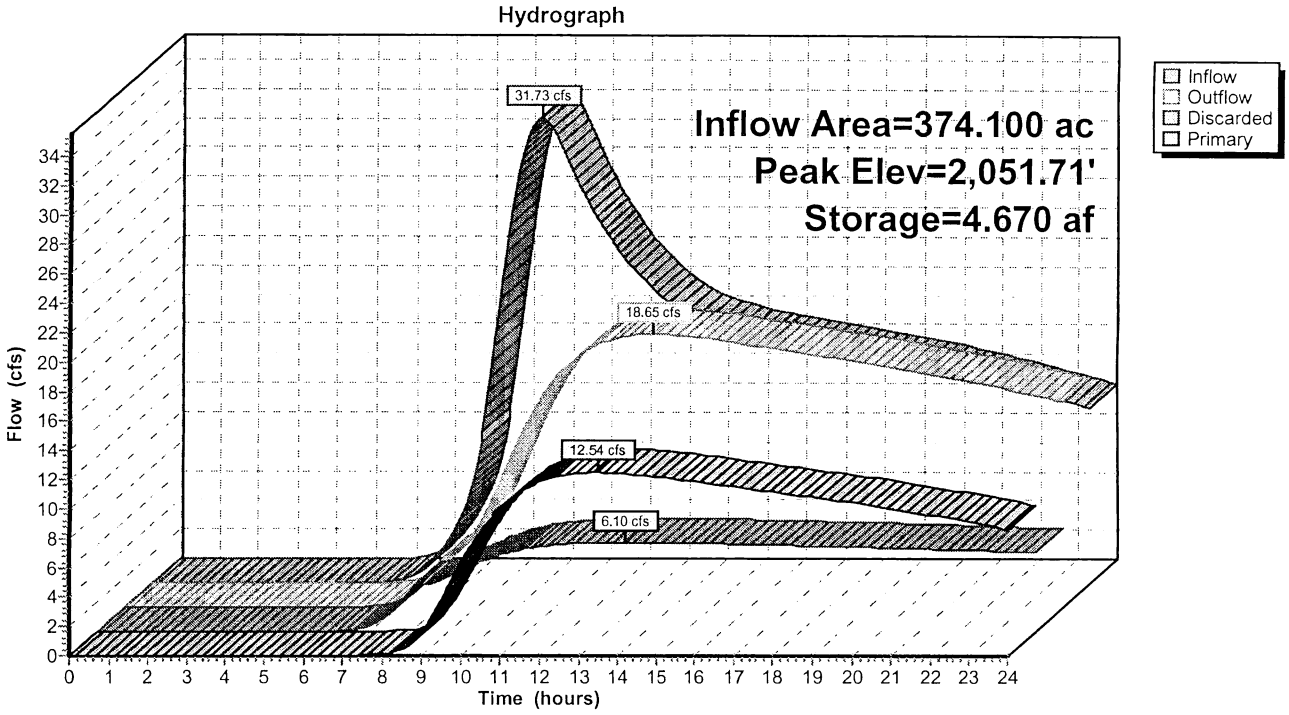
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
2,051.50	14.500	0.000	0.000
2,052.00	52.300	16.700	16.700
2,052.50	57.300	27.400	44.100

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,051.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	2,051.50'	**26.6 deg x 40.0' long Sharp-Crested Vee/Trap Weir** C= 2.63

Discarded OutFlow Max=6.10 cfs @ 13.46 hrs HW=2,051.71' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 6.10 cfs)

Primary OutFlow Max=12.54 cfs @ 13.46 hrs HW=2,051.71' (Free Discharge)
└**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 12.54 cfs @ 1.50 fps)

Pond 11P: POI 2 Detention Area



Summary for Pond 12P: POI 3

Removed 53.9 acres of Water Ponds

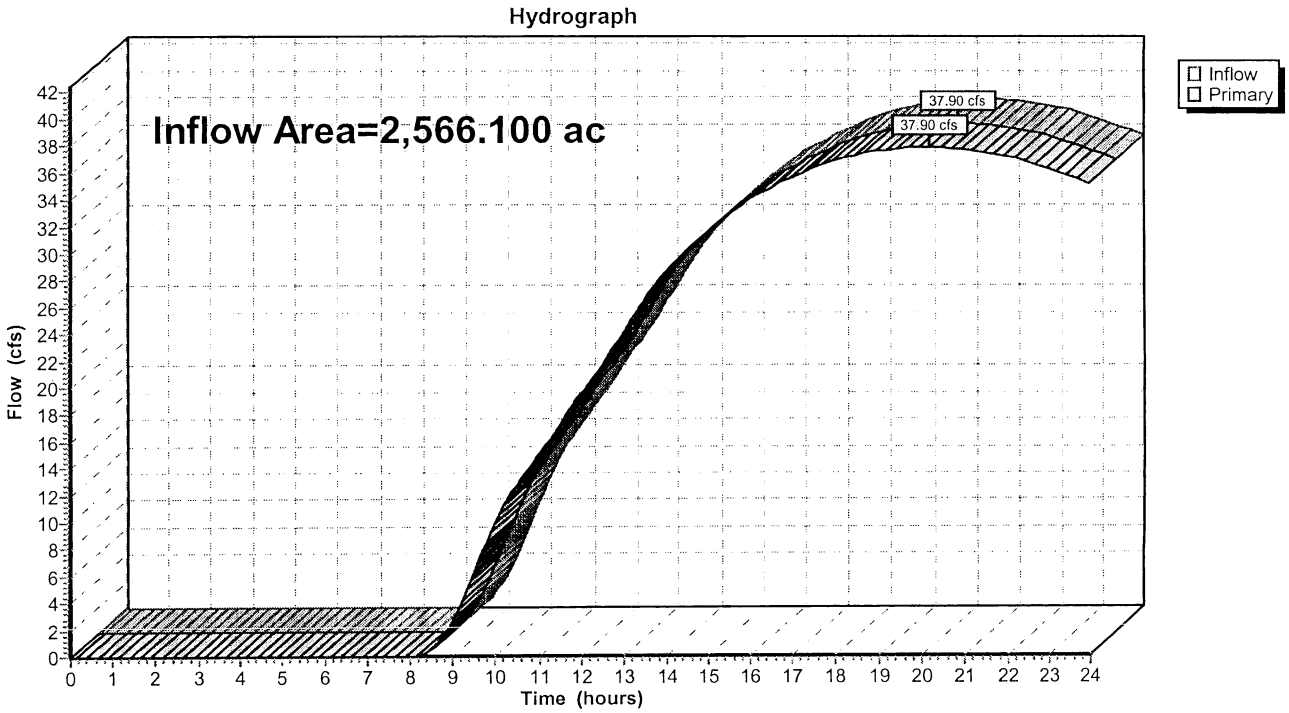
---

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,566.100 ac, 0.00% Impervious, Inflow Depth > 0.17" for 10 Year event
Inflow = 37.90 cfs @ 20.17 hrs, Volume= 36.689 af
Primary = 37.90 cfs @ 20.17 hrs, Volume= 36.689 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 12P: POI 3



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Above SR 14 Runoff Area=548.000 ac 0.00% Impervious Runoff Depth>0.94"
Flow Length=13,530' Tc=29.5 min CN=72 Runoff=74.42 cfs 43.110 af

Subcatchment 3S: ABOVE RR Runoff Area=389.400 ac 0.00% Impervious Runoff Depth>0.53"
Flow Length=8,690' Tc=32.0 min CN=63 Runoff=13.95 cfs 17.154 af

Subcatchment 8S: WEST of REROUTED Runoff Area=1,126.200 ac 0.00% Impervious Runoff Depth>0.69"
Flow Length=8,935' Tc=54.2 min CN=67 Runoff=65.93 cfs 64.403 af

Subcatchment 9S: EAST of REROUTED Runoff Area=502.500 ac 0.00% Impervious Runoff Depth>0.91"
Flow Length=5,350' Slope=0.0120 '/' Tc=81.4 min CN=72 Runoff=47.84 cfs 38.157 af

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth>1.76"
Flow Length=9,425' Tc=133.2 min CN=86 Runoff=82.69 cfs 54.868 af

Subcatchment 13S: Water Ponds Runoff Area=26.600 ac 0.00% Impervious Runoff Depth>0.54"
Flow Length=100' Slope=0.0150 '/' Tc=7.8 min CN=63 Runoff=1.00 cfs 1.195 af

Reach 2R: SR 14 to RR Avg. Depth=1.52' Max Vel=6.00 fps Inflow=74.42 cfs 43.110 af
n=0.030 L=8,590.0' S=0.0180 '/' Capacity=296.80 cfs Outflow=59.56 cfs 41.425 af

Reach 5R: RR Crossing to POI 3 Avg. Depth=0.91' Max Vel=4.83 fps Inflow=73.11 cfs 58.579 af
n=0.022 L=15,850.0' S=0.0077 '/' Capacity=238.77 cfs Outflow=56.17 cfs 52.756 af

Pond 7P: POI 1 Combined Flow-Post Construction Inflow=175.49 cfs 191.189 af
Primary=175.49 cfs 191.189 af

Pond 11P: POI 2 Detention Area Peak Elev=2,051.92' Storage=12.617 af Inflow=82.69 cfs 54.868 af
Discarded=9.28 cfs 11.450 af Primary=35.47 cfs 35.873 af Outflow=44.76 cfs 47.323 af

Pond 12P: POI 3 Inflow=144.08 cfs 155.316 af
Primary=144.08 cfs 155.316 af

Total Runoff Area = 2,966.800 ac Runoff Volume = 218.888 af Average Runoff Depth = 0.89"
100.00% Pervious = 2,966.800 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Above SR 14

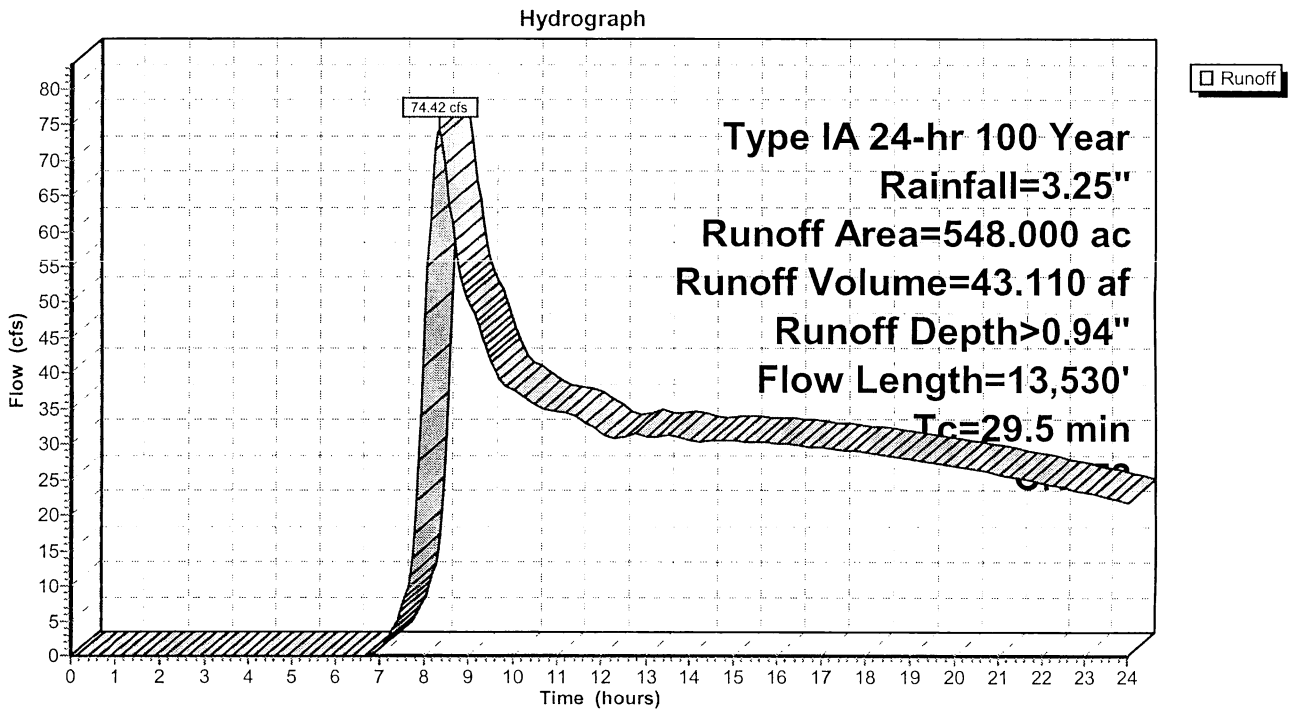
Runoff = 74.42 cfs @ 8.30 hrs, Volume= 43.110 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
207.300	88	Desert shrub range, Poor, HSG D
340.700	63	Desert shrub range, Poor, HSG A
548.000	72	Weighted Average
548.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	200	0.0940	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
12.0	8,350	0.0940	11.59	115.90	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.0	4,980	0.0400	7.56	75.60	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
29.5	13,530	Total			

Subcatchment 1S: Above SR 14



Summary for Subcatchment 3S: ABOVE RR

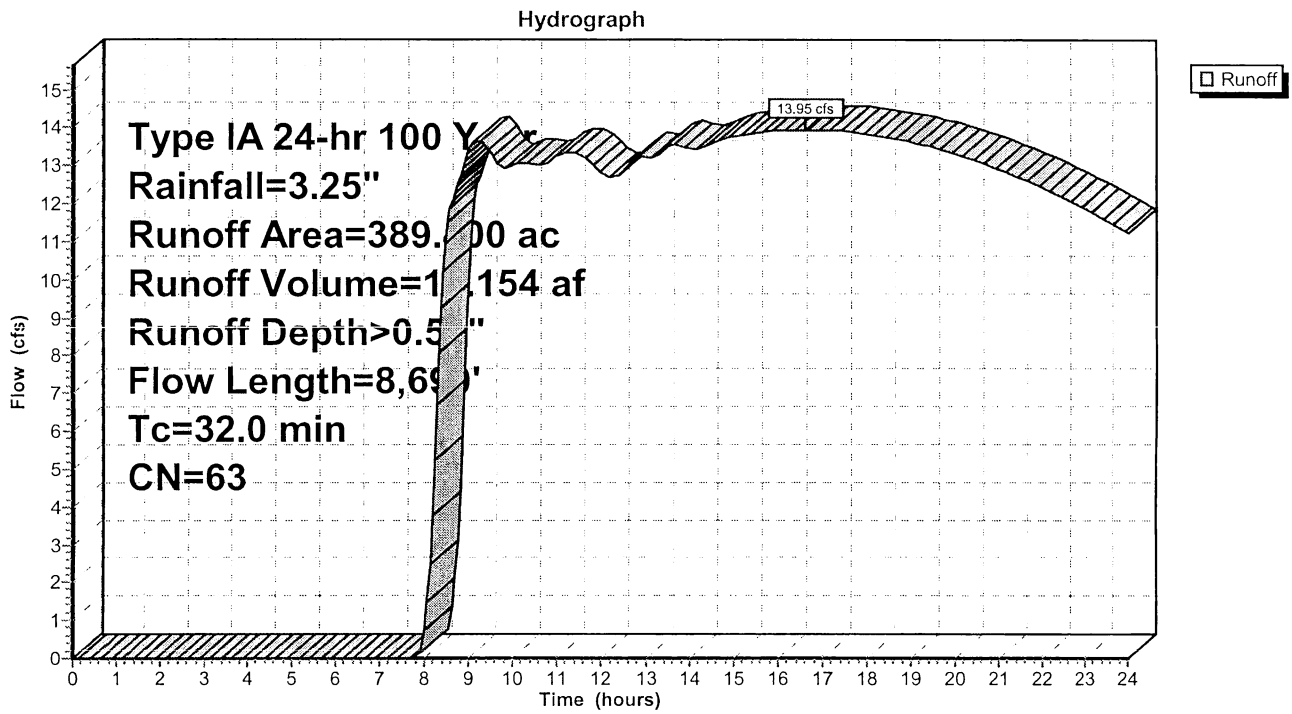
Runoff = 13.95 cfs @ 16.59 hrs, Volume= 17.154 af, Depth> 0.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
389.400	63	Desert shrub range, Poor, HSG A
389.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0200	0.36		**Sheet Flow,** n= 0.030 P2= 1.10"
16.1	5,180	0.0200	5.35	53.46	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.3	3,410	0.0150	5.01	75.12	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030
32.0	8,690	Total			

Subcatchment 3S: ABOVE RR



Summary for Subcatchment 8S: WEST of REROUTED DRY WASH/ EAST of RAILROAD

Desert Shrub Range, poor, A Area=1255.6
Subtract Water Pond area=53.9 acres
Total Desert Shrub Range poor A Area=1201.7 acres

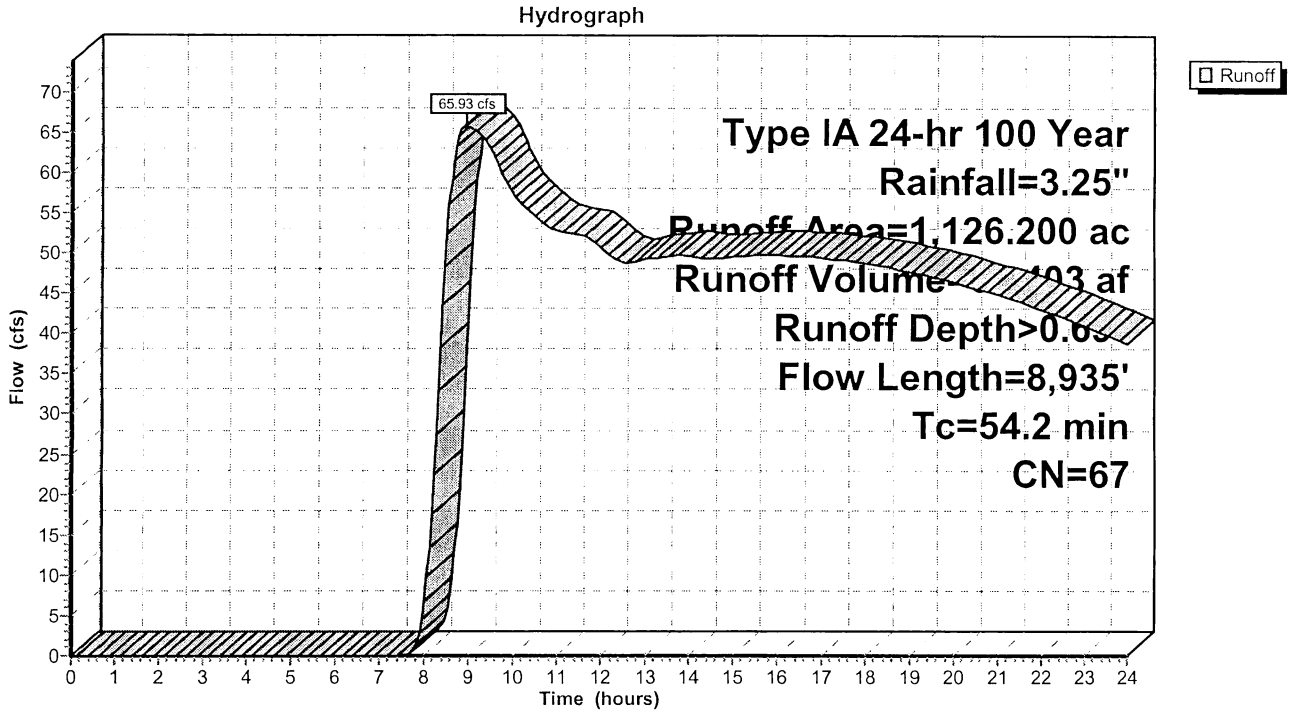
Runoff = 65.93 cfs @ 8.93 hrs, Volume= 64.403 af, Depth> 0.69"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
94.800	87	Desert shrub range, Poor, HSG C
1,031.400	65	Desert shrub range, Poor, HSG A
1,126.200	67	Weighted Average
1,126.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
6.9	725	0.0120	1.76		**Shallow Concentrated Flow, Unpaved** Unpaved Kv= 16.1 fps
35.7	7,810	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
5.9	100	0.0300	0.28		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
54.2	8,935	Total			

Subcatchment 8S: WEST of REROUTED DRY WASH/ EAST of RAILROAD



Summary for Subcatchment 9S: EAST of REROUTED DRY WASH (INCLUDING DRY WASH)

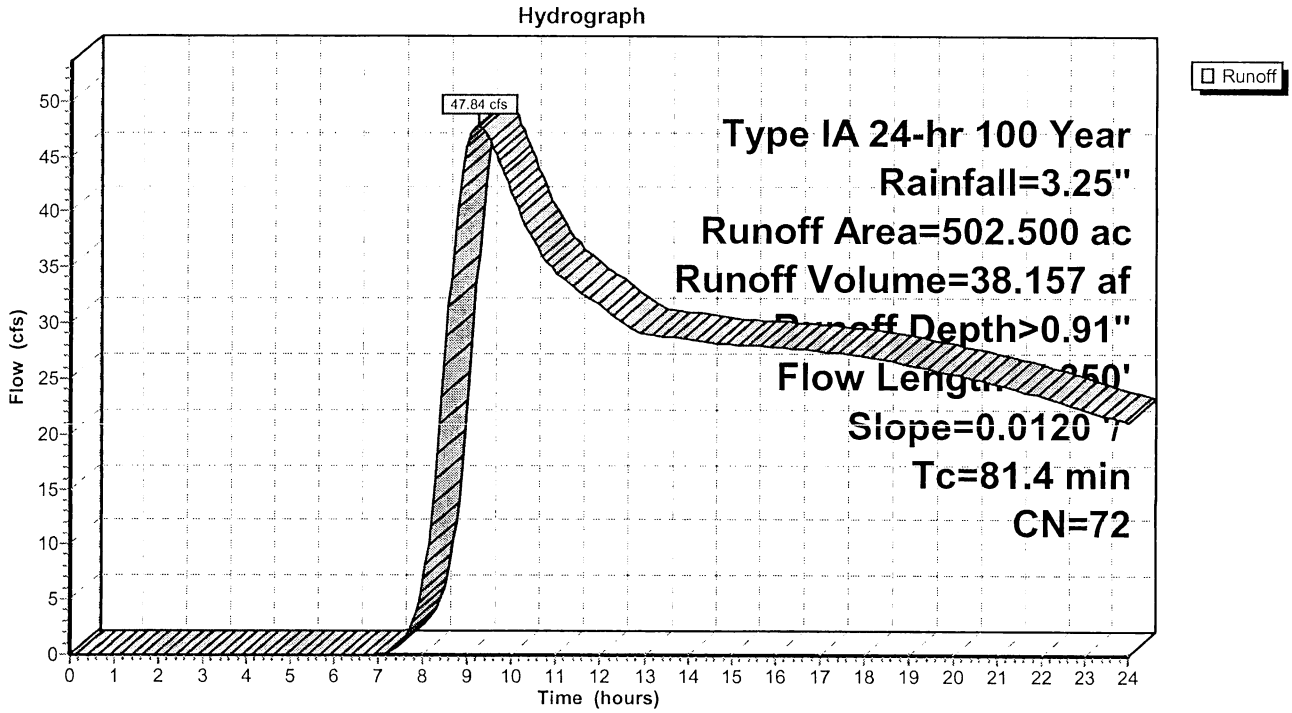
Runoff = 47.84 cfs @ 9.19 hrs, Volume= 38.157 af, Depth> 0.91"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
208.900	85	Desert shrub range, Poor, HSG C
293.600	63	Desert shrub range, Poor, HSG A
502.500	72	Weighted Average
502.500		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
81.4	5,350	0.0120	1.10		**Shallow Concentrated Flow,** Nearly Bare & Untilled Kv= 10.0 fps

Subcatchment 9S: EAST of REROUTED DRY WASH (INCLUDING DRY WASH)



Summary for Subcatchment 10S: NORTH SECTION

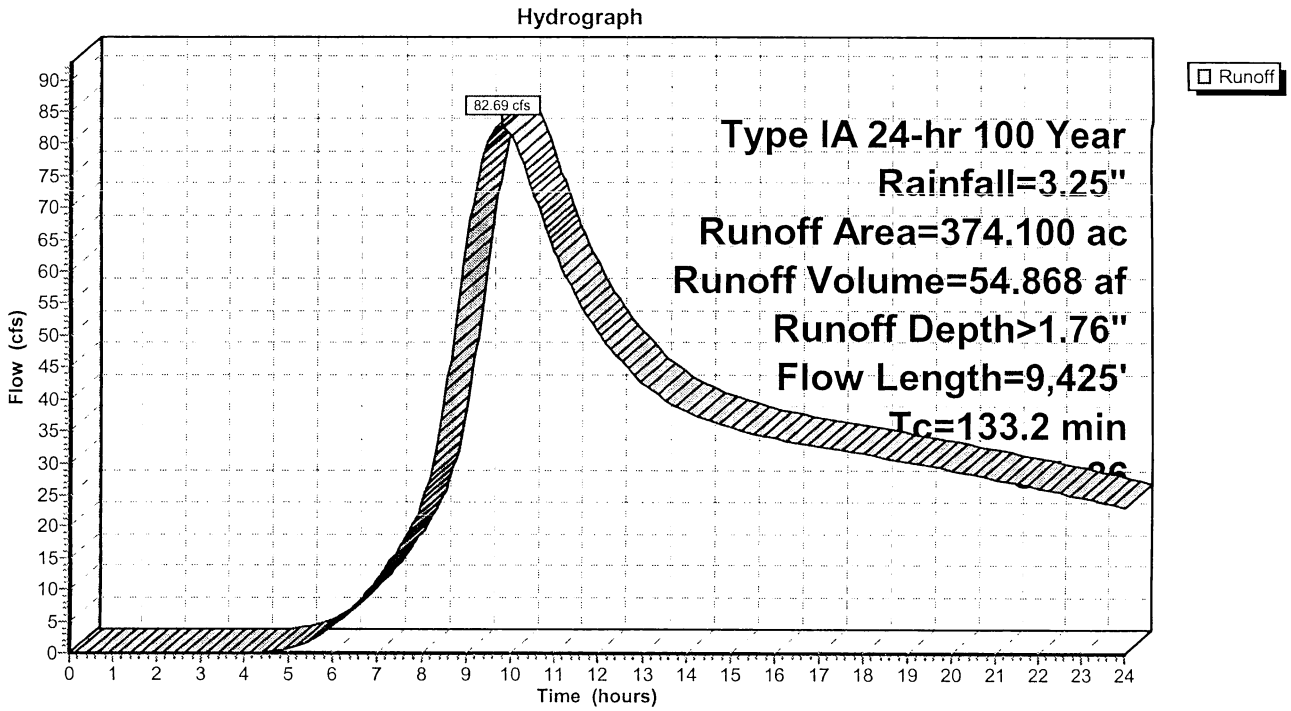
Runoff = 82.69 cfs @ 9.74 hrs, Volume= 54.868 af, Depth> 1.76"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
16.300	65	Desert shrub range, Poor, HSG A
357.800	87	Desert shrub range, Poor, HSG C
374.100	86	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



Summary for Subcatchment 13S: Water Ponds

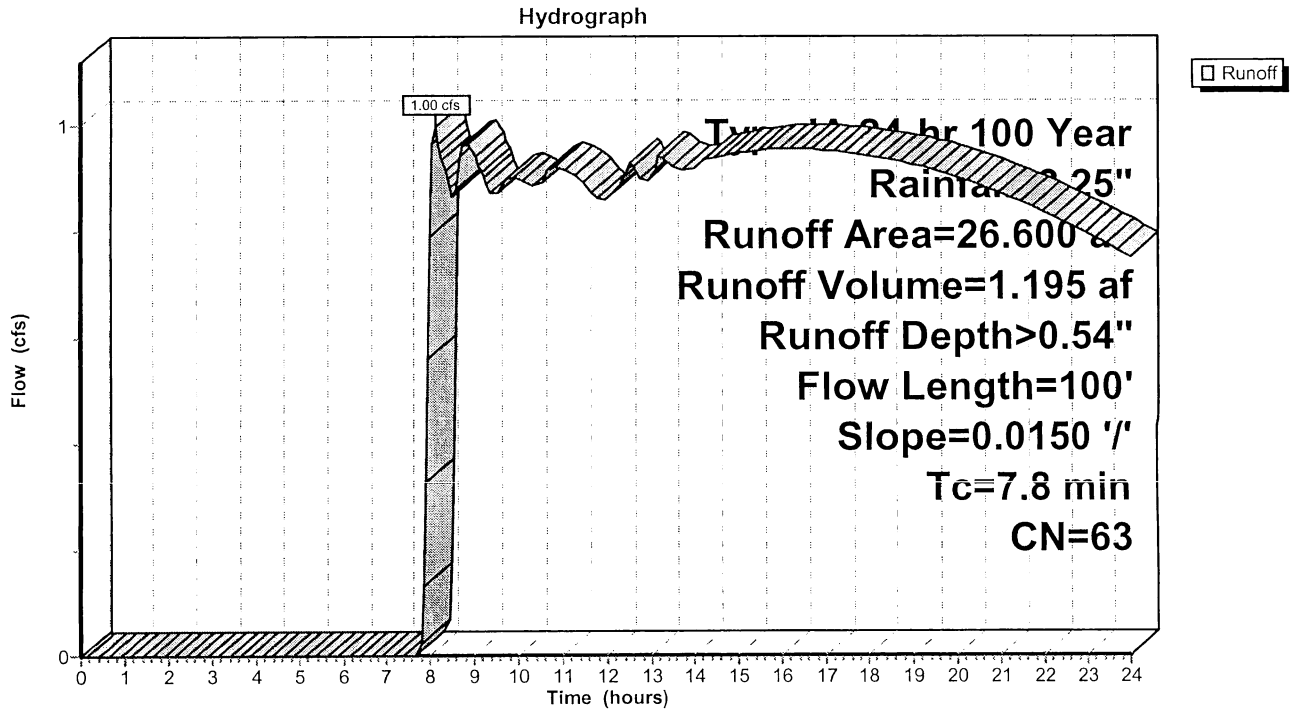
Runoff = 1.00 cfs @ 8.10 hrs, Volume= 1.195 af, Depth> 0.54"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
26.600	63	Desert shrub range, Poor, HSG A
26.600		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.8	100	0.0150	0.21		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"

Subcatchment 13S: Water Ponds



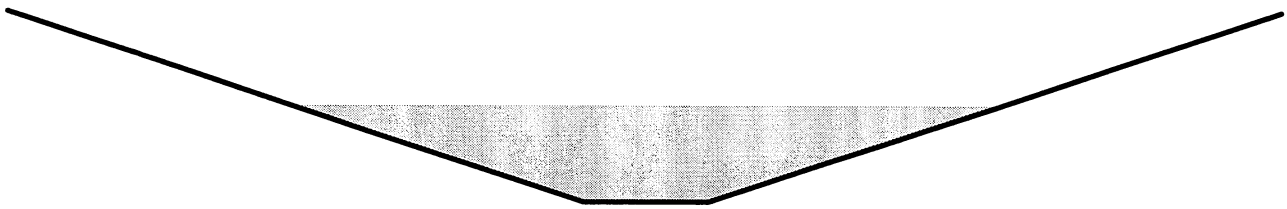
Summary for Reach 2R: SR 14 to RR

Inflow Area = 548.000 ac, 0.00% Impervious, Inflow Depth > 0.94" for 100 Year event
Inflow = 74.42 cfs @ 8.30 hrs, Volume= 43.110 af
Outflow = 59.56 cfs @ 9.03 hrs, Volume= 41.425 af, Atten= 20%, Lag= 43.8 min

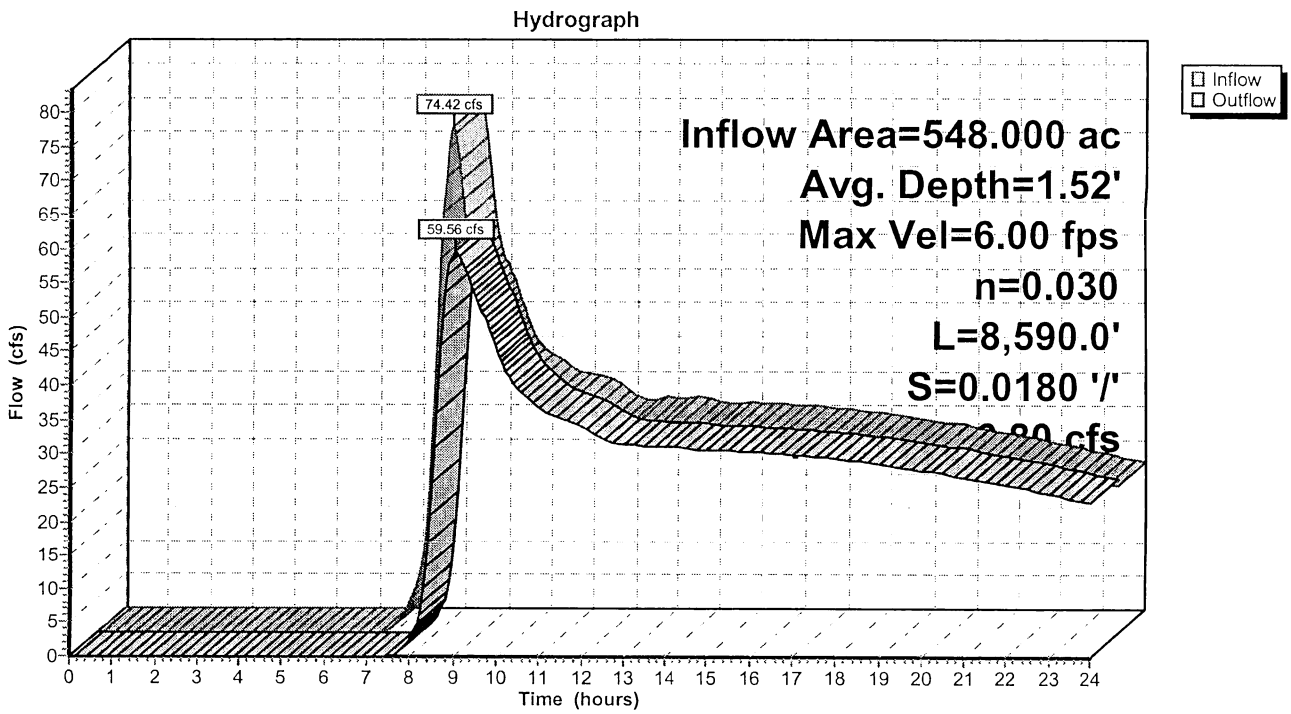
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.00 fps, Min. Travel Time= 23.9 min
Avg. Velocity = 4.83 fps, Avg. Travel Time= 29.6 min

Peak Storage= 85,311 cf @ 8.63 hrs, Average Depth at Peak Storage= 1.52'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 296.80 cfs

2.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 8,590.0' Slope= 0.0180 '/'
Inlet Invert= 2,326.75', Outlet Invert= 2,172.00'



Reach 2R: SR 14 to RR



Summary for Reach 5R: RR Crossing to POI 3

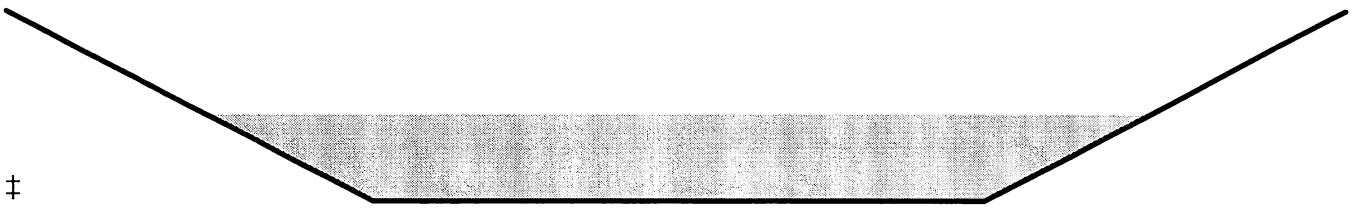
[61] Hint: Exceeded Reach 2R outlet invert by 0.91' @ 10.15 hrs

Inflow Area = 937.400 ac, 0.00% Impervious, Inflow Depth > 0.75" for 100 Year event
Inflow = 73.11 cfs @ 9.04 hrs, Volume= 58.579 af
Outflow = 56.17 cfs @ 11.04 hrs, Volume= 52.756 af, Atten= 23%, Lag= 119.7 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.83 fps, Min. Travel Time= 54.6 min
Avg. Velocity = 4.14 fps, Avg. Travel Time= 63.8 min

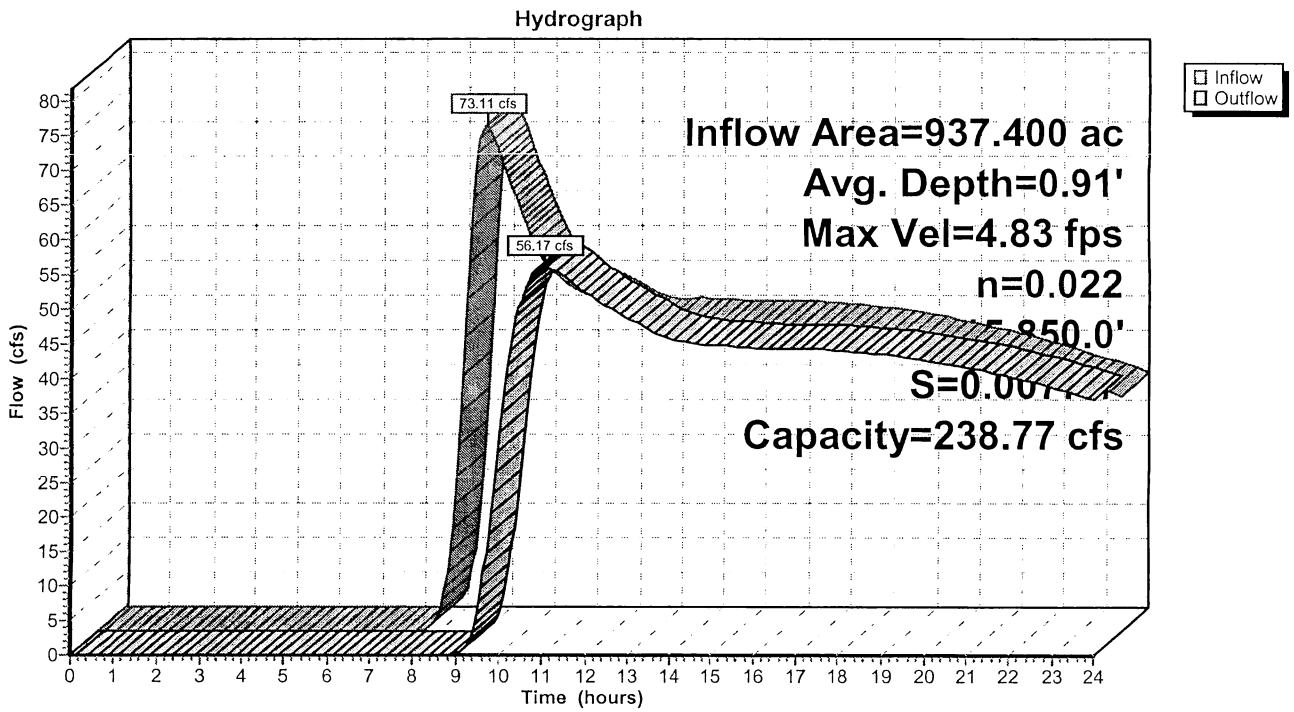
Peak Storage= 184,177 cf @ 10.13 hrs, Average Depth at Peak Storage= 0.91'
Bank-Full Depth= 2.00', Capacity at Bank-Full= 238.77 cfs

10.00' x 2.00' deep channel, n= 0.022
Side Slope Z-value= 3.0 '/' Top Width= 22.00'
Length= 15,850.0' Slope= 0.0077 '/'
Inlet Invert= 2,172.00', Outlet Invert= 2,050.00'



‡

Reach 5R: RR Crossing to POI 3



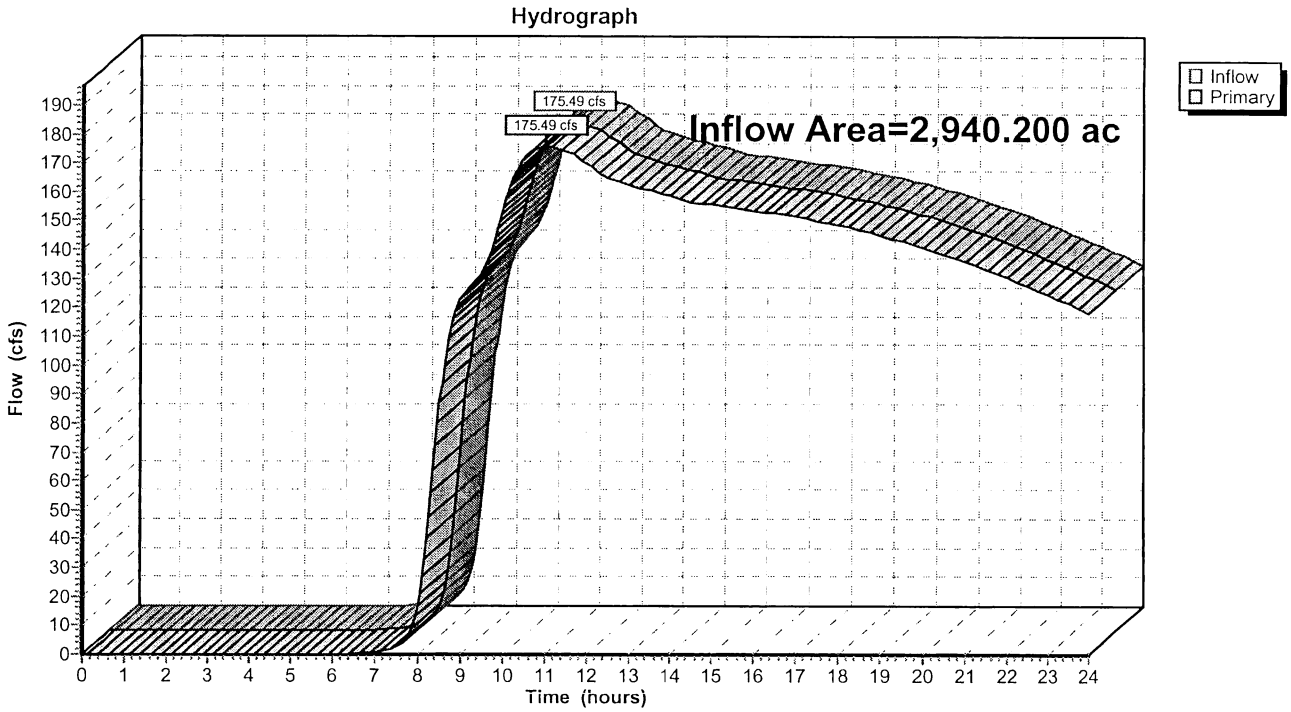
Summary for Pond 7P: POI 1 Combined Flow-Post Construction

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,940.200 ac, 0.00% Impervious, Inflow Depth > 0.78" for 100 Year event
Inflow = 175.49 cfs @ 11.01 hrs, Volume= 191.189 af
Primary = 175.49 cfs @ 11.01 hrs, Volume= 191.189 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 7P: POI 1 Combined Flow-Post Construction



Summary for Pond 11P: POI 2 Detention Area

Inflow Area =	374.100 ac,	0.00% Impervious,	Inflow Depth >	1.76"	for 100 Year event
Inflow =	82.69 cfs @	9.74 hrs,	Volume=	54.868 af	
Outflow =	44.76 cfs @	12.65 hrs,	Volume=	47.323 af,	Atten= 46%, Lag= 174.7 min
Discarded =	9.28 cfs @	12.65 hrs,	Volume=	11.450 af	
Primary =	35.47 cfs @	12.65 hrs,	Volume=	35.873 af	

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 2,051.92' @ 12.65 hrs Surf.Area= 46.021 ac Storage= 12.617 af

Plug-Flow detention time= 179.5 min calculated for 47.225 af (86% of inflow)
Center-of-Mass det. time= 103.2 min (956.3 - 853.0)

Volume	Invert	Avail.Storage	Storage Description
#1	2,051.50'	44.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

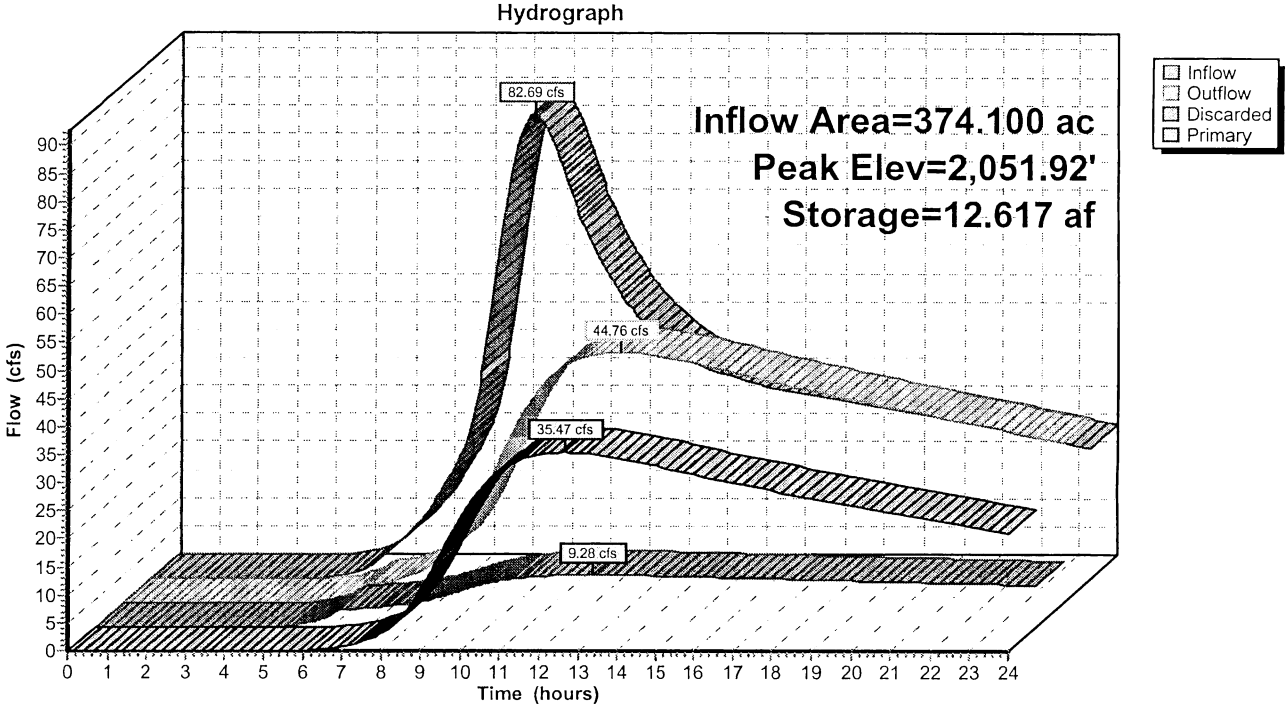
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
2,051.50	14.500	0.000	0.000
2,052.00	52.300	16.700	16.700
2,052.50	57.300	27.400	44.100

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,051.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	2,051.50'	**26.6 deg x 40.0' long Sharp-Crested Vee/Trap Weir** C= 2.63

Discarded OutFlow Max=9.28 cfs @ 12.65 hrs HW=2,051.92' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 9.28 cfs)

Primary OutFlow Max=35.47 cfs @ 12.65 hrs HW=2,051.92' (Free Discharge)
└**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 35.47 cfs @ 2.12 fps)

Pond 11P: POI 2 Detention Area



Summary for Pond 12P: POI 3

Removed 53.9 acres of Water Ponds

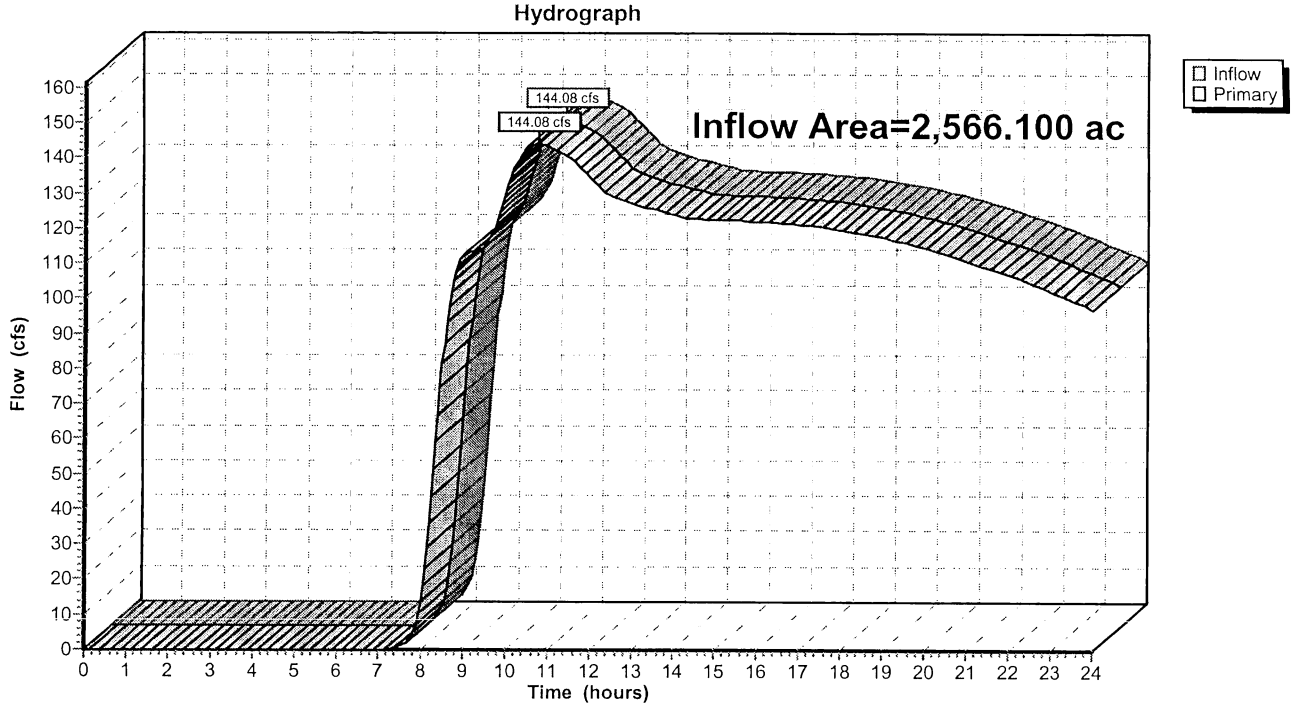
---

[40] Hint: Not Described (Outflow=Inflow)

Inflow Area = 2,566.100 ac, 0.00% Impervious, Inflow Depth > 0.73" for 100 Year event
Inflow = 144.08 cfs @ 10.75 hrs, Volume= 155.316 af
Primary = 144.08 cfs @ 10.75 hrs, Volume= 155.316 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Pond 12P: POI 3

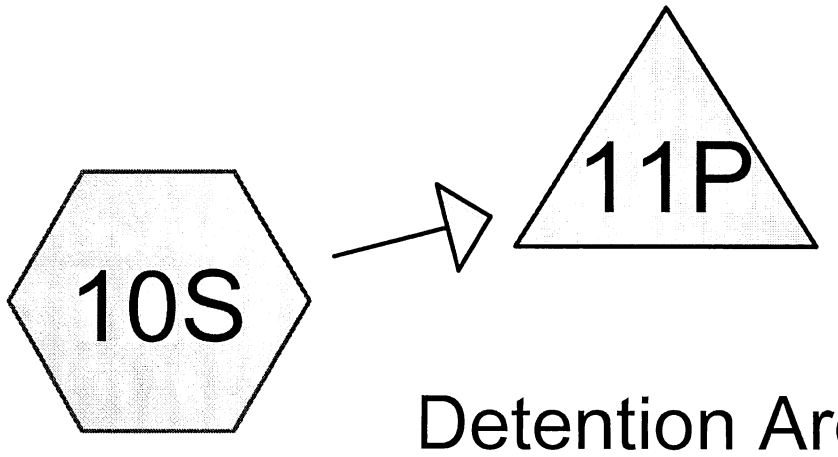


POST CONSTRUCTION

10 YR 5 DAY Q_{IN} = 20.4CFS, Q_{OUT} = 7.8CFS

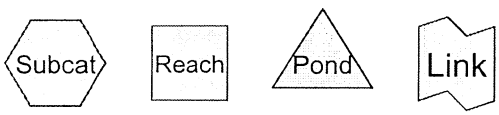
10 YR 24 HR Q_{IN} = 31.7CFS, Q_{OUT} = 12.5CFS

100 YR 24 HR Q_{IN} = 82.7CFS, Q_{OUT} = 35.5CFS



Detention Area

NORTH SECTION



Drainage Diagram for POST - North Detention Area
Prepared by Carlton Engineering, Inc, Printed 02/21/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
16.300	65	Desert shrub range, Poor, HSG A (10S)
357.800	87	Desert shrub range, Poor, HSG C (10S)
374.100		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
16.300	HSG A	10S
0.000	HSG B	
357.800	HSG C	10S
0.000	HSG D	
0.000	Other	
374.100		**TOTAL AREA**

Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth=1.32"
Flow Length=9,425' Tc=133.2 min CN=86 Runoff=20.39 cfs 41.069 af

Pond 11P: Detention Area Peak Elev=2,051.65' Storage=3.091 af Inflow=20.39 cfs 41.069 af
Discarded=5.25 cfs 28.147 af Primary=7.84 cfs 12.922 af Outflow=13.09 cfs 41.069 af

Total Runoff Area = 374.100 ac Runoff Volume = 41.069 af Average Runoff Depth = 1.32"
100.00% Pervious = 374.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 10S: NORTH SECTION

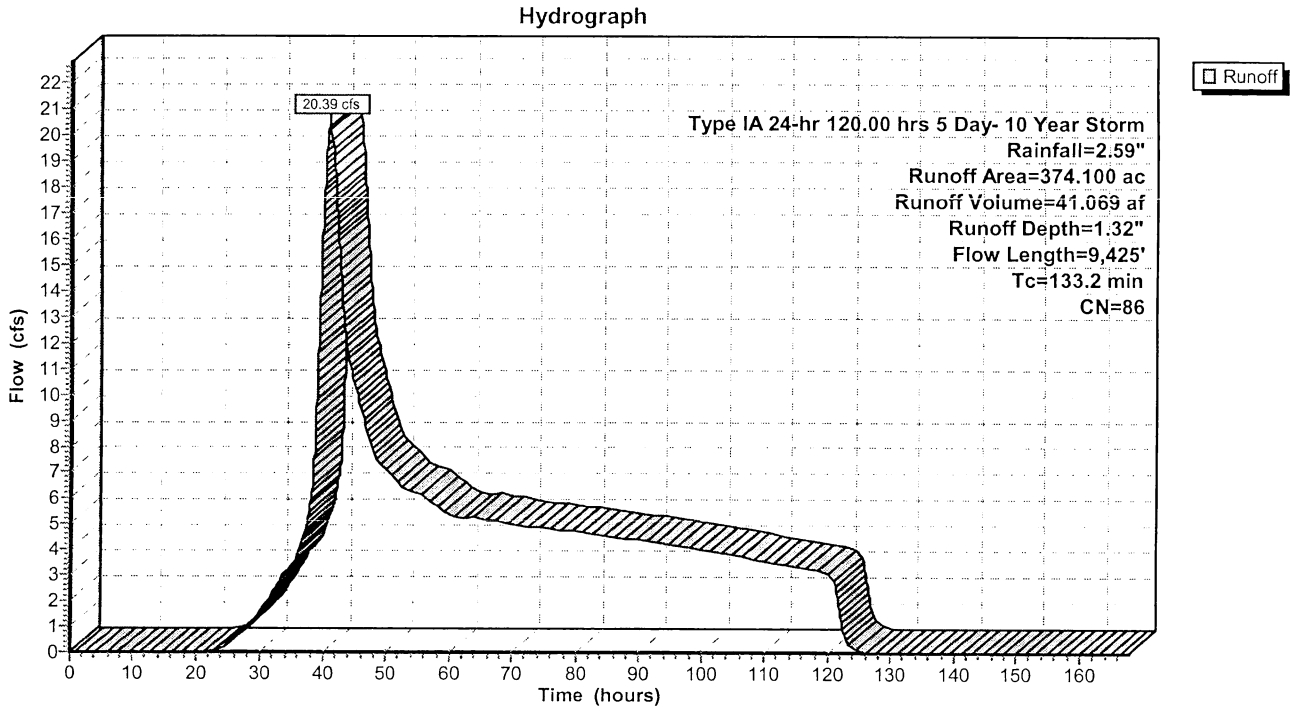
Runoff = 20.39 cfs @ 40.99 hrs, Volume= 41.069 af, Depth= 1.32"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type IA 24-hr 120.00 hrs 5 Day- 10 Year Storm Rainfall=2.59"

Area (ac)	CN	Description
16.300	65	Desert shrub range, Poor, HSG A
357.800	87	Desert shrub range, Poor, HSG C
374.100	86	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



Summary for Pond 11P: Detention Area

Inflow Area =	374.100 ac,	0.00% Impervious,	Inflow Depth =	1.32"	for 5 Day- 10 Year Storm event
Inflow =	20.39 cfs @	40.99 hrs,	Volume=	41.069 af	
Outflow =	13.09 cfs @	43.14 hrs,	Volume=	41.069 af,	Atten= 36%, Lag= 128.7 min
Discarded =	5.25 cfs @	43.14 hrs,	Volume=	28.147 af	
Primary =	7.84 cfs @	43.14 hrs,	Volume=	12.922 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 2,051.65' @ 43.14 hrs Surf.Area= 26.030 ac Storage= 3.091 af

Plug-Flow detention time= 115.3 min calculated for 41.069 af (100% of inflow)
Center-of-Mass det. time= 115.2 min (4,201.9 - 4,086.7)

Volume	Invert	Avail.Storage	Storage Description
#1	2,051.50'	44.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

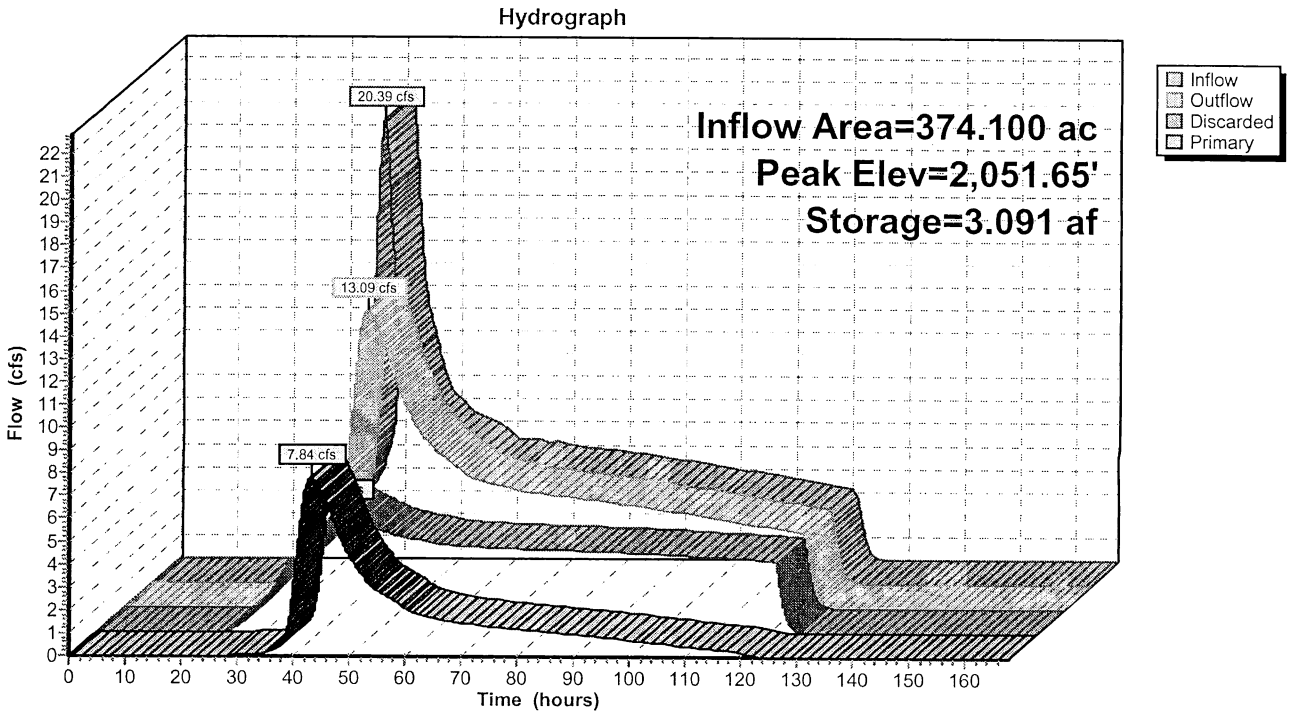
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
2,051.50	14.500	0.000	0.000
2,052.00	52.300	16.700	16.700
2,052.50	57.300	27.400	44.100

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,051.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	2,051.50'	**26.6 deg x 40.0' long Sharp-Crested Vee/Trap Weir** C= 2.63

Discarded OutFlow Max=5.25 cfs @ 43.14 hrs HW=2,051.65' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 5.25 cfs)

Primary OutFlow Max=7.84 cfs @ 43.14 hrs HW=2,051.65' (Free Discharge)
└**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 7.84 cfs @ 1.28 fps)

Pond 11P: Detention Area



Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth=0.83"
Flow Length=9,425' Tc=133.2 min CN=86 Runoff=31.73 cfs 25.762 af

Pond 11P: Detention Area Peak Elev=2,051.71' Storage=4.670 af Inflow=31.73 cfs 25.762 af
Discarded=6.10 cfs 10.275 af Primary=12.54 cfs 15.486 af Outflow=18.65 cfs 25.762 af

Total Runoff Area = 374.100 ac Runoff Volume = 25.762 af Average Runoff Depth = 0.83"
100.00% Pervious = 374.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 10S: NORTH SECTION

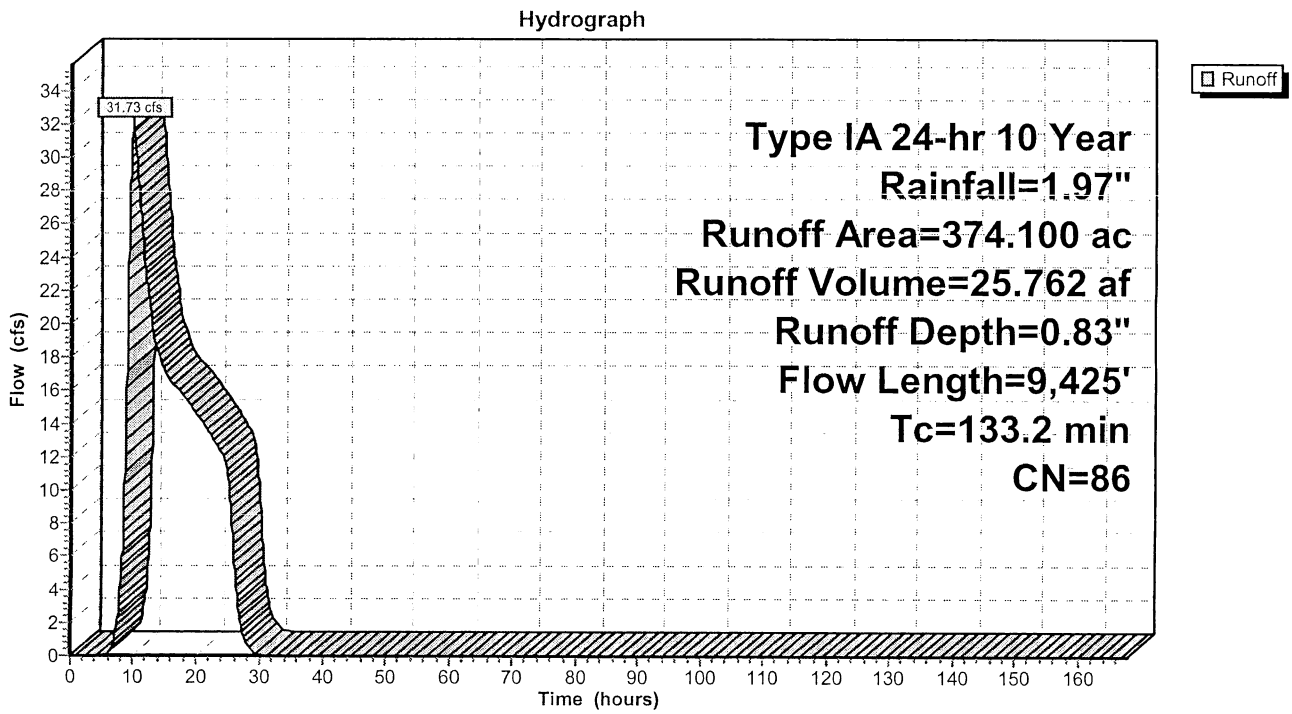
Runoff = 31.73 cfs @ 9.91 hrs, Volume= 25.762 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
16.300	65	Desert shrub range, Poor, HSG A
357.800	87	Desert shrub range, Poor, HSG C
374.100	86	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



Summary for Pond 11P: Detention Area

Inflow Area =	374.100 ac,	0.00% Impervious,	Inflow Depth =	0.83"	for 10 Year event	
Inflow =	31.73 cfs @	9.91 hrs,	Volume=	25.762 af		
Outflow =	18.65 cfs @	13.46 hrs,	Volume=	25.762 af,	Atten= 41%,	Lag= 213.3 min
Discarded =	6.10 cfs @	13.46 hrs,	Volume=	10.275 af		
Primary =	12.54 cfs @	13.46 hrs,	Volume=	15.486 af		

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 2,051.71' @ 13.46 hrs Surf.Area= 30.272 ac Storage= 4.670 af

Plug-Flow detention time= 169.6 min calculated for 25.754 af (100% of inflow)
Center-of-Mass det. time= 169.6 min (1,115.0 - 945.3)

Volume	Invert	Avail.Storage	Storage Description
#1	2,051.50'	44.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

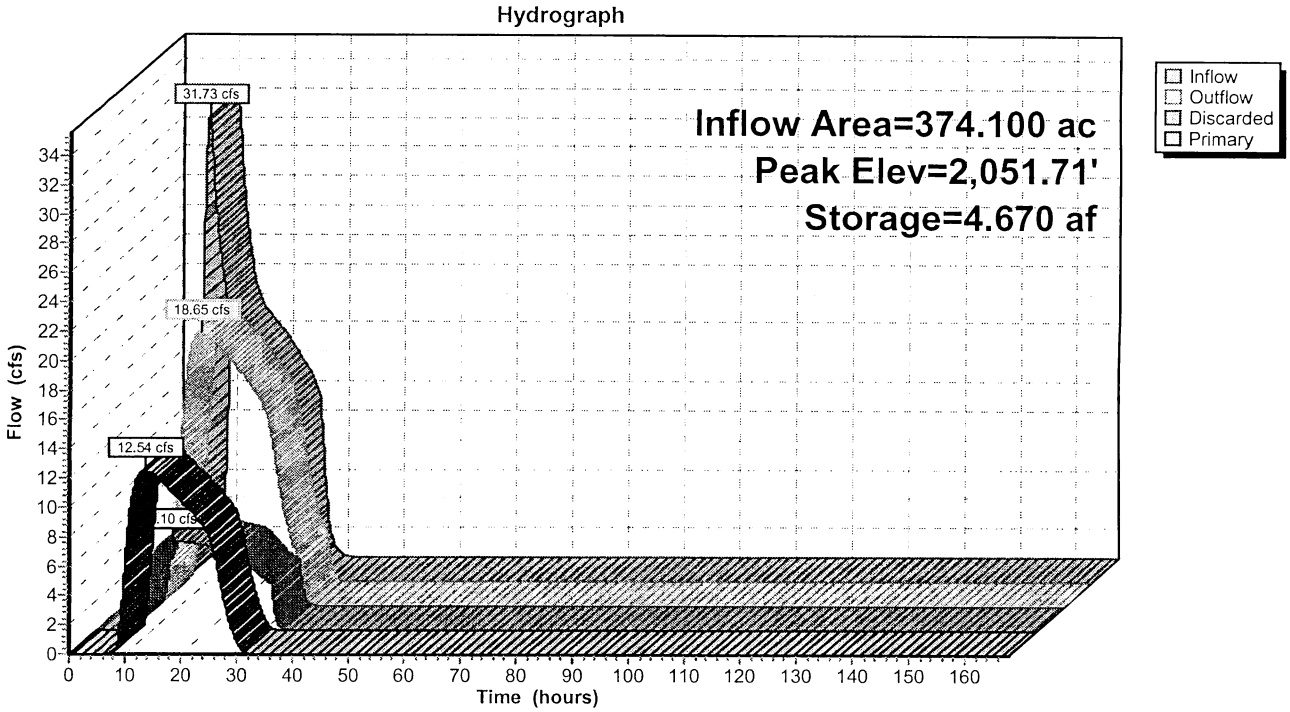
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
2,051.50	14.500	0.000	0.000
2,052.00	52.300	16.700	16.700
2,052.50	57.300	27.400	44.100

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,051.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	2,051.50'	**26.6 deg x 40.0' long Sharp-Crested Vee/Trap Weir** C= 2.63

Discarded OutFlow Max=6.10 cfs @ 13.46 hrs HW=2,051.71' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 6.10 cfs)

Primary OutFlow Max=12.54 cfs @ 13.46 hrs HW=2,051.71' (Free Discharge)
└**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 12.54 cfs @ 1.50 fps)

Pond 11P: Detention Area



Time span=0.00-168.00 hrs, dt=0.05 hrs, 3361 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 10S: NORTH SECTION Runoff Area=374.100 ac 0.00% Impervious Runoff Depth=1.88"
Flow Length=9,425' Tc=133.2 min CN=86 Runoff=82.69 cfs 58.567 af

Pond 11P: Detention Area Peak Elev=2,051.92' Storage=12.617 af Inflow=82.69 cfs 58.567 af
Discarded=9.28 cfs 15.758 af Primary=35.47 cfs 42.808 af Outflow=44.76 cfs 58.567 af

Total Runoff Area = 374.100 ac Runoff Volume = 58.567 af Average Runoff Depth = 1.88"
100.00% Pervious = 374.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 10S: NORTH SECTION

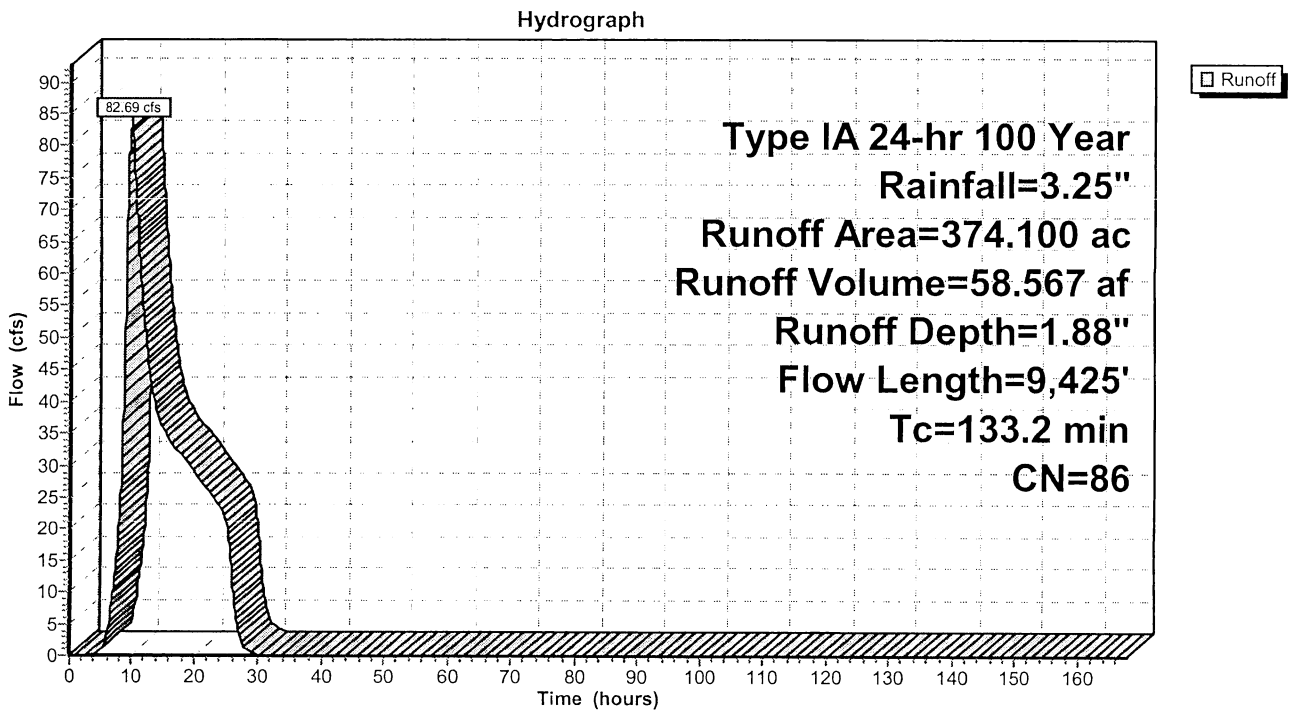
Runoff = 82.69 cfs @ 9.74 hrs, Volume= 58.567 af, Depth= 1.88"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
16.300	65	Desert shrub range, Poor, HSG A
357.800	87	Desert shrub range, Poor, HSG C
374.100	86	Weighted Average
374.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
86.7	725	0.0060	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
24.2	5,300	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
14.2	3,100	0.0050	3.64	43.74	**Channel Flow,** Area= 12.0 sf Perim= 18.0' r= 0.67' n= 0.022
133.2	9,425	Total			

Subcatchment 10S: NORTH SECTION



Summary for Pond 11P: Detention Area

Inflow Area =	374.100 ac,	0.00% Impervious,	Inflow Depth =	1.88"	for 100 Year event
Inflow =	82.69 cfs @	9.74 hrs,	Volume=	58.567 af	
Outflow =	44.76 cfs @	12.65 hrs,	Volume=	58.567 af,	Atten= 46%, Lag= 174.7 min
Discarded =	9.28 cfs @	12.65 hrs,	Volume=	15.758 af	
Primary =	35.47 cfs @	12.65 hrs,	Volume=	42.808 af	

Routing by Stor-Ind method, Time Span= 0.00-168.00 hrs, dt= 0.05 hrs
Peak Elev= 2,051.92' @ 12.65 hrs Surf.Area= 46.021 ac Storage= 12.617 af

Plug-Flow detention time= 192.1 min calculated for 58.549 af (100% of inflow)
Center-of-Mass det. time= 192.1 min (1,087.0 - 894.9)

Volume	Invert	Avail.Storage	Storage Description
#1	2,051.50'	44.100 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

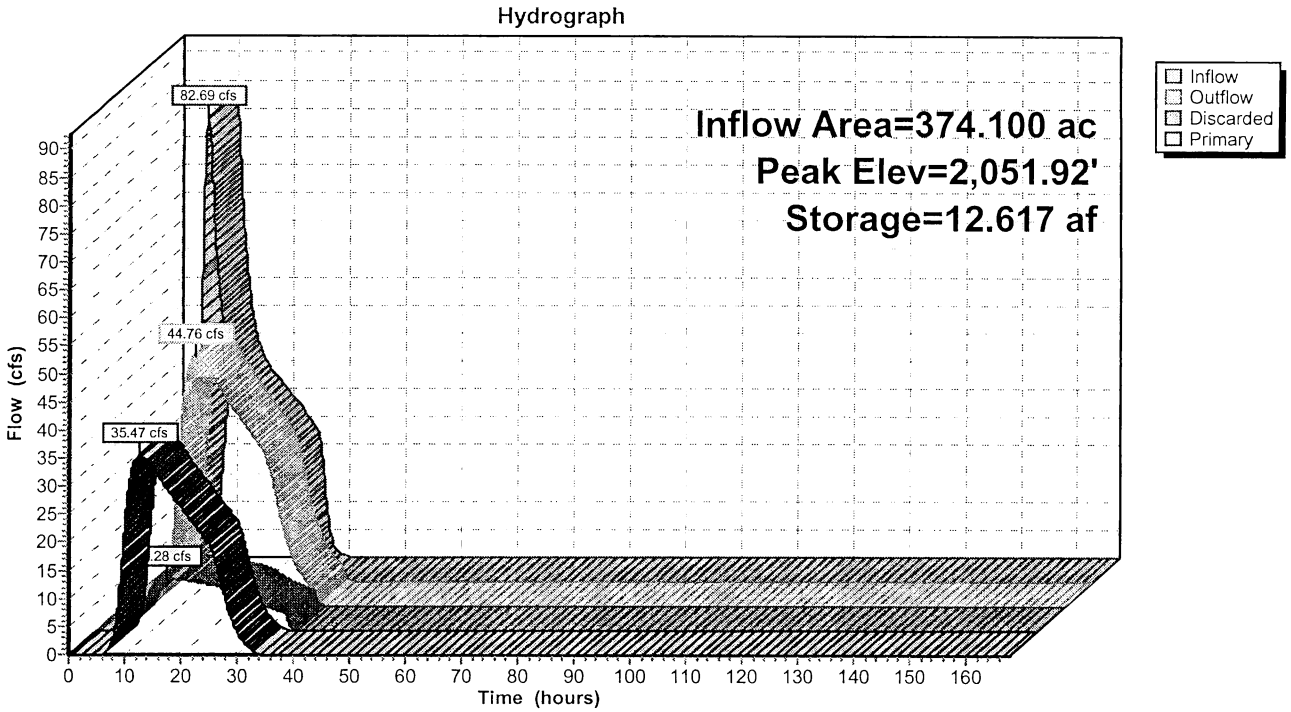
Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
2,051.50	14.500	0.000	0.000
2,052.00	52.300	16.700	16.700
2,052.50	57.300	27.400	44.100

Device	Routing	Invert	Outlet Devices
#1	Discarded	2,051.50'	**0.200 in/hr Exfiltration over Surface area**
#2	Primary	2,051.50'	**26.6 deg x 40.0' long Sharp-Crested Vee/Trap Weir** C= 2.63

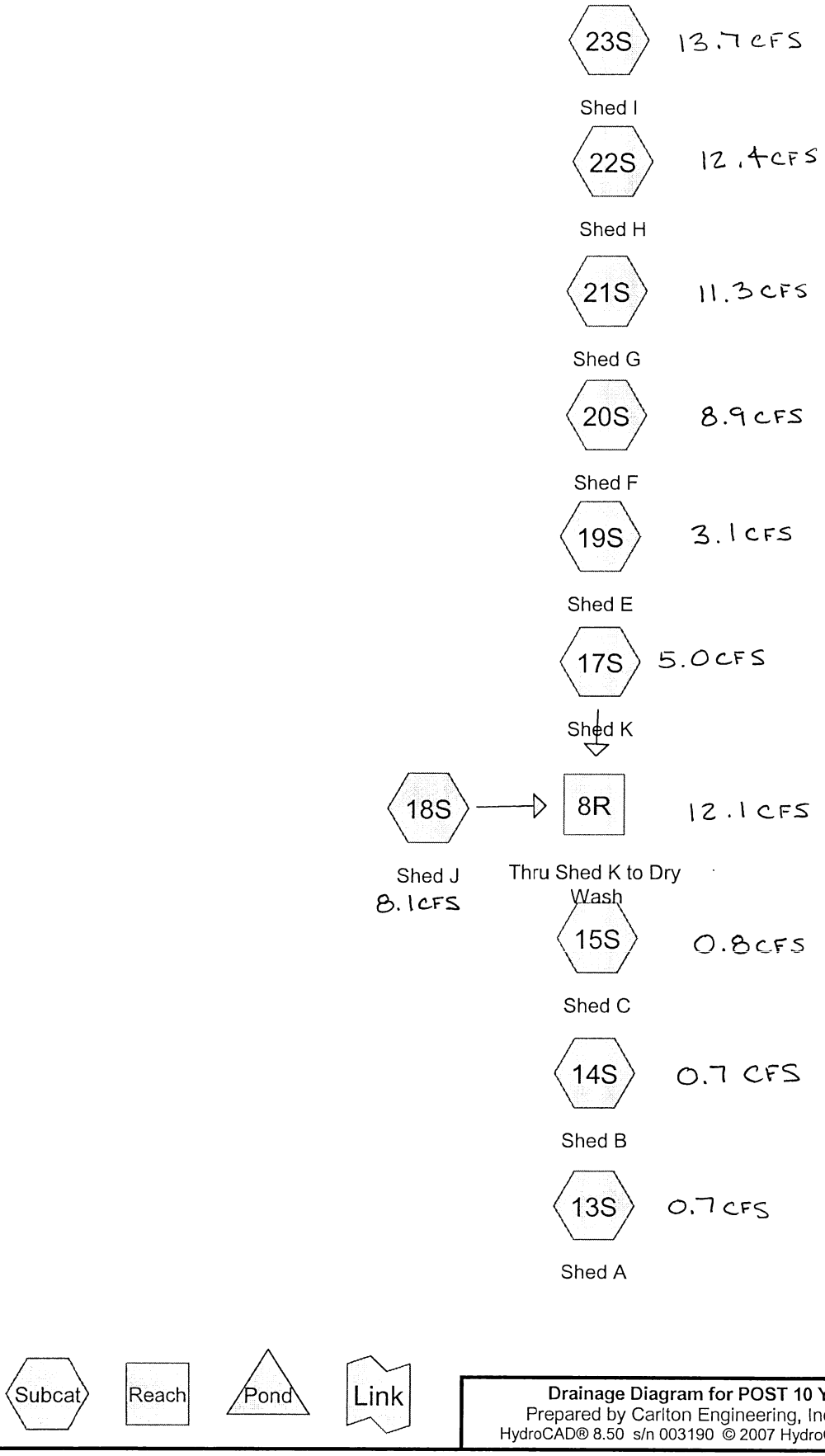
Discarded OutFlow Max=9.28 cfs @ 12.65 hrs HW=2,051.92' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 9.28 cfs)

Primary OutFlow Max=35.47 cfs @ 12.65 hrs HW=2,051.92' (Free Discharge)
└**2=Sharp-Crested Vee/Trap Weir** (Weir Controls 35.47 cfs @ 2.12 fps)

Pond 11P: Detention Area



RATIONAL METHOD POST CONSTRUCTION 10YR



Drainage Diagram for POST 10 Yr Rational Method
Prepared by Carlton Engineering, Inc, Printed 01/23/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	C	Description (subcatchment-numbers)
493.100	0.01	(13S,14S,15S)
115.100	0.07	(19S)
111.600	0.10	(17S)
121.100	0.18	(20S)
119.900	0.25	(21S)
60.000	0.30	(18S)
128.100	0.36	(22S)
126.200	0.39	(23S)
1,275.100		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
1,275.100	Other	13S, 14S, 15S, 17S, 18S, 19S, 20S, 21S, 22S, 23S
1,275.100		**TOTAL AREA**

Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 13S: Shed A Runoff Area=155.100 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=7,725' Tc=101.1 min C=0.01 Runoff=0.69 cfs 0.095 af

Subcatchment 14S: Shed B Runoff Area=168.800 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=8,625' Tc=101.6 min C=0.01 Runoff=0.74 cfs 0.103 af

Subcatchment 15S: Shed C Runoff Area=169.200 ac 0.00% Impervious Runoff Depth=0.01"
Flow Length=8,625' Tc=93.4 min C=0.01 Runoff=0.76 cfs 0.105 af

Subcatchment 17S: Shed K Runoff Area=111.600 ac 0.00% Impervious Runoff Depth=0.07"
Flow Length=5,800' Tc=84.6 min C=0.10 Runoff=5.01 cfs 0.690 af

Subcatchment 18S: Shed J Runoff Area=60.000 ac 0.00% Impervious Runoff Depth=0.22"
Flow Length=6,740' Tc=26.7 min C=0.30 Runoff=8.08 cfs 1.113 af

Subcatchment 19S: Shed E Runoff Area=115.100 ac 0.00% Impervious Runoff Depth=0.05"
Flow Length=5,800' Tc=115.2 min C=0.07 Runoff=3.13 cfs 0.432 af

Subcatchment 20S: Shed F Runoff Area=121.100 ac 0.00% Impervious Runoff Depth=0.12"
Flow Length=4,830' Tc=109.4 min C=0.18 Runoff=8.93 cfs 1.232 af

Subcatchment 21S: Shed G Runoff Area=119.900 ac 0.00% Impervious Runoff Depth=0.16"
Flow Length=6,230' Tc=118.4 min C=0.25 Runoff=11.34 cfs 1.565 af

Subcatchment 22S: Shed H Runoff Area=128.100 ac 0.00% Impervious Runoff Depth=0.16"
Flow Length=6,230' Tc=166.3 min C=0.36 Runoff=12.42 cfs 1.714 af

Subcatchment 23S: Shed I Runoff Area=126.200 ac 0.00% Impervious Runoff Depth=0.18"
Flow Length=6,225' Tc=161.4 min C=0.39 Runoff=13.66 cfs 1.885 af

Reach 8R: Thru Shed K to Dry Wash Avg. Depth=0.40' Max Vel=2.50 fps Inflow=13.08 cfs 1.802 af
n=0.022 L=4,770.0' S=0.0057 '/' Capacity=62.74 cfs Outflow=12.14 cfs 1.763 af

Total Runoff Area = 1,275.100 ac Runoff Volume = 8.932 af Average Runoff Depth = 0.08"
100.00% Pervious = 1,275.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 13S: Shed A

[48] Hint: Peak<CiA due to short duration

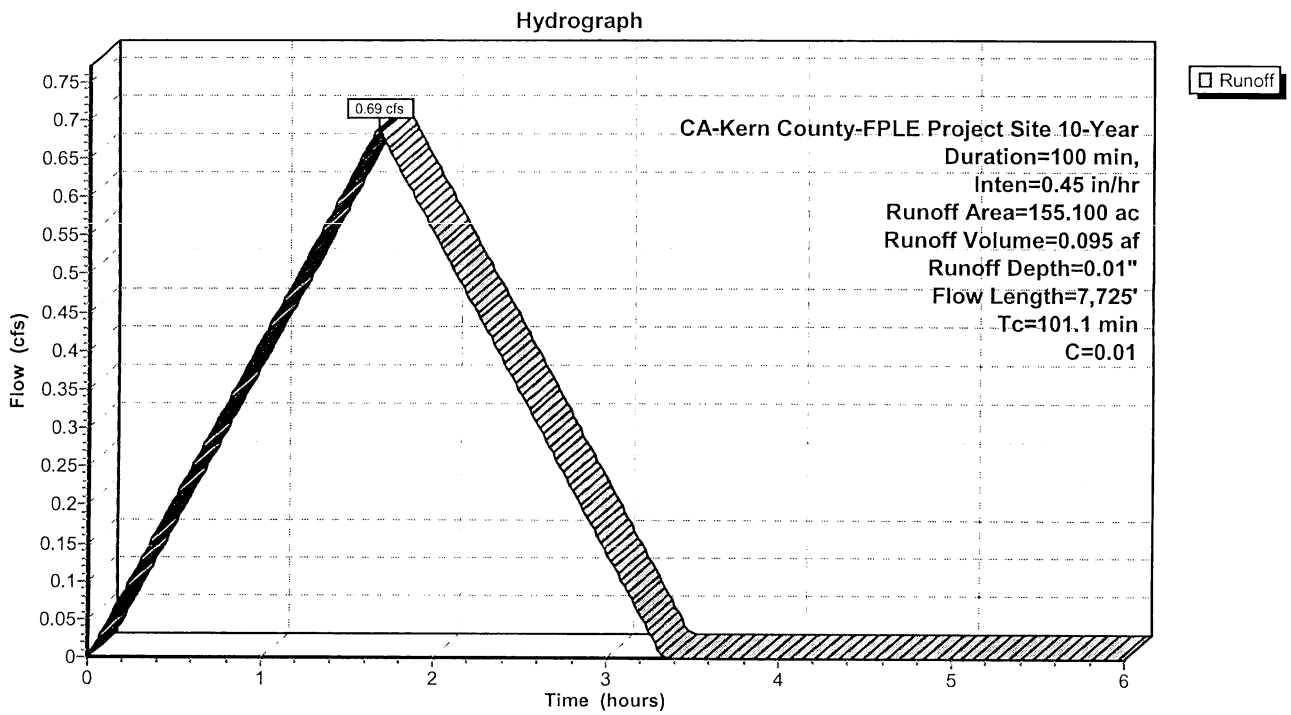
Runoff = 0.69 cfs @ 1.67 hrs, Volume= 0.095 af, Depth= 0.01"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
155.100	0.01	
155.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	300	0.0120	0.82		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
61.3	725	0.0120	0.20		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
33.7	6,700	0.0050	3.31	33.44	**Channel Flow,** Area= 10.1 sf Perim= 17.5' r= 0.58' n= 0.022 Earth, clean & straight
101.1	7,725	Total			

Subcatchment 13S: Shed A



Summary for Subcatchment 14S: Shed B

[48] Hint: Peak<CiA due to short duration

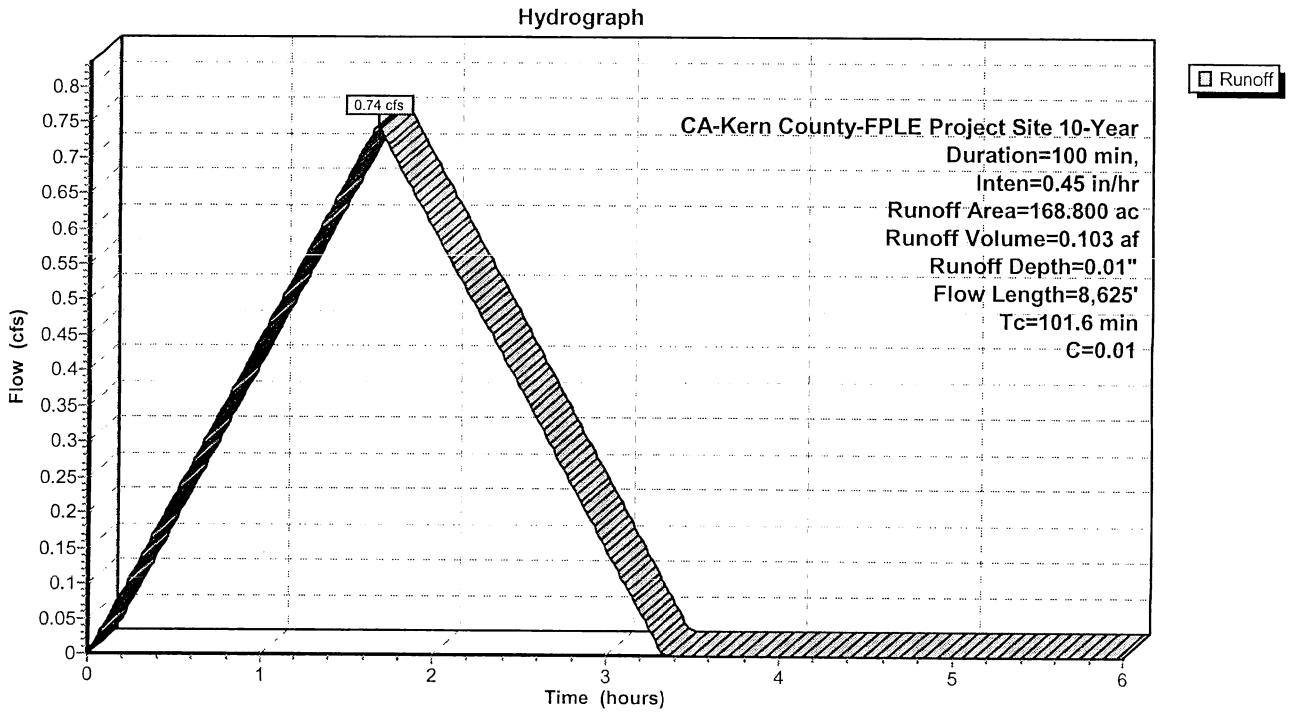
Runoff = 0.74 cfs @ 1.67 hrs, Volume= 0.103 af, Depth= 0.01"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
168.800	0.01	
168.800		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	300	0.0120	0.82		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
61.3	725	0.0120	0.20		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
34.2	7,600	0.0050	3.70	48.49	**Channel Flow,** Area= 13.1 sf Perim= 19.2' r= 0.68' n= 0.022
101.6	8,625	Total			

Subcatchment 14S: Shed B



Summary for Subcatchment 15S: Shed C

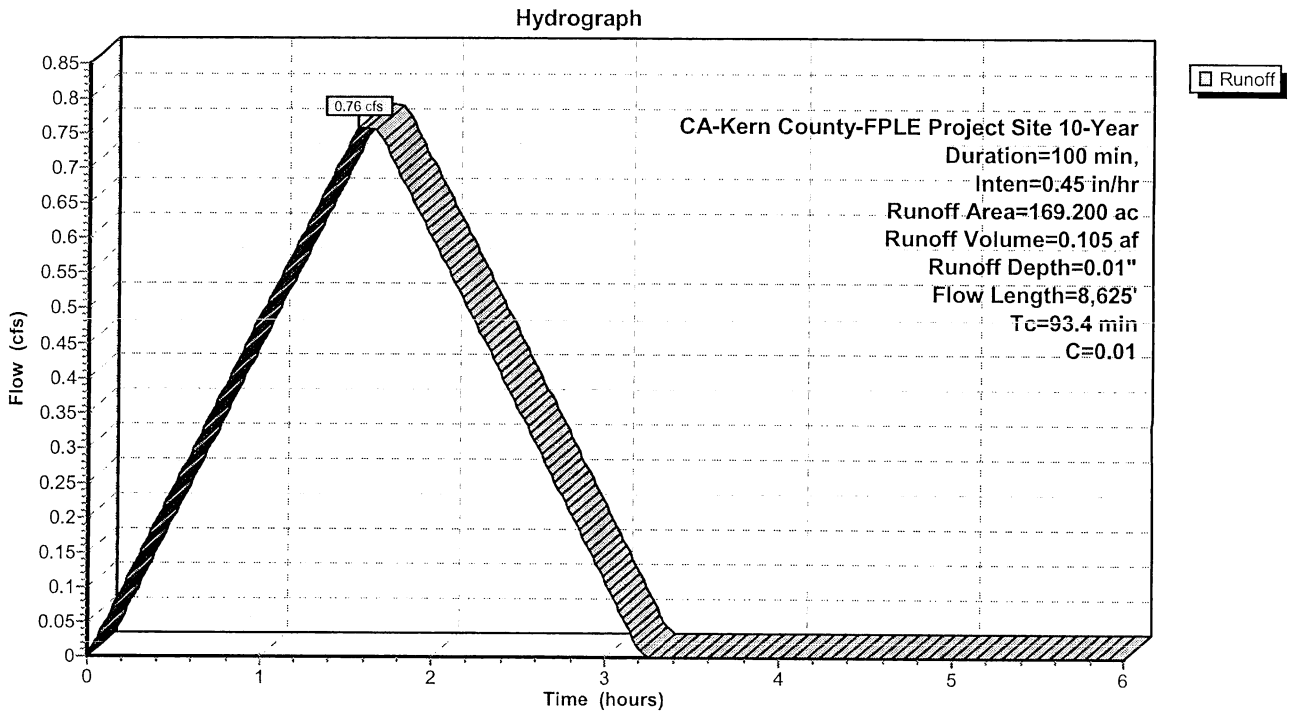
Runoff = 0.76 cfs @ 1.56 hrs, Volume= 0.105 af, Depth= 0.01"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
169.200	0.01	
169.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
53.7	725	0.0140	0.22		**Shallow Concentrated Flow, Unpaved** Kv= 1.9 fps
34.0	7,600	0.0050	3.73	49.56	**Channel Flow,** Area= 13.3 sf Perim= 19.3' r= 0.69' n= 0.022
93.4	8,625	Total			

Subcatchment 15S: Shed C



Summary for Subcatchment 17S: Shed K

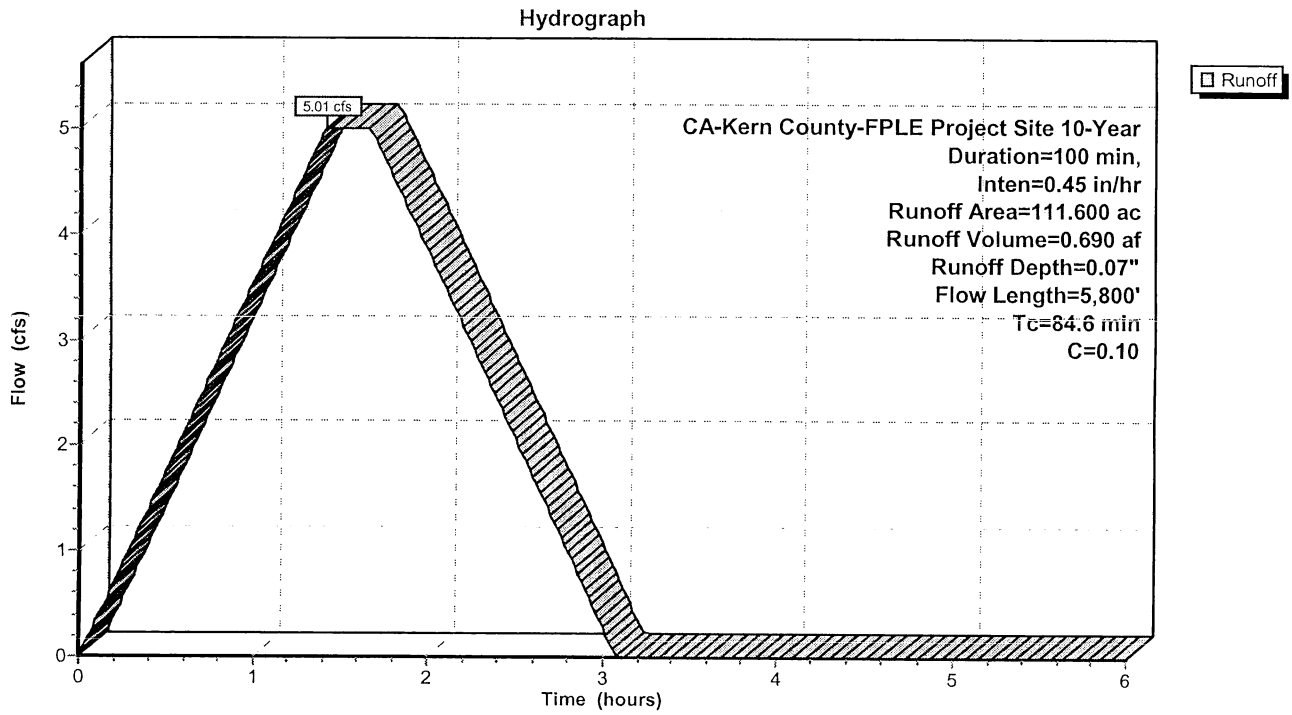
Runoff = 5.01 cfs @ 1.41 hrs, Volume= 0.690 af, Depth= 0.07"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
111.600	0.10	
111.600		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
57.1	730	0.0140	0.21		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
21.8	4,770	0.0050	3.64	36.45	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.022
84.6	5,800	Total			

Subcatchment 17S: Shed K



Summary for Subcatchment 18S: Shed J

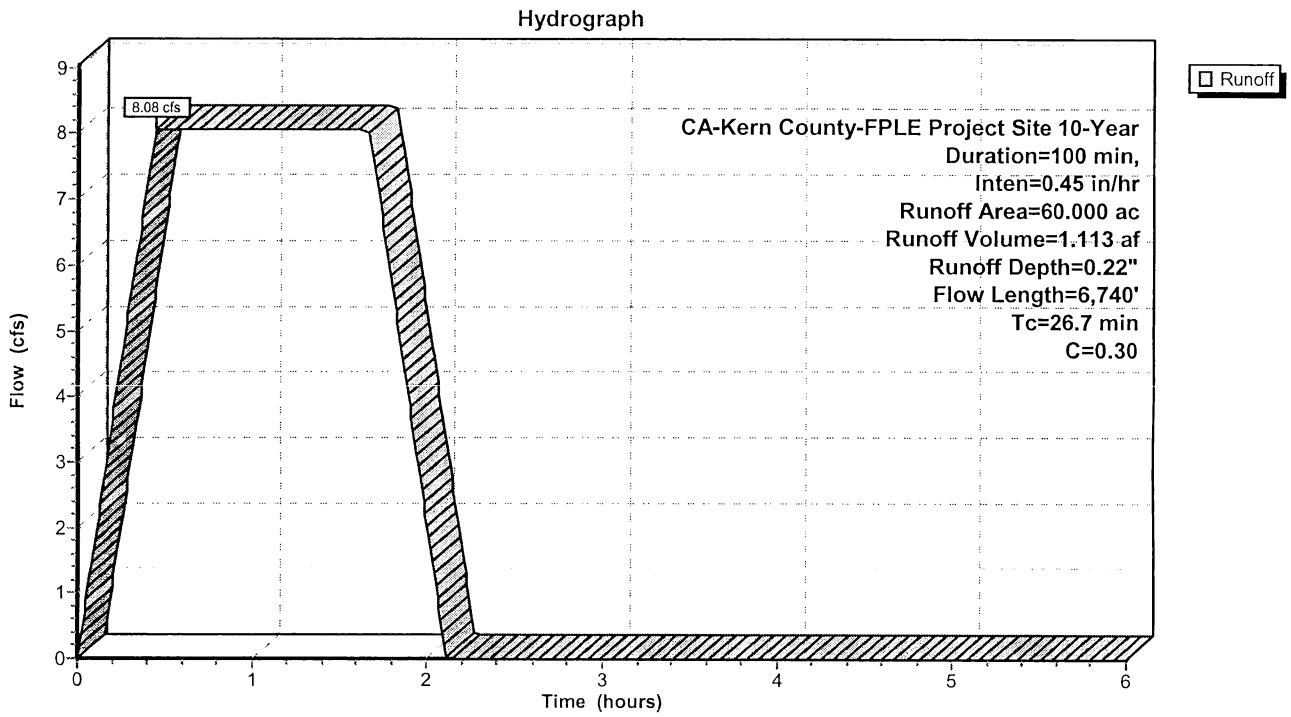
Runoff = 8.08 cfs @ 0.45 hrs, Volume= 1.113 af, Depth= 0.22"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
60.000	0.30	
60.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	100	0.0100	0.61		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
24.0	6,640	0.0080	4.61	46.10	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.022
26.7	6,740	Total			

Subcatchment 18S: Shed J



Summary for Subcatchment 19S: Shed E

[48] Hint: Peak<CiA due to short duration

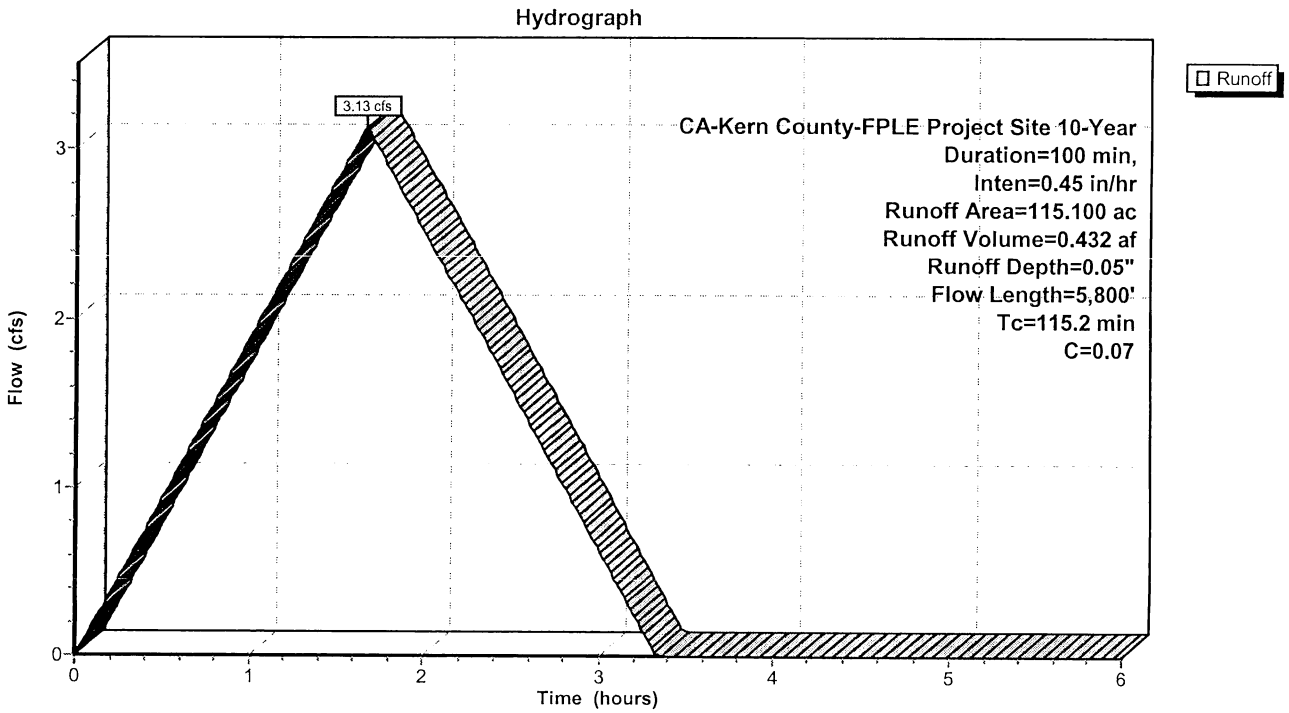
Runoff = 3.13 cfs @ 1.67 hrs, Volume= 0.432 af, Depth= 0.05"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
115.100	0.07	
115.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	300	0.0090	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
85.5	730	0.0090	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.5 fps
22.9	4,770	0.0050	3.48	39.28	**Channel Flow,** Area= 11.3 sf Perim= 18.2' r= 0.62' n= 0.022
115.2	5,800	Total			

Subcatchment 19S: Shed E



Summary for Subcatchment 20S: Shed F

[48] Hint: Peak<CiA due to short duration

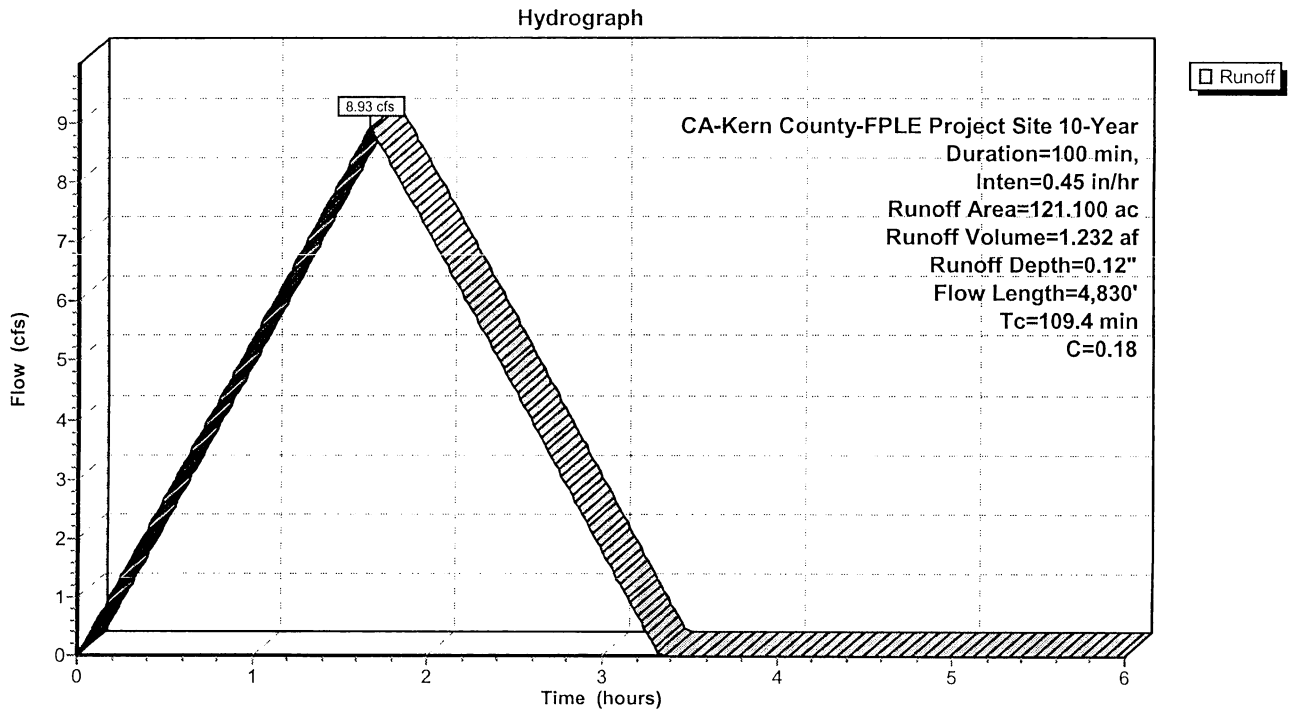
Runoff = 8.93 cfs @ 1.67 hrs, Volume= 1.232 af, Depth= 0.12"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
121.100	0.18	
121.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	300	0.0090	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
85.5	730	0.0090	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.5 fps
17.1	3,800	0.0050	3.71	48.94	**Channel Flow,** Area= 13.2 sf Perim= 19.3' r= 0.68' n= 0.022
109.4	4,830	Total			

Subcatchment 20S: Shed F



Summary for Subcatchment 21S: Shed G

[48] Hint: Peak<CiA due to short duration

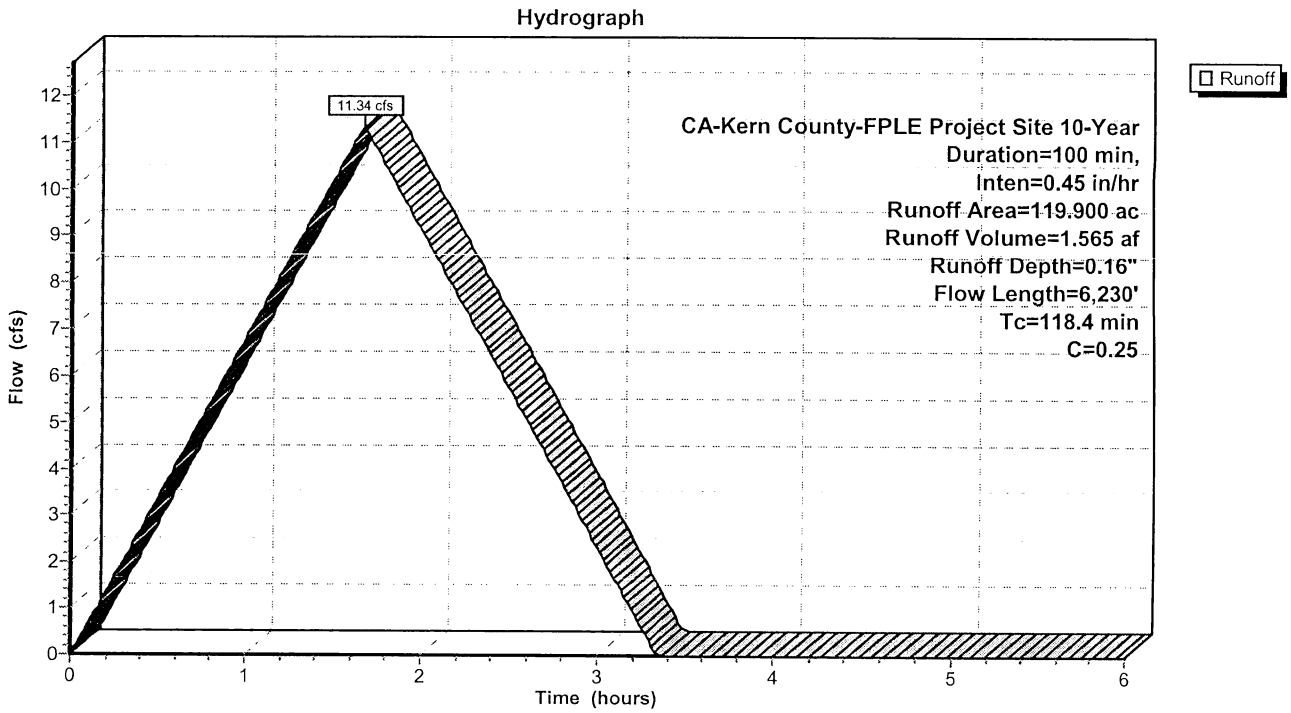
Runoff = 11.34 cfs @ 1.67 hrs, Volume= 1.565 af, Depth= 0.16"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
119.900	0.25	
119.900		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	300	0.0090	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
85.5	730	0.0090	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.5 fps
26.1	5,200	0.0050	3.32	33.86	**Channel Flow,** Area= 10.2 sf Perim= 17.6' r= 0.58' n= 0.022
118.4	6,230	Total			

Subcatchment 21S: Shed G



Summary for Subcatchment 22S: Shed H

[48] Hint: Peak<CiA due to short duration

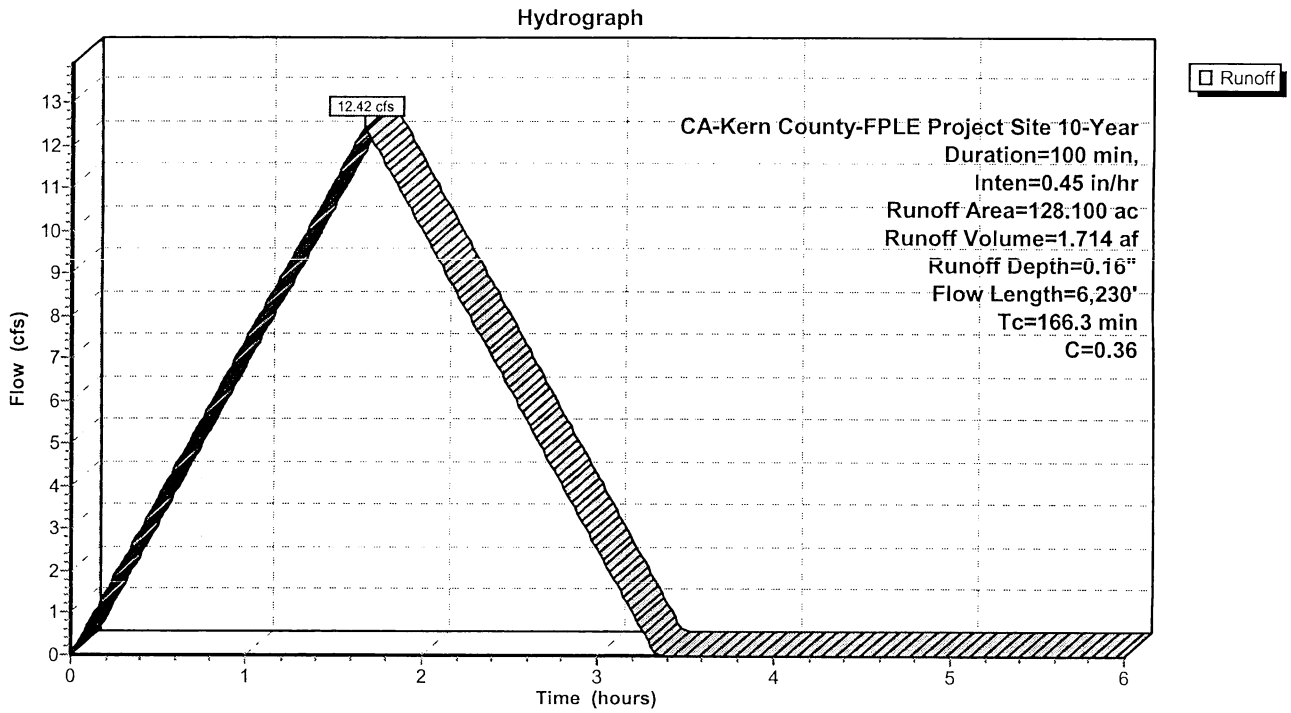
Runoff = 12.42 cfs @ 1.67 hrs, Volume= 1.714 af, Depth= 0.16"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
128.100	0.36	
128.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
130.9	730	0.0060	0.09		**Shallow Concentrated Flow, Unpaved** Kv= 1.2 fps
27.3	5,200	0.0050	3.17	29.18	**Channel Flow,** Area= 9.2 sf Perim= 17.0' r= 0.54' n= 0.022
166.3	6,230	Total			

Subcatchment 22S: Shed H



Summary for Subcatchment 23S: Shed I

[48] Hint: Peak<CiA due to short duration

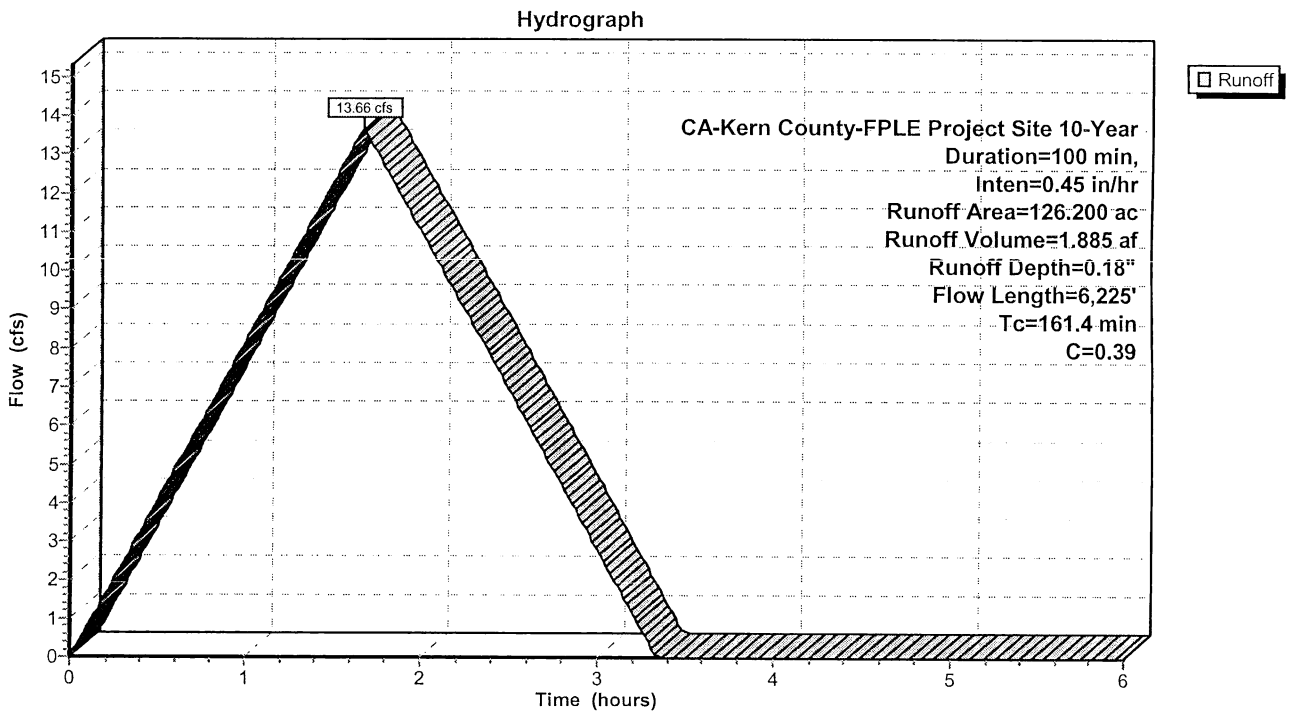
Runoff = 13.66 cfs @ 1.67 hrs, Volume= 1.885 af, Depth= 0.18"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 10-Year Duration=100 min, Inten=0.45 in/hr

Area (ac)	C	Description
126.200	0.39	
126.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	300	0.0063	0.63		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
130.0	725	0.0060	0.09		**Shallow Concentrated Flow, Unpaved** Kv= 1.2 fps
23.5	5,200	0.0065	3.68	34.96	**Channel Flow,** Area= 9.5 sf Perim= 17.1' r= 0.56' n= 0.022
161.4	6,225	Total			

Subcatchment 23S: Shed I



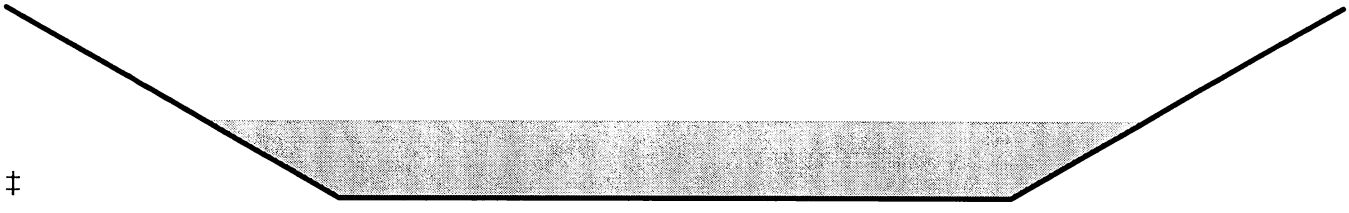
Summary for Reach 8R: Thru Shed K to Dry Wash

Inflow Area = 171.600 ac, 0.00% Impervious, Inflow Depth = 0.13" for 10-Year event
Inflow = 13.08 cfs @ 1.41 hrs, Volume= 1.802 af
Outflow = 12.14 cfs @ 2.24 hrs, Volume= 1.763 af, Atten= 7%, Lag= 49.8 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.50 fps, Min. Travel Time= 31.8 min
Avg. Velocity = 1.33 fps, Avg. Travel Time= 59.8 min

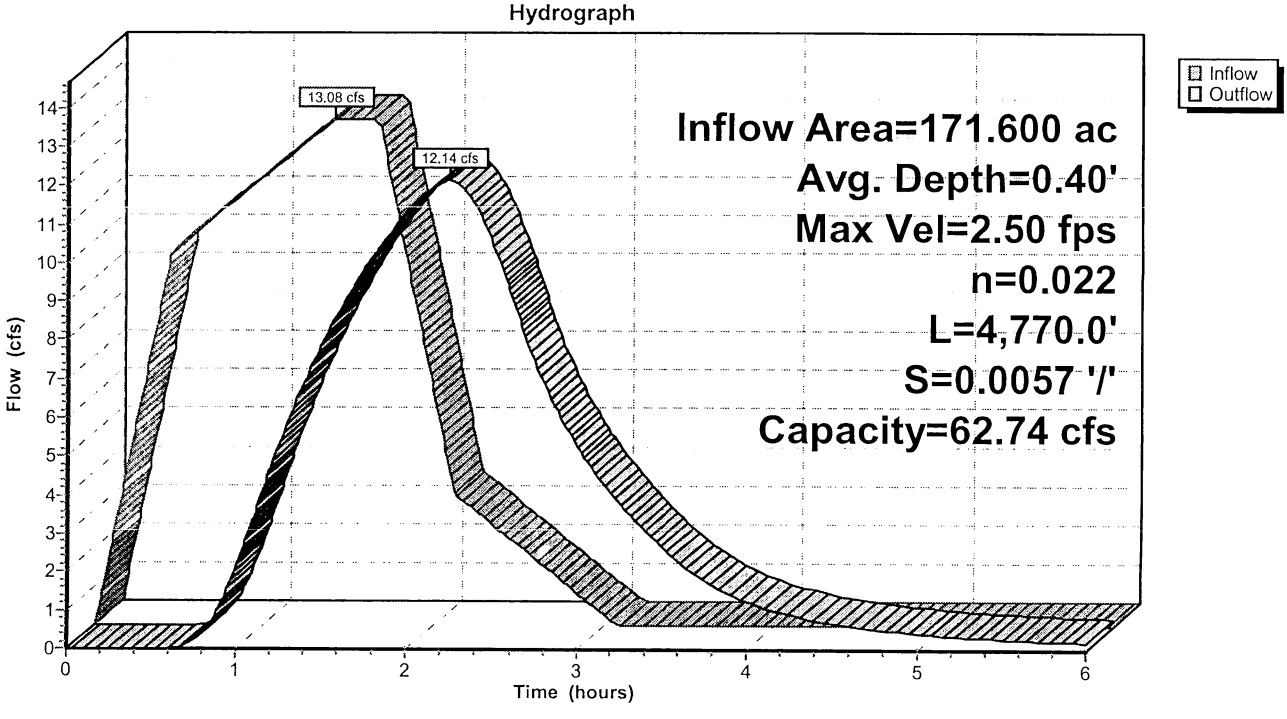
Peak Storage= 23,144 cf @ 1.71 hrs, Average Depth at Peak Storage= 0.40'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 62.74 cfs

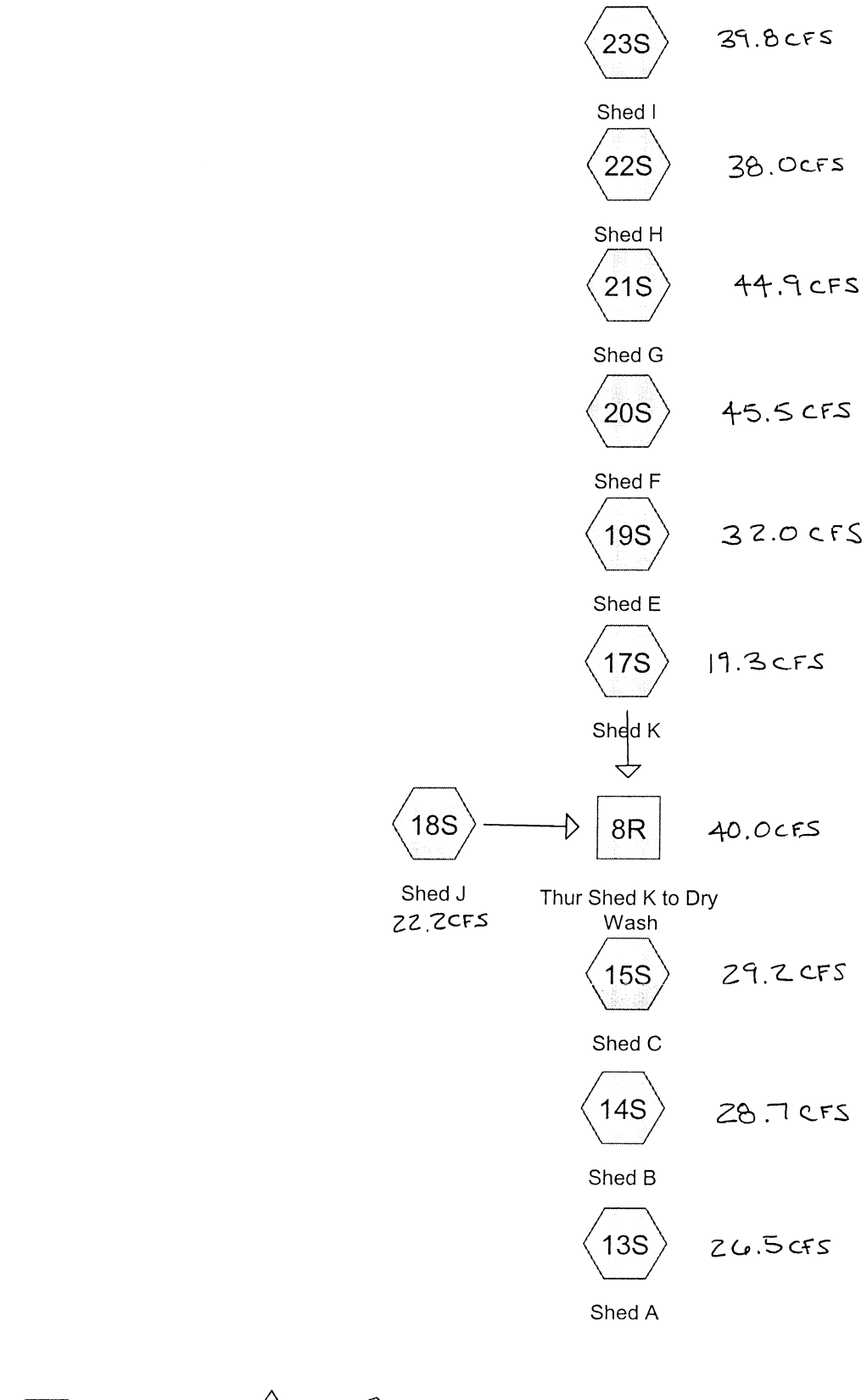
10.00' x 1.00' deep channel, n= 0.022
Side Slope Z-value= 5.0 '/' Top Width= 20.00'
Length= 4,770.0' Slope= 0.0057 '/'
Inlet Invert= 2,120.50', Outlet Invert= 2,093.30'



‡

Reach 8R: Thru Shed K to Dry Wash





Drainage Diagram for POST 100 Yr Rational Method
Prepared by Carlton Engineering, Inc, Printed 01/23/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	C	Description (subcatchment-numbers)
604.700	0.21	(13S,14S,15S,17S)
115.100	0.39	(19S)
60.000	0.45	(18S)
121.100	0.50	(20S)
119.900	0.54	(21S)
128.100	0.60	(22S)
126.200	0.62	(23S)
1,275.100		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
0.000	HSG A	
0.000	HSG B	
0.000	HSG C	
0.000	HSG D	
1,275.100	Other	13S, 14S, 15S, 17S, 18S, 19S, 20S, 21S, 22S, 23S
1,275.100		**TOTAL AREA**

Time span=0.00-6.00 hrs, dt=0.01 hrs, 601 points
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 13S: Shed A Runoff Area=155.100 ac 0.00% Impervious Runoff Depth=0.28"
Flow Length=7,725' Tc=101.1 min C=0.21 Runoff=26.47 cfs 3.652 af

Subcatchment 14S: Shed B Runoff Area=168.800 ac 0.00% Impervious Runoff Depth=0.28"
Flow Length=8,625' Tc=101.6 min C=0.21 Runoff=28.67 cfs 3.955 af

Subcatchment 15S: Shed C Runoff Area=169.200 ac 0.00% Impervious Runoff Depth=0.29"
Flow Length=8,625' Tc=93.4 min C=0.21 Runoff=29.24 cfs 4.028 af

Subcatchment 17S: Shed K Runoff Area=111.600 ac 0.00% Impervious Runoff Depth=0.29"
Flow Length=5,800' Tc=84.6 min C=0.21 Runoff=19.29 cfs 2.657 af

Subcatchment 18S: Shed J Runoff Area=60.000 ac 0.00% Impervious Runoff Depth=0.61"
Flow Length=6,740' Tc=26.7 min C=0.45 Runoff=22.22 cfs 3.061 af

Subcatchment 19S: Shed E Runoff Area=115.100 ac 0.00% Impervious Runoff Depth=0.46"
Flow Length=5,800' Tc=115.2 min C=0.39 Runoff=32.01 cfs 4.417 af

Subcatchment 20S: Shed F Runoff Area=121.100 ac 0.00% Impervious Runoff Depth=0.62"
Flow Length=4,830' Tc=109.4 min C=0.50 Runoff=45.47 cfs 6.274 af

Subcatchment 21S: Shed G Runoff Area=119.900 ac 0.00% Impervious Runoff Depth=0.62"
Flow Length=6,230' Tc=118.4 min C=0.54 Runoff=44.93 cfs 6.199 af

Subcatchment 22S: Shed H Runoff Area=128.100 ac 0.00% Impervious Runoff Depth=0.49"
Flow Length=6,230' Tc=166.3 min C=0.60 Runoff=37.97 cfs 5.239 af

Subcatchment 23S: Shed I Runoff Area=126.200 ac 0.00% Impervious Runoff Depth=0.52"
Flow Length=6,225' Tc=161.4 min C=0.62 Runoff=39.83 cfs 5.496 af

Reach 8R: Thur Shed K to Dry Wash Avg. Depth=0.79' Max Vel=3.66 fps Inflow=41.51 cfs 5.718 af
n=0.022 L=4,770.0' S=0.0057 '/' Capacity=62.74 cfs Outflow=40.04 cfs 5.673 af

Total Runoff Area = 1,275.100 ac Runoff Volume = 44.980 af Average Runoff Depth = 0.42"
100.00% Pervious = 1,275.100 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 13S: Shed A

[48] Hint: Peak<CiA due to short duration

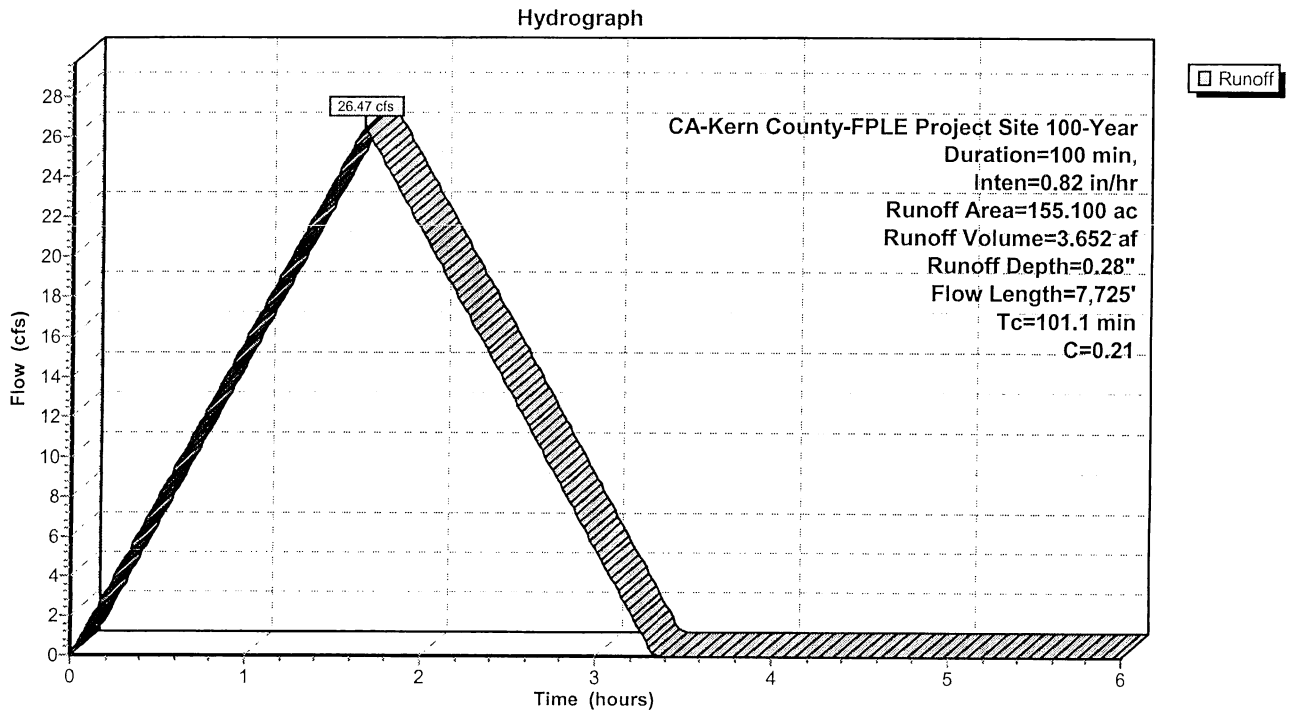
Runoff = 26.47 cfs @ 1.67 hrs, Volume= 3.652 af, Depth= 0.28"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
155.100	0.21	
155.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	300	0.0120	0.82		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
61.3	725	0.0120	0.20		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
33.7	6,700	0.0050	3.31	33.44	**Channel Flow,** Area= 10.1 sf Perim= 17.5' r= 0.58' n= 0.022 Earth, clean & straight
101.1	7,725	Total			

Subcatchment 13S: Shed A



Summary for Subcatchment 14S: Shed B

[48] Hint: Peak<CiA due to short duration

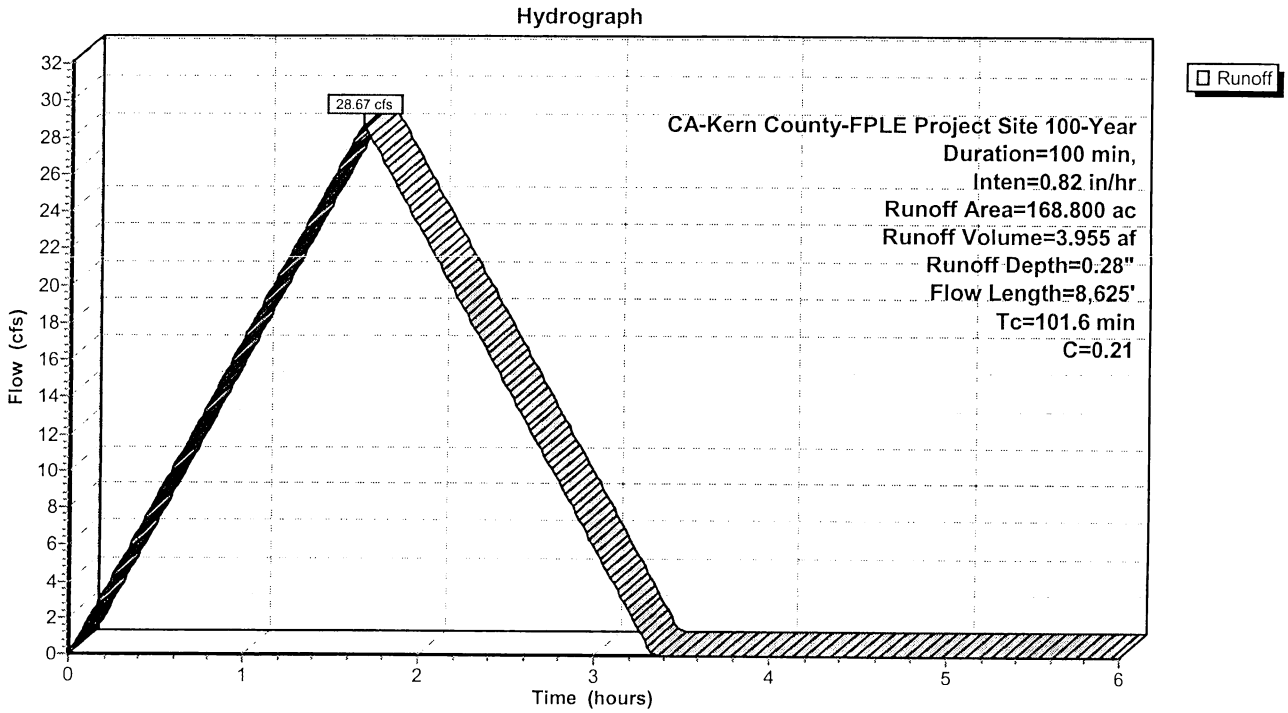
Runoff = 28.67 cfs @ 1.67 hrs, Volume= 3.955 af, Depth= 0.28"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
168.800	0.21	
168.800		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.1	300	0.0120	0.82		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
61.3	725	0.0120	0.20		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
34.2	7,600	0.0050	3.70	48.49	**Channel Flow,** Area= 13.1 sf Perim= 19.2' r= 0.68' n= 0.022
101.6	8,625	Total			

Subcatchment 14S: Shed B



Summary for Subcatchment 15S: Shed C

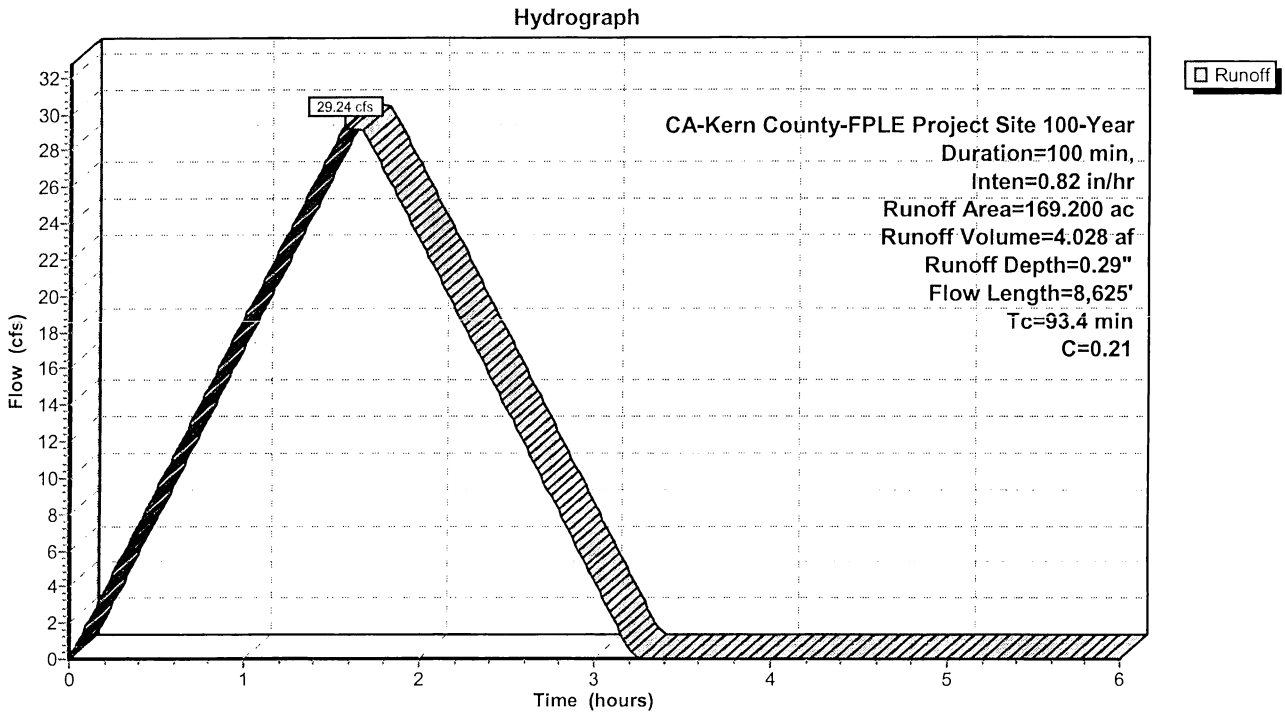
Runoff = 29.24 cfs @ 1.56 hrs, Volume= 4.028 af, Depth= 0.29"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
169.200	0.21	
169.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
53.7	725	0.0140	0.22		**Shallow Concentrated Flow, Unpaved** Kv= 1.9 fps
34.0	7,600	0.0050	3.73	49.56	**Channel Flow,** Area= 13.3 sf Perim= 19.3' r= 0.69' n= 0.022
93.4	8,625	Total			

Subcatchment 15S: Shed C



Summary for Subcatchment 17S: Shed K

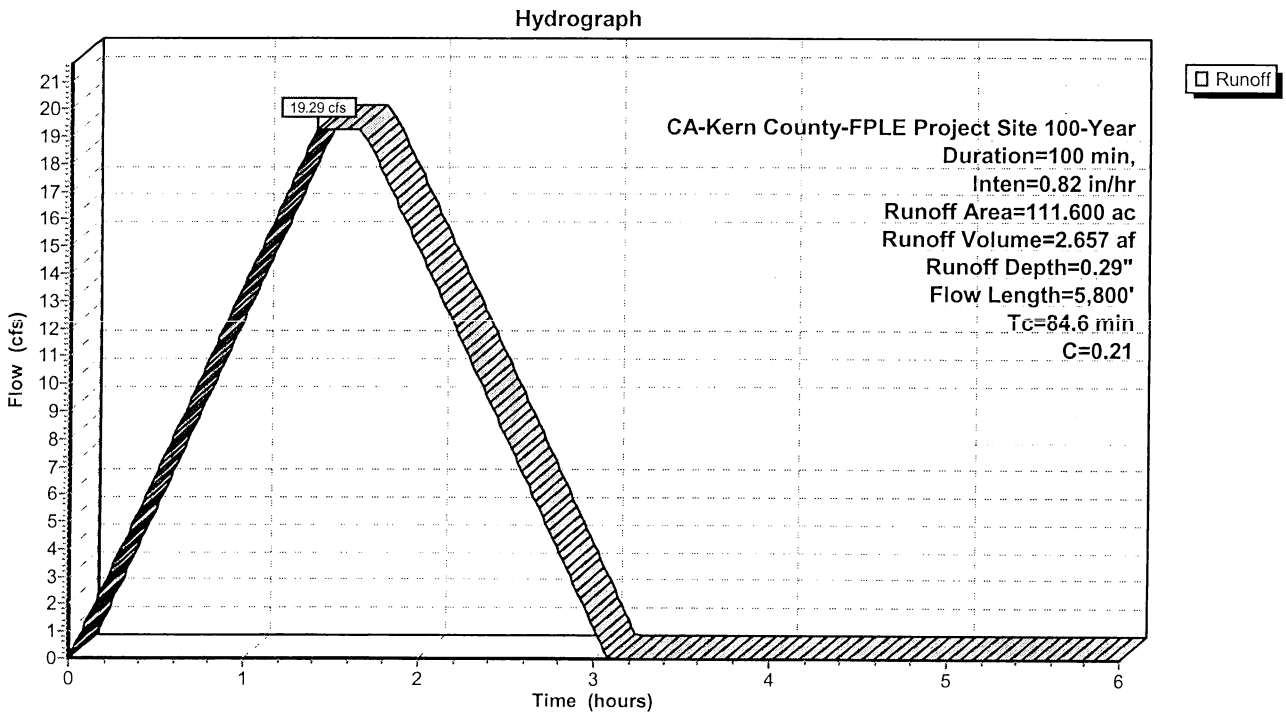
Runoff = 19.29 cfs @ 1.41 hrs, Volume= 2.657 af, Depth= 0.29"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
111.600	0.21	
111.600		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
57.1	730	0.0140	0.21		**Shallow Concentrated Flow, Unpaved** Kv= 1.8 fps
21.8	4,770	0.0050	3.64	36.45	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.022
84.6	5,800	Total			

Subcatchment 17S: Shed K



Summary for Subcatchment 18S: Shed J

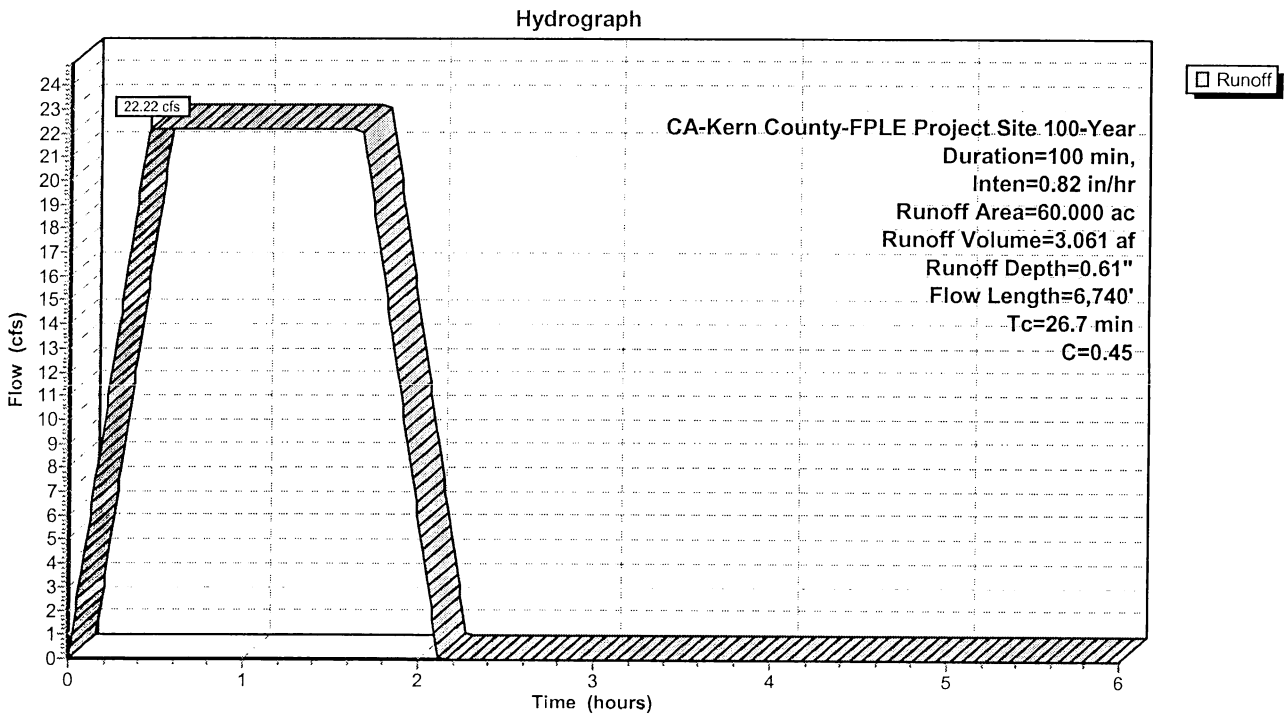
Runoff = 22.22 cfs @ 0.45 hrs, Volume= 3.061 af, Depth= 0.61"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
60.000	0.45	
60.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	100	0.0100	0.61		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
24.0	6,640	0.0080	4.61	46.10	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.022
26.7	6,740	Total			

Subcatchment 18S: Shed J



Summary for Subcatchment 19S: Shed E

[48] Hint: Peak<CiA due to short duration

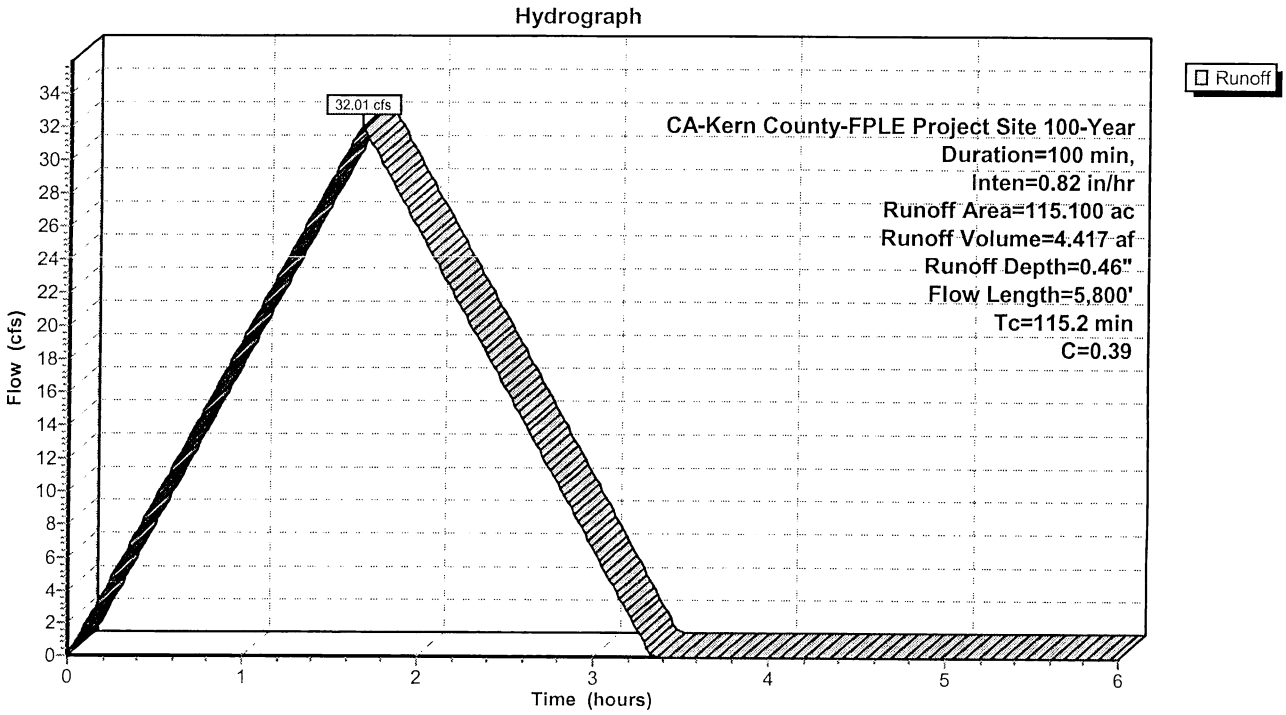
Runoff = 32.01 cfs @ 1.67 hrs, Volume= 4.417 af, Depth= 0.46"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
115.100	0.39	
115.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	300	0.0090	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
85.5	730	0.0090	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.5 fps
22.9	4,770	0.0050	3.48	39.28	**Channel Flow,** Area= 11.3 sf Perim= 18.2' r= 0.62' n= 0.022
115.2	5,800	Total			

Subcatchment 19S: Shed E



Summary for Subcatchment 20S: Shed F

[48] Hint: Peak<CiA due to short duration

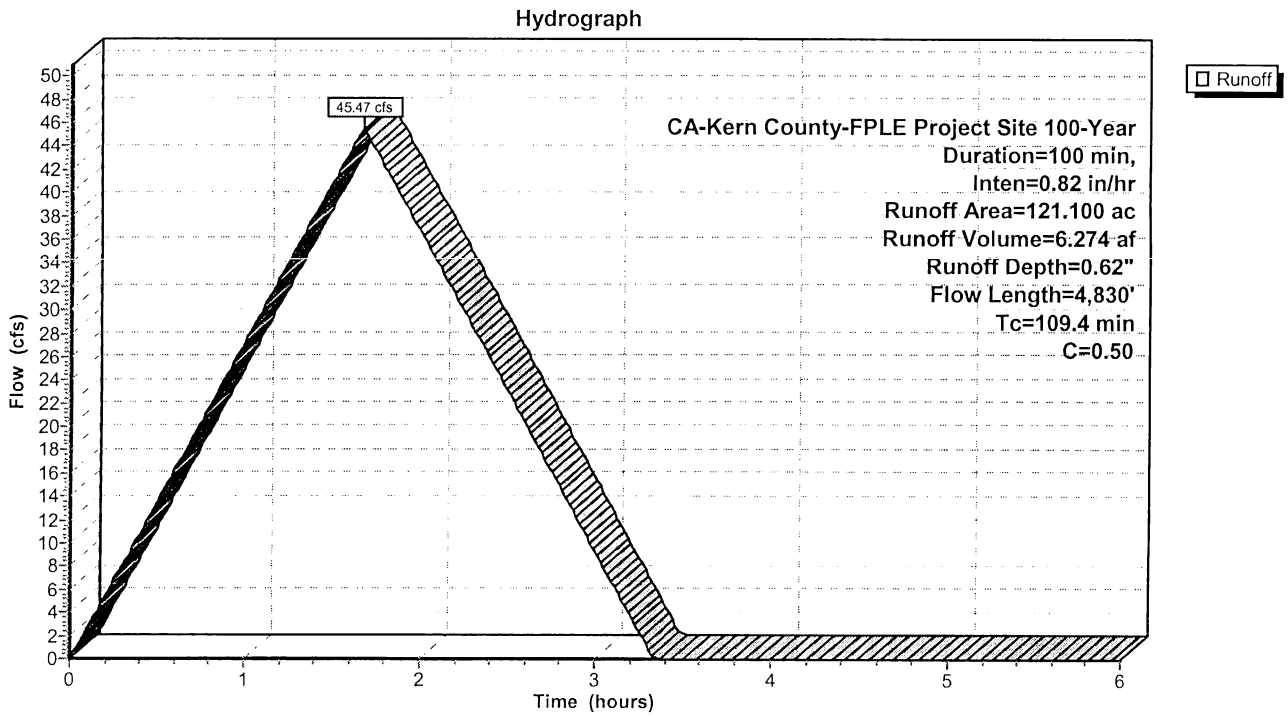
Runoff = 45.47 cfs @ 1.67 hrs, Volume= 6.274 af, Depth= 0.62"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
121.100	0.50	
121.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	300	0.0090	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
85.5	730	0.0090	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.5 fps
17.1	3,800	0.0050	3.71	48.94	**Channel Flow,** Area= 13.2 sf Perim= 19.3' r= 0.68' n= 0.022
109.4	4,830	Total			

Subcatchment 20S: Shed F



Summary for Subcatchment 21S: Shed G

[48] Hint: Peak<CiA due to short duration

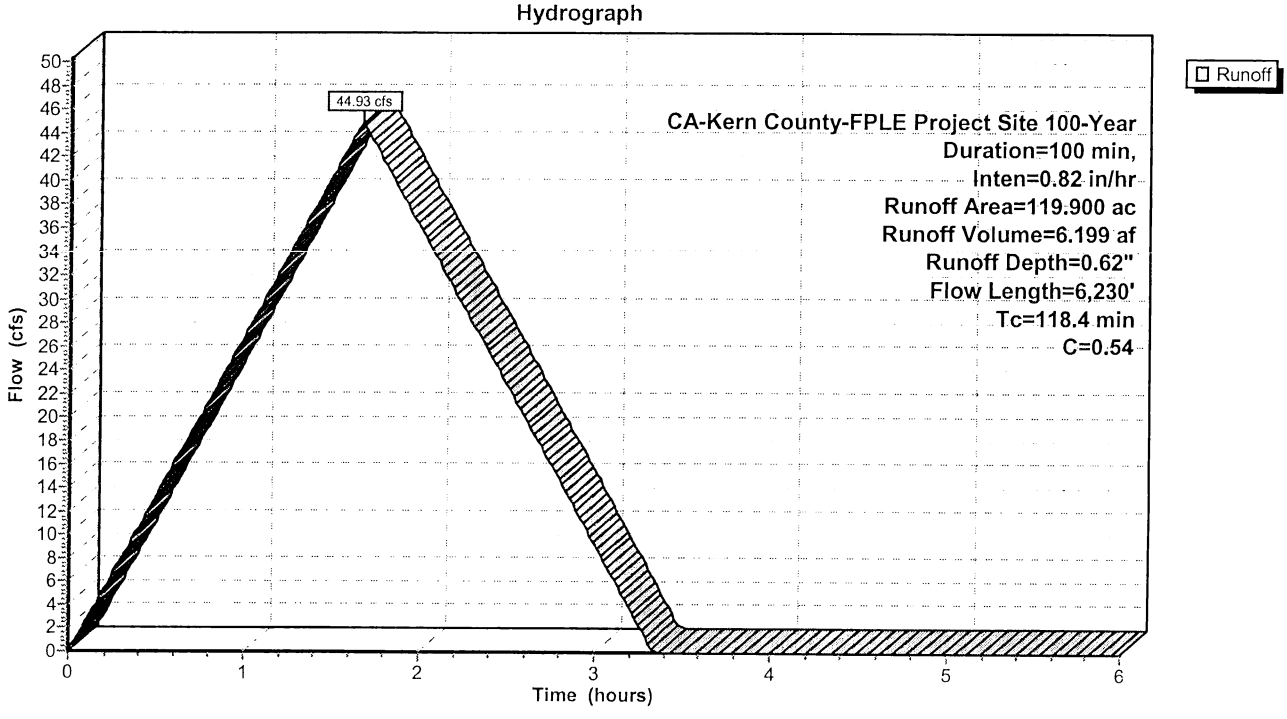
Runoff = 44.93 cfs @ 1.67 hrs, Volume= 6.199 af, Depth= 0.62"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
119.900	0.54	
119.900		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.8	300	0.0090	0.73		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
85.5	730	0.0090	0.14		**Shallow Concentrated Flow, Unpaved** Kv= 1.5 fps
26.1	5,200	0.0050	3.32	33.86	**Channel Flow,** Area= 10.2 sf Perim= 17.6' r= 0.58' n= 0.022
118.4	6,230	Total			

Subcatchment 21S: Shed G



Summary for Subcatchment 22S: Shed H

[48] Hint: Peak<CiA due to short duration

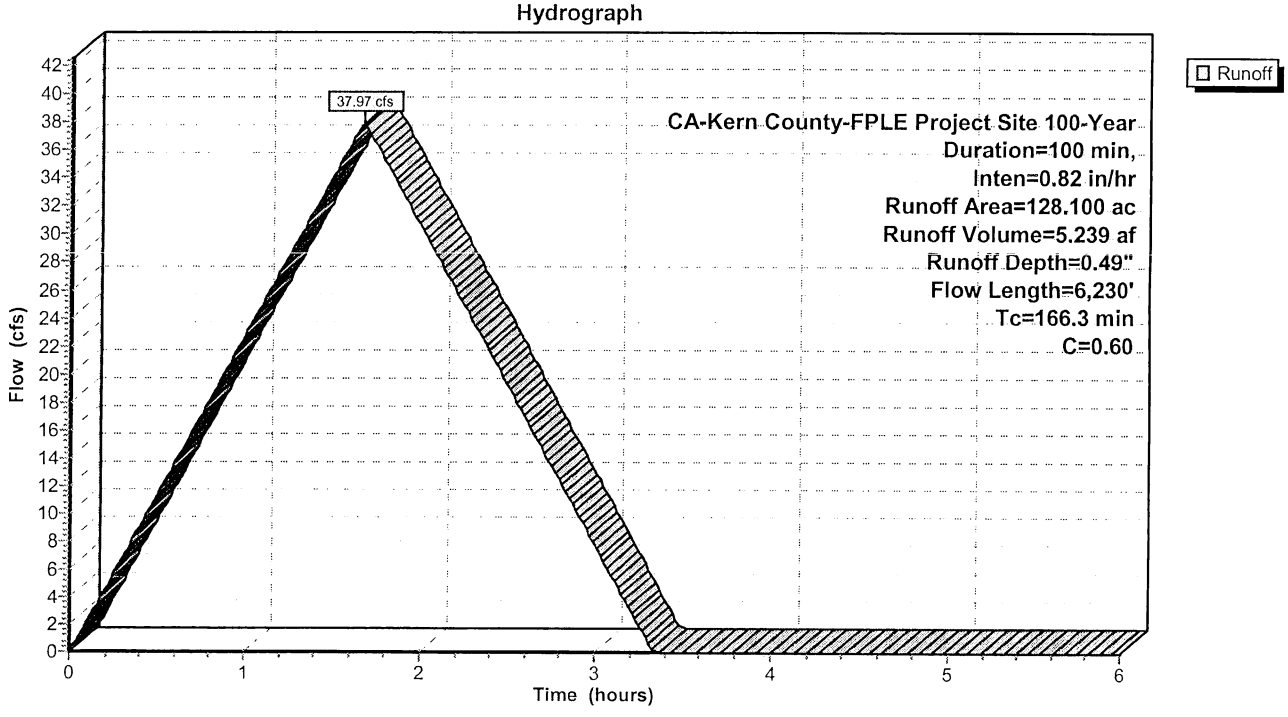
Runoff = 37.97 cfs @ 1.67 hrs, Volume= 5.239 af, Depth= 0.49"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
128.100	0.60	
128.100		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.1	300	0.0060	0.62		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
130.9	730	0.0060	0.09		**Shallow Concentrated Flow, Unpaved** Kv= 1.2 fps
27.3	5,200	0.0050	3.17	29.18	**Channel Flow,** Area= 9.2 sf Perim= 17.0' r= 0.54' n= 0.022
166.3	6,230	Total			

Subcatchment 22S: Shed H



Summary for Subcatchment 23S: Shed I

[48] Hint: Peak<CiA due to short duration

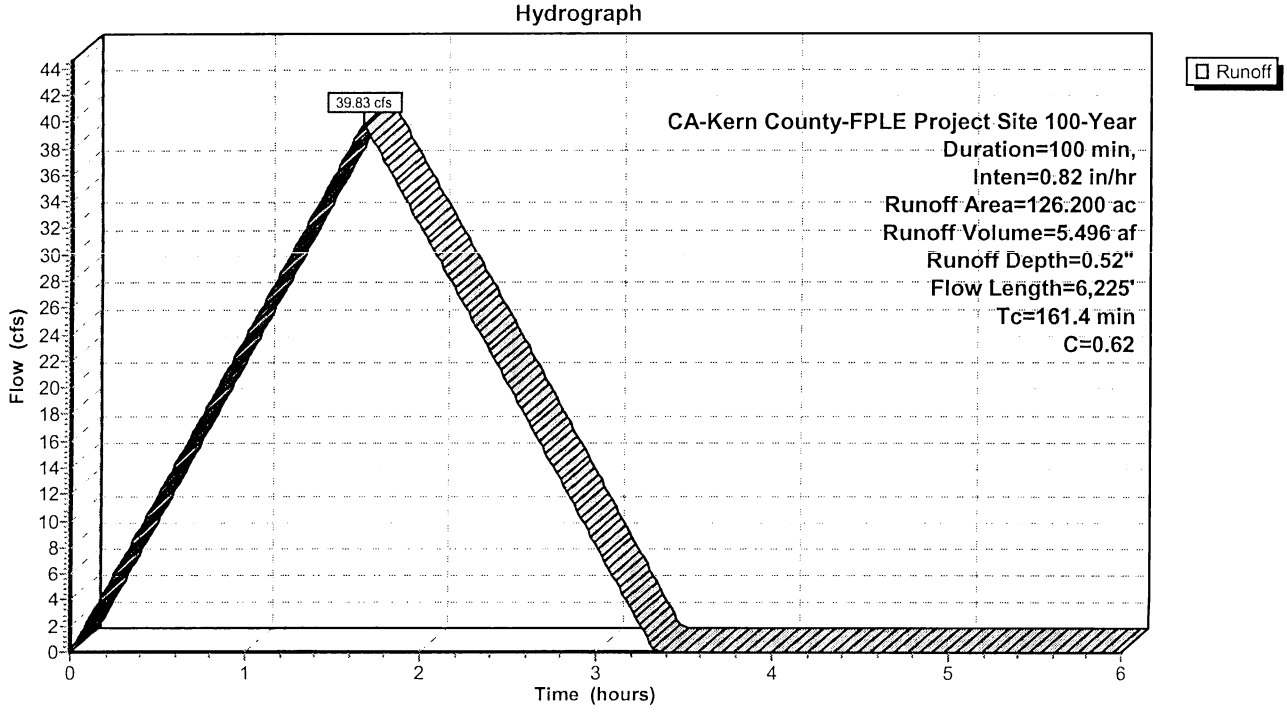
Runoff = 39.83 cfs @ 1.67 hrs, Volume= 5.496 af, Depth= 0.52"

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
CA-Kern County-FPLE Project Site 100-Year Duration=100 min, Inten=0.82 in/hr

Area (ac)	C	Description
126.200	0.62	
126.200		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
7.9	300	0.0063	0.63		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
130.0	725	0.0060	0.09		**Shallow Concentrated Flow, Unpaved** Kv= 1.2 fps
23.5	5,200	0.0065	3.68	34.96	**Channel Flow,** Area= 9.5 sf Perim= 17.1' r= 0.56' n= 0.022
161.4	6,225	Total			

Subcatchment 23S: Shed I



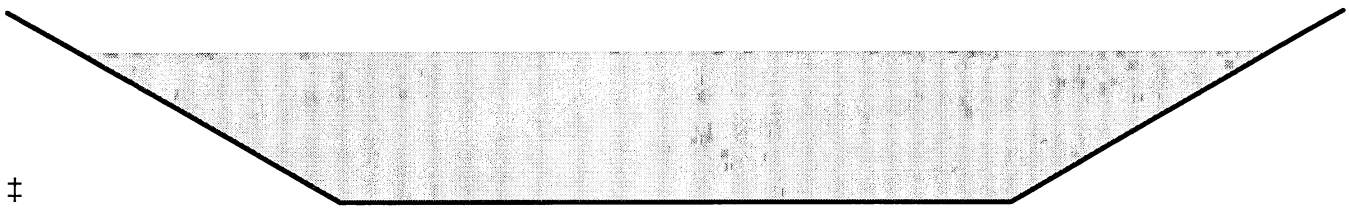
Summary for Reach 8R: Thur Shed K to Dry Wash

Inflow Area = 171.600 ac, 0.00% Impervious, Inflow Depth = 0.40" for 100-Year event
Inflow = 41.51 cfs @ 1.41 hrs, Volume= 5.718 af
Outflow = 40.04 cfs @ 2.05 hrs, Volume= 5.673 af, Atten= 4%, Lag= 38.5 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-6.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.66 fps, Min. Travel Time= 21.7 min
Avg. Velocity = 1.89 fps, Avg. Travel Time= 42.0 min

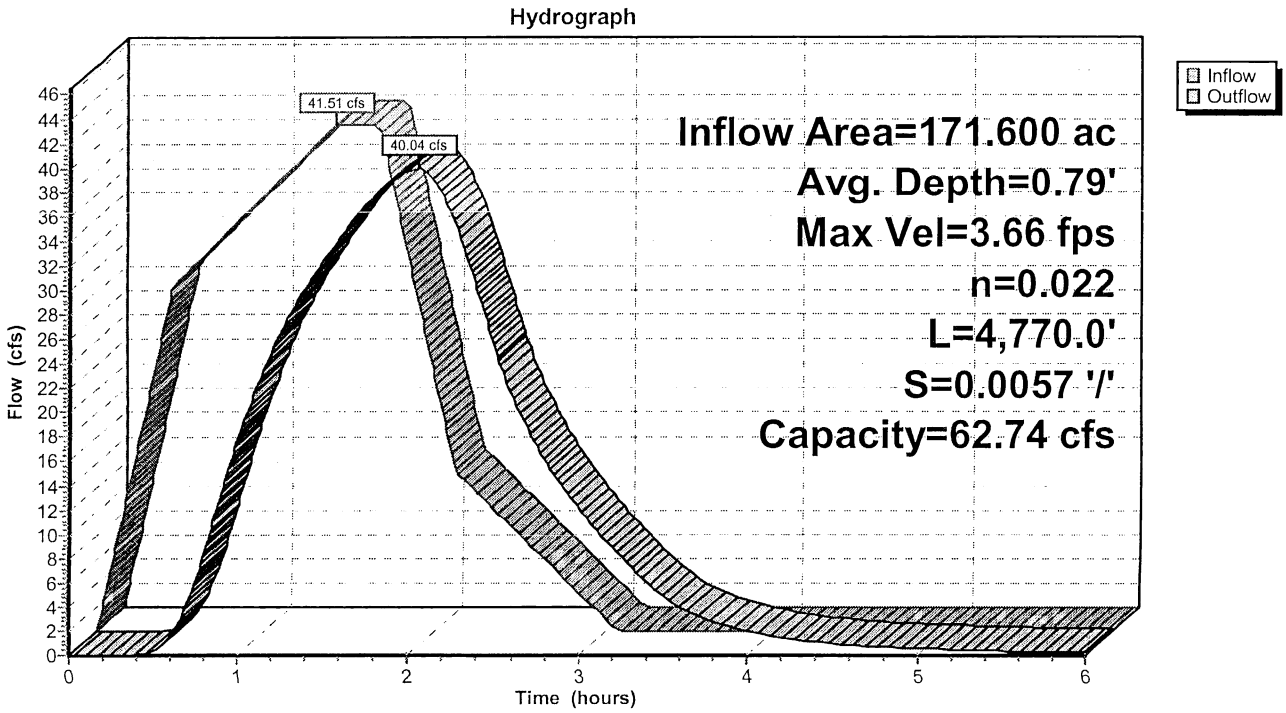
Peak Storage= 52,199 cf @ 1.69 hrs, Average Depth at Peak Storage= 0.79'
Bank-Full Depth= 1.00', Capacity at Bank-Full= 62.74 cfs

10.00' x 1.00' deep channel, n= 0.022
Side Slope Z-value= 5.0 '/' Top Width= 20.00'
Length= 4,770.0' Slope= 0.0057 '/'
Inlet Invert= 2,120.50', Outlet Invert= 2,093.30'

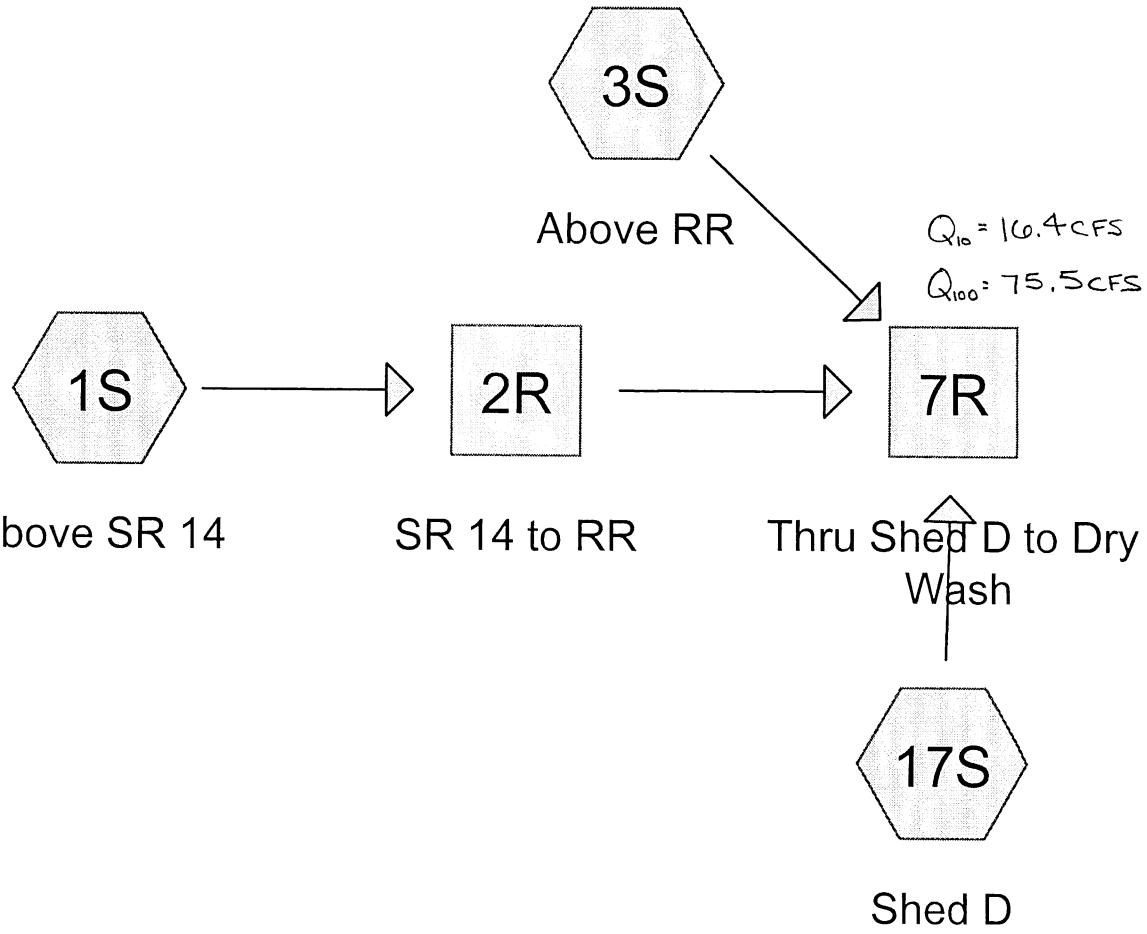


‡

Reach 8R: Thur Shed K to Dry Wash



POST CONSTRUCTION



Subcat Reach Pond Link

Drainage Diagram for POST SCS - SHED D DRAINAGE
Prepared by Carlton Engineering, Inc, Printed 01/23/2008
HydroCAD® 8.50 s/n 003190 © 2007 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
730.100	63	Desert shrub range, Fair, HSG A (1S,3S)
231.000	65	Desert shrub range, Poor, HSG A (17S)
207.300	88	Desert shrub range, Fair, HSG D (1S)
1,168.400		**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Goup	Subcatchment Numbers
961.100	HSG A	1S, 3S, 17S
0.000	HSG B	
0.000	HSG C	
207.300	HSG D	1S
0.000	Other	
1,168.400		**TOTAL AREA**

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Above SR 14 Runoff Area=548.000 ac 0.00% Impervious Runoff Depth>0.27"
Flow Length=13,530' Tc=29.5 min CN=72 Runoff=10.55 cfs 12.468 af

Subcatchment 3S: Above RR Runoff Area=389.400 ac 0.00% Impervious Runoff Depth>0.09"
Flow Length=8,690' Tc=32.0 min CN=63 Runoff=3.52 cfs 2.951 af

Subcatchment 17S: Shed D Runoff Area=231.000 ac 0.00% Impervious Runoff Depth>0.11"
Flow Length=8,625' Tc=93.6 min CN=65 Runoff=2.53 cfs 2.168 af

Reach 2R: SR 14 to RR Avg. Depth=0.68' Max Vel=3.83 fps Inflow=10.55 cfs 12.468 af
n=0.030 L=8,590.0' S=0.0180 '/' Capacity=296.80 cfs Outflow=10.54 cfs 11.521 af

Reach 7R: Thru Shed D to Dry Wash Avg. Depth=0.48' Max Vel=2.76 fps Inflow=16.44 cfs 16.640 af
n=0.022 L=4,770.0' S=0.0057 '/' Capacity=1,085.74 cfs Outflow=16.43 cfs 15.421 af

Total Runoff Area = 1,168.400 ac Runoff Volume = 17.587 af Average Runoff Depth = 0.18"
100.00% Pervious = 1,168.400 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Above SR 14

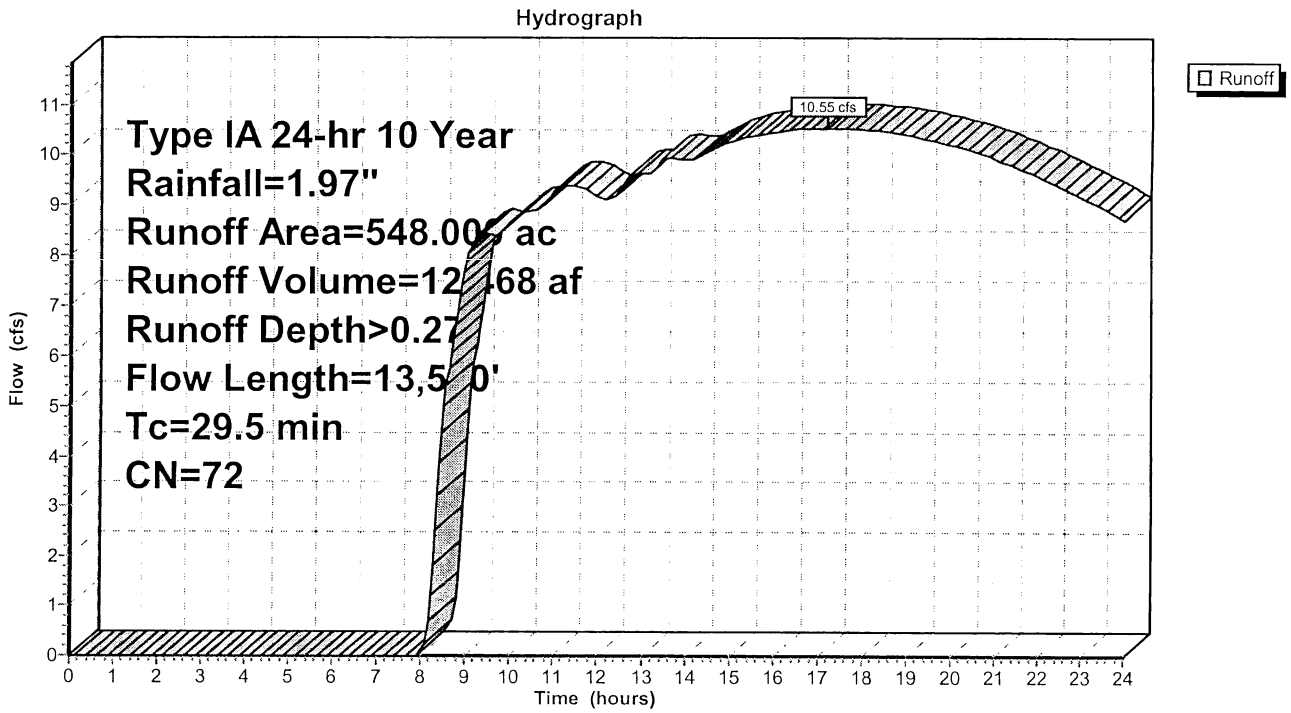
Runoff = 10.55 cfs @ 17.18 hrs, Volume= 12.468 af, Depth> 0.27"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
207.300	88	Desert shrub range, Fair, HSG D
340.700	63	Desert shrub range, Fair, HSG A
548.000	72	Weighted Average
548.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	200	0.0940	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
12.0	8,350	0.0940	11.59	115.90	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.0	4,980	0.0400	7.56	75.60	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
29.5	13,530	Total			

Subcatchment 1S: Above SR 14



Summary for Subcatchment 3S: Above RR

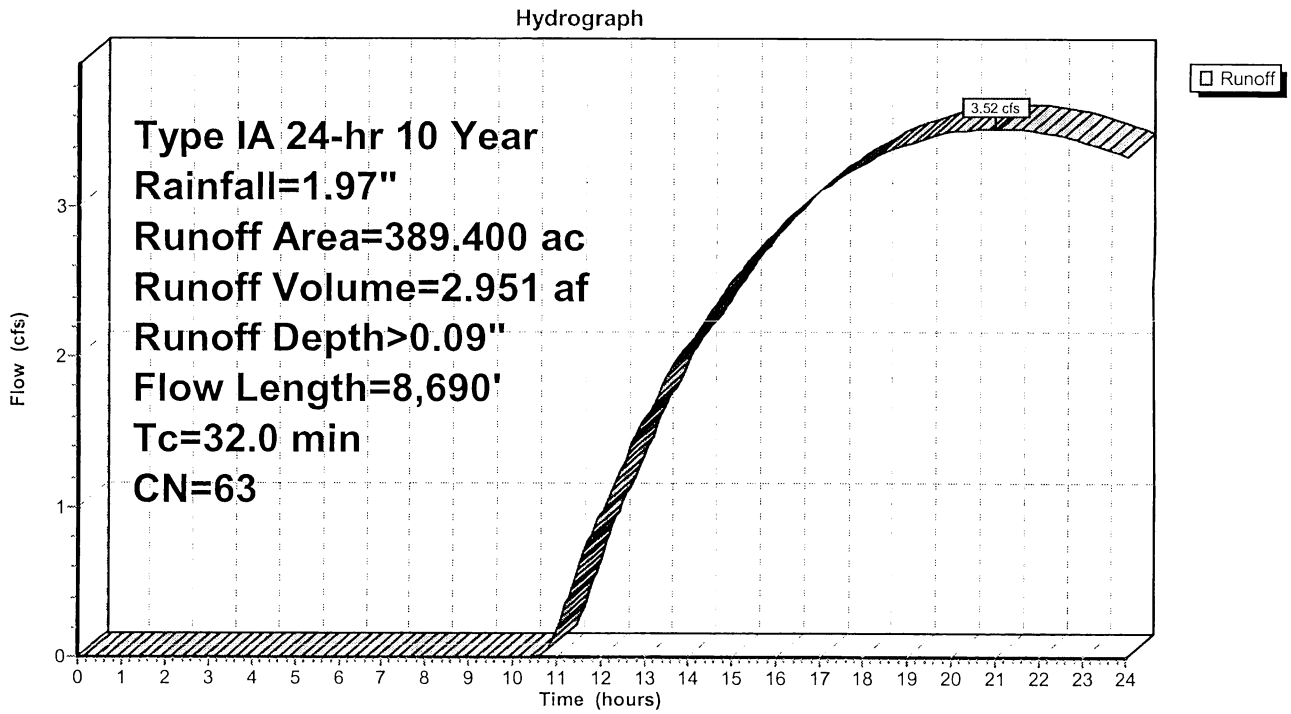
Runoff = 3.52 cfs @ 20.97 hrs, Volume= 2.951 af, Depth> 0.09"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
389.400	63	Desert shrub range, Fair, HSG A
389.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0200	0.36		**Sheet Flow,** n= 0.030 P2= 1.10"
16.1	5,180	0.0200	5.35	53.46	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.3	3,410	0.0150	5.01	75.12	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030
32.0	8,690	Total			

Subcatchment 3S: Above RR



Summary for Subcatchment 17S: Shed D

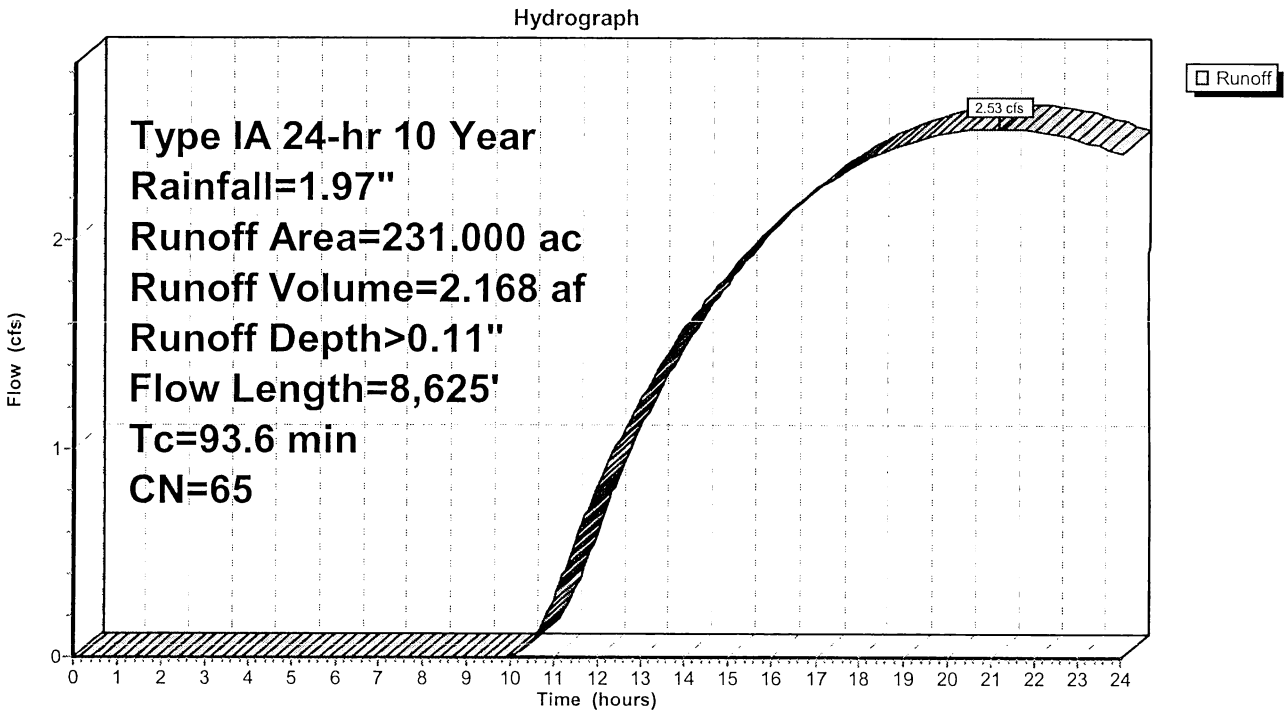
Runoff = 2.53 cfs @ 21.11 hrs, Volume= 2.168 af, Depth> 0.11"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 10 Year Rainfall=1.97"

Area (ac)	CN	Description
231.000	65	Desert shrub range, Poor, HSG A
231.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
53.7	725	0.0140	0.22		**Shallow Concentrated Flow, Unpaved** Kv= 1.9 fps
34.2	7,600	0.0050	3.71	48.94	**Channel Flow,** Area= 13.2 sf Perim= 19.3' r= 0.68' n= 0.022
93.6	8,625	Total			

Subcatchment 17S: Shed D



Summary for Reach 2R: SR 14 to RR

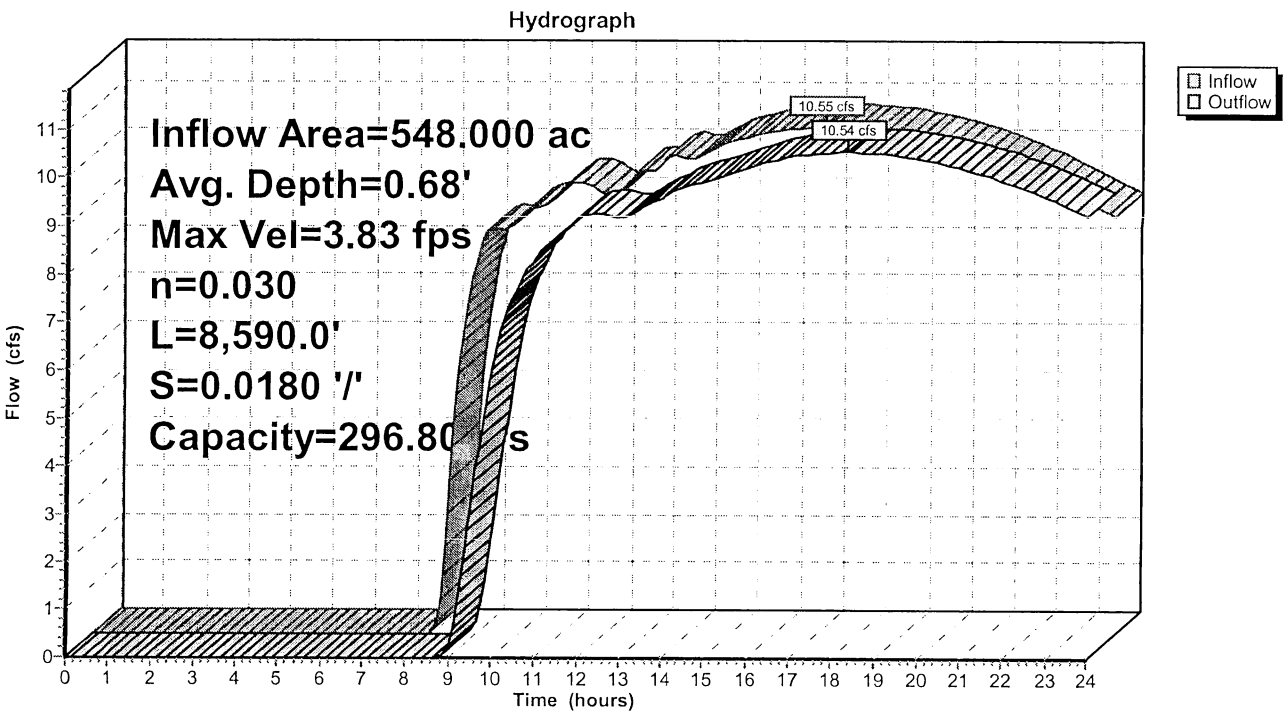
Inflow Area = 548.000 ac, 0.00% Impervious, Inflow Depth > 0.27" for 10 Year event
Inflow = 10.55 cfs @ 17.18 hrs, Volume= 12.468 af
Outflow = 10.54 cfs @ 18.35 hrs, Volume= 11.521 af, Atten= 0%, Lag= 70.0 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.83 fps, Min. Travel Time= 37.4 min
Avg. Velocity = 3.59 fps, Avg. Travel Time= 39.9 min

Peak Storage= 23,658 cf @ 17.71 hrs, Average Depth at Peak Storage= 0.68'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 296.80 cfs

2.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 8,590.0' Slope= 0.0180 '/'
Inlet Invert= 2,326.75', Outlet Invert= 2,172.00'

Reach 2R: SR 14 to RR



Summary for Reach 7R: Thru Shed D to Dry Wash

Inflow Area = 1,168.400 ac, 0.00% Impervious, Inflow Depth > 0.17" for 10 Year event
Inflow = 16.44 cfs @ 19.64 hrs, Volume= 16.640 af
Outflow = 16.43 cfs @ 20.40 hrs, Volume= 15.421 af, Atten= 0%, Lag= 45.7 min

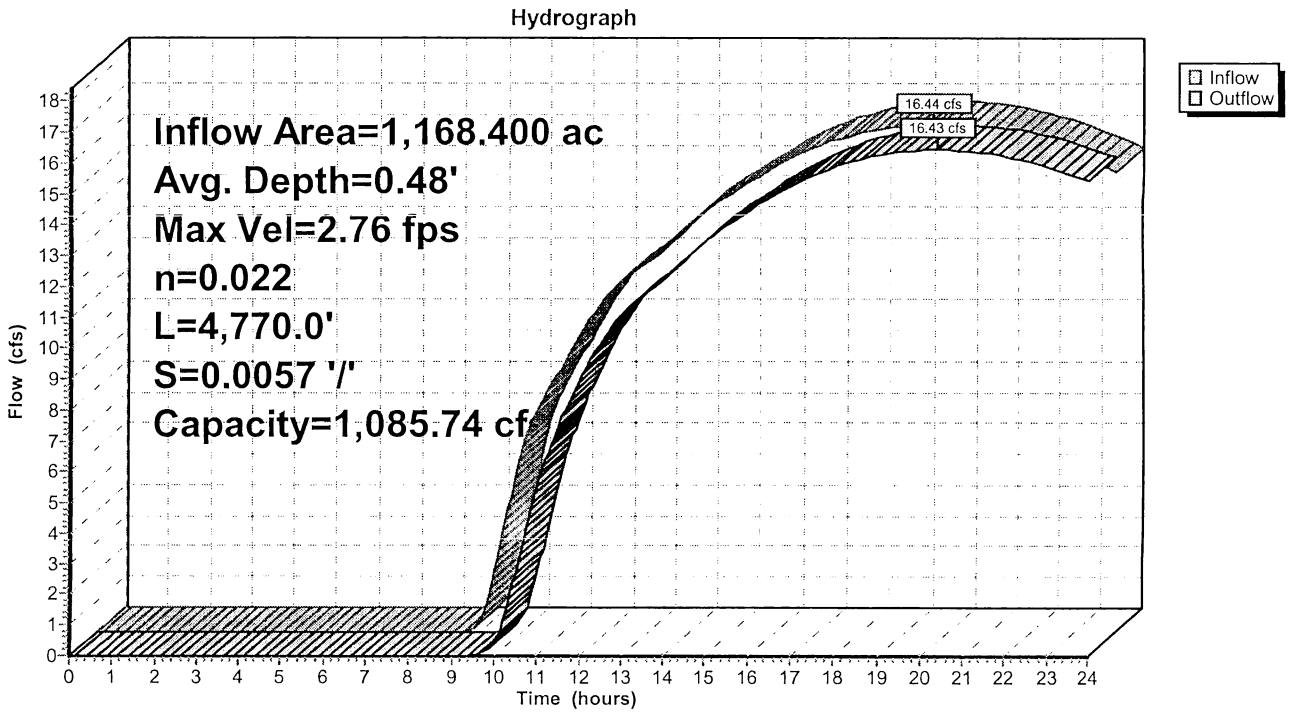
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.76 fps, Min. Travel Time= 28.8 min
Avg. Velocity = 2.44 fps, Avg. Travel Time= 32.6 min

Peak Storage= 28,339 cf @ 19.92 hrs, Average Depth at Peak Storage= 0.48'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 1,085.74 cfs

10.00' x 4.00' deep channel, n= 0.022
Side Slope Z-value= 5.0 '/' Top Width= 50.00'
Length= 4,770.0' Slope= 0.0057 '/'
Inlet Invert= 2,120.50', Outlet Invert= 2,093.30'

‡

Reach 7R: Thru Shed D to Dry Wash



Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Above SR 14 Runoff Area=548.000 ac 0.00% Impervious Runoff Depth>0.94"
Flow Length=13,530' Tc=29.5 min CN=72 Runoff=74.42 cfs 43.110 af

Subcatchment 3S: Above RR Runoff Area=389.400 ac 0.00% Impervious Runoff Depth>0.53"
Flow Length=8,690' Tc=32.0 min CN=63 Runoff=13.95 cfs 17.154 af

Subcatchment 17S: Shed D Runoff Area=231.000 ac 0.00% Impervious Runoff Depth>0.58"
Flow Length=8,625' Tc=93.6 min CN=65 Runoff=9.44 cfs 11.161 af

Reach 2R: SR 14 to RR Avg. Depth=1.52' Max Vel=6.00 fps Inflow=74.42 cfs 43.110 af
n=0.030 L=8,590.0' S=0.0180 '/' Capacity=296.80 cfs Outflow=59.56 cfs 41.425 af

Reach 7R: Thru Shed D to Dry Wash Avg. Depth=1.10' Max Vel=4.42 fps Inflow=79.30 cfs 69.740 af
n=0.022 L=4,770.0' S=0.0057 '/' Capacity=1,085.74 cfs Outflow=75.52 cfs 67.439 af

Total Runoff Area = 1,168.400 ac Runoff Volume = 71.425 af Average Runoff Depth = 0.73"
100.00% Pervious = 1,168.400 ac 0.00% Impervious = 0.000 ac

Summary for Subcatchment 1S: Above SR 14

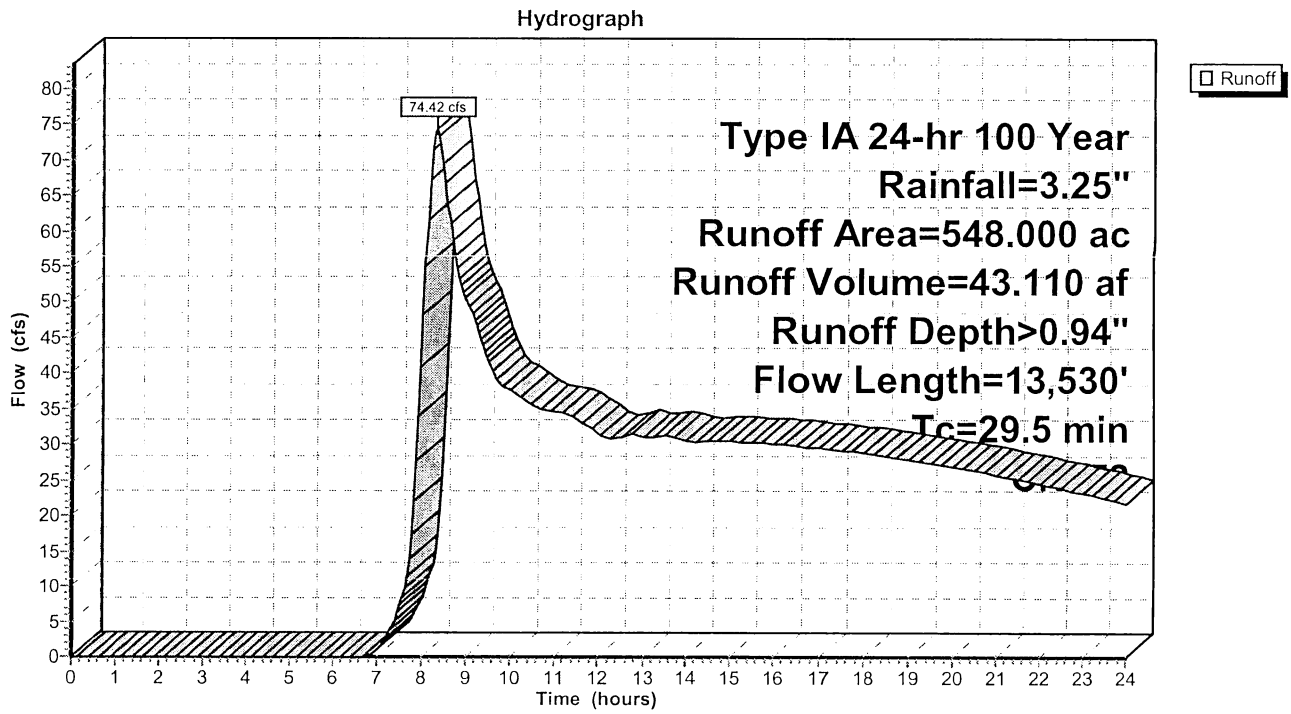
Runoff = 74.42 cfs @ 8.30 hrs, Volume= 43.110 af, Depth> 0.94"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
207.300	88	Desert shrub range, Fair, HSG D
340.700	63	Desert shrub range, Fair, HSG A
548.000	72	Weighted Average
548.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.5	200	0.0940	0.51		**Sheet Flow,** Fallow n= 0.050 P2= 1.10"
12.0	8,350	0.0940	11.59	115.90	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.0	4,980	0.0400	7.56	75.60	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
29.5	13,530	Total			

Subcatchment 1S: Above SR 14



Summary for Subcatchment 3S: Above RR

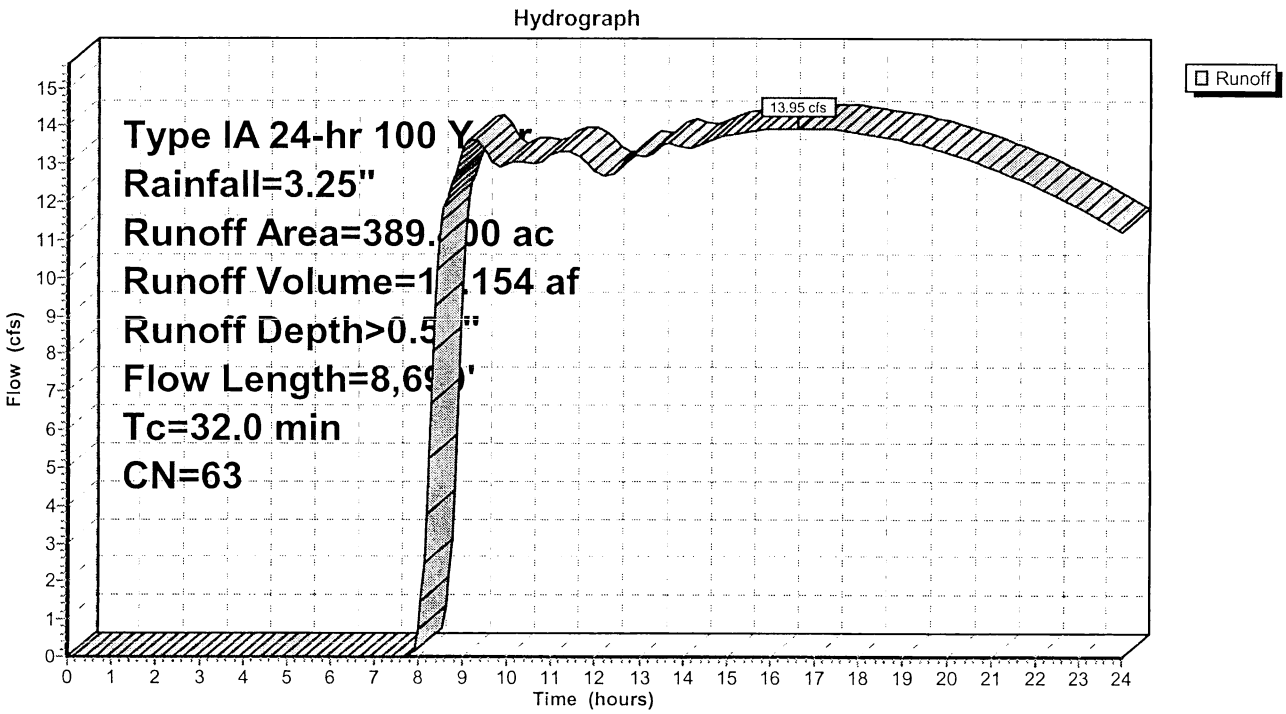
Runoff = 13.95 cfs @ 16.59 hrs, Volume= 17.154 af, Depth> 0.53"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
389.400	63	Desert shrub range, Fair, HSG A
389.400		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.6	100	0.0200	0.36		**Sheet Flow,** n= 0.030 P2= 1.10"
16.1	5,180	0.0200	5.35	53.46	**Channel Flow,** Area= 10.0 sf Perim= 15.0' r= 0.67' n= 0.030
11.3	3,410	0.0150	5.01	75.12	**Channel Flow,** Area= 15.0 sf Perim= 20.0' r= 0.75' n= 0.030
32.0	8,690	Total			

Subcatchment 3S: Above RR



Summary for Subcatchment 17S: Shed D

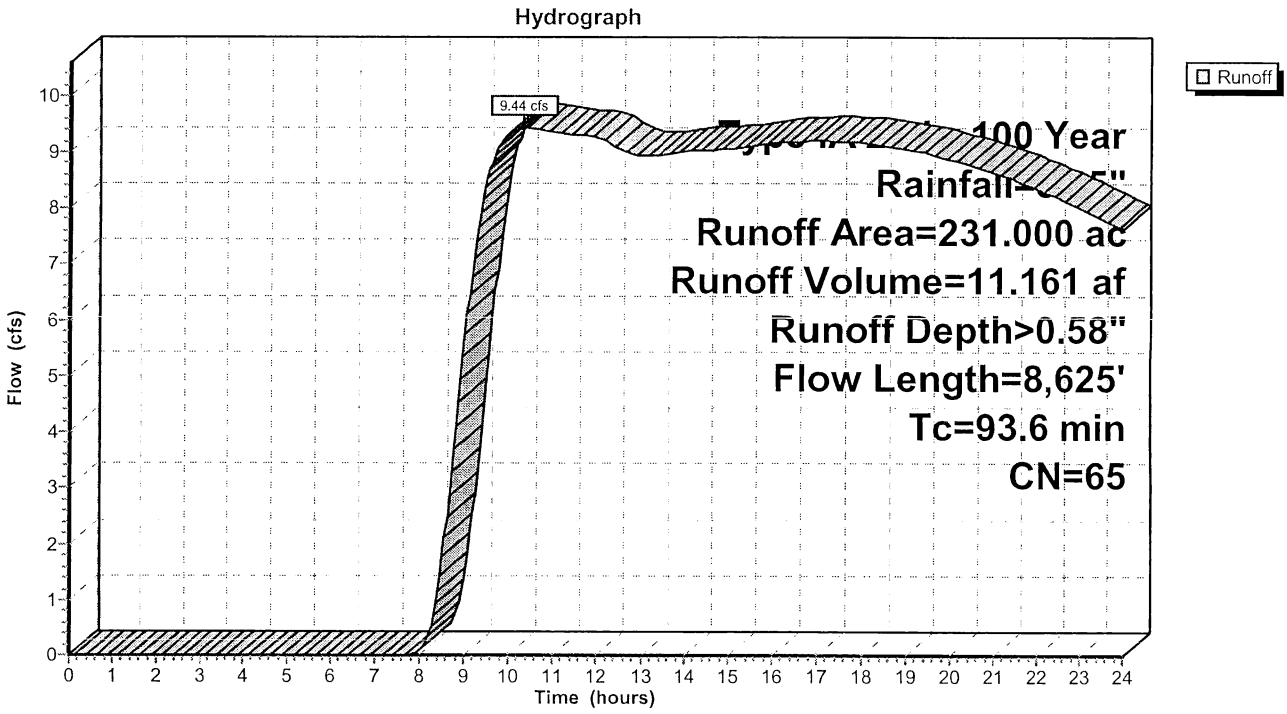
Runoff = 9.44 cfs @ 10.31 hrs, Volume= 11.161 af, Depth> 0.58"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type IA 24-hr 100 Year Rainfall=3.25"

Area (ac)	CN	Description
231.000	65	Desert shrub range, Poor, HSG A
231.000		Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.7	300	0.0140	0.87		**Sheet Flow,** Smooth surfaces n= 0.011 P2= 1.10"
53.7	725	0.0140	0.22		**Shallow Concentrated Flow, Unpaved** Kv= 1.9 fps
34.2	7,600	0.0050	3.71	48.94	**Channel Flow,** Area= 13.2 sf Perim= 19.3' r= 0.68' n= 0.022
93.6	8,625	Total			

Subcatchment 17S: Shed D



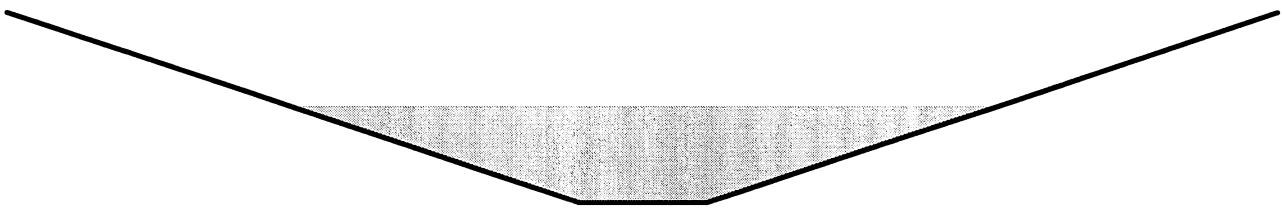
Summary for Reach 2R: SR 14 to RR

Inflow Area = 548.000 ac, 0.00% Impervious, Inflow Depth > 0.94" for 100 Year event
Inflow = 74.42 cfs @ 8.30 hrs, Volume= 43.110 af
Outflow = 59.56 cfs @ 9.03 hrs, Volume= 41.425 af, Atten= 20%, Lag= 43.8 min

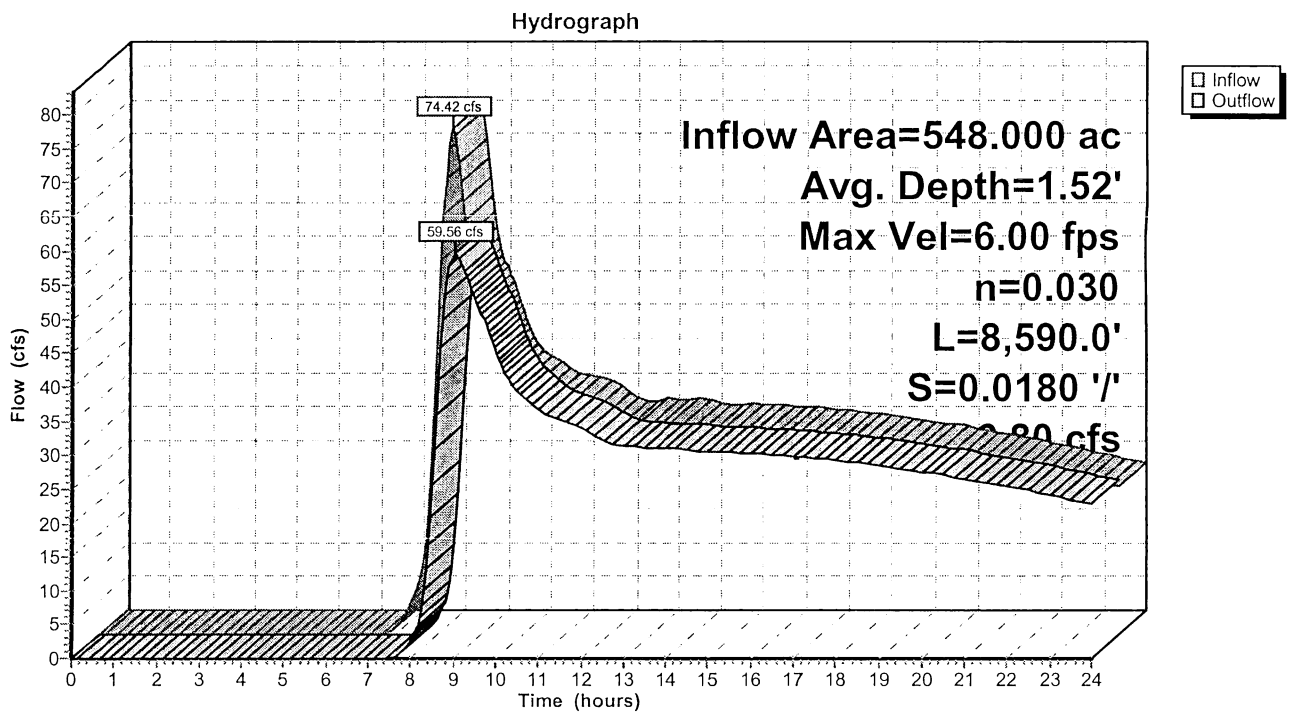
Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.00 fps, Min. Travel Time= 23.9 min
Avg. Velocity = 4.83 fps, Avg. Travel Time= 29.6 min

Peak Storage= 85,311 cf @ 8.63 hrs, Average Depth at Peak Storage= 1.52'
Bank-Full Depth= 3.00', Capacity at Bank-Full= 296.80 cfs

2.00' x 3.00' deep channel, n= 0.030
Side Slope Z-value= 3.0 '/' Top Width= 20.00'
Length= 8,590.0' Slope= 0.0180 '/'
Inlet Invert= 2,326.75', Outlet Invert= 2,172.00'



Reach 2R: SR 14 to RR



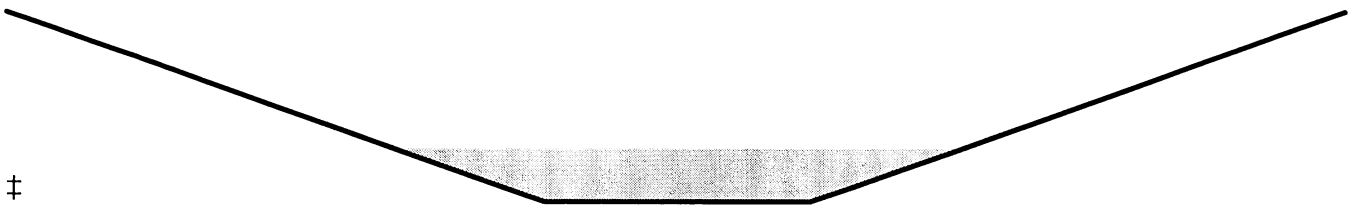
Summary for Reach 7R: Thru Shed D to Dry Wash

Inflow Area = 1,168.400 ac, 0.00% Impervious, Inflow Depth > 0.72" for 100 Year event
Inflow = 79.30 cfs @ 9.09 hrs, Volume= 69.740 af
Outflow = 75.52 cfs @ 9.76 hrs, Volume= 67.439 af, Atten= 5%, Lag= 40.1 min

Routing by Stor-Ind+Trans method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.42 fps, Min. Travel Time= 18.0 min
Avg. Velocity = 3.74 fps, Avg. Travel Time= 21.2 min

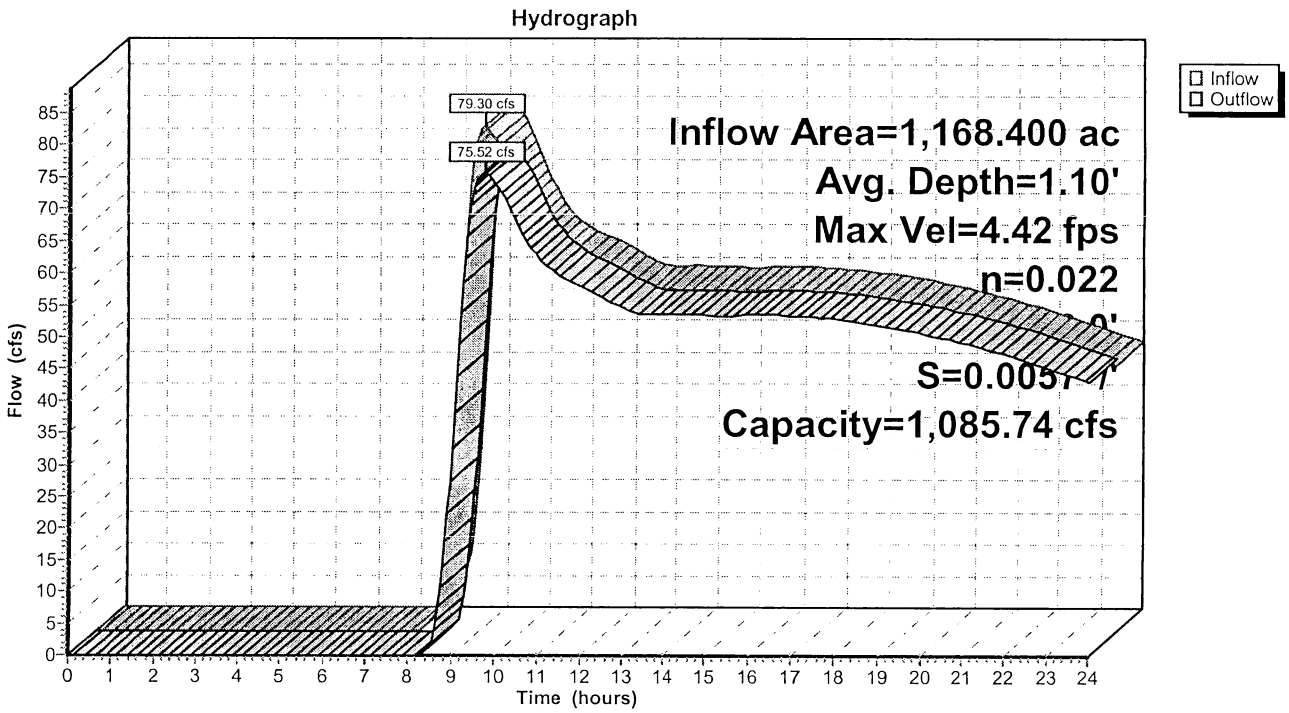
Peak Storage= 81,592 cf @ 9.46 hrs, Average Depth at Peak Storage= 1.10'
Bank-Full Depth= 4.00', Capacity at Bank-Full= 1,085.74 cfs

10.00' x 4.00' deep channel, n= 0.022
Side Slope Z-value= 5.0 '/' Top Width= 50.00'
Length= 4,770.0' Slope= 0.0057 '/'
Inlet Invert= 2,120.50', Outlet Invert= 2,093.30'



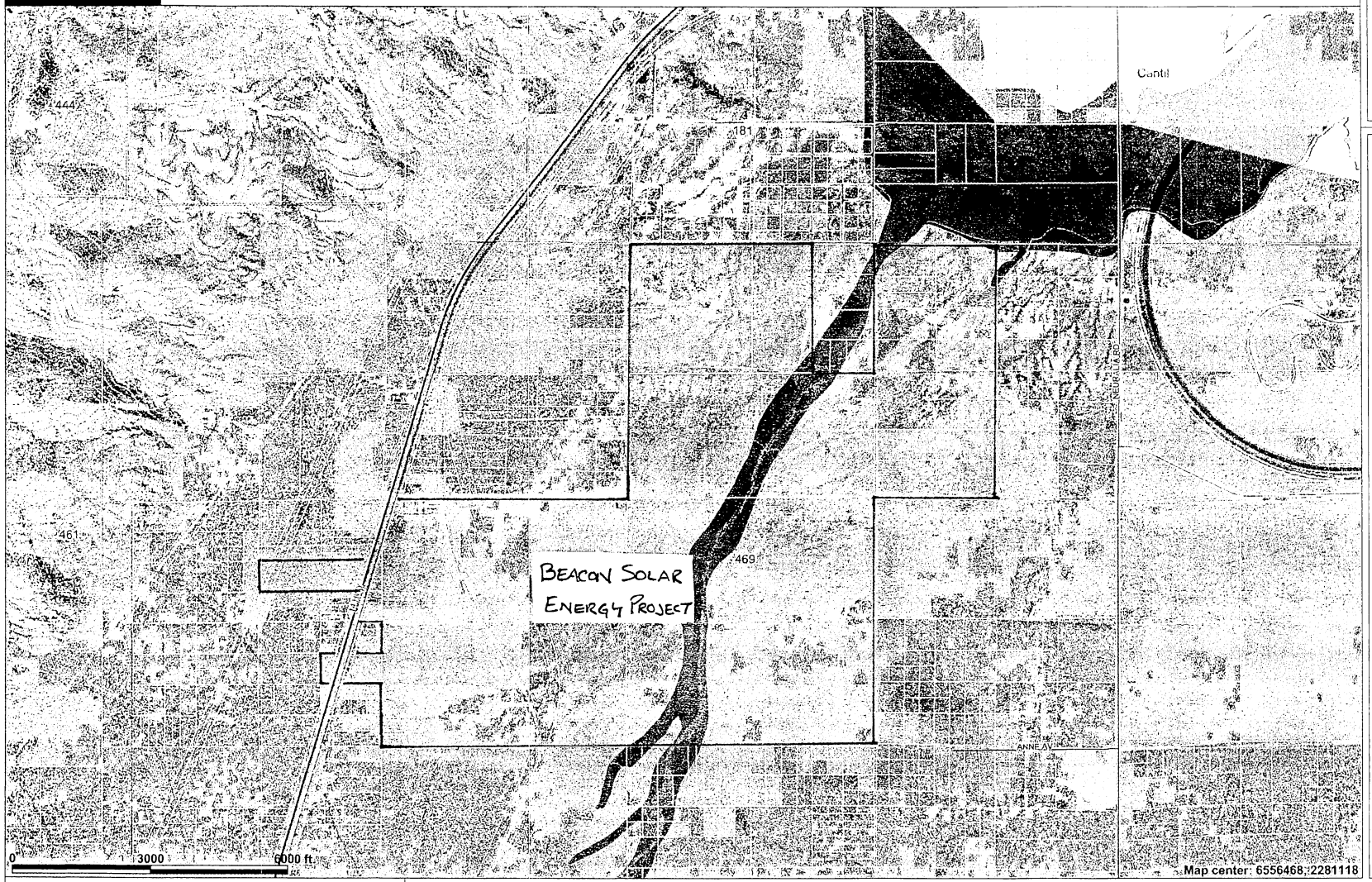
‡

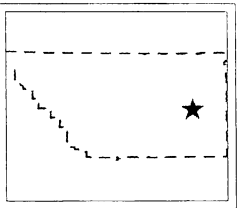
Reach 7R: Thru Shed D to Dry Wash



VIII. APPENDIX C: REFERENCES

Kern County Online Mapping





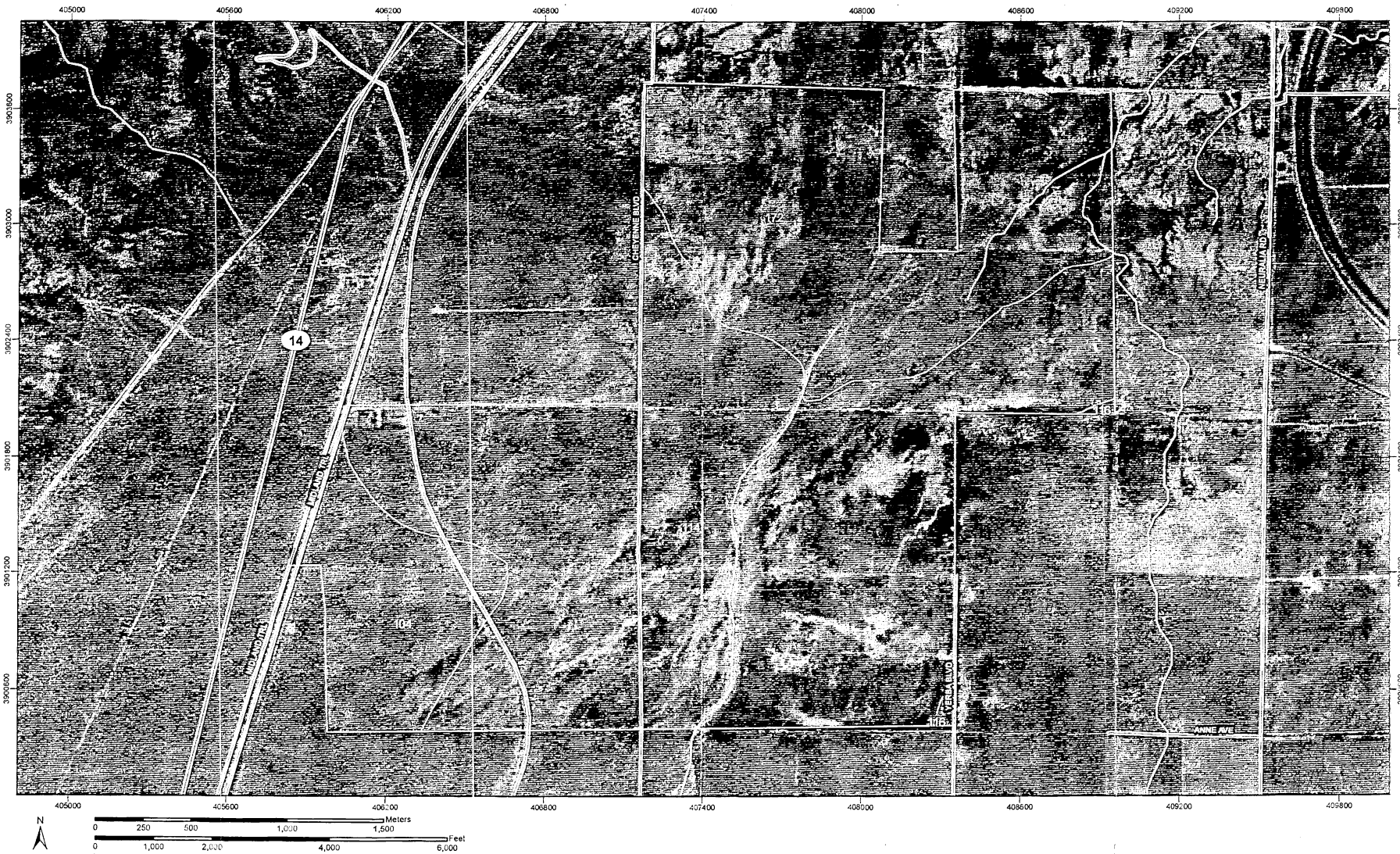
Legend

- Flood_Warning_Gage
- Hwy Symbols
  - California State
  - Interstate
  - US Route
- 100 ft Contours
- Roads
  - Arterial
  - Collector
  - Highway
  - Local
  - Ramp
  - Unpaved
- Railroads
- County of Kern
- Assessment Parcels
- Water Bodies
- Water Course
- Dry Lakes
- Assessor Map Books
- Spheres of Influence Cities
- Isabella_Failure_Innundation
  - Less than 2.6 hrs
  - 2.6 - 5.0 hrs
  - 5.0 - 7.3 hrs
  - 7.3 - 9.7 hrs
  - 9.7 - 12.1 hrs
  - 12.1 - 14.5 hrs
  - 14.5 - 16.9 hrs
  - 16.9 - 19.2 hrs

Scale: 1:25,438

This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

146


405000
405600
406200
406800
407400
408000
408600
409200
409800
3903600
3903000
3902400
3901800
3901200
3900600
14
CHEYENNE BLVD
ANNE AVE
N
0 250 500 1,000 1,500 Meters
0 1,000 2,000 4,000 6,000 Feet

147

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Special Point Features

- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

- Gully
- Short Steep Slope
- Other

Political Features

Municipalities

- Cities
- Urban Areas

Water Features

- Oceans
- Streams and Canals

Transportation

- Rails

Roads

- Interstate Highways
- US Routes
- State Highways
- Local Roads
- Other Roads

MAP INFORMATION

Original soil survey map sheets were prepared at publication scale. Viewing scale and printing scale, however, may vary from the original. Please rely on the bar scale on each map sheet for proper map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kern County, California, Southeastern Part
Survey Area Data: Version 3, Jan 9, 2007

Date(s) aerial images were photographed: 5/28/1994

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

148

Map Unit Legend

Kern County, California, Southeastern Part (CA670)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
104	ARIZO GRAVELLY LOAMY SAND, 2 TO 9 PERCENT SLOPES	228.9	10.0%
114	CAJON LOAMY SAND, 0 TO 5 PERCENT SLOPES	1,390.6	61.0%
116	CAJON GRAVELLY LOAMY SAND, 0 TO 9 PERCENT SLOPES	6.0	0.3%
172	ROSAMOND CLAY LOAM, SALINE-ALKALI	653.6	28.7%
Totals for Area of Interest (AOI)		2,279.1	100.0%

TABLE 14.--SOIL AND WATER FEATURES

[See text for definitions of terms. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that the data were not estimated]

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
100*:							
Alko	D	>60	---	5-14	Rippable	High	Low.
Neuralia	C	>60	---	---	---	High	Low.
101 Anaheim Variant	B	24-35	Rippable	---	---	High	Low.
102, 103 Anaverde	B	>60	---	---	---	Moderate	Low.
104 Arizo	A	>60	---	---	---	Moderate	Low.
105 Arujo	B	40-60	Rippable	---	---	Moderate	Low.
106*, 107*, 108*:							
Arujo	B	40-60	Rippable	---	---	Moderate	Low.
Friant	D	6-20	Rippable	---	---	Moderate	Moderate.
Tunis	D	10-20	Rippable	---	---	Moderate	Low.
109, 110, 111 Arvin	B	>60	---	---	---	Moderate	Low.
112*:							
Badland.							
Orthents.							
113, 114 Cajon	A	>60	---	---	---	Moderate	Low.
115 Cajon	B	>60	---	---	---	High	High.
116 Cajon	A	>60	---	---	---	Moderate	Low.
117*:							
Cajon	B	>60	---	---	---	Moderate	Low.
Garlock	B	>60	---	---	---	High	Low.
118*:							
Chanac	B	>60	---	---	---	High	Low.
Badland.							
119*, 120*:							
Chanac	B	>60	---	---	---	High	Low.
Pleito	C	>60	---	---	---	High	Low.
121 Chino Variant	D	>60	---	---	---	High	Low.
122, 123 Cibo	D	24-36	Hard	---	---	High	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
124---------- Cinco	A	>60	---	---	---	Moderate----	Low.
125---------- DeStazo	B	>60	---	---	---	High--------	Low.
126---------- DeStazo	B	>60	---	---	---	High--------	Low.
127---------- DiGiorgio	B	>60	---	---	---	High--------	Low.
128*. Dumps							
129, 130, 131, 132---------- Edmundston	B	40-60	Rippable	---	---	Moderate----	Moderate.
133*, 134*:							
Edmundston-------	B	40-60	Rippable	---	---	Moderate----	Moderate.
Godde----------	D	10-20	Hard	---	---	Moderate----	Moderate.
Tollhouse--------	D	10-20	Rippable	---	---	Low---------	Moderate.
135*. Fluvents							
136---------- Friant	D	6-20	Rippable	---	---	Moderate----	Moderate.
137---------- Garlock	B	>60	---	---	---	High--------	Low.
138*:							
Godde----------	D	10-20	Hard	---	---	Moderate----	Moderate.
Tollhouse--------	D	5-15	Rippable	---	---	Low---------	Moderate.
139*. Haploxerolls							
140, 141, 142, 143---------- Havala	B	>60	---	---	---	High--------	Low.
144, 145, 146----- Hesperia	B	>60	---	---	---	High--------	Low.
147---------- Hi Vista	C	20-40	Hard	---	---	High--------	Low.
148---------- Jawbone	D	4-12	Rippable	---	---	Moderate----	Low.
149---------- Los Osos Variant	C	25-40	Hard	---	---	High--------	Low.
150---------- Muroc	D	20-30	Rippable	8-20	Rippable	High--------	Low.
151*:							
Muroc----------	D	20-30	Rippable	8-20	Rippable	High--------	Low.
Randsburg--------	D	8-20	Rippable	---	---	High--------	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
152*, 153*-------- Nacimiento	C	20-40	Rippable	---	---	High--------	Low.
154---------- Neuralia	C	>60	---	---	---	High--------	Low.
155*:							
Norob----------	C	>60	---	---	---	High--------	Moderate.
Neuralia---------	C	>60	---	---	---	High--------	Low.
156*:							
Pajuela----------	B	>60	---	---	---	Moderate----	Low.
Whitewolf--------	A	>60	---	---	---	High--------	Low.
157*. Pits							
158*. Playas							
159, 160---------- Pleito	C	>60	---	---	---	High--------	Low.
161*, 162*:							
Pleito----------	C	>60	---	---	---	High--------	Low.
Chanac----------	B	>60	---	---	---	High--------	Low.
163, 164---------- Porterville	D	>60	---	---	---	High--------	Low.
165*:							
Psamments.							
Xerolls.							
166*. Quarries							
167---------- Randsburg	D	8-20	Rippable	---	---	High--------	Low.
168, 169---------- Rescue Variant	C	>40	---	---	---	Moderate----	Low.
170*. Rock outcrop							
171, 172---------- Rosamond	C	>60	---	---	---	High--------	Low.
173---------- Rosamond Variant	B	>60	---	---	---	High--------	Low.
174---------- Steuber	B	>60	---	---	---	High--------	Low.
175, 176, 177----- Steuber	B	>60	---	---	---	High--------	Low.
178*:							
Sween Variant----	C	24-40	Hard	---	---	High--------	Low.
Rock outcrop.							

See footnote at end of table.

104—Arizo gravelly loamy sand, 2 to 9 percent slopes. This soil is very deep, excessively drained, and gently to moderately sloping. It is on alluvial fans and plains. It formed in mixed alluvium derived from granitic rock. Areas are irregular in shape and range from 60 to 3,000 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 2,500 to 4,000 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 63 degrees F. The average frost-free season ranges from 200 to 225 days.

Typically, the surface layer is very pale brown gravelly loamy sand about 3 inches thick. The underlying material to a depth of 65 inches is very pale brown very gravelly loamy coarse sand.

Included with this soil in mapping are areas of Cajon soils that make up about 15 percent of the unit. Near Jawbone Canyon there are a few areas of included soils similar to Arizo but which are calcareous throughout or are very stratified. Also included are a few areas that are dissected by many shallow channels. The soil in these areas is coarser.

Permeability of this Arizo soil is very rapid, and available water capacity is very low or low. Surface runoff is very slow, and the hazard of erosion and soil blowing is high. The effective rooting depth is 60 inches or more. Flooding occurs whenever rainfall is intense. Floods are usually of short duration.

Areas of this soil are used for recreation, wildlife habitat, and occasional grazing.

This soil is poorly suited for rangeland. The major limitations are low available water capacity, low annual precipitation, and lack of livestock water. Forage production is generally low. Indian ricegrass and desert needlegrass are the main forage plants. During favorable precipitation years, filaree may produce abundant quantities of high quality forage. Excessive surface disturbance of this soil can result in excessive soil blowing.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 200 pounds during unfavorable years. The range site is Gravelly Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

114—Cajon loamy sand, 0 to 5 percent slopes. This soil is very deep, somewhat excessively drained, and nearly level to gently sloping. It is on alluvial fans and plains. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 60 to 20,000 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs with a few Joshua trees (fig. 8). Elevation ranges from 2,500 to 3,500 feet. The mean annual precipitation is dominantly between 4 and 6 inches but is as much as 12 inches along the eastern base of the Tehachapi Mountains. The mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is pale brown loamy sand about 4 inches thick. The underlying material to a depth of 20 inches is light yellowish brown loamy sand. Below that, it is stratified light yellowish brown gravelly loamy sand and gravelly sandy loam. Gravel content is as much as 20 percent by volume. Reaction is mildly or moderately alkaline throughout.

Included with this soil in mapping are small areas of Arizo, Garlock, Neuralia, and DeStazo soils. These areas make up 20 percent of the unit. Also included are a few areas of Cajon gravelly loamy sand.

116—Cajon gravelly loamy sand, 0 to 9 percent slopes. This soil is very deep, excessively drained, nearly level to moderately sloping. It is on alluvial fans and plains. It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 200 to 1,500 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,000 to 3,500 feet. The mean annual precipitation is dominantly between 4 and 6 inches but is as much as 12 inches along the eastern base of the Tehachapi Mountains. The mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is pale brown and yellowish brown gravelly loamy sand about 36 inches thick. Gravel content ranges from 15 to 30 percent. The underlying material is light yellowish brown gravelly sand and gravelly fine sand. Gravel content ranges from 15 to 35 percent by volume.

Included with this soil in mapping are areas of Arizo soils and areas of Garlock soils. The Arizo soils make up about 10 percent of the unit, and the Garlock soils 5 percent.

Permeability of this Cajon soil is rapid, and available water capacity is very low or low. Surface runoff is slow, and the hazard of erosion and soil blowing is high. The effective rooting depth is 60 inches or more.

Areas of this soil are used for rangeland, recreation, and homesites. A few small areas are used for irrigated crops and pasture.

This soil is poorly suited to rangeland. Limitations are low available water capacity and the coarse surface texture. Forage production is low. Desert needlegrass and filaree are the major forage plants. Forage production is quite variable. In areas of high precipitation yields may be greater and more reliable than in drier areas. In years when precipitation is exceptionally favorable, annual grasses and filaree may produce abundant forage. Major browse species are white bursage and winterfat. Excessive disturbance of this soil can result in severe wind erosion.

This soil is suited to homesite development. Rapid permeability and the hazard of soil blowing are the main limitations. During construction, no larger an area should be disturbed than necessary, and disturbed areas should be reseeded as soon as possible to prevent soil blowing. Effluent from septic tank filter fields can contaminate gound water. Water supplies should be located a sufficient distance from leach fields. Because of the limited amount of precipitation and low or very low available water capacity, landscape plants should be watered frequently.

The estimated total annual forage production is 200 pounds per acre during favorable years, 150 pounds during normal years, and 100 pounds during unfavorable years. The range site is Gravelly Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

148—Jawbone gravelly loamy sand, 15 to 75 percent slopes. This shallow, excessively drained, hilly to very steep soil is on mountainous uplands. It formed in residual material weathered from granitic rock. Areas are irregular in shape and range from 1,700 to 6,500 acres in size. The vegetation is mainly annual grasses, forbs, shrubs, and scattered conifers. Elevation dominantly ranges from 3,000 to 4,000 feet. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 175 to 225 days.

Typically, the surface layer is a light yellowish brown gravelly loamy sand about 10 inches thick. Below this is highly weathered granite. In some places the surface layer is gravelly loamy coarse sand.

Included with this soil in mapping are small areas of Arizo, Cinco, and Hi Vista soils. These included areas make up about 20 percent of the unit. Also included are a few areas of rock outcrop and Jawbone soils on gently or moderately sloping ridgetops.

Permeability of this Jawbone soil is rapid, and available water capacity is very low. Surface runoff is rapid to very rapid, and the hazard of erosion is high or very high. The effective rooting depth is 4 to 12 inches.

Areas of this soil are used for rangeland and watershed.

This soil is poorly suited for rangeland. The shallow depth to bedrock, steep slopes, high or very high hazard of erosion, and very low available water capacity are the main soil limitations. Steep escarpments limit livestock distribution and excessive disturbance or overgrazing may result in a severe erosion problem. Forage production is low and livestock water is lacking. Fencing and the development of livestock water facilities will help to obtain proper livestock distribution. Winterfat, spiny hopsage, and junipers dominate the vegetation. Indian ricegrass, red brome, and filaree are the main forage plants. Rotation grazing may be beneficial to increase the amount of desert needlegrass and to control erosion.

The estimated total annual forage production is 1,000 pounds per acre during favorable years, 500 pounds during normal years, and 200 pounds during unfavorable years. The range site is Shallow Gravelly Loamy (29).

This soil is in capability subclass VIIe (29), nonirrigated.

172—Rosamond clay loam, saline-alkali. This very deep, well drained, nearly level soil is on alluvial plains. It formed in alluvial material derived from granitic rock. Slope ranges from 0 to 2 percent. Areas are irregular in shape and range from 2,000 to 3,500 acres in size. The vegetation is mainly shrubs and scattered annual grasses and forbs. Elevation ranges from 2,000 to 2,900 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is brown sandy loam about 2 inches thick. The underlying material to a depth of 12 inches is pale brown clay loam. Below that, to a depth of 60 inches, it is pale brown loam with thin layers of fine sandy loam and silt loam. This soil has an excessive amount of salts and sodium.

Included with this soil in mapping are small areas of Arizo, Cajon, and Rosamond soils that contain less salt and sodium. These included areas make up about 10 percent of the unit.

Permeability of this Rosamond soil is moderately slow, and the available water capacity is low to very low. Surface runoff is medium, and the hazard of erosion is moderate or high. The hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for rangeland, recreation, and wildlife habitat. A few places are used for homesites.

This soil is poorly suited for rangeland. It is limited for this use mainly by the saline-alkali conditions. Low annual precipitation and lack of available livestock water is also a problem. Forage production is low and limited to salt-tolerant species. The main plant community is allscale, alkali blite, and iodine bush. Excessive disturbance of this soil through overgrazing can result in severe wind erosion. Onsite evaluation is needed to determine feasibility for water development.

The nearness of Edwards Air Force Base has resulted in construction of houses on this soil. The hazard of erosion, saline-alkali conditions, moderately slow permeability, and moderate shrink-swell potentials are the main limitations for homesites. These limitations can cause failures or problems with foundations, septic tank absorption fields, sanitary landfields, and home gardening and landscaping. Soil limitations can be improved or corrected for homesites, however, by the use of proper design and installation procedures. Suitability of this soil for a particular urban use can be determined by onsite evaluation.

The estimated total annual forage production is 500 pounds per acre during favorable years, 300 pounds during normal years, and 200 pounds during unfavorable years. The range site is Alkali Flats (30).

This soil is in capability subclass VIIs (30), nonirrigated.

Permeability of this Cajon soil is rapid, and available ater capacity is low or moderate. Surface runoff is ow, and the hazard of erosion is slight. The hazard of oil blowing is high. The effective rooting depth is 60 ches or more.

Areas of this soil are mainly used for irrigated crops nd pasture. Alfalfa is the main crop. Areas not ltivated are used for desert range, recreation, and ildlife habitat. Some areas are used for homesites.

This soil is suited to most irrigated crops grown in the ea. The hazard of soil blowing and low available water apacity are the main limitations. Maintaining a plant over, utilizing all crop residues, and limiting tillage can elp to maintain or improve organic matter content and event soil blowing. Sprinkler type irrigation systems are est suited to this soil. Irrigation water should be applied a rate sufficient for maximum production but in mounts small enough to avoid excessive fertilizer loss, noff, or deep percolation.

This soil is poorly suited for rangeland. Major nitations are the low or moderate available water apacity and coarse surface texture. Excessive disturbance of this soil can result in severe wind erosion. Native forage production is low in quantity but high in quality. Desert needlegrass, Indian ricegrass, winterfat, shadscale, and white bursage are the main forage and browse plants. In years when precipitation is favorable, filaree and annual grasses produce abundant forage.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 150 pounds during unfavorable years. The range site is Sandy (30). Forage production is quite variable. In areas of high precipitation yields are more reliable and may be double those in drier areas.

This soil is suited to urban development. Rapid permeability and the hazard of soil blowing are the main limitations. During construction, no larger an area should be disturbed than is necessary. Disturbed areas should be reseeded as soon as possible to prevent soil blowing. Effluent from septic tank filter fields can contaminate ground water. Water supplies should be located a sufficient distance from leach fields.

This soil is in capability subclass VIIe (30), nonirrigated, and capability unit IVe-4 (30), irrigated.

Table 2-2a.—Runoff curve numbers for urban areas[1]

Cover description		Curve numbers for hydrologic soil group—			
Cover type and hydrologic condition	Average percent impervious area[2]	A	B	C	D
Fully developed urban areas (vegetation established)					
Open space (lawns, parks, golf courses, cemeteries, etc.)[3]:					
Poor condition (grass cover < 50%)		68	79	86	89
Fair condition (grass cover 50% to 75%)		49	69	79	84
Good condition (grass cover > 75%)		39	61	74	80
Impervious areas:					
Paved parking lots, roofs, driveways, etc. (excluding right-of-way)		98	98	98	98
Streets and roads:					
Paved; curbs and storm sewers (excluding right-of-way)		98	98	98	98
Paved; open ditches (including right-of-way)		83	89	92	93
Gravel (including right-of-way)		76	85	89	91
Dirt (including right-of-way)		72	82	87	89
Western desert urban areas:					
Natural desert landscaping (pervious areas only)[4]		63	77	85	88
Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-inch sand or gravel mulch and basin borders)		96	96	96	96
Urban districts:					
Commercial and business	85	89	92	94	95
Industrial	72	81	88	91	93
Residential districts by average lot size:					
1/8 acre or less (town houses)	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
2 acres	12	46	65	77	82
Developing urban areas					
Newly graded areas (pervious areas only, no vegetation)[5]		77	86	91	94
Idle lands (CN's are determined using cover types similar to those in table 2-2c).					

[1]Average runoff condition, and $I_a = 0.2S$.
[2]The average percent impervious area shown was used to develop the composite CN's. Other assumptions are as follows: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. CN's for other combinations of conditions may be computed using figure 2-3 or 2-4.
[3]CN's shown are equivalent to those of pasture. Composite CN's may be computed for other combinations of open space cover type.
[4]Composite CN's for natural desert landscaping should be computed using figures 2-3 or 2-4 based on the impervious area percentage (CN = 98) and the pervious area CN. The pervious area CN's are assumed equivalent to desert shrub in poor hydrologic condition.
[5]Composite CN's to use for the design of temporary measures during grading and construction should be computed using figure 2-3 or 2-4, based on the degree of development (impervious area percentage) and the CN's for the newly graded pervious areas.

Table 2-2d.—Runoff curve numbers for arid and semiarid rangelands[1]

Cover description		Curve numbers for hydrologic soil group—			
Cover type	Hydrologic condition[2]	A[3]	B	C	D
Herbaceous—mixture of grass, weeds, and low-growing brush, with brush the minor element.	Poor		80	87	93
	Fair		71	81	89
	Good		62	74	85
Oak-aspen—mountain brush mixture of oak brush, aspen, mountain mahogany, bitter brush, maple, and other brush.	Poor		66	74	79
	Fair		48	57	63
	Good		30	41	48
Pinyon-juniper—pinyon, juniper, or both; grass understory.	Poor		75	85	89
	Fair		58	73	80
	Good		41	61	7[illegible]
Sagebrush with grass understory.	Poor		67	80	85
	Fair		51	63	70
	Good		35	47	55
Desert shrub—major plants include saltbush, greasewood, creosotebush, blackbrush, bursage, palo verde, mesquite, and cactus.	Poor	63	77	85	88
	Fair	55	72	81	86
	Good	49	68	79	84

[1]Average runoff condition, and $I_a = 0.2S$. For range in humid regions, use table 2-2c.

[2]*Poor:* <30% ground cover (litter, grass, and brush overstory).
Fair: 30 to 70% ground cover.
Good: >70% ground cover.

[3]Curve numbers for group A have been developed only for desert shrub.

APPENDIX II

EQUATIONS FOR CURVES AND FIGURES

Figure C-6: Infiltration Rate For Pervious Areas Versus SCS Curve Numbers

CN	Fp
20	1.00
25	1.00
30	0.985
35	0.96
40	0.92
45	0.87
50	0.82
55	0.76
60	0.70
65	0.63
70	0.55
75	0.47
80	0.38
85	0.29
90	0.20
95	0.10
98	0.00
73	0.502
81	0.362
83	0.3260
86	0.272
87	0.254

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

California 35.212 N 117.937 W 2326 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Fri Oct 19 2007

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Help | Docs | U.S. Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.08	0.13	0.16	0.21	0.26	0.36	0.44	0.58	0.72	0.90	0.96	1.07	1.17	1.29	1.48	1.72	1.98	2.18
2	0.11	0.16	0.20	0.27	0.34	0.47	0.57	0.75	0.94	~~1.18~~	1.27	1.43	1.57	1.73	2.00	2.33	2.71	2.97
5	0.15	0.23	0.29	0.39	0.48	0.65	0.78	1.02	1.28	1.64	1.77	2.04	2.25	2.47	2.88	3.37	4.02	4.42
10	0.19	0.29	0.36	0.48	0.60	0.80	0.94	1.24	1.54	1.97	2.13	2.50	2.76	3.02	3.51	4.11	5.00	5.51
25	0.25	0.38	0.48	0.64	0.79	1.02	1.19	1.56	1.90	2.42	2.62	3.13	3.45	3.74	4.33	5.07	6.32	7.01
50	0.31	0.47	0.58	0.78	0.96	1.22	1.39	1.81	2.17	~~2.77~~	2.98	3.62	3.99	4.30	4.95	5.80	7.36	8.19
100	0.37	0.56	0.69	0.94	1.16	1.44	1.62	2.08	2.46	~~3.12~~	3.36	4.14	4.56	4.88	5.57	6.53	8.44	9.44
200	0.44	0.67	0.82	1.11	1.37	1.68	1.86	2.38	2.76	3.48	3.75	4.68	5.14	5.46	6.19	7.26	9.55	10.73
500	0.54	0.83	1.02	1.38	1.71	2.04	2.23	2.82	3.19	3.96	4.26	5.42	5.95	6.25	7.01	8.22	11.08	12.53
1000	0.63	0.96	1.19	1.60	1.98	2.35	2.53	3.19	3.54	4.34	4.66	6.01	6.58	6.87	7.63	8.95	12.28	13.96

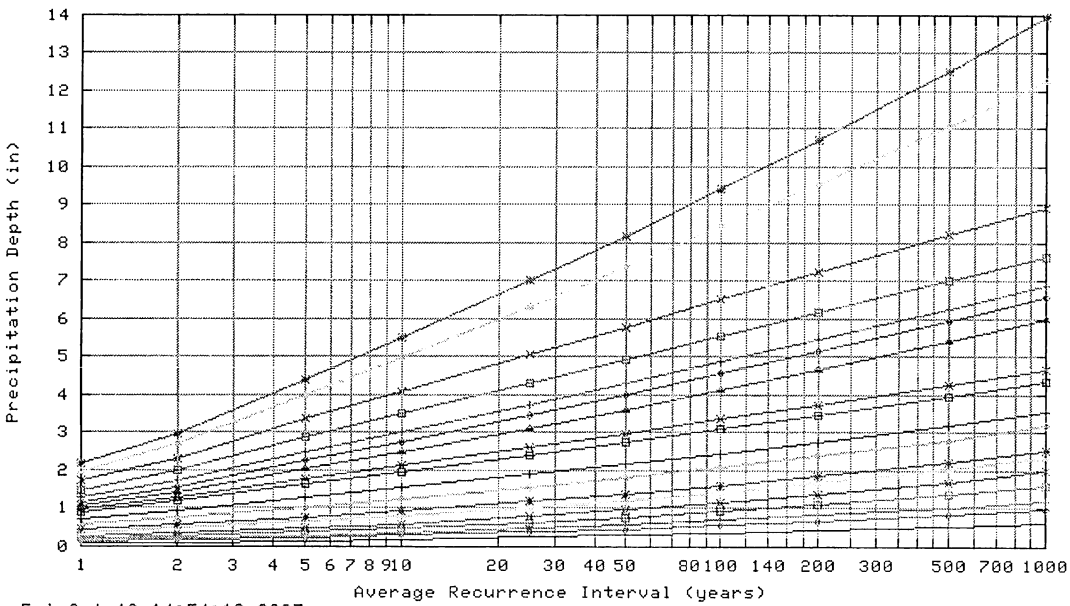
10YR 24HR = 1.97"

10YR 5-DAY = 2.59"

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

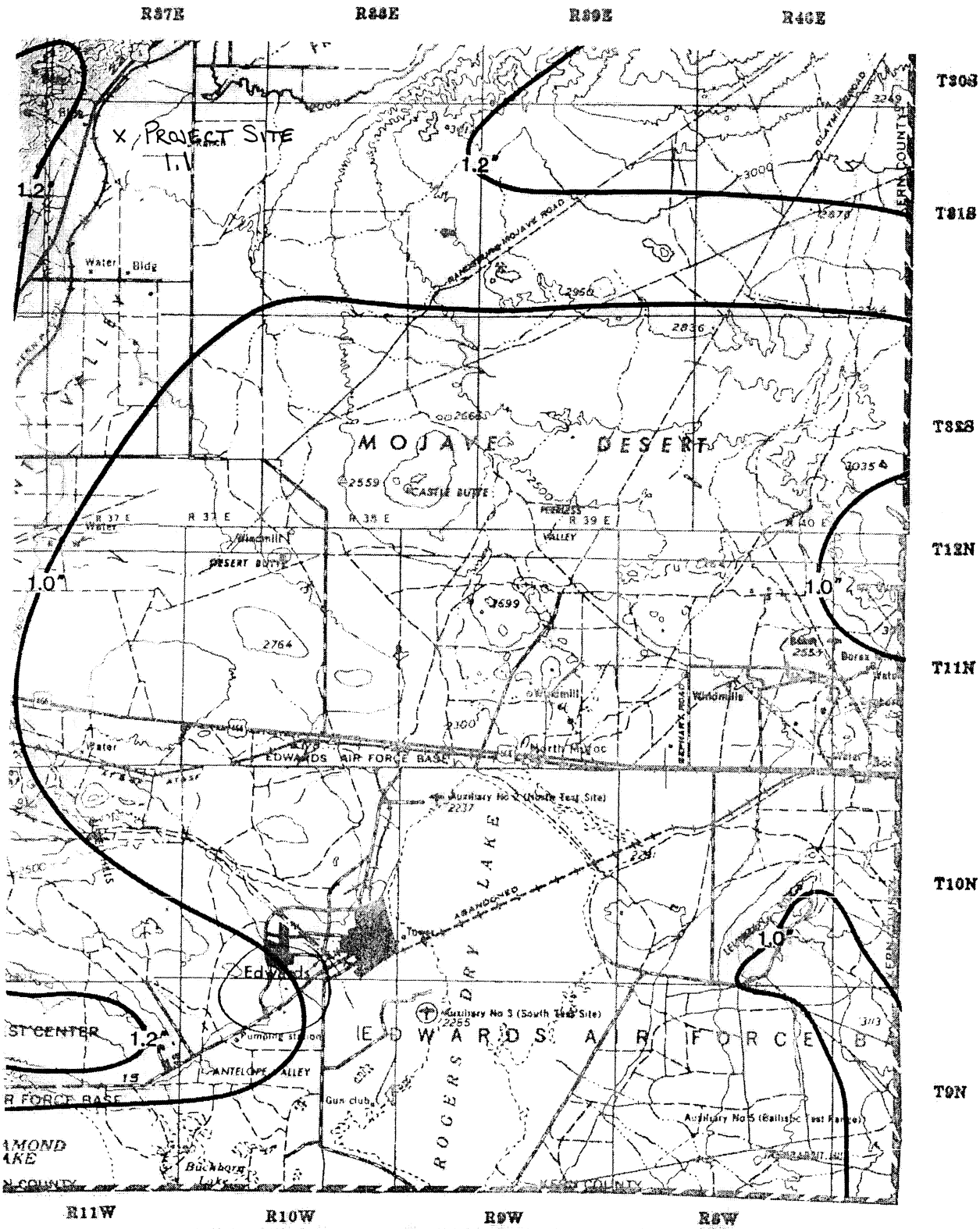
Partial duration based Point Precipitation Frequency Estimates Version: 4
35.212 N 117.937 W 2326 ft



Fri Oct 19 14:54:19 2007

Duration			
5-min	[illegible]	48-hr	30-day
10-min	3-hr	4-day	[illegible]
15-min	6-hr	7-day	60-day
30-min	12-hr	10-day	
60-min	24-hr	20-day	

160



KERN COUNTY HYDROLOGY MANUAL

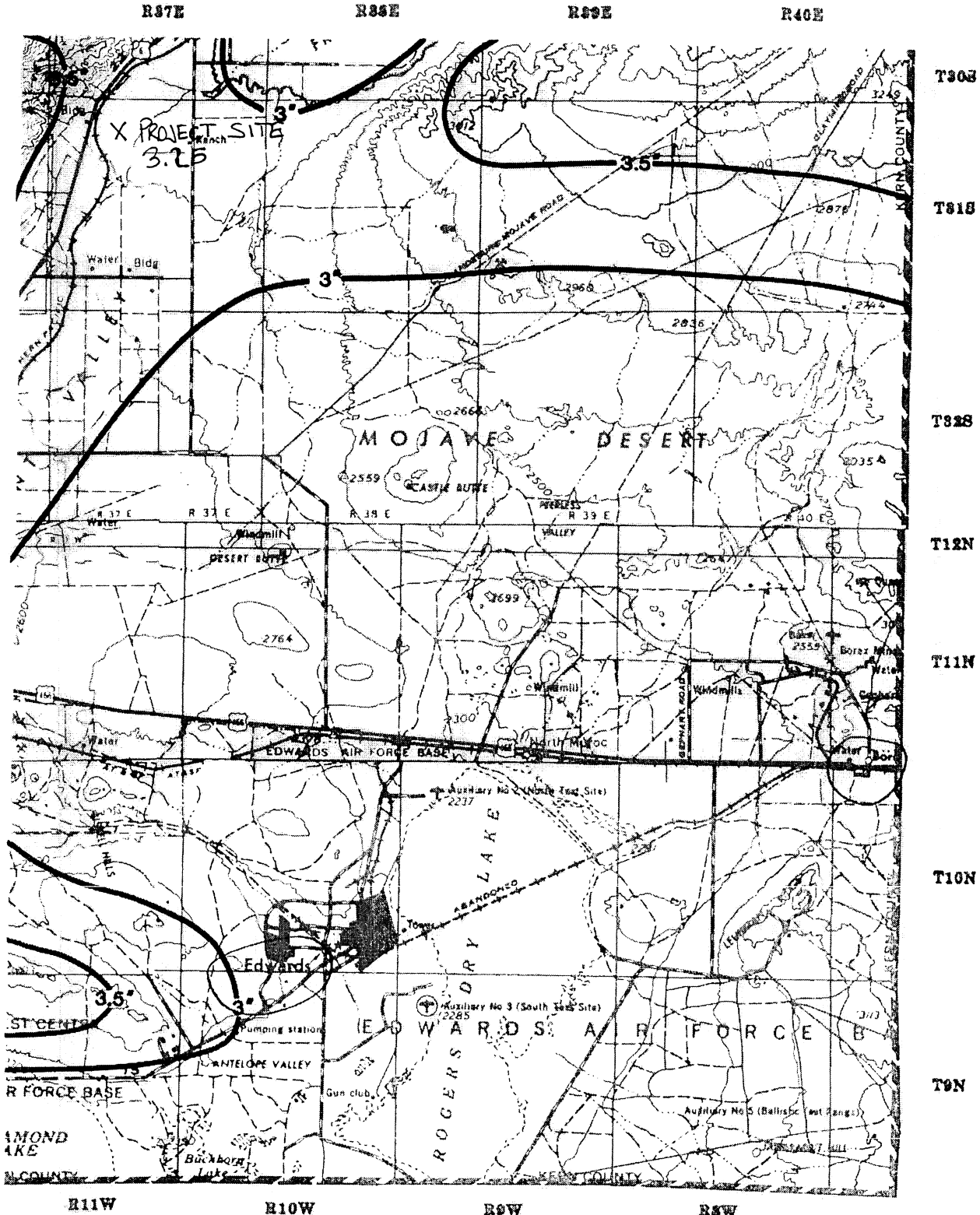
RAINFALL ISOHYET MAP

APPROXIMATE SCALE
1" = 4 miles

——— 2-Year, 24-Hour Isohyet

NORTH

FIGURE B- 22



KERN COUNTY HYDROLOGY MANUAL

RAINFALL ISOHYET MAP

APPROXIMATE SCALE
1"=4 miles

100-Year, 24-Hour Isohyet

NORTH

FIGURE B-55

IX. APPENDIX D: HYDRAULICS

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (*continued*)

Type of channel and description	Minimum	Normal	Maximum
C. EXCAVATED OR DREDGED			
a. Earth, straight and uniform			
1. Clean, recently completed	0.016	0.018	0.020
2. Clean, after weathering	0.018	0.022	0.025
3. Gravel, uniform section, clean	0.022	0.025	0.030
4. With short grass, few weeds	0.022	0.027	0.033
b. Earth, winding and sluggish			
1. No vegetation	0.023	0.025	0.030
2. Grass, some weeds	0.025	0.030	0.033
3. Dense weeds or aquatic plants in deep channels	0.030	0.035	0.040
4. Earth bottom and rubble sides	0.028	0.030	0.035
5. Stony bottom and weedy banks	0.025	0.035	0.040
6. Cobble bottom and clean sides	0.030	0.040	0.050
c. Dragline-excavated or dredged			
1. No vegetation	0.025	0.028	0.033
2. Light brush on banks	0.035	0.050	0.060
d. Rock cuts			
1. Smooth and uniform	0.025	0.035	0.040
2. Jagged and irregular	0.035	0.040	0.050
e. Channels not maintained, weeds and brush uncut			
1. Dense weeds, high as flow depth	0.050	0.080	0.120
2. Clean bottom, brush on sides	0.040	0.050	0.080
3. Same, highest stage of flow	0.045	0.070	0.110
4. Dense brush, high stage	0.080	0.100	0.140
D. NATURAL STREAMS			
D-1. Minor streams (top width at flood stage <100 ft)			
a. Streams on plain			
1. Clean, straight, full stage, no rifts or deep pools	0.025	0.030	0.033
2. Same as above, but more stones and weeds	0.030	0.035	0.040
3. Clean, winding, some pools and shoals	0.033	0.040	0.045
4. Same as above, but some weeds and stones	0.035	0.045	0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040	0.048	0.055
6. Same as 4, but more stones	0.045	0.050	0.060
7. Sluggish reaches, weedy, deep pools	0.050	0.070	0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbrush	0.075	0.100	0.150

TABLE 5-6. VALUES OF THE ROUGHNESS COEFFICIENT n (*continued*)

Type of channel and description	Minimum	Normal	Maximum
b. Mountain streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages			
1. Bottom: gravels, cobbles, and few boulders	0.030	0.040	0.050
2. Bottom: cobbles with large boulders	0.040	0.050	0.070
D-2. Flood plains			
a. Pasture, no brush			
1. Short grass	0.025	0.030	0.035
2. High grass	0.030	0.035	0.050
b. Cultivated areas			
1. No crop	0.020	0.030	0.040
2. Mature row crops	0.025	0.035	0.045
3. Mature field crops	0.030	0.040	0.050
c. Brush			
1. Scattered brush, heavy weeds	0.035	0.050	0.070
2. Light brush and trees, in winter	0.035	0.050	0.060
3. Light brush and trees, in summer	0.040	0.060	0.080
4. Medium to dense brush, in winter	0.045	0.070	0.110
5. Medium to dense brush, in summer	0.070	0.100	0.160
d. Trees			
1. Dense willows, summer, straight	0.110	0.150	0.200
2. Cleared land with tree stumps, no sprouts	0.030	0.040	0.050
3. Same as above, but with heavy growth of sprouts	0.050	0.060	0.080
4. Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080	0.100	0.120
5. Same as above, but with flood stage reaching branches	0.100	0.120	0.160
D-3. Major streams (top width at flood stage >100 ft). The n value is less than that for minor streams of similar description, because banks offer less effective resistance.			
a. Regular section with no boulders or brush	0.025	.....	0.060
b. Irregular and rough section	0.035	.....	0.100

FROM KERN COUNTY FLOOD INSURANCE STUDY, 1995

Table 3. Summary of Roughness Coefficients

Flooding Source	Range of "n" Values: Channel	Range of "n" Values: Overbank
Region 1		
Little Dixie Wash (Lower Reach)	0.025-0.035	0.025-0.045
South El Poso Wash	0.030-0.035	0.040-0.045
North El Poso Wash	0.030-0.035	0.040-0.045
South Ridgecrest Wash	0.030	0.040
North Ridgecrest Wash	0.030	0.040
Calvert Wash	0.030	0.040
Boron Avenue	0.025-0.049	0.030-0.085
Twenty Mule Team Creek	0.013-0.075	0.016-0.075
Claymine Road	0.025-0.070	0.025-0.070
23 → Jawbone Canyon Wash	0.030-0.049	0.045
Shallow Flooding in Mojave	0.035-0.050	0.035-0.050
Region 2		
Kern River at Kernville	0.036-0.041	0.040-0.065
Kern River at Bakersfield	0.036-0.065	0.035-0.065
South Fork Kern River	0.032-0.055	0.042-0.062
Erskine Creek	0.035-0.070	0.035-0.070
Breckenridge	0.040-0.050	0.040-0.050
Doyle Street	0.010-0.060	0.010-0.060
Ward Street	0.025-0.030	0.025-0.045
Kelso Creek	0.035-0.050	0.035-0.050
Hawthorne	0.012-0.046	0.012-0.046
McFarland, East of State Highway 99	0.025-0.030	0.025-0.045

165

Pine Tree Creek Rerouted Channel S=0.5% 14,000 cfs

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

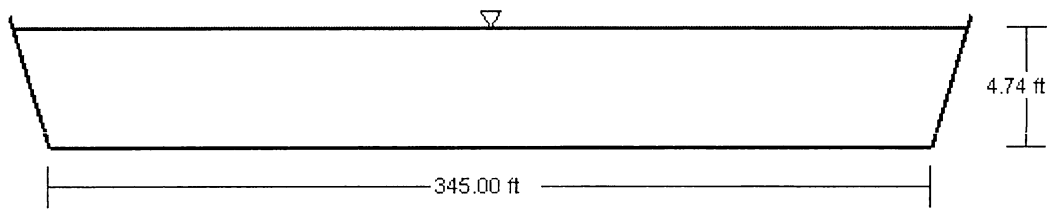
Input Data

Roughness Coefficient	0.035	
Channel Slope	0.00500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	345.00	ft
Discharge	14000.00	ft^3/s

Results

Normal Depth	4.74	ft
Flow Area	1701.46	ft^2
Wetted Perimeter	374.96	ft
Top Width	373.42	ft
Critical Depth	3.67	ft
Critical Slope	0.01174	ft/ft
Velocity	8.23	ft/s
Velocity Head	1.05	ft
Specific Energy	5.79	ft
Froude Number	0.68	
Flow Type	Subcritical	

Cross Section Image



V: 10
H: 1

Pine Tree Creek Rerouted Channel S=0.5% 20,000 cfs

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

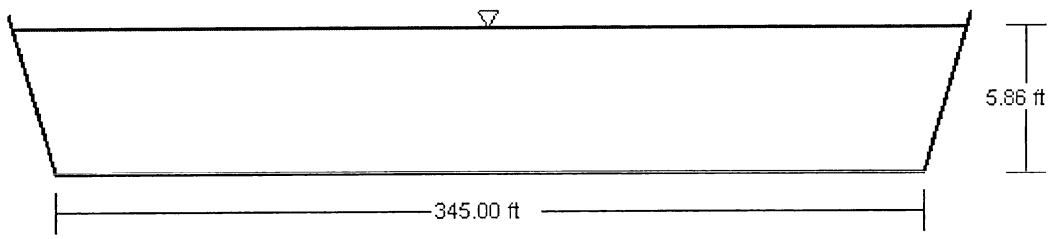
Input Data

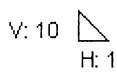
Roughness Coefficient	0.035	
Channel Slope	0.00500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	345.00	ft
Discharge	20000.00	ft^3/s

Results

Normal Depth	5.86	ft
Flow Area	2123.31	ft^2
Wetted Perimeter	382.04	ft
Top Width	380.14	ft
Critical Depth	4.65	ft
Critical Slope	0.01089	ft/ft
Velocity	9.42	ft/s
Velocity Head	1.38	ft
Specific Energy	7.24	ft
Froude Number	0.70	
Flow Type	Subcritical	

Cross Section Image





Pine Tree Creek Rerouted Channel S=1.4% 14,000cfs

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

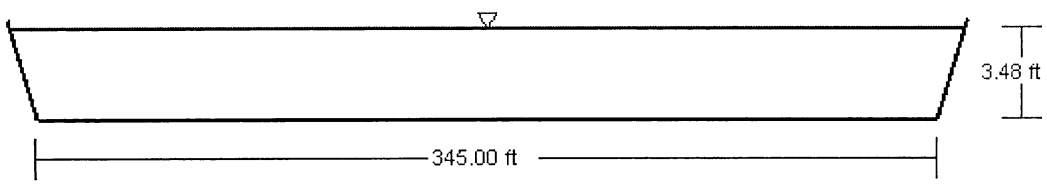
Input Data

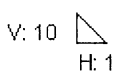
Roughness Coefficient	0.035	
Channel Slope	0.01400	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	345.00	ft
Discharge	14000.00	ft^3/s

Results

Normal Depth	3.48	ft
Flow Area	1238.70	ft^2
Wetted Perimeter	367.04	ft
Top Width	365.91	ft
Critical Depth	3.67	ft
Critical Slope	0.01174	ft/ft
Velocity	11.30	ft/s
Velocity Head	1.99	ft
Specific Energy	5.47	ft
Froude Number	1.08	
Flow Type	Supercritical	

Cross Section Image





Pine Tree Creek Rerouted Channel S=1.4% 20,000cfs

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

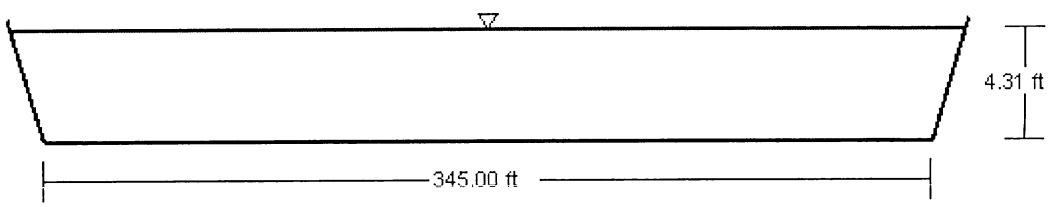
Input Data

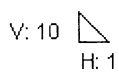
Roughness Coefficient	0.035	
Channel Slope	0.01400	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	3.00	ft/ft (H:V)
Bottom Width	345.00	ft
Discharge	20000.00	ft^3/s

Results

Normal Depth	4.31	ft
Flow Area	1542.99	ft^2
Wetted Perimeter	372.26	ft
Top Width	370.87	ft
Critical Depth	4.65	ft
Critical Slope	0.01089	ft/ft
Velocity	12.96	ft/s
Velocity Head	2.61	ft
Specific Energy	6.92	ft
Froude Number	1.12	
Flow Type	Supercritical	

Cross Section Image





Worksheet for 100 Yr Onsite Channel - SHED A

Project Description

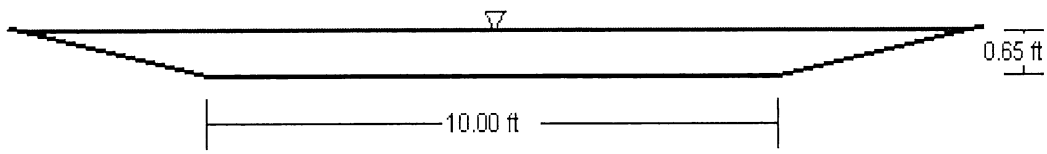
Friction Method	Manning Formula
Solve For	Normal Depth

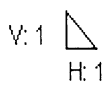
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	26.50	ft^3/s

Results

Normal Depth	0.65	ft
Flow Area	8.60	ft^2
Wetted Perimeter	16.62	ft
Top Width	16.50	ft
Critical Depth	0.55	ft
Critical Slope	0.00929	ft/ft
Velocity	3.08	ft/s
Velocity Head	0.15	ft
Specific Energy	0.80	ft
Froude Number	0.75	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED B

Project Description

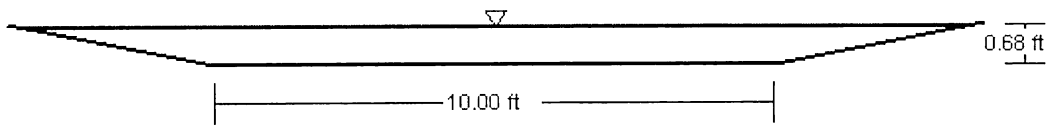
Friction Method	Manning Formula
Solve For	Normal Depth

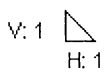
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	28.70	ft^3/s

Results

Normal Depth	0.68	ft
Flow Area	9.09	ft^2
Wetted Perimeter	16.92	ft
Top Width	16.79	ft
Critical Depth	0.57	ft
Critical Slope	0.00916	ft/ft
Velocity	3.16	ft/s
Velocity Head	0.15	ft
Specific Energy	0.83	ft
Froude Number	0.76	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED C

Project Description

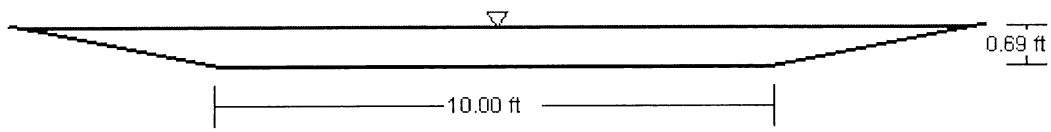
Friction Method	Manning Formula
Solve For	Normal Depth

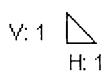
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	29.20	ft^3/s

Results

Normal Depth	0.69	ft
Flow Area	9.20	ft^2
Wetted Perimeter	16.99	ft
Top Width	16.85	ft
Critical Depth	0.58	ft
Critical Slope	0.00914	ft/ft
Velocity	3.17	ft/s
Velocity Head	0.16	ft
Specific Energy	0.84	ft
Froude Number	0.76	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED D

Project Description

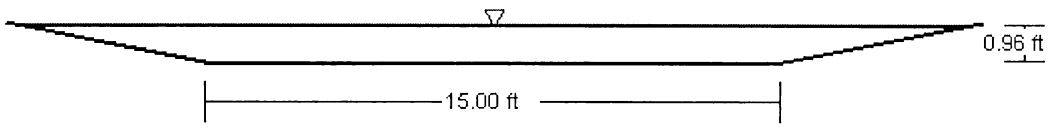
Friction Method	Manning Formula
Solve For	Normal Depth

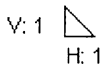
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	15.00	ft
Discharge	75.50	ft^3/s

Results

Normal Depth	0.96	ft
Flow Area	18.91	ft^2
Wetted Perimeter	24.75	ft
Top Width	24.56	ft
Critical Depth	0.84	ft
Critical Slope	0.00807	ft/ft
Velocity	3.99	ft/s
Velocity Head	0.25	ft
Specific Energy	1.20	ft
Froude Number	0.80	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED E

Project Description

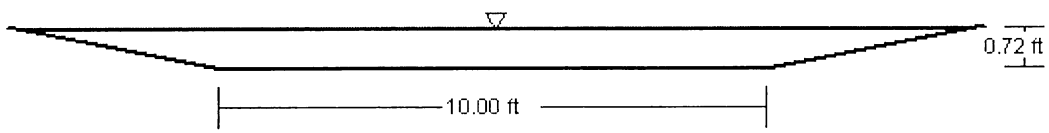
Friction Method	Manning Formula
Solve For	Normal Depth

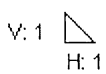
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	32.00	ft^3/s

Results

Normal Depth	0.72	ft
Flow Area	9.81	ft^2
Wetted Perimeter	17.35	ft
Top Width	17.21	ft
Critical Depth	0.61	ft
Critical Slope	0.00900	ft/ft
Velocity	3.26	ft/s
Velocity Head	0.17	ft
Specific Energy	0.89	ft
Froude Number	0.76	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED F

Project Description

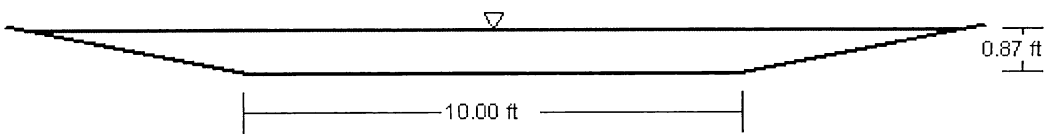
Friction Method	Manning Formula
Solve For	Normal Depth

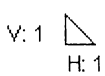
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	45.50	ft^3/s

Results

Normal Depth	0.87	ft
Flow Area	12.53	ft^2
Wetted Perimeter	18.90	ft
Top Width	18.73	ft
Critical Depth	0.76	ft
Critical Slope	0.00849	ft/ft
Velocity	3.63	ft/s
Velocity Head	0.20	ft
Specific Energy	1.08	ft
Froude Number	0.78	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED G

Project Description

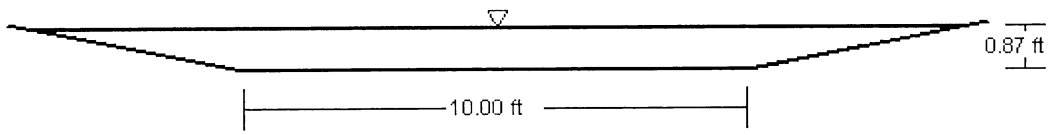
Friction Method	Manning Formula
Solve For	Normal Depth

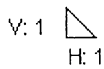
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	44.90	ft^3/s

Results

Normal Depth	0.87	ft
Flow Area	12.42	ft^2
Wetted Perimeter	18.84	ft
Top Width	18.66	ft
Critical Depth	0.75	ft
Critical Slope	0.00851	ft/ft
Velocity	3.62	ft/s
Velocity Head	0.20	ft
Specific Energy	1.07	ft
Froude Number	0.78	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED H

Project Description

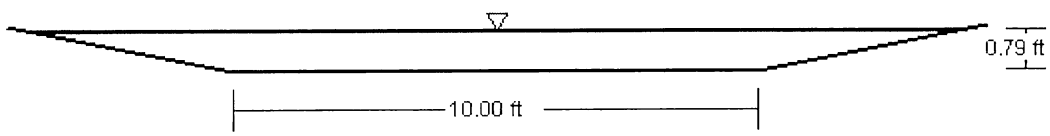
Friction Method	Manning Formula
Solve For	Normal Depth

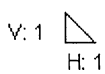
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	38.00	ft^3/s

Results

Normal Depth	0.79	ft
Flow Area	11.04	ft^2
Wetted Perimeter	18.07	ft
Top Width	17.91	ft
Critical Depth	0.68	ft
Critical Slope	0.00874	ft/ft
Velocity	3.44	ft/s
Velocity Head	0.18	ft
Specific Energy	0.98	ft
Froude Number	0.77	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED I

Project Description

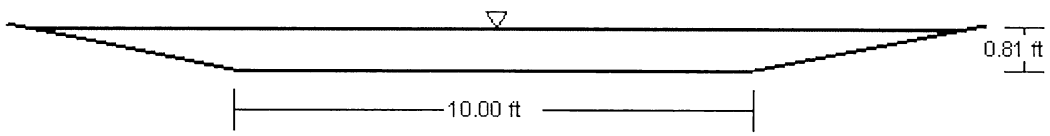
Friction Method	Manning Formula
Solve For	Normal Depth

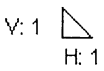
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	39.80	ft^3/s

Results

Normal Depth	0.81	ft
Flow Area	11.41	ft^2
Wetted Perimeter	18.28	ft
Top Width	18.12	ft
Critical Depth	0.70	ft
Critical Slope	0.00868	ft/ft
Velocity	3.49	ft/s
Velocity Head	0.19	ft
Specific Energy	1.00	ft
Froude Number	0.77	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED J

Project Description

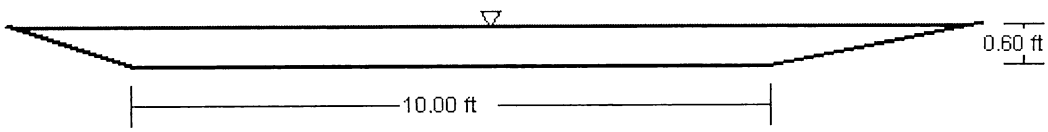
Friction Method	Manning Formula
Solve For	Normal Depth

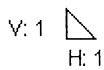
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	3.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	22.20	ft^3/s

Results

Normal Depth	0.60	ft
Flow Area	7.41	ft^2
Wetted Perimeter	14.94	ft
Top Width	14.79	ft
Critical Depth	0.50	ft
Critical Slope	0.00948	ft/ft
Velocity	2.99	ft/s
Velocity Head	0.14	ft
Specific Energy	0.74	ft
Froude Number	0.75	
Flow Type	Subcritical	





Worksheet for 100 Yr Onsite Channel - SHED K

Project Description

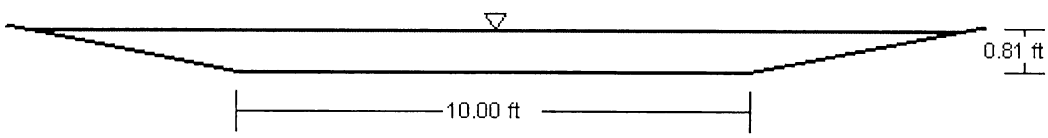
Friction Method	Manning Formula
Solve For	Normal Depth

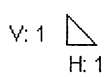
Input Data

Roughness Coefficient	0.022	
Channel Slope	0.00500	ft/ft
Left Side Slope	5.00	ft/ft (H:V)
Right Side Slope	5.00	ft/ft (H:V)
Bottom Width	10.00	ft
Discharge	40.00	ft^3/s

Results

Normal Depth	0.81	ft
Flow Area	11.45	ft^2
Wetted Perimeter	18.30	ft
Top Width	18.14	ft
Critical Depth	0.70	ft
Critical Slope	0.00867	ft/ft
Velocity	3.49	ft/s
Velocity Head	0.19	ft
Specific Energy	1.00	ft
Froude Number	0.77	
Flow Type	Subcritical	





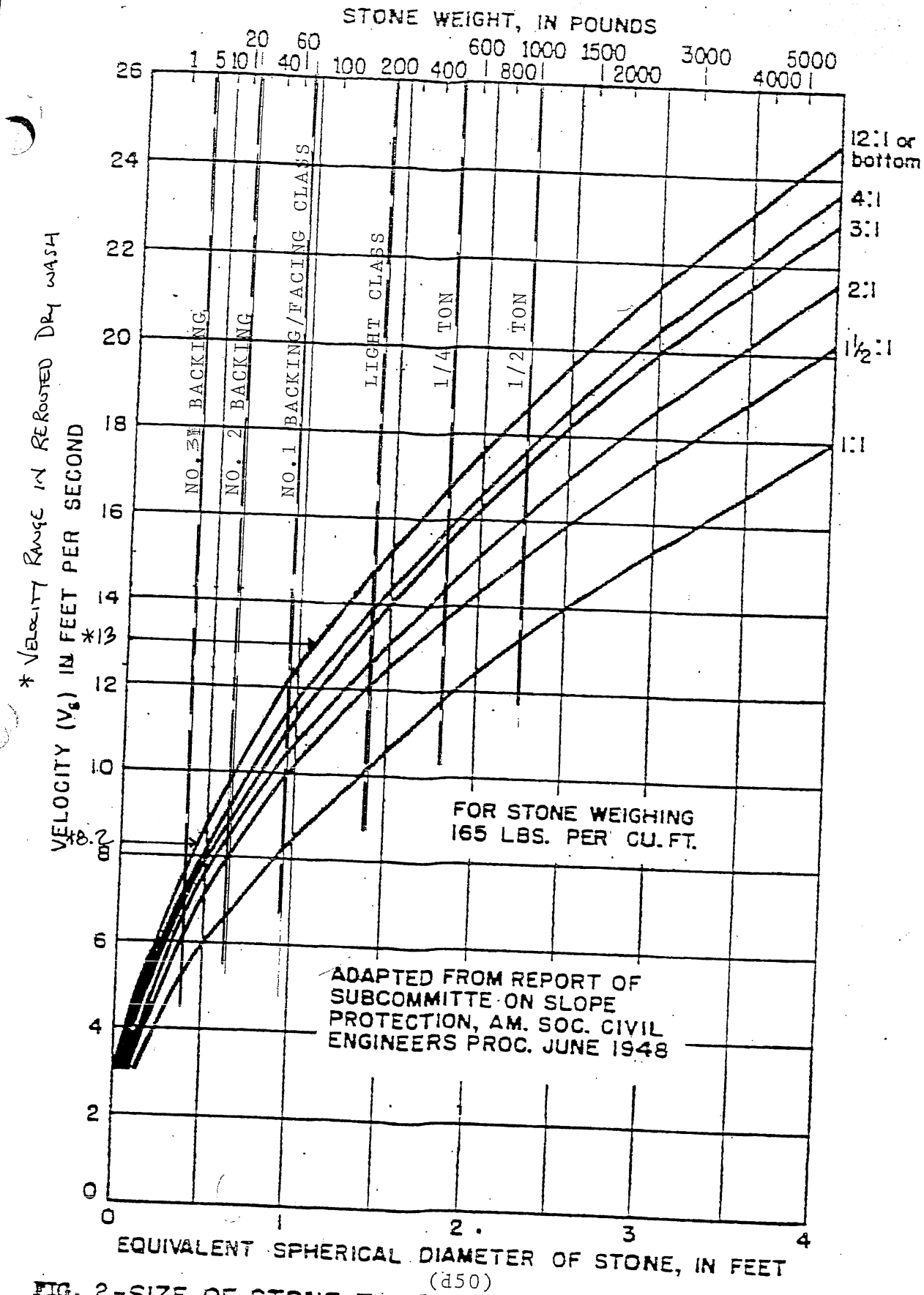
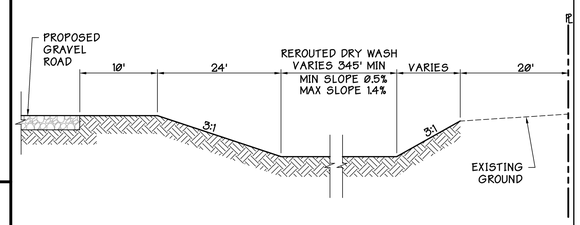


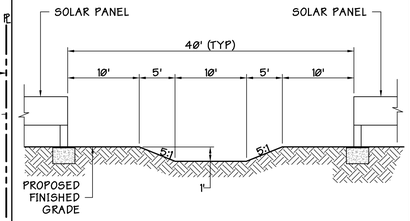
FIG. 2-SIZE OF STONE THAT WILL RESIST DISPLACEMENT FOR VARIOUS VELOCITIES AND SIDE SLOPES

1. Source: Bureau of Public Roads, USE OF RIPRAP FOR BANK PROTECTION
2. Caltrans recommends doubling the velocity before entering Figure 2.
3. Caltrans Standard Specifications relates type of rock to weight.
4. Hydraulic Engineering Circular No. 14 gives 2 d50 for inlets, and 3 d50 for outlets of culverts.



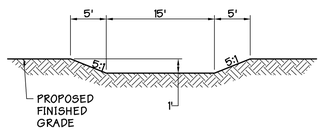
Rerouted Dry Wash

NTS **1**



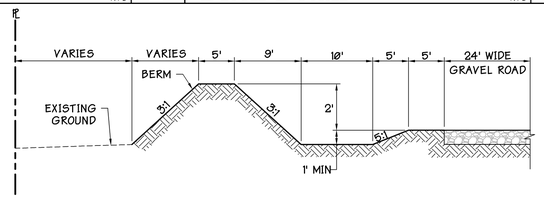
Ditch Detail

NTS **2**



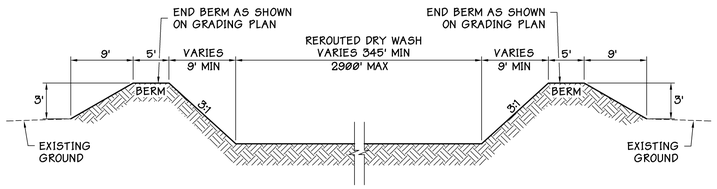
Ditch Detail

NTS **3**



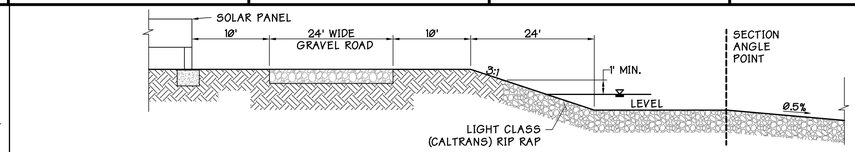
Berm

NTS **4**



Rerouted Dry Wash Channel Outlet

NTS **5**



Ditch Detail

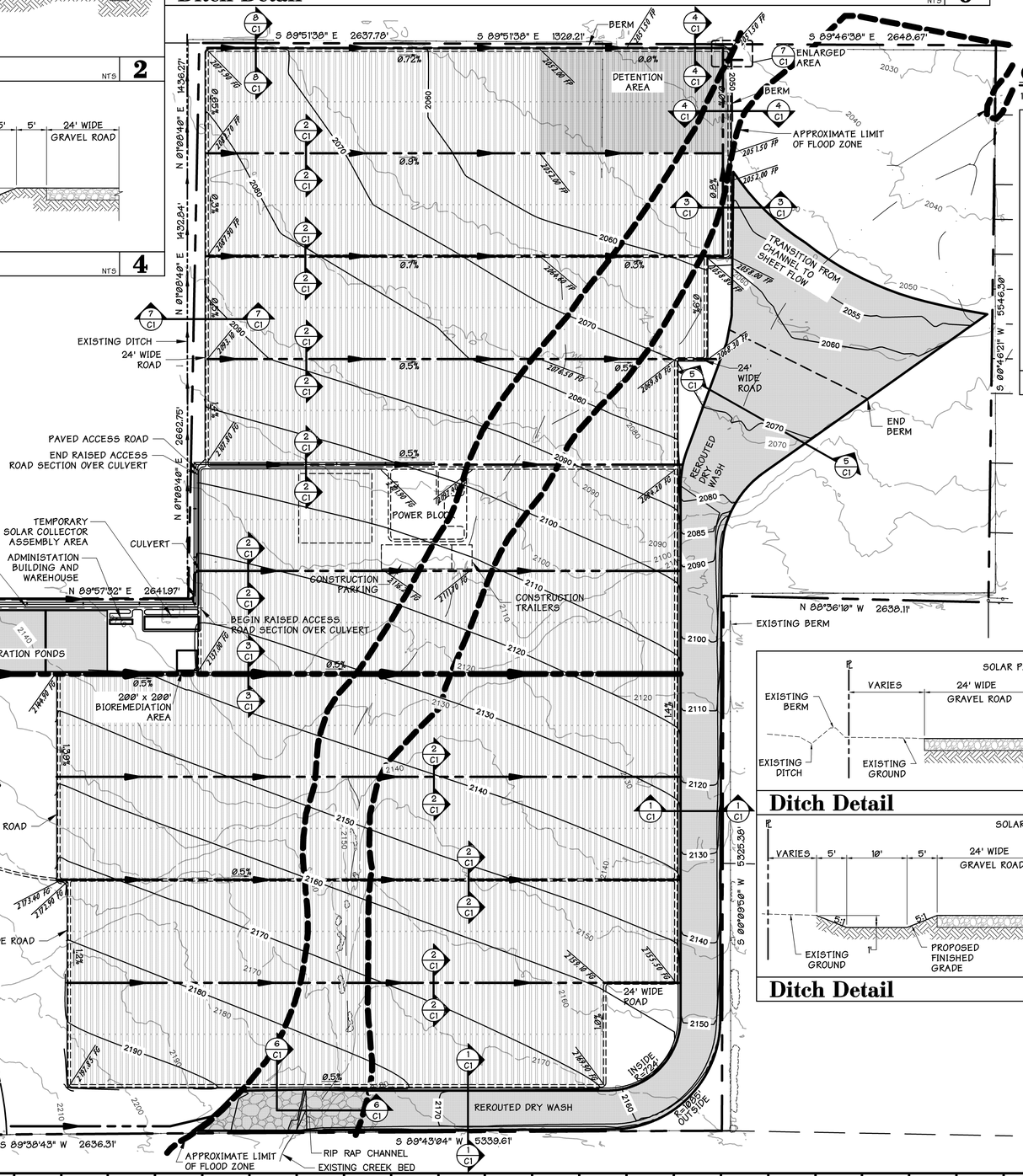
NTS **6**

DATE	CUT (YARDS)	FILL (YARDS)	TOTAL (YARDS)
01-16-2008	5,160,000	4,830,000	330,000 CUT *

* ASSUMES SHRINK OF APPOXIMATELY 7% BASED ON RELATIVE COMPACTION OF 90 PERCENT OF MAXIMUM DENSITY PER ASTM D1577

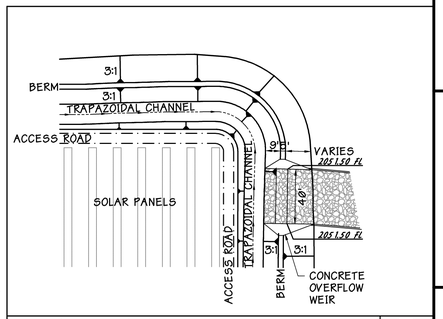
600 0 300 600 1200

1 inch = 600 ft.



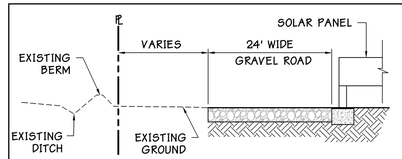
General Notes

1. ALL SLOPES ARE 3:1 UNLESS OTHERWISE SHOWN



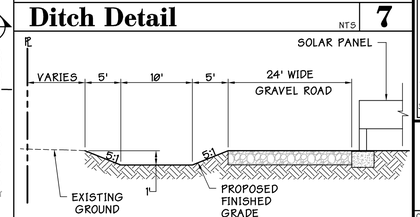
Enlarged Area

NTS **7**



Ditch Detail

NTS **7**



Ditch Detail

NTS **8**

WORKING DRAWING DATE 02/21/2008 REV

PRELIMINARY STATUS LDE	DATE	REPRESENTS GENERAL DESIGN CONCEPTS BASED ON ASSUMPTIONS. REVIEWED NOT CHECKED.
APPROVED STATUS LDE	DATE	REPRESENTS REVIEWED AND APPROVED DESIGN. ANY PORTION MARKED "HOLD" RETAINS PRELIMINARY STATUS.

ORIGINATING PERSONNEL

DRAWN BY: PEM
CHECKED BY: JDT
LEAD DESIGNER: MDH
ENGINEER/TECH SPECIALIST: MDH
PROJECT ENGINEERING MANAGER: GEOFF BAXTER
PROJECT MANAGER:

PROFESSIONAL ENGINEER'S SEAL

ORIGINALLY PREPARED UNDER THE RESPONSIBLE SUPERVISION OF
PE: STATE:
LIC. NO.: DATE:

Zero Harm — Leadership, No Incidents, Safe Behavior

TEAM DRIVEN SOLUTIONS FOR THE BUILT ENVIRONMENT
CARLTON Engineering Inc.
3883 Ponderosa Road, Shingle Springs, CA 95682
Voice 530.677.5515 Fax 530.677.6645

PRELIMINARY NOT FOR CONSTRUCTION

WorleyParsons resources & energy

CLIENT/PROJECT TITLE
BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT

DRAWING TITLE
CONCEPTUAL GRADING PLAN

SHEET NO: C1

SCALE 1" = 600'
DRAWING SIZE ARCH D (24" x 36")
WORLEYPARSONS DWG. NO.
REV A

PROJECT MANAGER
PROJ ENGR MANAGER
LEAD DISC ENGINEER
ENGINEER/TECH. SPEC
LEAD DESIGNER
CHECKED
DRAWN
DATE
REV

FAC PIPING I & C ELECT MECH CIVIL STRUC

21Feb2008 11:59am pmckenna Z:\Worley Parsons\6199-01-07 FRE Project Beacon\Dwg\civil\619901_C1

APPENDIX L.2

Drainage Erosion and Sediment Control Plan

Administrative Draft

BEACON SOLAR ENERGY PROJECT
Construction Drainage, Erosion, and Sediment Control/ Stormwater Pollution Prevention Plan

Prepared for

BEACON ENERGY, LLC

March 2008

WorleyParsons

resources & energy

Stormwater Pollution Prevention Plan

For :

Beacon Solar Energy Project

Grading Permit No. XXXXXXXXX

Building Permit No. XXXXXXXXX

Tract No. XXXXXXXXXX

Prepared for :

Beacon Energy, LLC

Contractor:

Contractor's Company Name-TBD
Address
City, State, Zip
Telephone Number
Contractor's Representative's Name

Project Site Location/Address :

Beacon Solar Energy Project
Cheyenne Road
California City, CA 95955

Contractor's Storm Water Pollution Prevention Manager

SWPPM's Name
Telephone Number

SWPPP Prepared by :

Company Name
Address
City, State, ZIP
Telephone Number
Name and Title of Preparer

SWPPP Preparation Date :

Date

Estimated Project Dates :

Start of Construction : Date **Completion of Construction : Date**

WDID No. : XXXXXXXX

Table of Contents

100 SWPPP Certifications and Approval 1
100.1 Initial SWPPP Certification by Contractor 1
100.2 Owner Approval and Certification of SWPPP 2
100.3 Annual Compliance Certification 3
200 Introduction 4
200.1 Introduction 4
200.2 SWPPP Amendments 4
200.3 Amendment Log 7
300 Introduction and Project Description 9
300.1 Introduction and Project Description 9
300.2 Unique Site Features 9
300.3 Construction Site Estimates 9
300.4 Project Schedule/Water Pollution Control Schedule 10
400 Construction Permitting, NOI letters, etc. 13
500.1 Objectives 14
500.2 Implementation Schedule 15
500.3 Project Activities 15
500.4 Vicinity Map 17
500.5 Pollutant Source Identification and BMP Selection 17
500.6 Water Pollution Control Drawings (WPCDs) 40
500.7 Construction BMP Maintenance, Inspection, and Repair 41
500.8 Post-Construction Stormwater Management 41
500.9 Training 42
500.10 List of Subcontractors 43
500.11 Other Plans/Permits 43
600 Monitoring Program and Reports 46
600.1 Site Inspections 46
600.2 Non-Compliance Reporting 46
600.3 Record Keeping and Reports 47
600.4 Sampling and Analysis Plan for Sediment 47
600.5 Sampling and Analysis Plan for Non-Visible Pollutants 47
600.6 Change of Conditions 54
600.7 Mitigation Monitoring Plan 54
700 References 55

SWPPP Attachments

Attachment A	Vicinity Map
Attachment B	Water Pollution Control Drawings
Attachment C	BMP Consideration Checklist
Attachment D	Computation Sheet for Determining Runoff Coefficients
Attachment E	Computation Sheet for Determining Run-on Coefficients
Attachment F	Notice of Intent (NOI)
Attachment G	Program for Maintenance, Inspection, and Repair of Construction Site BMPs
Attachment H	Storm Water Quality Construction Site Inspection Checklist
Attachment I	Trained Contractor Personnel Log
Attachment J	Subcontractor Notification Letter and Log
Attachment K	Notice of Non-Compliance
Attachment L	SWPPP and Monitoring Program Checklist
Attachment M	Annual Certification of Compliance Form
Attachment N	Other Plans/Permits
Attachment O	Water Pollution Control Cost Breakdown
Attachment P	Notice of Termination (NOT)
Attachment Q	Background and Sampling Activity Log
Attachment R	Construction Material and Pollutant Testing Guidance Table –Non-Visible Pollutants
Attachment S	Discharge Reporting Log

Tables

300.3-1	Project Schedule Major Milestones
300.4.2-1	Anticipated Project Schedule
300.3-1	Construction Site Estimates
300.5-1	Average Monthly Rainfall near the Proposed Project Site
600.5.4.1-1	Potential Non-Visible Pollutant and Water Quality Indicator Constituents
600.5.5.1-1	Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants

Figures

Attachment A	Vicinity Map
500-1	WEB Soils Survey

500.11-1 Beacon Conceptual Grading
500-5.1 Fault Zones 1
500-5.2 Fault Zones 2

Appendix

Appendix A BMP Fact Sheets
Appendix B Post-Construction Program

100 SWPPP Certifications and Approval

100.1 Initial SWPPP Certification by Contractor

Project Name: Beacon Solar Energy Project

Project Number:

Tract No. TBD

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Contractor's Signature	Date
Contractor's Name and Title	Telephone Number

100.2 Owner Approval and Certification of SWPPP

Owner
Approval and Certification of the
Storm Water Pollution Prevention Plan

Project Name: Beacon Solar Electric Project

Project Number:

Tract No. TBD

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Owner Representative Signature	Date
Owner Representative's Name and Title	Telephone Number

100.3 Annual Compliance Certification

By June 15 of each year, the Contractor will submit an Annual Certification of Compliance to the appropriate Regional Water Quality Control Board (RWQCB), stating compliance with the terms and conditions of the National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity and the Storm water Pollution Prevention Plan. The Annual Certification of Compliance Form is included in Attachment M.

200 Introduction

200.1 Introduction

This SWPPP draft is preliminary from the standpoint that the soils reporting on geotechnical issues have been launched but are not yet in the final version. The grading and drainage calculations and drawings are also in conceptual stages with additional work necessary to address detention/ retention areas and protection of adjacent properties as well as rerouting of the wash through the project properties. As these items become final, an erosion control document can be drafted addressing Best Management Practices (BMPs) and containment of discharge runoff for adjacent properties. As these documents are finalized, the Owner or Owner's Authorized Representative shall review and approve all SWPPP documents.

200.2 SWPPP Amendments

When changes to the approved SWPPP are required, the SWPPP Preparer shall prepare and certify an amendment. The Owner or Owner's Authorized Representative shall review and approve all amendments.

This SWPPP will be amended:

- Whenever there is a change in construction or operations that may affect the discharge of pollutants to surface waters or groundwater.
- If any condition of the General Permit is violated or the general objective of reducing or eliminating pollutants in stormwater discharges has not been achieved. If the RWQCB determines that a General Permit violation has occurred, the SWPPP will be amended and implemented within 14 calendar days after notification by the RWQCB.
- Reviewed and amended annually, as needed, prior to the defined rainy season.
- When deemed necessary by Beacon Energy, LLC's Construction Contractor(s).

  The following items will be included in each amendment:

  - The person(s) or agency who requested the amendment
  - The location of proposed change
  - The reason for change
  - The original BMP proposed, if any
  - The new BMP proposed
  - Describe any existing implemented BMP(s).

All SWPPP amendments shall include revised drawings as appropriate.

The amendments for this SWPPP, along with Beacon Energy, LLC's Contractor Certification follow. All Amendments shall be recorded in the SWPPP Amendment Log located in Section 200.2 of the SWPPP.

This SWPPP certification and approval form shall be used as a cover sheet for each amendment.

Cover sheet shall have Project name and number.

The Owner or Owner's Authorized Representative shall sign and date the certification form.

All necessary names shall be printed or legibly displayed along with their telephone numbers.

SWPPP Amendment No.

Project Name: Beacon Solar Electric Project

Project Number: _____

Contractor Certification of the
Stormwater Pollution Prevention Plan Amendment

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Contractor's Signature	Date
Contractor's Name and Title	Telephone Number

Owner/Developer Approval of the
Stormwater Pollution Prevention Plan Amendment

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Owner Representative Signature	Date
Owner Representative Name and Title	Telephone Number

200.3 Amendment Log

Project Name: Beacon Solar Energy Project

Project Number:

Amendment No.	Date	Brief Description of Amendment	Prepared By

200.3.1 Amendment Log Example

Amendment No.	Date	Brief Description of Amendment	Prepared By
001	Dec 21, 2006	Grading schedule changed to begin on Feb 10, 2009, and will include additional 2 acres. Amended plans attached to SWPPP	John Doe, Superintendent

200.3.2 Plan Availability

A copy of the SWPPP shall be maintained at the construction site during construction activity and be available to operating personnel. The SWPPP will be provided to the RWQCB upon request, is available to the public under Section 308(b) of the Clean Water Act, and will be made available to the public by the RWQCB upon request.

300 Introduction and Project Description

300.1 Introduction and Project Description

The proposed site is located approximately four miles north-northwest of California City's northern boundary, at an altitude of 2,220 - 2,025 feet (above mean-sea-level) decreasing from southwest to northeast. The Beacon Electric Solar Project is located in Kern County, in the Fremont Valley, on approximately 2,012 acres adjacent to Highway 14 (Midland Trail). The project included construction of a solar power plant which will generate approximately 250 Mega Watts of power using solar panels. In conjunction with the power plant, an administration building, warehouse and a paved access road from Highway 14 (Midland Trail) to the central power block will be constructed. An evaporation pond is planned in the western portion of the site.

Site Groundwater will be used for the power plant cooling system. The groundwater supply appears to be capable to support the project given that there are 13 wells reported on the site and that several of the wells can reportedly pump upwards of 1, 000 gallons per minute.

The project design includes construction of a small package sewage showers and toilet. Sewage sludge will be removed from site by a sanitary service. Recycled water will be used in local landscaping.

300.2 Unique Site Features

There is a mapped State-designated Alquist-Priolo Earthquake Fault Zone (AP zone) roughly coincident with the wash that runs down the approximate center of the CCSP site and the preliminary site plan shows the power block and evaporation pond within this fault zone. This fault is thought to be the active Cantil Valley fault (also known as Garlock West because it is part of the Garlock fault system); the Garlock East fault (also an AP zone) extends a short distance to the west of the CCSP site, with a finger of the zone extending into the northwestern portion of the site.

300.3 Construction Site Estimates

Table 300.3-1 lists estimates of the construction site:

TABLE 300.3-1
Construction Site Estimates

Construction site area	2,012 acres
Percentage impervious area before construction	0 *
Runoff coefficient before construction	0.01
Percentage impervious area after construction	0.15
Runoff coefficient after construction	0.15
Anticipated stormwater run-on for 10-year 6-hour storm	63.38 cfs

cfs = cubic feet per second, assuming I = 1/6 of total depth for a 10yr-6hr storm = 1.24in / 6hr = 0.21 in/hr. Rational Method,

Stormwater runoff at the site is predominantly sheet flow from the west out of the mountains to the northeast, eventually discharging into the dry lake bed (playa).

With exception of the power block areas, site development will maintain controlled collection of ditch flow exiting to the relocated channel and then offsite in an area very similar in location and manner as the undeveloped discharge.

To protect the power block from floods, a western diversion ditch flooding, the final grade will be slightly elevated. The diversions ditches and evaporation areas will be designed to pass flow from a 100 year storm event to prevent damage project facilities; the design will also include in its calculations stormwater run-on to the site.

Paved access roads will be protected from floods via ditches, culverts and local fords with reinforced concrete shoulders. Overall the project is being designed to maintain, to the extent possible, the existing sheet flow patterns on the site.

300.4 Project Schedule/Water Pollution Control Schedule

Beacon Energy, LLC's Contractor will mobilize and develop temporary construction facilities and lay down areas adjacent to the power block. Temporary facilities will include:

- 20 single-wide full-length trailer offices or equivalent
- Chemical toilets
- Parking for 400 vehicles
- 10 Tool sheds/containers
- Equipment parking for 40 pieces of construction equipment
- Construction material lay down area 400 feet by 800 feet
- Site equipment lay down area 400 feet by 1000 feet
- Batch plant (outside plant entrance gate).

The Contractor will perform clearing and grubbing of the construction areas via two scrapers or equivalent. Clearing and grubbing at the site area will last 4-5 months. Areas cleared and grubbed will be smoothed by earthwork equipment, possibly a grader or similar pieces of equipment, and select areas will be compacted with vibrating rollers.

300.4.1 Power Block, Administration Buildings, and Transmission Towers

Concrete, mechanical and electrical works will be performed over a period of 30 months, with the aid of graders, rollers, front loaders, dump trucks, trenching machines, concrete mixer and pump trucks, cranes, and pick-ups.

Some of the above areas may impinge on areas intended for the later stages of site erection. As site erection nears completion in the power block area, temporary construction mobilization areas will be reduced as required. Site equipment and materials lay down areas will be rotated through the site, on the quadrants currently being assembled.

Miscellaneous non-vehicle motorized equipment will also be used over the length of the job, such as vibrators, welding machines, etc.

300.4.2 Anticipated Project Schedule

Table 300.4.2-1 lists the anticipated project schedule and will be updated and supplemented by the Contractor. The rainy season in this region of California is defined as December 1 through March 1. 1.

TABLE 300.4.2-1
Anticipated Project Schedule-Pre-Construction

Activity	Approximate Date/Timeframe
Mobilization	March 3, 2009
Delineate and mark the boundaries of the construction zone.	March 25, 2009
Review BMP EC-1 and make adjustments if required. Install SE-1(silt fence) per manufacturer's instructions & align per Drawing SWPPP 1-2. Install SE-2 (check dams) per Drawing SWPPP 1-2.	April 3, 2009

TABLE 300.4.2-1
Anticipated Project Schedule-Start Grading Activities

Activity	Approximate Date/Timeframe
Site Construction	
Grading Mobilization	April 3, 2009
Review BMPs SE-1 & SE-2; Clear & Grub - Strip topsoil. Rough grade site, access roads, construction lay down areas, parking areas, etc. Stabilize construction entrance/exit and roadway (BMPs SE-3 thru SE-4, TC-1 &TC-2). Implement BMP EC-1.	April 2009– May 1, 2009
Establish parking and staging areas for vehicle and equipment storage, maintenance, and fueling in accordance with BMPs NS-8, NS-9, and NS-10. Implement BMPs EC-2, EC-3, EC-4 & EC-5. Build north Basin.	
Establish lay down area(s) for materials storage/staging in accordance with BMPs WM-1 through WM-6 and NS-12 & NS-14.	
Build Basin #2 and grade power block and switchyard areas.	
Review BMPs SE-1 & SE-2; Build basins #3 & #4. Review BMP EC-1. Implement BMP SE-5.	
Establish concrete washout area in accordance with BMPs WM-8, NS-12 and NS-14. Establish tire wash in accordance with BMP TC-3.	
Build out tire wash in accordance with BMP TC-3. Implement BMPs SE-5, TC-3, NS-6 & NS-7, working into recurring items list on BMP EC-1.	
Finish installation and implementation of BMP EC-6. Review EC-1 for errors and omissions.	
Verify that at least a minimum of 2 inches of erosion control	

Anticipated Project Schedule-Start Grading Activities

Activity	Approximate Date/Timeframe
stone was placed on disturbed areas.	
Establish tire wash in accordance with BMP TC-3 if needed.	
Establish Wind Erosion Control Bmps, WE-1and NS-1.	
Implement BMP SE-5, WM-8, WM-9, & WM10.	
Pave and or repave areas on site and off site. Implement BMPs NS-3 with recurring items list.	

TABLE 300. 4.2-1

Anticipated Project Schedule-Post -Construction

Activity	Approximate Date/Timeframe
Defined later	(Later)

300.5 Hydrology

The Beacon Electrical Solar Project will be located in the eastern Kern County, in the Central Valley South geographical region of the state. The project site is situated in Kern County approximately 0.3 miles to the east of Hwy-14 (Midland Trail), a primary north-south travel route connecting I-395 with Highway 58 outside of California City, CA. The site is approximately four miles north of the California City and 70 miles east of Bakersfield.

The approximate average monthly precipitation from 1971 to 2000 is shown in Table 300.5-1. Most of the precipitation in the project area falls during December through March. The rainfall for a 100-year 24-hour event is 3.25 inches and 2.08 inches for a 6-hour event; a 10-year 24-hour event is 1.97 inches and 1.24 inches for a 6-hour event (Source: NOAA Atlas 14). Average annual precipitation at the project site from 1971 to 2000 was 4.73 inches.

TABLE 300.5-1

Average Monthly Rainfall Inyokern, CA, near the Proposed Project Site (1971 to 2000)

Precipitation	Total	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	4.73	0.89	1.11	0.81	0.19	0.10	0.02	0.12	0.34	0.25	0.07	0.28	0.55
Maximum	25.71	4.55	4.58	3.77	1.05	0.79	0.20	1.51	2.91	1.71	0.71	1.60	2.34
Minimum	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

400 Construction Permitting, NOI letters, etc.

Not obtained at this time.

500 Body of SWPPP

500.1 Objectives

This Storm Water Pollution Plan (SWPPP) has six main objectives:

- Identify all pollutant sources, including sources of sediment that may affect the quality of storm water discharges associated with the construction activity (storm water discharges) from the construction site, and
- Identify non-storm water discharges, and
- Identify, construct, implement in accordance with a time schedule, and maintain Best Management Practices(BMPs) to reduce or eliminate pollutants in storm water discharges and authorized non-storm water discharges from the construction site during construction, and
- Develop a maintenance schedule for BMPs installed during construction designed to reduce or eliminate pollutants after construction is completed (post-construction BMPs).
- Identify a sampling and analysis strategy and sampling schedule for discharges from construction activity which discharge directly into water bodies listed on Attachment 3 of the Permit (Clean Water Act Section 303(d) [303(d)] Water Bodies listed for Sedimentation).
- For all construction activity, identifying a sampling and analysis strategy and sampling schedule for discharges that have been discovered through visual monitoring to be potentially contaminated by pollutants not visually detectable in runoff.

This SWPPP conforms to the required elements of the General Permit No. CAS 000002 issued by the State of California, State Water Resources Control Board (SWRCB). This SWPPP will be modified and amended to reflect any amendments to the Permit or any changes in construction or operations that may affect the discharge of pollutants from the construction site to surface waters, groundwater, or the municipal separate storm sewer system (MS4). The SWPPP will also be amended if it is in violation of any condition of the Permit or has not achieved the general objective of reducing pollutants in storm water discharges. The SWPPP shall be readily available on-site for the duration of the project.

This Stormwater Pollution Prevention Plan[1] (SWPPP) was developed to address the new construction activity associated with the Beacon Solar Energy Project (BSEP).

The construction activity does not discharge directly to a water body listed as impaired for sedimentation/siltation or turbidity under the Clean Water Act Section 303(d); therefore, a sampling and analysis strategy for turbidity or settable solids will not be established. Section 600 provides a sampling strategy for non-visible pollutants for background only, or as it becomes necessary.

Once a final design has been established, the selected Contractor will prepare site maps showing the construction project in detail. Site conditions, including paved areas, buildings, lots and roadways, general topography and drainage patterns for stormwater collection will be shown for the following phases of construction:

- **Existing Site Topography**—A plan showing existing site topography and drainage will be prepared.

- **Conceptual Rough Grading**—A plan with figures for interim grading and erosion control will be prepared. It will show the temporary onsite drainage patterns to be established by the grading of the project site, as well as any necessary erosion control features.
- **Stabilized Site**—A detailed finish grading and drainage plan with figures will be prepared showing the final conditions of the site as constructed.
- **Finished Project**—A conceptual image of the completed Beacon Solar Energy Project.

500.2 Implementation Schedule

Construction will take place over approximately 48 months, from the second quarter of 2009 to the second quarter 2011. Commercial operations are expected to commence in 2011. Major milestones are listed in Table 500.3-1. (Later)

TABLE 500.3-1
Project Schedule Major Milestones

Activity	Date
Begin Construction	Second Quarter 2009
Commercial Operation	Second Quarter 2011

Construction will generally be scheduled to occur between 5:00 a.m. and 7:00 p.m. on weekdays and Saturdays. Additional hours may be necessary to make up schedule deficiencies, or to complete critical construction activities (e.g., pouring concrete at night during hot weather, working around time-critical shutdowns and constraints). During some construction periods and during the startup phase of the project, some activities may continue 24 hours per day, 7 days per week.

500.3 Project Activities

The construction phases of the Beacon Solar Energy Project as they pertain to stormwater management are expected to be as follows:

- **Site Disturbance**—Within the power equipment areas, clearing and grubbing will be performed over the entire area. As much as possible, stripped topsoil will remain onsite and wasted as necessary in site designated/specific areas. Native vegetation may be harvested for possible reuse to obtain long term soil stabilization.
- **Preparation**—Parking areas for construction workers and lay down areas for construction materials will be prepared per appropriate drawings. Detailed information regarding the location within the site of the lay down and parking areas will be developed after a Contractor is hired, and incorporated into the SWPPP as appropriate and/or by amendment.
- **Access Road**—Primary access to the site is via a new paved road from state highway 14. The access roads to the plant will be paved from their point of connection to the power block area. Access road beds will typically be 20 feet wide with 6-foot-wide crushed stone shoulders all per CALTRANS specifications. A stabilized entrance/exit will be provided to clean vehicle wheels prior to exiting the construction area.
- **Site Grading**—The existing site has about a 2-3 percent relatively uniform natural slope down from west to east, located on a relatively small alluvial runoff drainage basin. Disturbance activities will include clearing and grubbing, topsoil stripping and the

development of compacted embankments. Extensive grading will be applied to the whole site including the power block areas, construction lay down areas, and the major access roads. Heavy equipment will be stored in designated areas to isolate drippage and for ease of cleanup of unwanted lubricating liquids.

- **Foundation**—All underground piping, conduits, and wiring will be installed, followed by installation of the foundations for the new power equipment, transmission pull-offs and towers to support, as necessary, overhead ground wire towers, and miscellaneous structures.
- **Station Construction**—Conceptual site design will be finalized and prior to any soil disturbance, the owner will be required to finalize the Drainage, Erosion and Sediment Control Plan / Construction SWPPP. During construction, the owner will be required to follow the Drainage, Erosion and Sediment Control Plan / Construction SWPPP to prevent the offsite migration of sediment and other pollutants and to reduce the effects of runoff from the construction site. BMPs to be used at the site will be fully addressed in the Drainage, Erosion and Sediment Control Plan / Construction SWPPP; this document will include the location of BMPs to be used, installation instructions, and maintenance schedules for each BMP.
- **Site Stabilization**— Finish subgrade areas in the power equipment areas will have temporary erosion protection in the form of well graded crushed stone spread in disturbed areas approximately 2 inches deep. During periods of heavy rain, collection basins may overflow into the respective armored ditches and catchments designed to return flow to sheet flow.
- **Demobilization**—All temporary construction facilities will be removed.

Surface water impacts, if any, are anticipated to be a by product of short-term construction activity and consist of increased turbidity due to erosion of newly excavated or placed soils. Activities such as grading can potentially increase rates of erosion during construction. In addition, construction materials could contaminate runoff or groundwater if not properly stored and used. Compliance with engineering and construction specifications, following approved grading and drainage plans, and adhering to proper material handling procedures will ensure effective mitigation of these short-term impacts. BMPs for erosion and sediment control, surface water pollution prevention measures, and other BMPs will be developed and implemented for both construction and operational phases. These plans will be prepared in accordance with the NPDES General Permit for Storm Water Discharges Associated with Construction Activity (General Permit) and local agency requirements.

A Notice of Intent to comply with the terms of the General Permit will be prepared and submitted to the SWRCB prior to commencement of construction. Once construction activities have been concluded and the site has been stabilized, a Notice of Termination will be submitted to the RWQCB.

Pipeline Construction:
The construction of the natural gas pipeline will consist of the following:

- **Trenching-**width depends on the type of soils encountered and requirements of the governing agencies. The optimal trench will be approximately 36 inches wide and 5 to 10 feet deep. With loose soil, a trench up to 8 feet wide at the top and 3 feet wide at the bottom may be required. The pipeline will be buried to provide a minimum cover of 36 inches. The excavated soil(s) will be piled on one side of the trench and used for backfilling after the pipe is installed.

- **Stringing** consists of trucking lengths of pipe and laying them on wooden skids beside the open trench.
- **Installation** consists of bending, welding, and coating the weld-joint areas of the pipe after it has been strung, padding the ditch with sand or fine spoil, and lowering the pipe string into the trench. Installation methods will vary and contractors are urged to use his acceptable method in combination with best management principles to accomplish installation. Bends will be made using a cold bending machine or shop-fabricated as required for various changes in bearing and elevation. All coating will be checked for defects and will be repaired before lowering the pipe into the trench.
- **Backfilling** consists of returning spoil back into the trench around and on top of the pipe, ensuring that the surface is returned to its original grade or level. The backfill will be compacted to protect the stability of the pipe and to minimize subsequent subsidence.
- **Plating** consists of covering any open trench in areas of foot or vehicle traffic at the end of a workday. Plywood plates will be used in areas of foot traffic and steel plates will be used in areas of vehicle traffic to ensure public safety. Plates will be removed at the start of each workday. Efforts will be made to minimize the length of trench open at any given time.
- **Hydrostatic testing** consists of filling the pipeline with fresh water, venting all air, increasing the pressure to the specified code requirements, and holding the pressure for a period of time. Stainless steel piping will tested with demineralized water, while carbon steel piping will be pressure tested using either demineralized water or potable water. Demineralized water would be trucked in. After hydrostatic testing, the test water will be chemically analyzed for contaminants and discharged to the evaporation basins, unless the analysis shows that the water is contaminated. In which case, the water would be trucked to an appropriate disposal facility. Temporary approvals for test water use and permits for discharge will be obtained by the construction Contractor, as required.
- **Cleanup** consists of restoring the surface of the roadway by removing any construction debris, grading to the original grade and contour, and repairing where required.
- **Commissioning** consists of cleaning and drying the inside of the pipeline, purging air from the pipeline, and filling the pipeline with natural gas.

500.4 Vicinity Map

The construction project vicinity map showing the project location, surface water boundaries, geographic features, construction site perimeter, and general topography, is located in Attachment A. The project's Title Sheet provides more detail regarding the project location and is also included in Attachment A.

500.5 Pollutant Source Identification and BMP Selection

500.5.1 Materials Lists

The following is a list of construction materials that will be used and activities that will be performed that will have the potential to contribute pollutants, other than sediment, to storm water runoff. Control practices for each activity are identified in the Water Pollution Control Drawings (WPCDs) Attachment B and /or in sections 500.5.3 through 500.5.9. Construction materials and activities include:

- Vehicle fluids, including oil, grease, petroleum, and coolants
- Asphaltic emulsions associated with asphalt-concrete paving operations
- Cement materials associated with portland cement concrete (PCC)
- Base and subbase material
- Joint and curing compounds
- Concrete curing compounds
- Paints
- Solvents, thinners, acids
- BMP materials
- Treated lumber (materials and waste)
- PCC rubble
- General litter

Construction activities that have the potential to contribute sediment to stormwater discharges include:

- Clear and grub operations
- Grading operations
- Paving operations
- Boring operations
- Delivery/transportation operations
- Utility excavation operations
- Foundation/structure construction operations
- Vehicle and equipment cleaning, fueling, and maintenance
- Painting

500.5.2 Related Construction Disturbance

The construction and operation of the Beacon Electrical Solar Project would not adversely affect the agricultural productivity of surrounding agricultural lands. BMPs will protect surrounding agricultural lands from flooding, erosion, sloughing, and sedimentation during both construction and operation. Because plant emissions during operation would not affect the re-vegetation potential of the soil, no effect on agricultural productivity would be expected from this source.

Temporary Erosion Control Measures

Temporary erosion control measures would be required during the construction period to help maintain water quality, protect property from erosion damage, and prevent accelerated soil erosion or dust generation. These measures will be installed before construction begins and will be removed after completion.

Typically, temporary erosion control measures include re-vegetation, slope stabilizers, dust suppression, construction of beams and ditches, and sediment barriers. Vegetation is the most efficient form of erosion control, because it stabilizes the soil and maintains the landscape. Vegetation reduces erosion by absorbing raindrop impact energy and holding soil in place with fibrous roots; it reduces runoff volume by increasing infiltration into the soil. Disturbed areas will be re-vegetated with rapidly growing groundcover as soon as possible after construction, and vehicle traffic will be restricted from re-vegetated areas.

During construction of the proposed project, dust erosion control measures will be employed to minimize the wind-blown erosion of soil from the site. Clean water will be sprayed on the soil in construction areas to suppress dust and/or re-vegetation.

Sediment barriers, such as straw bales or silt fences, slow runoff and trap sediment. They are generally placed below disturbed areas, at the base of exposed slopes, below the disturbed area. Sediment barriers are often placed around sensitive areas, such as wetlands or creeks, to prevent contamination by sediment-laden water. Barriers will be placed around the proposed project and the active construction area of the BESP to prevent sediment from leaving the site. Because the BESP site is relatively level to gently sloping, standard surface erosion control techniques should be effective. Runoff detention/retention basins, drainage diversions, and other large-scale sediment traps are not expected to be needed because of the topography. Soil stockpiles generated during construction will be covered and protected from rainfall if left on site for long periods of time.

Permanent Erosion Control Measures

Permanent erosion control measures include drainage systems and/or, as required, re-vegetation. Re-vegetation will follow planting for short-term erosion control. Seed mixes will contain annuals that establish ground cover quickly, perennials and reseeding annuals for long-term vegetation, and legumes to provide a source of nitrogen to the plant community. Due to the site's gently sloping nature, additional long-term measures should not be required.

500.5.3 Inventory of Materials and Activities that May Pollute Stormwater

Construction materials and activities that have the potential to contribute pollutants, other than sediment, to stormwater runoff are listed below. Control practices for each activity are identified in the Water Pollution Control Drawings (Attachment B – to be provided by Contractor) and Sections 500.5.4 through 500.2.10. Construction materials and activities include:

- Vehicle fluids, including oil, grease, petroleum, and coolants
- Asphaltic emulsions associated with asphalt-concrete paving operations
- Cement materials associated with portland cement concrete (PCC)
- Base and subbase material
- Joint and curing compounds
- Concrete curing compounds
- Paints
- Solvents, thinners, acids
- BMP materials
- Treated lumber (materials and waste)
- PCC rubble
- General litter

Construction activities that have the potential to contribute sediment to stormwater discharges include:

- Clear and grub operations
- Grading operations
- Paving operations
- Boring operations
- Delivery/transportation operations
- Utility excavation operations
- Foundation/structure construction operations

- Vehicle and equipment cleaning, fueling, and maintenance
- Painting

500.5.3.1 Site Earthwork

Earthwork activities with heavy equipment will be required to grade a level area, cut new channels and to manage the no compressible soils for the power generation facility and switchyard. The volume of cut and fill is estimated to be approximately 5,160,000 cubic yards.

Earthwork on the power plant site will consist of removal of poor soils, topsoil, vegetation, and debris; excavation and compaction of earth to create the plant grade; and excavation for foundations and underground systems. Materials suitable for compaction will be stored in stockpiles within designated locations on the site using proper erosion prevention methods and then reused on site (e.g., plant power block). Materials unsuitable for compacted fills will be stored in separate stockpiles and reused on the site, where appropriate. Any contaminated materials encountered during excavation will be disposed in accordance with applicable laws, ordinances, regulations, and standards.

Maximum soil densities will be achieved by rolling or roller vibrating soils having the optimum conditions and uniform layers of specified thickness. Materials in each layer will be properly moistened to facilitate compaction to the specified density. To verify compaction, representative density and moisture content tests will be performed in the field during compaction. Structural fill material supporting foundations, roads, parking areas, etc., will be compacted. Prior to placing fill materials, sub grades will be examined for loose or soft areas and further excavated as necessary.

In an attempt to reduce erosion of alluvial soils, project construction will minimize land disturbance by limiting construction activities only to areas that are designated as being essential to the installation and operation of the project. In addition, disturbed soils will be compacted to reduce the rainfall absorptive capacity and vegetative productivity of the soils that are permanently covered by project facilities.

It will be necessary to segregate and stockpile surface soils and organic matter during construction and excavation. In areas of substantial grading, native vegetation may be harvested for possible reuse to obtain long term soil stabilization. All excavated soils are to be reused during construction at the site to prevent subsequent erosion and sedimentation issues. Materials suitable for backfill will be stored in stockpiles at designated locations using proper erosion and sediment control methods.

Electrical conduits will be placed underground by means of open cut trenches and, as needed, installed in precast concrete trenches or continuous boxes for protection from heavy loads and/or flooding.

500.5.3.2 Linear Construction

Construction of the natural gas lines will be by open trench. Trench excavation will consist of making subgrade to the depth, width, and grade necessary for construction of the utilities. Excavated topsoil will be stockpiled separately from the underlying excavated soils using proper erosion and sediment control

methods. The stockpiled topsoil would then be placed and compacted over the backfilled trench. Excess materials (i.e., sand, gravel, loose rock) will be incorporated into the unused portion of the site.

500.5.4 Existing (Pre-Construction) Control Measures

Initial BMPs possibly could include silt fence and/ or check dams. (SE-1, SE-2)

In areas that have initial construction erosional action potential, a row of silt fence (SE-1) and rip rap check dams (SE-4) will be installed per BMP fact sheets and referenced BMPs as depicted in the attachment (later).

500.5.5 Nature of Fill material and Existing Data Describing Soil

500.5.5.1 Soil Types

Soil types in the vicinity of the proposed BESP site are shown on attached figures. Soils are described and mapped at the level of “mapping unit” which are defined to the approximate level of detail appropriate for making decisions about soil management. The location and properties of the soil mapping units were identified from draft maps of the area using an aerial photograph base and from preliminary drafts of soil property descriptions, both prepared by the Natural Resources Conservation Service. Of the various soil mapping units illustrated, only 5 will potentially be affected by the construction of the solar plant. Table (later) summarizes the physical and chemical characteristics of these 5 soil mapping units and provides interpretations for erosion (erosion hazard index and re-vegetation potential) and agricultural productivity (Storie index, land capability, and prime agricultural land status). The following paragraphs provide a brief description of the soil types potentially affected by BESP construction.

The soils descriptions from the Beacon Grading and Drainage Report are as follows:

104—Arizo gravelly loamy sand, 2 to 9 percent slopes. This soil is very deep, excessively drained, and gently to moderately sloping. It is on alluvial fans and plains. It formed in mixed alluvium derived from granitic rock. Areas are irregular in shape and range from 60 to 3,000 acres in size. The vegetation is mainly annual grasses and forbs. Elevation ranges from 2,500 to 4,000 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 63 degrees F. The average frost-free season ranges from 200 to 225 days.

Typically, the surface layer is very pale brown gravelly loamy sand about 3 inches thick. The underlying material to a depth of 65 inches is very pale brown very gravelly loamy coarse sand.

Included with this soil in mapping are areas of Cajon soils that make up about 15 percent of the unit. Near Jawbone Canyon there are a few areas of included soils similar to Arizo but which are calcareous throughout or are very stratified. Also included are a few areas that are dissected by many shallow channels. The soil in these areas is coarser.

Permeability of this Arizo soil is very rapid, and available water capacity is very low or low. Surface runoff is very slow, and the hazard of erosion and soil blowing is high. The effective rooting depth is 60 inches or more. Flooding occurs whenever rainfall is intense. Floods are usually of short duration.

Areas of this soil are used for recreation, wildlife habitat, and occasional grazing.

This soil is poorly suited for rangeland. The major limitations are low available water capacity, low annual precipitation, and lack of livestock water. Forage production is generally low. Indian ricegrass and desert needlegrass are the main forage plants. During favorable precipitation years, filaree may produce abundant quantities of high quality forage. Excessive surface disturbance of this soil can result in excessive soil blowing.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 200 pounds during unfavorable years. The range site is Gravelly Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

114—Cajon loamy sand, 0 to 5 percent slopes. This soil is very deep, somewhat excessively drained, and nearly level to gently sloping. It is on alluvial fans and plains. It formed in alluvial material derived mainly from granitic rock. Areas are irregular in shape and range from 60 to 20,000 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs with a few Joshua trees (fig. 3). Elevation ranges from 2,500 to 3,500 feet. The mean annual precipitation is dominantly between 4 and 6 inches but is as much as 12 inches along the eastern base of the Tehachapi Mountains. The mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is pale brown loamy sand about 4 inches thick. The underlying material to a depth of 20 inches is light yellowish brown loamy sand. Below that, it is stratified light yellowish brown gravelly loamy sand and gravelly sandy loam. Gravel content is as much as 20 percent by volume. Reaction is mildly or moderately alkaline throughout.

Included with this soil in mapping are small areas of Arizo, Garlock, Neuralia, and DeStazo soils. These areas make up 20 percent of the unit. Also included are a few areas of Cajon gravelly loamy sand.

116—Cajon gravelly loamy sand, 0 to 9 percent slopes. This soil is very deep, excessively drained, nearly level to moderately sloping. It is on alluvial fans and plains. It formed in alluvial material derived from granitic rock. Areas are irregular in shape and range from 200 to 1,500 acres in size. The vegetation is mainly annual grasses, forbs, and shrubs. Elevation ranges from 2,000 to 3,500 feet. The mean annual precipitation is dominantly between 4 and 6 inches but is as much as 12 inches along the eastern base of the Tehachapi Mountains. The mean annual air temperature is about 65 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is pale brown and yellowish brown gravelly loamy sand about 36 inches thick. Gravel content ranges from 15 to 30 percent. The underlying material is light yellowish brown gravelly sand and gravelly fine sand. Gravel content ranges from 15 to 35 percent by volume.

Included with this soil in mapping are areas of Arizo soils and areas of Garlock soils. The Arizo soils make up about 10 percent of the unit, and the Garlock soils 5 percent.

Permeability of this Cajon soil is rapid, and available water capacity is very low or low. Surface runoff is slow, and the hazard of erosion and soil blowing is high. The effective rooting depth is 60 inches or more.

Areas of this soil are used for rangeland, recreation, and homesites. A few small areas are used for irrigated crops and pasture.

This soil is poorly suited to rangeland. Limitations are low available water capacity and the coarse surface texture. Forage production is low. Desert needlegrass and filaree are the major forage plants. Forage production is quite variable. In areas of high precipitation yields may be greater and more reliable than in drier areas. In years when precipitation is exceptionally favorable, annual grasses and filaree may produce abundant forage. Major browse species are white bursage and winterfat. Excessive disturbance of this soil can result in severe wind erosion.

This soil is suited to homesite development. Rapid permeability and the hazard of soil blowing are the main limitations. During construction, no larger an area should be disturbed than necessary, and disturbed areas should be reseeded as soon as possible to prevent soil blowing. Effluent from septic tank filter fields can contaminate gound water. Water supplies should be located a sufficient distance from leach fields. Because of the limited amount of precipitation and low or very low available water capacity, landscape plants should be watered frequently.

The estimated total annual forage production is 200 pounds per acre during favorable years, 150 pounds during normal years, and 100 pounds during unfavorable years. The range site is Gravelly Sandy (30).

This soil is in capability subclass VIIe (30), nonirrigated.

172—Rosamond clay loam, saline-alkali. This very deep, well drained, nearly level soil is on alluvial plains. It formed in alluvial material derived from granitic rock. Slope ranges from 0 to 2 percent. Areas are irregular in shape and range from 2,000 to 3,500 acres in size. The vegetation is mainly shrubs and scattered annual grasses and forbs. Elevation ranges from 2,000 to 2,900 feet. The mean annual precipitation ranges from 4 to 6 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 200 to 250 days.

Typically, the surface layer is brown sandy loam about 2 inches thick. The underlying material to a depth of 12 inches is pale brown clay loam. Below that, to a depth of 60 inches, it is pale brown loam with thin layers of fine sandy loam and silt loam. This soil has an excessive amount of salts and sodium.

Included with this soil in mapping are small areas of Arizo, Cajon, and Rosamond soils that contain less salt and sodium. These included areas make up about 10 percent of the unit.

Permeability of this Rosamond soil is moderately slow, and the available water capacity is low to very low. Surface runoff is medium, and the hazard of erosion is moderate or high. The hazard of soil blowing is moderate. The effective rooting depth is 60 inches or more.

Most areas of this soil are used for rangeland, recreation, and wildlife habitat. A few places are used for homesites.

This soil is poorly suited for rangeland. It is limited for this use mainly by the saline-alkali conditions. Low annual precipitation and lack of available livestock water is also a problem. Forage production is low and limited to salt-tolerant species. The main plant community is allscale, alkali blite, and iodine bush. Excessive disturbance of this soil through overgrazing can result in severe wind erosion. Onsite evaluation is needed to determine feasibility for water development.

The nearness of Edwards Air Force Base has resulted in construction of houses on this soil. The hazard of erosion, saline-alkali conditions, moderately slow permeability, and moderate shrink-swell potentials are the main limitations for homesites. These limitations can cause failures or problems with foundations, septic tank absorption fields, sanitary landfields, and home gardening and landscaping. Soil limitations can be improved or corrected for homesites, however, by the use of proper design and installation procedures. Suitability of this soil for a particular urban use can be determined by onsite evaluation.

The estimated total annual forage production is 500 pounds per acre during favorable years, 300 pounds during normal years, and 200 pounds during unfavorable years. The range site is Alkali Flats (30).

This soil is in capability subclass VIIs (30), nonirrigated.

Permeability of this Cajon soil is rapid, and available ater capacity is low or moderate. Surface runoff is ow, and the hazard of erosion is slight. The hazard of oil blowing is high. The effective rooting depth is 60 ches or more.

Areas of this soil are mainly used for irrigated crops nd pasture. Alfalfa is the main crop. Areas not ultivated are used for desert range, recreation, and ildlife habitat. Some areas are used for homesites.

This soil is suited to most irrigated crops grown in the ea. The hazard of soil blowing and low available water apacity are the main limitations. Maintaining a plant over, utilizing all crop residues, and limiting tillage can elp to maintain or improve organic matter content and event soil blowing. Sprinkler type irrigation systems are est suited to this soil. Irrigation water should be applied a rate sufficient for maximum production but in nounts small enough to avoid excessive fertilizer loss, inoff, or deep percolation.

This soil is poorly suited for rangeland. Major nitations are the low or moderate available water apacity and coarse surface texture. Excessive disturbance of this soil can result in severe wind erosion. Native forage production is low in quantity but high in quality. Desert needlegrass, Indian ricegrass, winterfat, shadscale, and white bursage are the main forage and browse plants. In years when precipitation is favorable, filaree and annual grasses produce abundant forage.

The estimated total annual forage production is 375 pounds per acre during favorable years, 250 pounds during normal years, and 150 pounds during unfavorable years. The range site is Sandy (30). Forage production is quite variable. In areas of high precipitation yields are more reliable and may be double those in drier areas.

This soil is suited to urban development. Rapid permeability and the hazard of soil blowing are the main limitations. During construction, no larger an area should be disturbed than is necessary. Disturbed areas should be reseeded as soon as possible to prevent soil blowing. Effluent from septic tank filter fields can contaminate ground water. Water supplies should be located a sufficient distance from leach fields.

This soil is in capability subclass VIIe (30), nonirrigated, and capability unit IVe-4 (30), irrigated.

148—Jawbone gravelly loamy sand, 15 to 75 percent slopes. This shallow, excessively drained, hilly to very steep soil is on mountainous uplands. It formed in residual material weathered from granitic rock. Areas are irregular in shape and range from 1,700 to 6,500 acres in size. The vegetation is mainly annual grasses, forbs, shrubs, and scattered conifers. Elevation dominantly ranges from 3,000 to 4,000 feet. The mean annual precipitation ranges from 6 to 9 inches, and the mean annual air temperature is about 64 degrees F. The average frost-free season ranges from 175 to 225 days.

Typically, the surface layer is a light yellowish brown gravelly loamy sand about 10 inches thick. Below this is highly weathered granite. In some places the surface layer is gravelly loamy coarse sand.

Included with this soil in mapping are small areas of Arizo, Cinco, and Hi Vista soils. These included areas make up about 20 percent of the unit. Also included are a few areas of rock outcrop and Jawbone soils on gently or moderately sloping ridgetops.

Permeability of this Jawbone soil is rapid, and available water capacity is very low. Surface runoff is rapid to very rapid, and the hazard of erosion is high or very high. The effective rooting depth is 4 to 12 inches.

Areas of this soil are used for rangeland and watershed.

This soil is poorly suited for rangeland. The shallow depth to bedrock, steep slopes, high or very high hazard of erosion, and very low available water capacity are the main soil limitations. Steep escarpments limit livestock distribution and excessive disturbance or overgrazing may result in a severe erosion problem. Forage production is low and livestock water is lacking. Fencing and the development of livestock water facilities will help to obtain proper livestock distribution. Winterfat, spiny hopsage, and junipers dominate the vegetation. Indian ricegrass, red brome, and filaree are the main forage plants. Rotation grazing may be beneficial to increase the amount of desert needlegrass and to control erosion.

The estimated total annual forage production is 1,000 pounds per acre during favorable years, 500 pounds during normal years, and 200 pounds during unfavorable years. The range site is Shallow Gravelly Loamy (29).

This soil is in capability subclass VIIe (29), nonirrigated.

500.5.5.2 Web Soil Survey

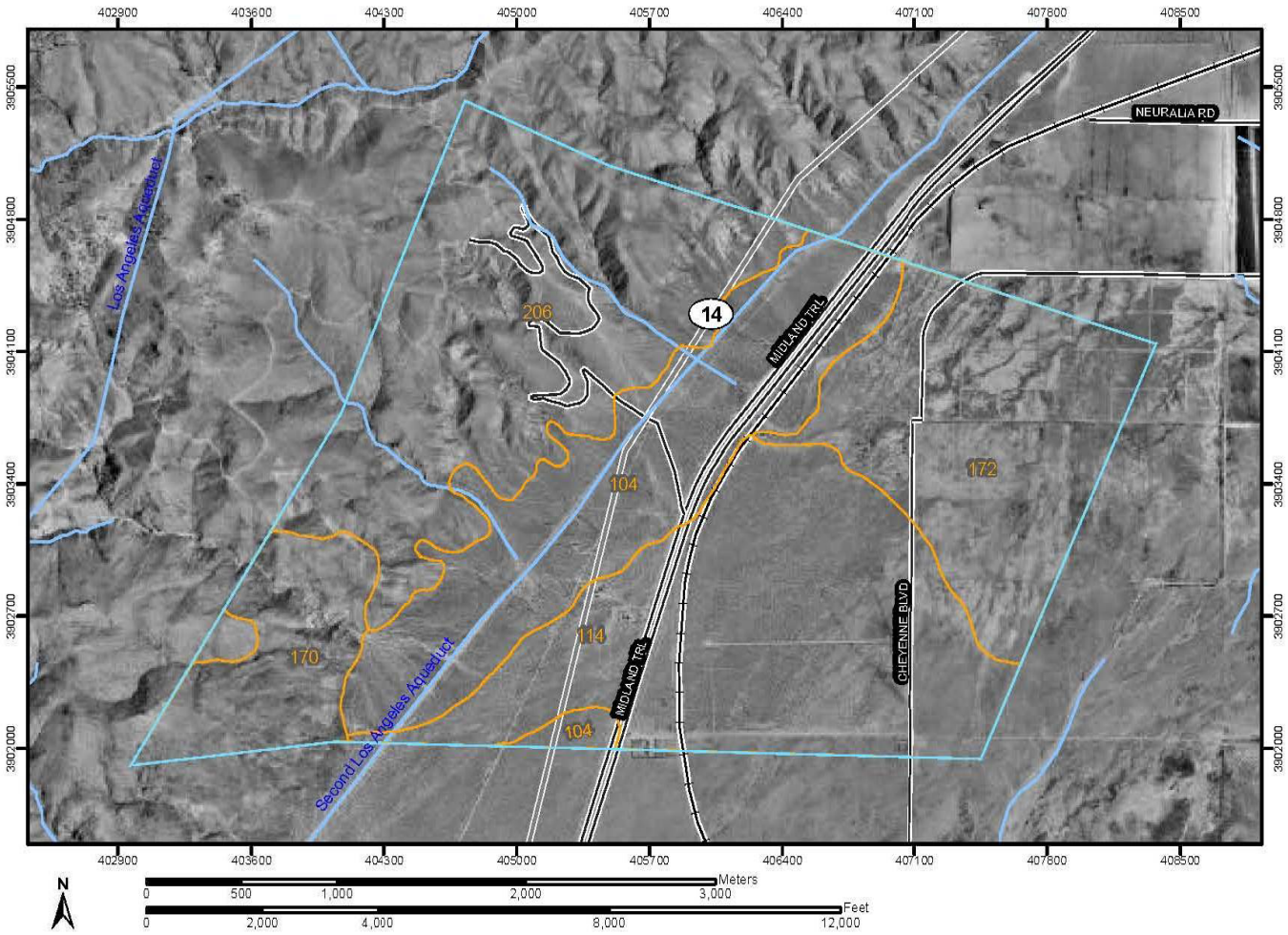
In addition to the above soils information, Figure 500-1.3 has been attached to show soils information as listed in the Web Soil Survey. Predominant soil is Altamont clays (ch),(172) a silty clay listed as covering approximately 60 % of the construction area.

500.5.5.3 Soil Loss and Erosion

The Universal Soil Loss Equation is typically used to quantify water-induced soil loss in agricultural areas. The Universal Soil Loss Equation was used to estimate the potential amount of soil erosion from the project area for pre-development, during construction and post-development conditions. The existing site is characterized as perimeter lake bed. Under the existing conditions the estimated soil erosion is one ton per acre per year. During construction, the plant site area, the construction lay down area, and the pipeline alignments will be disturbed. At that time, the surface will be void of vegetation and there will be the highest potential for erosion. Estimated soil erosion is approximately 150 tons per acre per year (too be verified with final geotech report from Kleinfelder). However, the use of Best Management Practices (BMPs) such as straw bales, silt fences, limiting exposed areas, etc., will minimize the potential for soil erosion so that the impact would not be significant. Once the project has been constructed, the construction lay down area and various utility alignments will be reseeded and returned to pre-construction conditions. The project site will either be covered with facilities or paved, and therefore, there would be no potential for soil erosion from the completed site. In summary, during construction, the potential for erosion would be greater than for the existing conditions but will be managed to minimize impacts; and after construction, the potential for erosion will be negligible compared with the existing conditions.

A review of the Kern County Online Mapping System (2007) and the Alquist-Priolo Earthquake Fault maps (Division of Mines and Geology, 2000) indicate that an AP fault zone crosses the BESP site diagonally, from the southwest corner to the uppermost northeast corner (**Figure 500.5-1**). The available maps show the fault as buried beneath recent alluvial soils with its projected surface trace trending in a northeasterly direction. As shown on **Figure 500.5-2**, the mapped AP zone crosses areas shown in the preliminary BESP site plan for the power block and evaporation pond, as well as the solar array field, although the administration building and warehouse as shown on the site plan are outside the AP zones.

Soil Map–Kern County, California, Southeastern Part



Map Unit Legend

Kern County, California, Southeastern Part (CA670)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
104	ARIZO GRAVELLY LOAMY SAND, 2 TO 9 PERCENT SLOPES	584.3	20.1%
114	CAJON LOAMY SAND, 0 TO 5 PERCENT SLOPES	759.4	26.1%
170	ROCK OUTCROP	218.2	7.5%
172	ROSAMOND CLAY LOAM, SALINE-ALKALI	518.1	17.8%
206	XERIC TORRIORTHENTS, VERY STEEP	824.9	28.4%
Totals for Area of Interest (AOI)		2,904.8	100.0%

Add AP Fault Zone Map

TABLE 14.--SOIL AND WATER FEATURES

[See text for definitions of terms. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that the data were not estimated]

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
100*:							
Alko	D	>60	---	5-14	Rippable	High	Low.
Neuralia	C	>60	---	---	---	High	Low.
101 Anaheim Variant	B	24-35	Rippable	---	---	High	Low.
102, 103 Anaverde	B	>60	---	---	---	Moderate	Low.
104 Arizo	A	>60	---	---	---	Moderate	Low.
105 Arujo	B	40-60	Rippable	---	---	Moderate	Low.
106*, 107*, 108*:							
Arujo	B	40-60	Rippable	---	---	Moderate	Low.
Friant	D	6-20	Rippable	---	---	Moderate	Moderate.
Tunis	D	10-20	Rippable	---	---	Moderate	Low.
109, 110, 111 Arvin	B	>60	---	---	---	Moderate	Low.
112*:							
Badland.							
Orthents.							
113, 114 Cajon	A	>60	---	---	---	Moderate	Low.
115 Cajon	B	>60	---	---	---	High	High.
116 Cajon	A	>60	---	---	---	Moderate	Low.
117*:							
Cajon	B	>60	---	---	---	Moderate	Low.
Garlock	B	>60	---	---	---	High	Low.
118*:							
Chanac	B	>60	---	---	---	High	Low.
Badland.							
119*, 120*:							
Chanac	B	>60	---	---	---	High	Low.
Pleito	C	>60	---	---	---	High	Low.
121 Chino Variant	D	>60	---	---	---	High	Low.
122, 123 Cibo	D	24-36	Hard	---	---	High	Low.

See footnote at end of table.

TABLE 14.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Bedrock		Cemented pan		Risk of corrosion	
		Depth	Hardness	Depth	Hardness	Uncoated steel	Concrete
		In		In			
152*, 153*: Nacimiento	C	20-40	Rippable	---	---	High	Low.
154: Neuralia	C	>60	---	---	---	High	Low.
155*:							
Norob	C	>60	---	---	---	High	Moderate.
Neuralia	C	>60	---	---	---	High	Low.
156*:							
Pajuela	B	>60	---	---	---	Moderate	Low.
Whitewolf	A	>60	---	---	---	High	Low.
157*. Pits							
158*. Playas							
159, 160: Pleito	C	>60	---	---	---	High	Low.
161*, 162*:							
Pleito	C	>60	---	---	---	High	Low.
Chanac	B	>60	---	---	---	High	Low.
163, 164: Porterville	D	>60	---	---	---	High	Low.
165*:							
Psamments.							
Xerolls.							
166*. Quarries							
167: Randsburg	D	8-20	Rippable	---	---	High	Low.
168, 169: Rescue Variant	C	>40	---	---	---	Moderate	Low.
170*. Rock outcrop							
171, 172: Rosamond	C	>60	---	---	---	High	Low.
173: Rosamond Variant	B	>60	---	---	---	High	Low.
174: Steuber	B	>60	---	---	---	High	Low.
175, 176, 177: Steuber	B	>60	---	---	---	High	Low.
178*:							
Sween Variant	C	24-40	Hard	---	---	High	Low.
Rock outcrop.							

See footnote at end of table.

Report—Physical Soil Properties

Physical Soil Properties– Kern County, California, Southeastern Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
104—ARIZO GRAVELLY LOAMY SAND, 2 TO 9 PERCENT SLOPES														
Arizo	0-3	—	—	5-12	1.40-1.55	42.00-42.00	0.05-0.07	0.0-2.9	0.0-0.5	.10	.32	5	2	134
	3-65	—	—	0-5	1.45-1.65	141.00-141.00	0.04-0.06	0.0-2.9	0.0-0.5	.10	.32			
114—CAJON LOAMY SAND, 0 TO 5 PERCENT SLOPES														
Cajon	0-20	—	—	0-8	1.60-1.70	42.00-141.00	0.06-0.10	0.0-2.9	0.5-1.0	.15	.20	5	2	134
	20-60	—	—	0-5	1.60-1.70	42.00-141.00	0.04-0.08	0.0-2.9	0.0-0.5	.10	.17			
116—CAJON GRAVELLY LOAMY SAND, 0 TO 9 PERCENT SLOPES														
Cajon	0-36	—	—	0-8	1.60-1.70	42.00-141.00	0.04-0.07	0.0-2.9	0.5-1.0	.10	.20	5	2	134
	36-60	—	—	0-5	1.60-1.70	42.00-141.00	0.04-0.06	0.0-2.9	0.0-0.5	.15	.17			

FIGURE 500.5-4

Physical Soil Properties– Kern County, California, Southeastern Part														
Map symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Saturated hydraulic conductivity	Available water capacity	Linear extensibility	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
										Kw	Kf	T		
	In	*Pct*	*Pct*	*Pct*	*g/cc*	*micro m/sec*	*In/In*	*Pct*	*Pct*					
171—ROSAMOND CLAY LOAM														
Rosamond	0-2	—	—	10-20	1.40-1.50	14.00-42.00	0.10-0.15	0.0-2.9	0.5-1.0	.28	.28	5	3	0
	2-14	—	—	—	1.50-1.60	1.40-4.00	0.15-0.18	3.0-5.9	0.5-1.0	.37	.37			
	14-60	—	—	18-25	1.45-1.55	4.00-14.00	0.14-0.16	3.0-5.9	0.4-0.5	.37	.37			
172—ROSAMOND CLAY LOAM, SALINE-ALKALI														
Rosamond	0-2	—	—	10-20	1.50-1.60	1.40-4.00	0.02-0.06	3.0-5.9	0.5-1.0	.28	.28	5	3	0
	2-12	—	—	18-35	1.40-1.50	1.40-4.00	0.03-0.07	3.0-5.9	0.5-1.0	.37	.37			
	12-60	—	—	18-25	1.45-1.55	4.00-14.00	0.14-0.16	3.0-5.9	0.0-0.5	.37	.37			
206—XERIC TORRIORTHENTS, VERY STEEP														
Xeric torriorthents	0-20	—	—	—	—	—	0.00-0.00	—	1.0-2.0			1		
	20-24	—	—	—	—	—	—	—	—					

Data Source Information

Soil Survey Area: Kern County, California, Southeastern Part
Survey Area Data: Version 3, Jan 9, 2007

FIGURE 500.5-5

500.5.6 Erosion Control

Erosion control, also referred to as soil stabilization, consists of source control measures designed to prevent soil particles from detaching and becoming transported in stormwater runoff. Erosion control BMPs protects the soil surface by covering or binding soil particles. The project will incorporate erosion control measures required by regulatory agency permits, contract documents, and other measures selected by the Contractor. Site-specific BMPs will be implemented by the construction contractor and associated figures are to be included in Attachment B. Attachment C is to be revised and will list the BMPs selected for this project. Appendix A contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for temporary and final erosion control based on BMPs from Appendix A:

Year-round:

- SWPPM to monitor the weather using National Weather Service reports to track conditions and alert crews to the onset of rainfall events.
- Preserve existing vegetation where required and when feasible. Conduct clearing and grading only in areas necessary for project activities and equipment traffic. Install temporary fencing prior to construction along the boundaries of the construction zone to clearly mark this zone, preventing vehicles or personnel from straying onto adjacent offsite habitat.
- Within designated site development areas, all vegetation will be removed. Areas to remain undisturbed shall be clearly marked and existing foliage will remain in place to anchor the soil reducing the potential for erosion. All cut vegetation is to mulched, buried, burned or composted onsite to limit waste disposal. In areas of substantial grading, native vegetation may be harvested for possible reuse to obtain long-term soil stabilization.
- Sequence construction activities with the installation of both erosion control and sediment control measures. Arrange the construction schedule as much as practicable to leave existing vegetation undisturbed until immediately prior to grading.
- Protect slopes susceptible to erosion by installing controls.
- Stabilize non-active areas as soon as feasible after construction is complete and no later than 14 days after construction in that portion of the site has temporarily or permanently ceased. Reapply as necessary to maintain effectiveness.
- Place covers over stockpiles prior to forecasted storm events and during windy conditions. Place sediment controls (fiber rolls or gravel bags) around the perimeter of stockpiled materials year-round.
- Maintain sufficient erosion control materials onsite to allow implementation in conformance with General Permit requirements and as described in this SWPPP. This includes implementation requirements for active areas and non-active areas that require deployment before the onset of rain.
- Repair and reapply BMPs in areas where erosion is evident as soon as possible.

During the rainy season:

- Implement temporary erosion control measures at regular intervals throughout the defined rainy season and as needed determined by site conditions.
- Inspect and stabilize disturbed areas with temporary or permanent erosion control measures before rain events.

During the non-rainy season:

- Conduct construction activities that will have an impact on waters of the United States during the dry season to the extent feasible to minimize erosion.

Appendix A provides fact-sheets on implementation of each BMP – these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. A combination of the following erosion controls may be used at the site:

- EC-1, Scheduling
- EC-2, Preservation of Existing Vegetation
- EC-3, Straw Mulch
- EC-4, Earth Dikes and Drainage Swales
- EC-5, Velocity Dissipation Devices
- EC-6, Hydro seeding

BMPs will be deployed in a sequence to follow the progress of grading and construction. As the locations of soil disturbance change, erosion controls will be adjusted accordingly to control stormwater runoff at the downgrade perimeter.

500.5.7 Sediment Control

Sediment controls are intended to complement and enhance the selected erosion control measures and reduce sediment discharges from active construction areas. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water. The project will incorporate sediment control measures required by regulatory agency permits, contract documents, and other measures selected by the Contractor. Site-specific BMPs will be designed and are shown in Attachment B. Attachment C is to be updated as required and lists the BMPs selected for this project. Appendix A contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for temporary sediment control:

Year-round:

- The power block area for each phase will be graded with moderate slopes to direct runoff and diverted stormwater to an infiltration/evaporation area before overflowing through native stone rip-rap to reinstate natural sheet flow conditions. Relatively small rock filters and local diversion berms through the sites will discourage water from concentrating to maintain sheet flow. The diversions ditches and infiltration/evaporation areas will be designed to pass flow from a 100 year storm event to prevent damage to the power block and tower areas; the design will also include in its calculations stormwater run-on to the site.
- Maintain the following temporary sediment control materials onsite: silt fence materials, gravel bags for linear barriers, and fiber rolls in sufficient quantities throughout the project

to implement temporary sediment controls in the event of predicted rain and to respond to failures or emergencies, in conformance with General Permit requirements and as described in this SWPPP.

- Install gravel filter berms at the base of slopes adjacent to delineated sensitive areas (i.e., wetlands, dry washes) – if any.
- Native onsite stones/rocks will be used in construction of gravel filter berms or check dams.
- Install gravel filter berms along the boundaries of delineated sensitive areas – if any – within the boundaries of the project site or receiving runoff from the project site.
- Native onsite stones/rocks will be used in construction of gravel filter berms or check dams.

During the rainy season:

- During the rainy season, implement temporary sediment controls at the draining perimeter of disturbed soil areas, at the toe of slopes, and at outfall areas.

During the non-rainy season:

- During the non-rainy season, implement temporary sediment controls at the draining perimeter of disturbed soil areas.

Appendix A provides fact-sheets on implementation of each BMP – these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. A combination of the following sediment controls may be used at the site:

- SE-1, Silt Fence
- SE-2, Check Dam
- SE-3, Fiber Rolls
- SE-4, Gravel Bag Berm
- SE-5, Street Sweeping and Vacuuming

BMPs will be deployed in a sequence to follow the progress of grading and construction. As the locations of soil disturbance change, sedimentation controls will be adjusted accordingly to control stormwater runoff at the downgrade perimeter.

500.5.8 Tracking Control

Site-specific BMPs will be designed and are shown in Attachment B. Attachment C is to be updated as required and lists the BMPs selected for this project. Appendix A contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for tracking control:

Year-round:

- The access roads to the plants will be paved from their point of connection to Dirks Road. Maintain all public roadways free from dust, dirt and debris caused by construction

activities. Sweep streets at the end of the day if visible soil materials are carried onto adjacent public paved roads.

- Clearly mark the driving areas within the site for limited speed to control dust.
- The Entrance /Outlet Tire Wash shall be a flooded basin type with gray water and supply water pushed and pulled from Sediment Basin #4 using portable pumps. Makeup water will be furnished by tanker truck. Details of basin design may be found in Appendix A.

Appendix A provides fact-sheets on implementation of each BMP – these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. A combination of the following tracking controls may be used at the site:

- TC-1, Stabilized Construction Entrance/Exit
- TC-2, Stabilized Construction Roadway
- TC-3, Entrance/Outlet Tire Wash
- SE-5, Street Sweeping and Vacuuming

500.5.9 Wind Erosion Control

Site-specific BMPs will be designed and are shown in Attachment B. Attachment C is to be updated as required and lists the BMPs selected for this project. Appendix A contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for wind erosion control:

Year-round:

- Apply potable water (groundwater) to disturbed soil areas of the project site to control dust and maintain optimum moisture levels for compaction as needed. Apply the water using water trucks. NS-1 - Minimize water application rates as necessary to prevent runoff and ponding.
- During windy conditions (forecast or actual wind conditions of approximately 25 mph or greater), apply dust control to disturbed areas, including haul roads, to adequately control wind erosion. Cover exposed stockpiled material areas.
- Suspend excavation and grading during periods of high winds.
- Cover all trucks hauling soil and other loose material or maintain at least 2 feet of freeboard.

Appendix A provides fact-sheets on implementation of each BMP – these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. The following BMPs have been selected to control dust at the construction site:

- WE-1, Wind Erosion Control
- NS-1, Water Conservation Practices

500.5.10 Non-Stormwater Control

Site-specific BMPs will be designed and are shown in Attachment B. Attachment C is to be updated as required and lists the BMPs selected for this project. Appendix A contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for non-stormwater control:

Year-round:

- Dispose of Portland cement concrete and asphalt concrete waste in accordance with NS-3.
- Regularly inspect vehicles and equipment for signs of leaks. Have vehicles and equipment on a regular maintenance schedule.
- Place drip pans or absorbent materials under paving equipment when not in use. Park paving equipment over plastic to prevent soil contamination.
- Locate staging areas for construction equipment so that spills of oil grease or other petroleum by-products will not be discarded into watercourses or sensitive habitat. Protect the staging area with berms and/or dikes to prevent run-on, runoff, and to contain spills.
- Fuel, clean, and maintain vehicles and other equipment only within designated areas.
- A dedicated fueling area will be protected with berms and/or dikes to prevent run-on, runoff, and to contain spills. Self-propelled vehicles will be fueled offsite or at the temporary fueling area. Fuel trucks will be used for onsite fueling, whether at the temporary fueling area or for mobile fueling elsewhere on the site. Drip pans will be used for mobile fueling. Each fuel truck will be equipped with absorbent spill cleanup materials and a spill containment boom at all times.
- Drip pans or absorbent pads will be used for vehicle and equipment maintenance activities that involve grease, oil, solvents, or other vehicle fluids.
- Machinery will be properly maintained and cleaned to prevent spills and leaks.
- Inform workers of the importance of preventing spills and measures to take should a spill occur. Clean up spills immediately in accordance with applicable local, state, or federal regulations. Such spills will be reported in the post-construction compliance reports.
- Use proper storage and handling techniques for concrete curing compounds.
- Clean offsite vehicles that regularly enter and leave the site.
- Inspect all vehicles and equipment for leaks before coming onsite.

Appendix A provides fact-sheets on implementation of each BMP – these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. An inventory of construction activities and potential non-stormwater discharges is provided in Section 500.5.10. The BMP consideration checklist in Attachment C and the following list indicates the BMPs that have been selected to control non-stormwater pollution on the construction site. Implementation and locations of some non-stormwater control BMPs are shown on the Water Pollution Control Drawings (WPCDs) in Attachment B. An additional narrative and pictorial description of each BMP is presented in Appendix A.

A combination of the following non-stormwater controls may be used at the site:

- NS-1, Water Conservation Practices
- NS-3, Paving and Grinding Operations
- NS-6, Illicit Connection/Illegal Discharge Detection and Reporting
- NS-7, Potable Water/Irrigation
- NS-8, Vehicle and Equipment Cleaning
- NS-9, Vehicle and Equipment Fueling
- NS-10, Vehicle and Equipment Maintenance
- NS-12, Concrete Curing
- NS-14, Concrete Finishing

500.5.11 Waste Management and Materials Pollution Control

The project will incorporate waste management and materials pollution control measures required by contract documents, supplemented with other measures selected by the Contractor as needed to meet General Permit objectives. Site-specific BMPs will be designed and are shown in Attachment B. Attachment C is to be updated as required and lists the BMPs selected for this project. Appendix A contains BMP fact-sheets with applicable detailed descriptions of suitability, implementation, and inspection and maintenance measures. At a minimum, this project will implement the following practices for waste management and materials pollution control:

Year-round:

In general, implement BMPs WM-1 and WM-2 to help prevent discharges of construction materials during delivery, storage, and use. Provide the following types of storage/containment facilities to minimize stormwater contact with construction materials:

1. Use a watertight container to store hand tools and other items such as small parts.
2. Provide cover and secondary containment for any stored hazardous materials. Store hazardous materials in appropriate containers.
    2.1. Temporary containment facilities for hazardous materials should provide for a spill containment volume able to contain precipitation from a 25-year storm event, plus 10% of the aggregate volume of all containers or 100% of the capacity of the largest container within its boundary, whichever is greater. It should be impervious to the materials stored therein for a minimum contact time of 72 hours.
3. Store large non-hazardous items, such as framing materials, in the general storage area. Elevate such materials with wood blocks to minimize contact with stormwater. Prevent run-on (i.e., with earthen dike, trench) into the general storage area.

Inspect storage areas for signs of spills and/or leakage.

Handle and dispose of hazardous wastes in accordance with applicable laws, ordinances, regulations, and standards, including licensing, personnel training, accumulation limits and times, and reporting and recordkeeping.

Collect hazardous wastes in satellite accumulation containers near the points of generation. Store hazardous wastes in appropriate and clearly marked containers and segregate from other non-waste materials. Move used waste containers daily to the Contractor's 90-day hazardous waste storage area, located at the site construction lay down area. Provide cover and secondary containment for the hazardous waste storage area. Remove the waste from the site by a certified hazardous waste collection company and deliver to an authorized hazardous waste management facility, prior to expiration of the 90-day storage limit.

In the unlikely event that even larger volumes of potentially hazardous material must be temporarily held awaiting disposition, a containment area will be constructed. Plastic sheeting will be laid on the ground prior to placement of the contaminated material and the material itself will be covered.

Store only enough products required to do the job.

Keep products in their original containers with the original manufacturer's label.

Follow manufacturers' recommendations for the storage, use and disposal of all materials.

At a minimum, follow the following practices for spill prevention and cleanup:

- Manufacturers' recommended methods for spill cleanup will be clearly posted and personnel will be made aware of the procedures and the location of the information and cleanup supplies.
- Maintain spill cleanup materials, material safety data sheets, a material inventory, and emergency contact numbers in all storage areas.
- Spill cleanup materials should include at a minimum: 1) absorbent materials (granular, socks, pillows), 2) tools to manage/contain smaller spills such as brooms/shovels/rakes/squeegees, 3) a spill-berm that would hold the amount of the largest container, 4) appropriate, water-tight disposal containers for used spill cleanup materials, and 5) personal protective gear.
- Clean up spills immediately after discovery.
- Keep spill area well ventilated.
- The Project Manager (or designee) will be the Spill Prevention and Cleanup Coordinator. The names of additional responsible spill personnel and authorized Contractors will be posted in various areas.
- Report spills of toxic or hazardous materials to the Project Manager (or designee), regardless of the size.
- Report spills of hazardous materials that exceed their reportable quantities to all appropriate local, state and federal government agencies. The Project Manager (or designee) will be responsible for investigating spills and determining whether the reportable quantity has been exceeded. Regulations defining the reportable quantity levels for oil and hazardous substances are found in 40 CFR Part 110, Part 117 or Part 302.
- Place covers over stockpiles prior to forecasted storm events and during windy conditions. Place sediment controls at the foot of stockpiled materials.

- Load solid wastes directly into trucks for offsite disposal. When onsite storage is necessary, store solid wastes in watertight covered dumpsters in the general storage area. Have licensed waste hauler remove solid waste at least weekly and dispose of offsite.
- Provide weekly maintenance for portable toilets by a licensed sanitary service and dispose of wastes offsite.
- Locate portable toilets away from concentrated flow paths and traffic flow.
- Anchor portable toilets during periods of heavy winds.
- Establish concrete washout area in accordance with WM-8.

Appendix A provides fact-sheets on implementation of each BMP – these fact-sheets will be referenced for suitable applications, limitations, and implementation (specifications), inspection, and maintenance measures for each selected BMP. A combination of the following waste management and materials pollution controls may be used at the site:

- WM-1, Material Delivery and Storage
- WM-2, Material Use
- WM-3, Stockpile Management
- WM-4, Spill Prevention and Control
- WM-5, Solid Waste Management
- WM-6, Hazardous Waste Management
- WM-8, Concrete Waste Management
- WM-9, Sanitary/Septic Waste Management
- WM-10, Liquid Waste Management

500.5.12 Cost Breakdown for Water Pollution Control

A cost breakdown itemizing the contract lump sum for water pollution control has been developed for this project and included in Attachment O. The cost breakdown reflects the items of work, quantities and costs for BMPs shown in the SWPPP, except for those construction site BMPs and permanent BMPs that are shown on the project plans and for which there is a contract item of work.

500.5.13 Contaminated Soil

Although there is no known contaminated soil at the project site, it may be possible that contaminated soil is encountered during construction. Operators and construction personnel will be trained on the identification of contaminated soils and will be asked to report unusual conditions to an approved registered geologist. If soils require temporary stockpiling, piles will be placed on plastic sheeting, covered with plastic sheeting or tarp, secured safely with gravel bags and bermed with fiber rolls or silt fencing to prevent runoff from leaving the area. If required, samples will be collected and sent to a certified analytical laboratory for characterization. If contamination is detected, the waste will be handled accordingly and properly disposed of at an authorized waste management facility.

500.6 Water Pollution Control Drawings (WPCDs)

The WPCDs can be found in Attachment B of the SWPPP.

500.7 Construction BMP Maintenance, Inspection, and Repair

500.7.1 Inspection

Inspections will be conducted as follows:

- Prior to forecast storms
- After rain events that cause runoff from the construction site
- At 24-hour intervals during extended rain events
- At other time(s) or intervals of time specified in the contract documents

Completed inspection checklists will be submitted to the Project Manager within 24 hours of inspection. Copies of the completed checklists will be kept with the SWPPP.

500.7.2 Maintenance and Repair

A tracking or follow-up process will follow an inspection that identifies deficiencies in BMPs. A Maintenance, Inspection, and Repair Program of BMPs is to be implemented by the construction contractor; a template is shown in Attachment G. BMP fact-sheets in Appendix A will be referenced for inspection and maintenance measures for each selected BMP.

Erosion and sediment controls must be maintained to remain effective. Features that are washed out or damaged will be repaired as soon as possible, contingent at all times on worker safety. At a minimum, erosion and sediment controls should be cleaned, repaired, or replaced:

- In advance of the rainy season and prior to a storm event.
- When sediment or other debris has accumulated to greater than 1/3 the height of the barrier.
- When sediment accumulation reaches 1/3 of the trap capacity.
- When more than 1/3 of the cross-section of a conveyance structure, such as a drainage swale or ditch, is plugged or blocked.

500.8 Post-Construction Stormwater Management

500.8.1 Post-Construction Control Practices

Initial design will dictate requirements and special needs for post-construction BMPs. Once a final project design has been established, post-construction BMPs will be revised accordingly. A review of existing controls will be required with amendments to the SWPPP as required. The post–construction controls associated final site layout will be available from Appendix B.

Some re-grading for maintenance will most likely be required within the access road due to soil erosion and regular use. The occasional cutting of vegetation will be required to control plant re-growth.

Lists (later)

- EC-2, Preservation of Existing Vegetation

- EC-2, Preservation of Existing Vegetation
- NS-1, Water Conservation Practices

500.8.2 Operation/Maintenance of Post-Construction Control Practices

The post-construction BMPs described above will be funded and maintained by Beacon Energy, LLC.

500.9 Training

Prior to project startup, all designated onsite representatives will participate in a pre-project stormwater training workshop. The workshop will cover basic stormwater information, the requirements of the General Permit, and the SWPPP. Specifically, the workshop will focus on implementation, inspection, and maintenance of stormwater controls.

- Contractors are responsible for familiarizing their personnel with the information contained in the SWPPP. Contractors will be informed of this obligation.
- All new employees will be trained by staff familiar with these topics.
- Contractors are responsible for familiarizing subcontractors with information contained in the SWPPP.

As required by the SWRCB, individuals responsible for SWPPP preparation, implementation, and permit compliance will be appropriately trained, and the training will be documented. This includes those personnel responsible for installation, inspection, maintenance, and repair of BMPs. Those responsible for overseeing, revising, and amending the SWPPP shall also receive and document their training. Monitoring and inspection activities will only be conducted by individuals who have had additional training specific for this purpose.

Ongoing, formal training sessions will be selected from one of the following organizations:

- California Regional Water Quality Control Board
- International Erosion Control Association
- U.S. Environmental Protection Agency (EPA)
- Recognized municipal stakeholder organizations throughout California
- Professional organizations and societies in building and construction

Contractor personnel attending tailgate training will document attendance using the form in Attachment I. Informal training will include tailgate site briefings to be conducted bi-weekly and will address proper installation methods and maintenance for the following topics:

- Erosion control BMPs
- Sediment control BMPs
- Tracking control BMPs
- Wind erosion control BMPs

- Non-stormwater BMPs
- Waste management and materials pollution control BMPs
- Emergency procedures specific to the construction site stormwater management

The SWPPM has received the following training:

- To Be Determined

500.10 List of Subcontractors

Contractors and subcontractors will be notified of the requirements for stormwater management measures during the project. A list of subcontractors will be maintained and included in the SWPPP. If subcontractors change during the project, the list will be updated accordingly. The subcontractor notification letter and log is included in Attachment J.

500.11 Other Plans/Permits

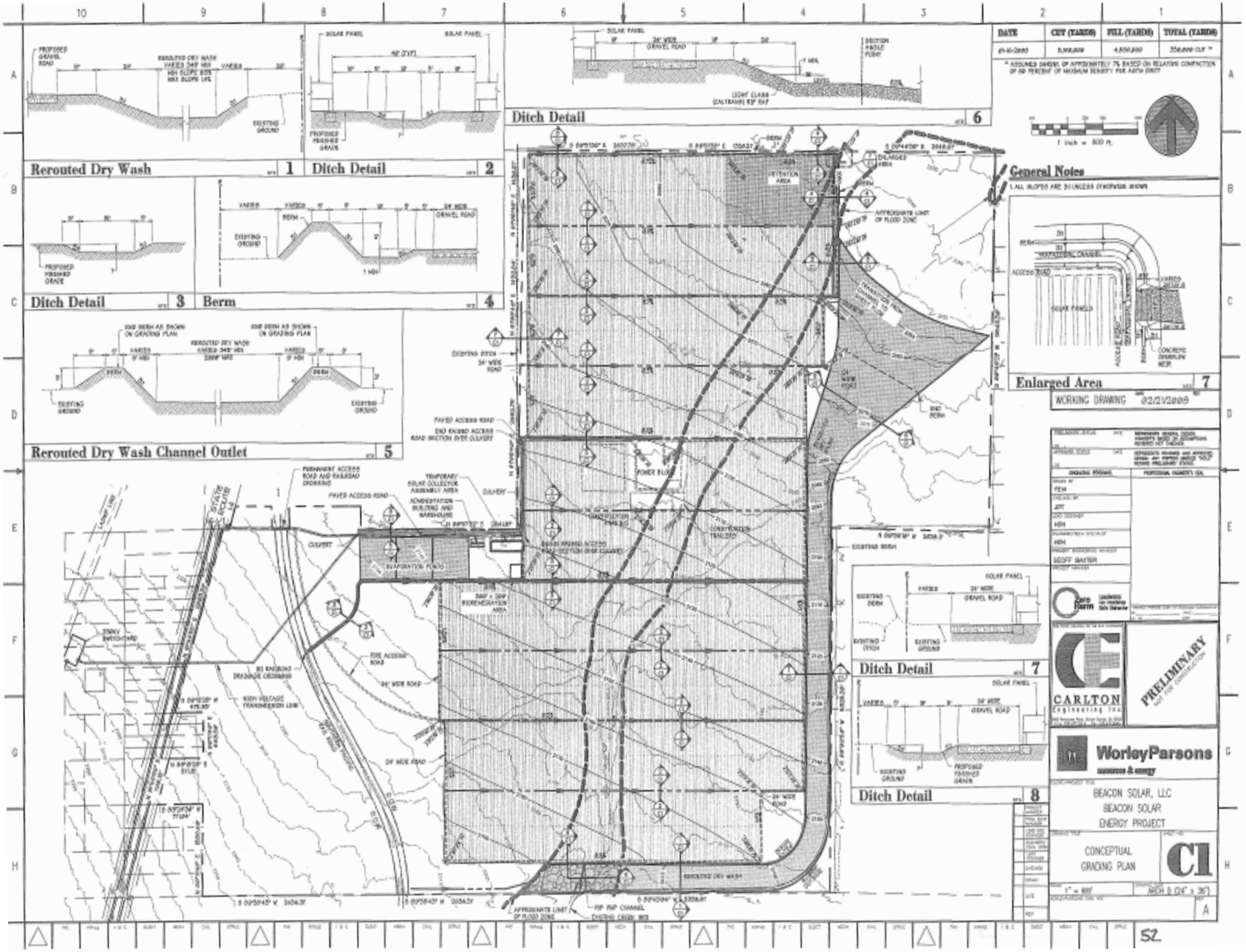
Attachment N includes copies of the following local, state, and federal plans and permits:

- SWRCB Order No. 99-08-DWQ, NPDES General Permit No. CASA000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity.

OTHER PLANS AND PERMITS WILL BE INCLUDED AS APPLICABLE

FIGURE 500.11-1

Conceptual Grading Plan


Rerouted Dry Wash 1
Ditch Detail 2
Ditch Detail 3
Berm 4
Rerouted Dry Wash Channel Outlet 5
Ditch Detail 6
Enlarged Area 7
Ditch Detail 7
Ditch Detail 8
General Notes
WORKING DRAWING 02/21/2008
CARLTON Engineering Inc
PRELIMINARY NOT FOR CONSTRUCTION
WorleyParsons resources & energy
BEACON SOLAR, LLC
BEACON SOLAR ENERGY PROJECT
CONCEPTUAL GRADING PLAN
C1
52

600 Monitoring Program and Reports

600.1 Site Inspections

The SWPPM or designated representative will inspect the site prior to forecast storms, after rain events that cause runoff from the construction site, at 24-hour intervals during extended rain events, and as specified in the contract documents. SWPPP inspections may be conducted in conjunction with other facility inspections. For instance, if a regulated amount of petroleum materials is onsite and there is a Spill Prevention, Control and Countermeasures Plan (SPCC), the SWPPP inspections may be conducted in conjunction with SPCC inspections.

The goals of these inspections are: (1) to identify areas contributing to a stormwater discharge; (2) to evaluate whether measures to reduce pollutant loadings identified in the SWPPP are adequate, properly installed and functioning in accordance with the terms of the General Permit; and (3) whether additional control practices or corrective maintenance activities are needed.

The results of inspections and assessments will be documented, a copy will be provided to the Project Manager within 24 hours of the inspection, and copies of the completed inspection checklists will be maintained with the SWPPP. Site inspections conducted for monitoring purposes will be performed using the inspection checklist shown in Attachment L.

The name(s) and contact number(s) of the assigned inspection personnel are listed below:

Assigned inspector: To Be Determined Contact phone: To Be Determined

600.2 Non-Compliance Reporting

If a discharge occurs or if the project receives a written notice of non-compliance, the Contractor will immediately notify the Project Manager, file a written report to Beacon Energy, LLC within 7 days of the discharge or notice, and file a written report to the RWQCB within 30 days of identification of non-compliance. Corrective measures will be implemented immediately following the discharge, notice, or order. A sample Notice of Non-Compliance (NONC) form is provided in Attachment K. Discharges will be documented on a Discharge Reporting Log using the example form in Attachment T.

The report to the Owner/Developer and to the RWQCB will contain the following items:

- The date, time, location, nature of operation, and type of unauthorized discharge, including the cause or nature of the notice or order
- The BMPs deployed before the discharge event, or prior to receiving the notice or order
- The date of deployment and type of BMPs deployed after the discharge event, or after receiving the notice or order, including additional measures installed or planned to reduce or prevent re-occurrence
- An implementation and maintenance schedule for affected BMPs.

600.3 Record Keeping and Reports

Records will be retained for a minimum of 3 years for the following items:

- Site inspections
- Compliance certifications
- Discharge reports
- Approved SWPPP document and amendments

600.4 Sampling and Analysis Plan for Sediment

This project does **not** receive run-on with the potential to combine with storm water that discharges directly to a water body listed as impaired due to sedimentation/siltation or turbidity pursuant to Clean Water Act, Section 303(d); therefore a Sampling and Analysis Plan for sedimentation is not required.

600.5 Sampling and Analysis Plan for Non-Visible Pollutants

This section describes the sampling and analysis strategy for monitoring non-visible pollutants in stormwater discharges from the project site and offsite activities directly related to the project, in accordance with the requirements of Section B of the General Permit, including SWRCB Resolution 2001-046.

600.5.1 Scope of Monitoring Activities

The following construction materials, wastes, or activities are potential sources of non-visible pollutants to stormwater discharges from a project. Identification, storage, use, and operational locations of potential sources of non-visible pollutants at this project site will be updated, identified on site maps, and incorporated into this SWPPP by the Contractor.

- Vehicle batteries
- Concrete curing
- Sealants
- Adhesives
- Cleaning products
- Solvents; Thinners
- Fertilizers; Herbicides
- Dust palliatives
- Soil binders
- Painting products
- Line flushing products
- Masonry products

No soil amendments are anticipated to be used on the project site that has the potential to change the chemical properties, engineering properties, or erosion resistance of the soil.

Stormwater run-on to this site does not have the potential to contribute non-visible pollutants to stormwater discharges from the project.

600.5.2 Background Monitoring Strategy

600.5.2.1 Background Sampling Schedule

Samples for the applicable non-visible pollutant(s) and a sufficiently large uncontaminated background sample will be collected during the first 2 hours of discharge from rain events that result in a sufficient discharge for sample collection. Samples will be collected during daylight hours (sunrise to sunset) and will be collected regardless of the time of year, status of the construction site, or day of the week.

In conformance with the EPA definition, a minimum of 72 hours of dry weather will be used to distinguish between separate rain events.

Collection of discharge samples for non-visible pollutant monitoring will be triggered when any of the following conditions are observed during inspections conducted before or during rain events:

- Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions. Watertight conditions are defined as (1) storage in a watertight container, (2) storage under a watertight roof or within a building, or (3) storage protected by temporary cover and containment that prevents stormwater contact and runoff from the storage area.
- Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but (1) a breach, malfunction, leakage, or spill is observed, (2) the leak or spill is not cleaned up prior to the rain event, and (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm sewer system.
- An operational activity with the potential to contribute non-visible pollutants (1) occurred during or within 24 hours prior to the rain event, (2) caused applicable BMPs to be breached, malfunction, or be improperly implemented, and (3) could result in a discharge of non-visible pollutants to surface waters or a storm sewer system.
- Soil amendments that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil have been applied, and there is the potential for discharge of non-visible pollutants to surface waters.

600.5.2.2 Background Sampling Locations

- Sampling locations will be determined by the Storm Water Pollution Prevention Plan Manager (SWPPPM).

600.5.3 Monitoring Preparation

Samples on the project site will be collected by the following Contractor sampling personnel:

Name/Telephone Number:	To Be Determined

Prior to the rainy season, sampling personnel and alternates will review the Sampling and Analysis Plan.

An adequate stock of monitoring supplies and equipment for monitoring non-visible pollutants will be available on the project site in case of a 'need to sample' event arises. Monitoring supplies and equipment will be stored in a cool-temperature environment that will not contact rain or direct sunlight. Sampling personnel shall be made available to collect samples as the need arises.

Supplies maintained at the project site will include surgical gloves, sample collection equipment, coolers, appropriate number and volume of sample bottles, identification labels, re-sealable storage bags, paper towels, personal rain gear, ice, Sampling Activity Log forms, and Chain of Custody (COC) forms. The Contractor will obtain and maintain the field-testing instruments for analyzing samples in the field by sampling personnel.

Safety practices for sample collection will be in accordance with the Contractor's Health and Safety Plan.

The SWPPM will contact sampling personnel on an as needed basis. This will ensure that adequate sample collection personnel, supplies, and field test equipment for monitoring non-visible pollutants are available and mobilized to collect samples on the project site in accordance with the project needs.

Maintenance of the field-testing instruments for analyzing samples in the field will be the requirement of the SWPPM.

600.5.4 Analytical Constituents

600.5.4.1 Identification of Non-Visible Pollutants

Table 600.5.4.1-1 lists specific sources and types of potential non-visible pollutants anticipated to be on the project site and the applicable water quality indicator constituent(s) for that pollutant. The list of types of non-visible pollutants will be updated at a later time.

TABLE 600.5.4.1-1
Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Batteries	Sulfuric acid, lead	pH
Cleaners (acid/TSP)	Acid/Phosphate	pH/Phosphate
Solvent	VOC, COD, SVOC	COD, VOC, SVOC
Thinners	VOC, COD	COD, VOC
Sealant	Methyl Methalcrylate, Cobalt, Zinc	Methyl Methalcrylate, Cobalt, Zinc

TABLE 600.5.4.1-1
Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Concrete Curing /Compound	Base, VOC, SVOC	pH, VOC, SVOC
Herbicides	Herbicide	Herbicide – check lab
Fertilizers	Nitrate, Phosphate, Organic Nitrogen, Potassium, TOC, COD	Nitrate, Phosphate
Dust palliatives	Chloride, TDS, Cations (Na, Mg, Ca)	Chloride, TDS
Adhesives	Phenols, COD, SVOC	COD, Phenols, SVOC

600.5.5 Sample Collection and Handling

600.5.5.1 Sample Collection Procedures

Samples of discharge will be collected at the designated sampling locations for observed breaches, malfunctions, leakages, spills, operational areas, soil amendment application areas, and/or historical site usage areas that triggered the sampling event.

Grab samples will be collected and preserved in accordance with the methods identified in Table 600.5.5.1-1. Only personnel trained in proper water quality sampling will collect samples.

Samples will be collected by placing a separate lab-provided sample container directly into a stream of water down gradient and close to the potential non-visible pollutant discharge location. This separate lab-provided sample container will be used to collect water, which will be transferred to sample bottles for laboratory analysis. The up gradient and uncontaminated background samples will be collected prior to collecting the down gradient sample to minimize cross-contamination. Sampling personnel will collect the water up gradient of where they are standing. Once the separate lab-provided sample container is filled, the water sample will be poured directly into sample bottles provided by the laboratory for the analyte(s) being monitored.

To maintain sample integrity and prevent cross-contamination, sampling collection personnel will:

- Wear a clean pair of surgical gloves prior to the collection and handling of each sample at each location.
- Prevent the inside of the sample bottle from contacting any material other than the water sample.
- Discard sample bottles or sample lids that have been dropped onto the ground prior to sample collection.
- Prevent the cooler lid from remaining open for an extended period of time once samples are placed inside.

- Avoid sampling near a running vehicle where exhaust fumes may affect the sample.
- Avoid touching the exposed end of a sampling tube, if applicable.
- Prevent rainwater from rain gear or other surfaces from dripping into sample bottles.
- Avoid eating, smoking, or drinking during sample collection.
- Avoid sneezing or coughing in the direction of an open sample bottle.
- Minimize the exposure of the samples to direct sunlight, as sunlight may cause biochemical transformation of the sample to take place.
- Decontaminate sampling equipment prior to sample collection using a TSP-soapy water wash, distilled water rinse, and final rinse with distilled water.
- Dispose of decontamination water/soaps appropriately; i.e., avoid discharge to the receiving water.

TABLE 600.5.5.1-1
Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants

Constituent	Analytical Method	Minimum Sample Volume	Sample Bottle	Sample Preservation	Reporting Limit	Maximum Holding Time
VOCs-Solvents	EPA 8260B	3 x 40 mL	VOA-glass	Store at 4˚ C, HCl to pH<2	1 µg/L	14 days
SVOCs	EPA 8270C	1 x 1 L	Glass-Amber	Store at 4˚ C	10 µg/L	7 days
Pesticides	EPA 8151A	1 x 1 L	Glass-Amber	Store at 4˚ C	Check Lab	7 days
Herbicides	EPA 8151A	1 x 1 L	Glass-Amber	Store at 4˚ C	Check Lab	7 days
COD	EPA 410.4	1 x 250 mL	Glass-Amber	Store at 4˚ C, H_2SO_4 to pH<2	5 mg/L	28 days
TDS	EPA 160.1 (TDS)	1 x 100 mL	Polypropylene	None	ppm	Immediate
pH	EPA 150.1	1 x 100 mL	Polypropylene	None	Unitless	Immediate
Alkalinity	SM 2320B	1 x 250 mL	Polypropylene	Store at 4˚ C	1 mg/L	14 days
Metals (Al, Sb, As, Ba, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, Se, Na, Th, Va, Zn)	EPA 6010B/7470A	1 x 250 mL	Polypropylene	Store at 4˚ C, HNO_3 to pH<2	0.1 mg/L	6 months
Metals (Chromium VI)	EPA 7199	1 x 500 mL	Polypropylene	Store at 4˚ C	1 µg/L	24 hours

TABLE 600.5.5.1-1
Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants

Constituent	Analytical Method	Minimum Sample Volume	Sample Bottle	Sample Preservation	Reporting Limit	Maximum Holding Time

Notes:

°C	–	Degrees Celsius	µg/L	–	Micrograms per Liter
COD	–	Chemical Oxygen Demand	mL	–	Milliliter
DO	–	Dissolved Oxygen	ppm	–	Parts per million
EPA	–	Environmental Protection Agency	PCB	–	Polychlorinated Biphenyl
HCl	–	Hydrogen Chloride	SVOC	–	Semi-Volatile Organic Compound
H_2SO_4	–	Hydrogen Sulfide	TDS	–	Total Dissolved Solids
HNO_3	–	Nitric Acid	VOA	–	Volatile Organic Analysis
L	–	Liter	VOC	–	Volatile Organic Compound
mg/L	–	Milligrams per Liter			

600.5.5.2 Sample Handling Procedures

Immediately following collection, sample bottles for laboratory analytical testing will be capped, labeled, documented on a COC form provided by the analytical laboratory; sealed in a re-sealable storage bag; placed in an ice-chilled cooler, as close to 4ºC as practicable; and delivered within 24 hours to a California-certified laboratory.

Immediately following collection, samples for field analysis (pH) will be tested in accordance with the field instrument manufacturer's instructions and results will be recorded on the Sampling Activity Log, Attachment R.

600.5.6 Sample Documentation Procedures

Original data documented on sample bottle identification labels, COC forms, Sampling Activity Logs, and Inspection Checklists will be recorded using waterproof ink. These will be considered accountable documents. If an error is made on an accountable document, the individual will make corrections by lining through the error and entering the correct information. The erroneous information will not be obliterated. Corrections will be initialed and dated. Copies of the Sampling Activity Log and Chain of Custody form are provided in Attachments R and (LATER).

Sampling and field analysis activities will be documented using the following:

- **Sample Bottle Identification Labels:** Sampling personnel will attach an identification label to each sample bottle. At a minimum, the following information will be recorded on the label:

  Project name

  Project number

  Unique sample identification number and location:

  a. [Project Number]-[Six digit sample collection date]-[Location](*Example:* 0G5304-081801-Inlet472)

  b. QA/QC samples will be identified similarly using a unique sample number or designation (*Example:* 0G5304-081801-DUP1)

Collection date/time (no time applied to QA/QC samples)

Analysis constituent

- **Sampling Activity Logs:** A log of sampling events will identify:

  Sampling date
  Separate times for collected samples and QA/QC samples recorded to the nearest minute
  Unique sample identification number and location
  Analysis constituent
  Names of sampling personnel
  Weather conditions (including precipitation amount)
  Field analysis results
  Other pertinent data

- **Chain of Custody (COC) Forms:** Samples to be analyzed by a laboratory will be accompanied by a COC form provided by the laboratory. Only the sample collectors will sign the COC form over to the lab. COC procedures will be strictly adhered to for QA/QC purposes.

- **Stormwater Quality Construction Inspection Checklists:** When applicable, the Contractor's stormwater inspector will document on the checklist that sample for non-visible pollutants were taken during a rain event.

600.5.7 Sample Analysis

Samples will be analyzed for the applicable constituents using the analytical methods identified in Table 600.5.5.1-1. For samples collected for field analysis, collection, analysis, and equipment calibration will be in accordance with the field instrument manufacturer's specifications.

600.5.8 Quality Assurance/Quality Control

For an initial verification of laboratory or field analysis, duplicate samples will be collected at a rate of 10 percent or 1 duplicate per sampling event. The duplicate sample will be collected, handled, and analyzed using the same protocols as primary samples. A duplicate sample will be collected at each location immediately after the primary sample has been collected. Duplicates will be collected where contamination is likely, not on the background sample. Duplicate samples will not influence evaluations or conclusions; however, they will be used as a check on laboratory quality assurance.

600.5.9 Data Management and Reporting

A copy of water quality analytical results and QA/QC data will be submitted to the Project Manager and Beacon Energy, LLC within 5 days of sampling (for field analyses) and within 30 days (for laboratory analyses).

Lab reports and COCs will be reviewed for consistency between lab methods, sample identifications, dates, and times for both primary samples and QA/QC samples. Data, including COC forms and Sampling Activity Logs, will be kept with the SWPPP.

600.5.9.1 Data Evaluation

If for whatever reason, a sample is taken and shows the runoff/down gradient sample has an increased level of the tested analyte relative to the background

sample, the BMPs, site conditions, and surrounding influences will be assessed to determine the probable cause for the increase. As determined by the site and data evaluation, appropriate BMPs will be repaired or modified to mitigate discharges of non-visual pollutant concentrations. Revisions to the BMPs will be recorded as an amendment to the SWPPP. Any evaluation of the water quality analytical results sampling, including figures with sample locations, will be submitted to the Project Manager and Beacon Energy, LLC.

600.6 Change of Conditions

Whenever SWPPP monitoring, pursuant to Section B of the General Permit, indicates a change in site conditions that might affect the appropriateness of sampling locations or introduce additional non-visible pollutants of concern, testing protocols will be revised accordingly. Revisions will be recorded as amendments to the SWPPP.

600.7 Mitigation Monitoring Plan

As required, a mitigation monitoring plan will also be developed in conjunction with California Energy Commission staff to set performance standards and monitor the effectiveness of mitigation measures. This plan will address the timing and methods of such measures, as well as reporting and response requirements. Personnel will receive training to conduct their jobs properly and recognize and report abnormal/adverse situations so that they can be quickly corrected.

700 References

California Stormwater Quality Association. California Stormwater BMP Handbook – Construction. January 2003.

CALTRANS Storm Water Pollution Prevention Plan (SWPPP) and Water Pollution Control Program (WPCP) Review Guidance Manual, December 2003.

Kern County Hydrology Manual, Hromadka II, T.V., 1992.

National Resource Conservation Service (NRCS). 2007. Soil Survey: Kern County California. Soil Web Survey Webpage at: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

NOAA Atlas 14 as appropriate.

State of California Department of Transportation (Caltrans). 2003, 2007. Caltrans Storm Water Quality Handbooks.

SWRCB Order No. 99-08-DWQ, NPDES General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity.

Attachment A

VICINITY MAP - LATER

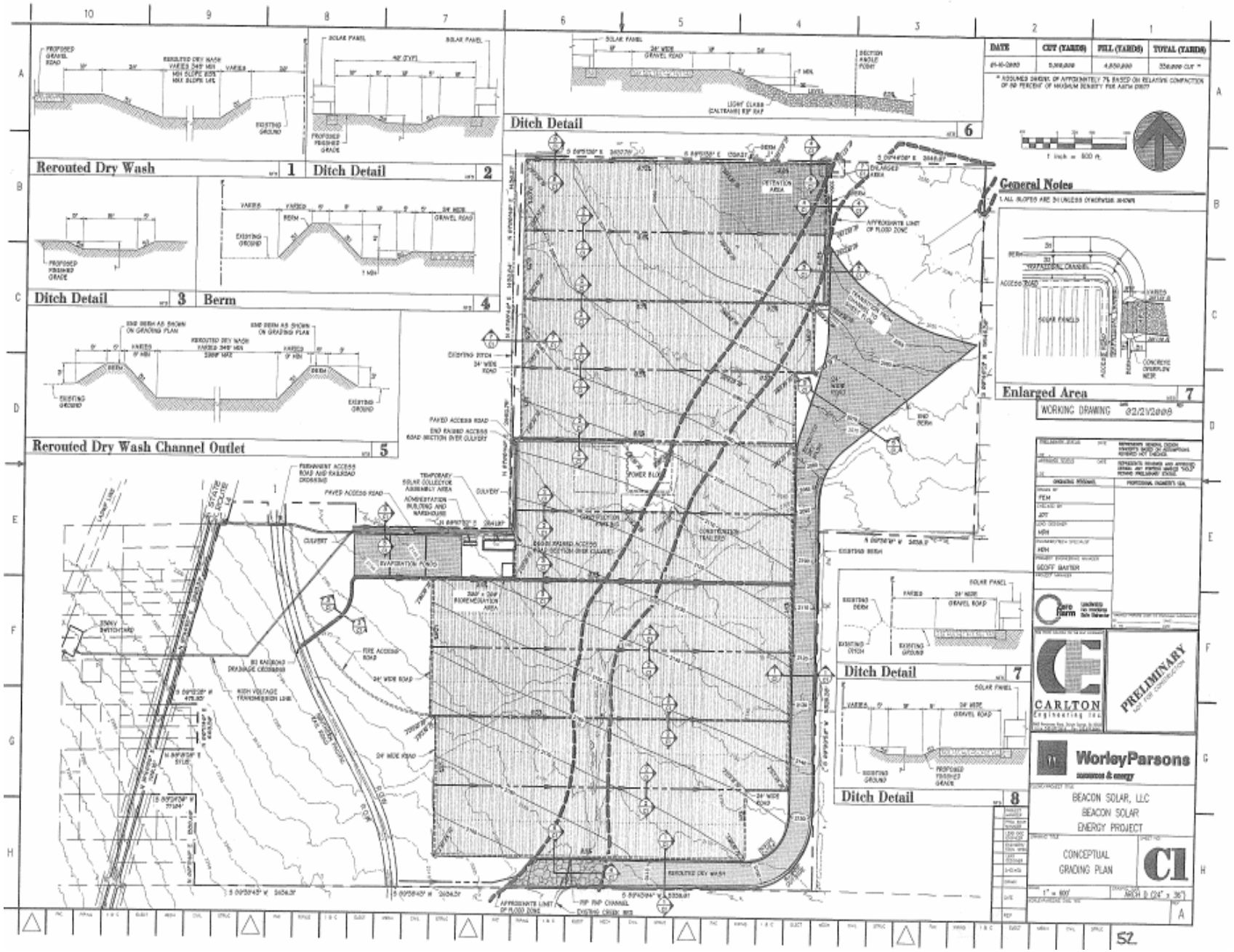
Attachment B

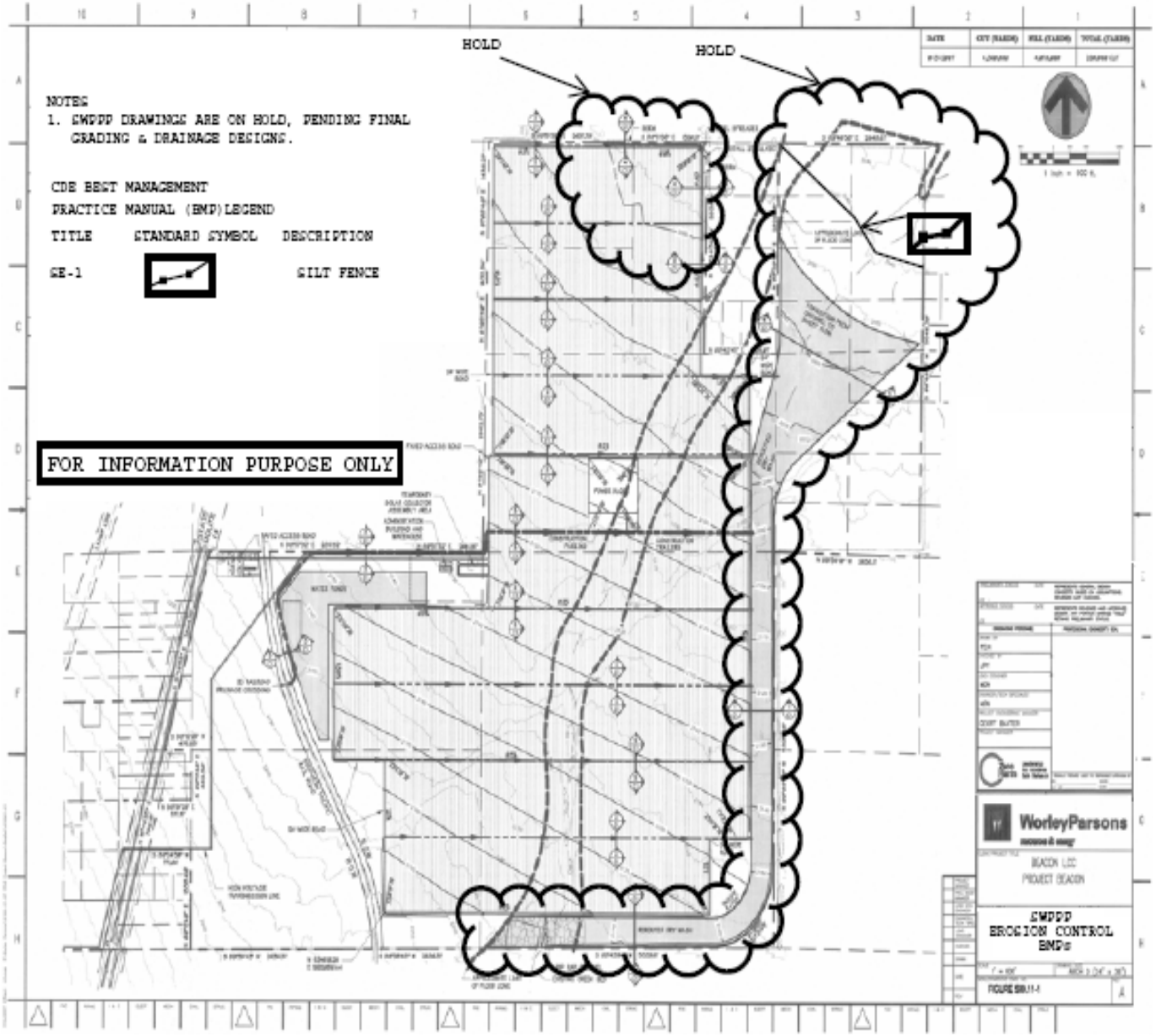
Water Pollution Control Drawings

To Be Provided (LATER)

Five sheets of BMPs:

Title	Sheet Number
Non storm water	SWPPP 2-2
Sediment control	SWPPP 2-3
Tracking control	SWPPP 2-4
Waste Mgmt /Materials Pollution	SWPPP 2-5
Wind erosion	SWPPP 2-6


Rerouted Dry Wash 1
Ditch Detail 2
Ditch Detail 3
Berm 4
Rerouted Dry Wash Channel Outlet 5
Ditch Detail 6
Enlarged Area 7
Ditch Detail 7
Ditch Detail 8
General Notes
1. ALL SLOPES ARE 3:1 UNLESS OTHERWISE SHOWN
WORKING DRAWING 02/21/2008
PRELIMINARY
NOT FOR CONSTRUCTION
CARLTON Engineering Inc.
WorleyParsons
BEACON SOLAR, LLC
BEACON SOLAR
ENERGY PROJECT
CONCEPTUAL
GRADING PLAN
C1
1" = 800'
ARCH D (24" x 36")
A
52


HOLD
HOLD
NOTES
1. SWPPP DRAWINGS ARE ON HOLD, PENDING FINAL GRADING & DRAINAGE DESIGNS.
CDE BEST MANAGEMENT
PRACTICE MANUAL (BMP) LEGEND
TITLE
STANDARD SYMBOL
DESCRIPTION
SE-1
SILT FENCE
FOR INFORMATION PURPOSE ONLY
WorleyParsons
BEACON LLC
PROJECT BEACON
SWPPP
EROSION CONTROL
BMPs

Attachment C

BMP Consideration Checklist

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The contractor shall consider using all BMPs listed hereon. Those BMPs which are not included in the SWPPP shall be checked as "Not Used" with a brief statement describing why it is not being used.
All selected BMPs shall be included in the schedule of values, except for those items shown on the plans and paid for as a separate item or work

TEMPORARY SOIL STABILIZATION BMPs

BMP No.	BMP	MINIMUM REQUIREMENT (2)	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
SE-1	Scheduling	✓				
SE-2	Preservation of Existing Vegetation	✓				
SE-3	Hydraulic Mulch	✓(1)				
SE-4	Hydroseeding	✓(1)				
SE-5	Soil Binders	✓(1)				
SE-6	Straw Mulch	✓(1)				
SE-7	Geotextiles, Plastic Covers, & Erosion Control Blankets/Mats	✓(1)				
SE-8	Wood Mulching					
SE-9	Earth Dikes/Drainage Swales & Lined Ditches					
SE-10	Outlet Protection/ Velocity Dissipation Devices					
SE-11	Slope Drains					
SE-12	Stream Bank Stabilization					

(1) The Contractor shall select one of the five measures listed or a combination thereof to achieve and maintain the contract's rainy season disturbed soil area (DSA) requirements.

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The Contractor shall consider using all BMPs listed hereon. Those BMPs which are not included in the SWPPP shall be checked as "Not Used" with a brief statement describing why it is not being used.
All selected BMPs shall be included in the Schedule of Values, except for those items shown on the plans and paid for as a separate item or work

BMP No.	BMP	MINIMUM REQUIREMENT (2)	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
TEMPORARY SEDIMENT CONTROL BMPs						
SE-1	Silt Fence	✓				
SE-2	Sediment/Desilting Basin					
SE-3	Sediment Trap					
SE-4	Check Dam					
SE-5	Fiber Rolls	✓				
SE-6	Gravel Bag Berm					
SE-7	Street Sweeping and Vacuuming	✓				
SE-8	Sand Bag Barrier					
SE-9	Straw Bale Barrier					
SE-10	Storm Drain Inlet Protection	✓				
WIND EROSION CONTROL BMPs						
WE-1	Wind Erosion Control	✓				
TRACKING CONTROL BMPs						
TC-1	Stabilized Construction Entrance/Exit					
TC-2	Stabilized Construction Roadway					
TC-3	Entrance/Outlet Tire Wash					

(2) The contractor shall select either sediment control measure or a combination thereof to achieve and maintain the contract's disturbed soil area (DSA) protection requirements.

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The Contractor shall consider using all BMPs listed hereon. Those BMPs which are not included in the SWPPP shall be checked as "not used" with a brief statement describing why it is not being included.
All selected BMPs shall be included in the Schedule of Values, except for those items shown on the plans and paid for as a separate item or work

NON-STORM WATER MANAGEMENT BMPs

BMP No.	BMP	MINIMUM REQUIREMENT (2)	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
NS-1	Water Conservation Practices					
NS-2	Dewatering Operations					
NS-3	Paving and Grinding Operations					
NS-4	Temporary Stream Crossing					
NS-5	Clear Water Diversion					
NS-6	Illicit Connection/Illegal Discharge Detection and Reporting	✓				
NS-7	Potable Water/Irrigation					
NS-8	Vehicle and Equipment Cleaning	✓				
NS-9	Vehicle and Equipment Fueling	✓				
NS-10	Vehicle and Equipment Maintenance	✓				
NS-11	Pile Driving Operations					
NS-12	Concrete Curing					
NS-13	Material and Equipment Use Over Water					
NS-14	Concrete Finishing					
NS-15	Structure Demolition/Removal					

CONSTRUCTION SITE BMPs
CONSIDERATION CHECKLIST

The Contractor shall consider using all BMPs listed hereon. Those BMPs which are not included in the SWPPP shall be checked as "not used" with a brief statement describing why it is not being used.
All selected BMPs shall be included in the Schedule of Values, except for those items shown on the plans and paid for as a separate item or work

WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs

BMP No.	BMP	MINIMUM REQUIREMENT (2)	CHECK IF CONTRACT REQUIREMENT	CHECK IF USED	CHECK IF NOT USED	IF NOT USED, STATE REASON
WM-1	Material Delivery and Storage	✓				
WM-2	Material Use	✓				
WM-3	Stockpile Management	✓				
WM-4	Spill Prevention and Control	✓				
WM-5	Solid Waste Management	✓				
WM-6	Hazardous Waste Management					
WM-7	Contaminated Soil Management					
WM-8	Concrete Waste Management					
WM-9	Sanitary/Septic Waste Management	✓				
WM-10	Liquid Waste Management					

Attachment D

Attachment E

Computation Sheet for Determining Run-on Discharges

Figure 819.2A

Runoff Coefficients for Undeveloped Areas
Watershed Types

	Extreme	High	Normal	Low
Relief	**.28 -.35** Steep, rugged terrain with average slopes above 30%	**.20 -.28** Hilly, with average slopes of 10 to 30%	**.14 -.20** Rolling, with average slopes of 5 to 10%	**.08 -.14** Relatively flat land, with average slopes of 0 to 5%
Soil Infiltration	**.12 -.16** No effective soil cover, either rock or thin soil mantle of negligible infiltration capacity	**.08 -.12** Slow to take up water, clay or shallow loam soils of low infiltration capacity, imperfectly or poorly drained	**.06 -.08** Normal; well drained light or medium textured soils, sandy loams, silt and silt loams	**.04 -.06** High; deep sand or other soil that takes up water readily, very light well drained soils
Vegetal Cover	**.12 -.16** No effective plant cover, bare or very sparse cover	**.08 -.12** Poor to fair; clean cultivation crops, or poor natural cover, less than 20% of drainage area over good cover	**.06 -.08** Fair to good; about 50% of area in good grassland or wood-land, not more than 50% of area in cultivated crops	**.04 -.06** Good to excellent; about 90% of drainage area in good grassland, woodland or equivalent cover.
Surface Storage	**.10 -.12** Negligible surface depression few and shallow; drainageways steep and small, no marshes	**.08 -.10** Low; well defined system of small drainageways; no ponds or marshes	**.06 -.08** Normal; considerable surface depression storage; lakes and pond marshes	**.04 -.06** High; surface stor-age, high; drainage system not sharply defined; large flood plain storage or large number of ponds or marshes.

Given An undeveloped watershed consisting of;

1) rolling terrain with average slopes of 5%,
2) clay type soils,
3) good grassland area, and
4) normal surface depressions.

Solution:

Relief	0.14
Soil Infiltration	0.08
Vegetal Cover	0.04
Surface Storage	0.06
C=	0.32

Find The runoff coefficient, C, for the above watershed.

Table 819.2B

Runoff Coefficients for Developed Areas

Type of Drainage Area	Runoff Coefficient
Business:	
Downtown areas	0.70 - 0.95
Neighborhood areas	0.50 - 0.70
Residential:	
Single-family areas	0.30 - 0.50
Multi-units, detached	0.40 - 0.60
Multi-units, attached	0.60 - 0.75
Suburban	0.25 - 0.40
Apartment dwelling areas	0.50 - 0.70
Industrial:	
Light areas	0.50 - 0.80
Heavy areas	0.60 - 0.90
Parks, cemeteries:	0.10 - 0.25
Playgrounds:	0.20 - 0.40
Railroad yard areas:	0.20 - 0.40
Unimproved areas:	0.10 - 0.30
Lawns:	
Sandy soil, flat, 2%	0.05 - 0.10
Sandy soil, average, 2-7%	0.10 - 0.15
Sandy soil, steep, 7%	0.15 - 0.20
Heavy soil, flat, 2%	0.13 - 0.17
Heavy soil, average, 2-7%	0.18 - 0.25
Heavy soil, steep, 7%	0.25 - 0.35
Streets:	
Asphaltic	0.70 - 0.95
Concrete	0.80 - 0.95
Brick	0.70 - 0.85
Drives and walks	0.75 - 0.85
Roofs:	0.75 - 0.95

Attachment F

Notice of Construction (NOC) / Notice of Intent (NOI)

Attachment G

Program for Maintenance, Inspection, and Repair of Construction Site BMPs

SWPPP Inspection, Maintenance and Repair Program			
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY**		**MAINTENANCE/REPAIR PROGRAM**
	Rainy	**Non-Rainy**	
TEMPORARY SOIL STABILIZATION BMPs			
TEMPORARY SEDIMENT CONTROL BMPs			
WIND EROSION CONTROL BMPs			
TRACKING CONTROL BMPs			

SWPPP Inspection, Maintenance and Repair Program			
BEST MANAGEMENT PRACTICES (BMPs)	**INSPECTION FREQUENCY**		**MAINTENANCE/REPAIR PROGRAM**
	Rainy	**Non-Rainy**	
NON-STORM WATER MANAGEMENT BMPs			
WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL BMPs			

Attachment H

Stormwater Quality Construction Site Inspection Checklist

GENERAL INFORMATION				
Project Name				
Contract No.				
Contractor				
Inspector's Name				
Inspector's Title				
Signature				
Date of Inspection				
Inspection Type (Check Applicable)	❒ Prior to forecast rain ❒ 24-hr intervals during extended rain		❒ After a rain event ❒ Other _____	
Season (Check Applicable)	❒ Rainy		❒ Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (mm)	

PROJECT AREA SUMMARY AND DISTURBED SOIL AREA (DSA) SIZE LIMITS FROM SPECIAL PROVISIONS				
Total Project Area	_____	Hectares	_____	Acres
Rainy Season DSA Limit	_____	Hectares	_____	Acres
Field Estimate of Non-Active DSAs	_____	Hectares	_____	Acres
Field Estimate of Active DSAs	_____	Hectares	_____	Acres

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Preservation of Existing Vegetation				
Is temporary fencing provided to preserve vegetation in areas where no construction activity is planned?				
Location:				
Location:				
Location:				
Location:				
Temporary Soil Stabilization				
Does the applied temporary soil stabilization provide 100% coverage for the required areas?				
Are any non-vegetated areas that may require temporary soil stabilization?				
Is the area where temporary soil stabilization required free from visible erosion?				
Location:				
Location:				
Location:				
Location:				
Temporary Linear Sediment Barriers				
Are temporary linear sediment barriers properly installed in accordance with the details, functional and maintained?				
Are temporary linear sediment barriers free of accumulated litter?				
Is the built-up sediment less than 1/3 the height of the barrier?				
Are cross barriers installed where necessary and properly spaced?				
Are fiber rolls installed and maintained on required slopes in accordance with the details, functional and maintained?				
Location:				
Location:				
Location:				
Location:				
Location:				
Storm Drain Inlet Protection				
Are storm drain inlets internal to the project properly protected with either Type 1, 2 or 3 inlet protection?				
Are storm drain inlet protection devices in working order and being properly maintained?				
Location:				
Location:				
Location:				
Location:				
Location:				

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Desilting Basins				
Are basins maintained to provide the required retention/detention?				
Are basin controls (inlets, outlets, diversions, weirs, spillways, and racks) in working order?				
Location:				
Location:				
Location:				
Location:				
Stockpiles				
Are all locations of temporary stockpiles, including soil, hazardous waste, and construction materials in approved areas?				
Are stockpiles protected from run-on, run-off from adjacent areas and from winds?				
Are stockpiles located at least 50 ft from concentrated flows, downstream drainage courses and storm drain inlets?				
Are required covers and/or perimeter controls in place?				
Location:				
Location:				
Location:				
Location:				
Concentrated Flows				
Are concentrated flow paths free of visible erosion?				
Location:				
Location:				
Location:				
Location:				
Tracking Control				
Are points of ingress/egress to public/private roads inspected, swept, and vacuumed daily?				
Are all paved areas free of visible sediment tracking or other particulate matter?				
Is rock at Temporary Construction Entrance(s) 12-inches or more in thickness?				
Does sediment need to be removed from the rock, or does the rock need to be replaced?				
For Type 2 Construction Entrance, does sediment need to be removed from ribbed plates?				
Location:				
Location:				
Location:				
Location:				

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Wind Erosion Control				
Is dust control implemented in conformance with Section 10 of the Standard Specifications?				
Location:				
Location:				
Location:				
Location:				
Dewatering Operations				
Is dewatering handled in conformance with the dewatering permit issued by the RWQCB?				
Is required treatment provided for dewatering effluent?				
Location:				
Location:				
Location:				
Location:				
Vehicle & Equipment Fueling, Cleaning, and Maintenance				
Are vehicle and equipment fueling, cleaning and maintenance areas reasonably clean and free of spills, leaks, or any other deleterious material?				
Are vehicle and equipment fueling, cleaning and maintenance activities performed on an impermeable surface in dedicated areas?				
If no, are drip pans used?				
Are dedicated fueling, cleaning, and maintenance areas located at least 15 m away from downstream drainage facilities and watercourses, and protected from run-on and runoff?				
Is wash water contained for infiltration/ evaporation and disposed of outside the highway right of way?				
Is on-site cleaning limited to washing with water (no soap, soaps substitutes, solvents, or steam)?				
On each day of use, are vehicles and equipment inspected for leaks and if necessary, repaired?				
Location:				
Location:				
Location:				
Location:				
Waste Management & Materials Pollution Control				
Are material storage areas and washout areas protected from run-on and runoff, and located at least 50 ft from concentrated flows and downstream drainage facilities?				
Are all material handling and storage areas clean; organized; free of spills, leaks, or any other deleterious material; and stocked with appropriate clean-up supplies?				
Are liquid materials, hazardous materials, and hazardous wastes stored in temporary containment facilities?				

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Are bagged and boxed materials stored on pallets?				
Are hazardous materials and wastes stored in appropriate, labeled containers?				
Are proper storage, clean-up, and spill-reporting procedures for hazardous materials and wastes posted in open, conspicuous and accessible locations adjacent to storage areas?				
Are temporary containment facilities free of spills and rainwater?				
Are temporary containment facilities and bagged/boxed materials covered?				
Are temporary concrete washout facilities designated and being used?				
Are temporary concrete washout facilities functional for receiving and containing concrete waste and are concrete residues prevented from entering the drainage system?				
Do temporary concrete washout facilities provide sufficient volume and freeboard for planned concrete operations?				
Are the temporary concrete washout facilities' PVC liners free from punctures and holes?				
Are concrete wastes, including residues from cutting and grinding, contained and disposed of off-site or in concrete washout facilities?				
Are spills from mobile equipment fueling and maintenance properly contained and cleaned up?				
Is the site free of litter?				
Are trash receptacles provided in the Contractor's yard, field trailer areas, and at locations where workers congregate for lunch and break periods?				
Is litter from work areas within the construction limits of the project site collected and placed in watertight dumpsters?				
Are waste management receptacles free of leaks?				
Are the contents of waste management receptacles properly protected from contact with storm water or from being dislodged by winds?				
Are waste management receptacles filled at or beyond capacity?				
Location:				
Location:				
Location:				
Location:				
Temporary Water Body Crossing or Encroachment				
Are temporary water body crossings and encroachments constructed as shown on the plans or as approved by the engineer?				
Does the project conform to the requirements of the 404 permit and/or 1601agreement?				
Location:				
Location:				
Location:				
Location:				

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Illicit Connection/Illegal Discharge Detection and Reporting				
Is there any evidence of illicit discharges or illegal dumping on the project site?				
If yes, has the Engineer been notified?				
Location:				
Location:				
Location:				
Location:				
Discharge Points				
Are discharge points and discharge flows free from noticeable pollutants?				
Are discharge points free of any significant erosion or sediment transport?				
Location:				
Location:				
Location:				
Location:				
WPCP/SWPPP Update				
Do the WPCP/SWPPP, Project Schedule/Water Pollution Control Schedule and WPCDs adequately reflect the current site conditions and contractor operations?				
Are all BMPs shown on the WPCDs installed in the proper location(s) and according to the details for the plan?				
Location:				
Location:				
Location:				
Location:				
General				
Are there any other potential water pollution control concerns at the site?				
Location:				
Location:				
Location:				
Location:				
Storm Water Monitoring				
Does storm water discharge directly to an water body listed as impaired for sediment/sedimentation or turbidity in the General Construction Activity Permit?				
If yes, were samples for sediment/sedimentation or turbidity collected pursuant to the sampling and analysis plan, if required, during rain events?				

OTHER REQUIREMENTS				
Requirement	**Yes**	**No**	**N/A**	**Corrective Action**
Were there any BMPs not properly implemented, or breaches, malfunctions, leakages or spills observed, which could result in the discharge of pollutants to surface waters that would not be visually detectable in storm water?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				
Were soil amendments (e.g., gypsum) used on the project?				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				
Did storm water contact stored materials or waste and resulted in a discharge from the construction site? (Materials not in watertight containers, etc.)				
If yes, were samples for non-visually detectable pollutants collected pursuant to the sampling and analysis plan during rain events?				

ATTACHMENT I
Trained Contractor Personnel Log Attachment I

Trained Contractor Personnel Log

Stormwater Management Training Log

Project Name: _____

Contract Number: _____

Storm Water Management Topic: (check as appropriate)

- ❑ Temporary Soil Stabilization
- ❑ Temporary Sediment Control
- ❑ Wind Erosion Control
- ❑ Tracking Control
- ❑ Non-storm water management
- ❑ Waste Management and Materials Pollution Control
- ❑ Storm Water Sampling

Specific Training Objective: _____

Location: _____ Date: _____

Instructor: _____ Telephone: _____

Course Length (hours): _____

Attendee Roster (attach additional forms if necessary)

Name	Company	Phone

Name	Company	Phone

COMMENTS:

Attachment J
Subcontractor Notification Letter Attachment J

Subcontractor Notification Letter (Sample) and Notification Log

SWPPP Notification

ABC Construction Inc,
123 Sunset Blvd., Suite 456
Hollywood, CA 90000

Dear Sir/Madam,

Please be advised that the California State Water Resources Control Board has adopted the NPDES Statewide Storm Water Permit, and the General Permit (General Permit) for Storm Water Discharges Associated with Construction Activity (CAS000002, Order No. 99-08-DWQ), and modifications thereto. The goal of these permits is prevent the discharge of pollutants associated with construction activity from entering the storm drain system, ground and surface waters.

[Contractor] has developed a Storm Water Pollution Prevention Plan (SWPPP) in order to implement the requirements of the Permits.

As a subcontractor, you are required to comply with the SWPPP and the Permits for any work that you perform on site. Any person or group who violates any condition of the Permits may be subject to substantial penalties in accordance with state and federal law. You are encouraged to advise each of your employees working on this project of the requirements of the SWPPP and the Permits. A copy of the Permits and the SWPPP are available for your review at the construction office. Please contact me if you have further questions.

Sincerely,

John Doe
Project Superintendent

Attachment K

NOTICE OF NON-COMPLIANCE

To: Name of [City] Engineer/Regional Board Staff Date: Insert Date

Subject: Notice of Non-Compliance

Project Name: Insert Project Name

Project Number/Location: Project number

In accordance with the NPDES Statewide Permit for Storm Water Discharges Associated with Construction Activity, the following instance of discharge is noted:

Date, time, and location of discharge
Insert description and date of event

Nature of the operation that caused the discharge
insert description of operation

Initial assessment of any impact cause by the discharge
insert assessment

Existing BMP(s) in place prior to discharge event
list BMPs in place

Date of deployment and type of BMPs deployed after the discharge.
BMPs deployed after the discharge (with dates)

Steps taken or planned to reduce, eliminate and/or prevent recurrence of the discharge
insert steps taken to prevent recurrence

Implementation and maintenance schedule for any affected BMPs
insert implementation and maintenance schedule

If further information or a modification to the above schedule is required, notify the contact person below.

Name of Contact Person	*Title*
Company	*Telephone Number*
Signature	*Date*

Attachment M

Annual Certification of Compliance Form

Annual Certification of Compliance for the Construction Contractor

Project Name: _____

Contract Number: _____

Contractor Company Name: _____

Contractor Address: _____

Annual Certification Inspection Date: _____

Description of Work:

description of work

Work Now in Progress:

work in progress

Work Planned for Next 12 Months:

work planned

Water Pollution Control Manager Findings

I, and/or personnel acting under my direction and supervision, have inspected the project site and the work described above and certify:

1. ☐ YES ☐ NO Stormwater pollution control measures are being implemented in accordance with the SWPPP approved for the project.

2. ☐ YES ☐ NO The project site and activities thereon are in compliance with the NPDES General Permit No. xxxxxxx, or local NPDES permits, which ever is applicable.

“I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations

Contractor Signature: _____ Date: _____

Approval by the Engineer for the Annual Certification of Compliance

Engineer’s Findings

I, and/or personnel acting under my direction and supervision, have inspected the project site and the work described above and find as follows:

1. ☐ YES ☐ NO Stormwater pollution control measures are being implemented in accordance with the SWPPP approved for the project.

2. ☐ YES ☐ NO The project site and activities thereon are in compliance with the NPDES General Permit No. xxxxxxxx, or local NPDES permits, which ever is applicable.

When both 1 and 2 above are checked “yes”, the engineer must complete the annual certification below.

If either 1 or 2 above are checked “no”, the engineer must:

- File a notice of non-compliance within 30 days of identification of the noncompliance;
- Document follow up actions below;
- Notify the contractor; and
- Initiate corrective actions in accordance with the contract.

Is a Local Agency administering the project?

☐ Yes ☐ No

Engineer's Follow up Actions:

I, and or personnel acting under my direction and supervision, have reviewed and approved of the Contractor's Annual Certification of Compliance. However, the Contractor remains responsible and liable at all times for compliance with applicable requirements for which compliance is ultimately determined by the Regional Water Quality Control Board and/or the State Water Resources Control Board, and/or the EPA.

CERTIFICATION BY LOCAL AGENCY / PRIVATE ENTITY ENGINEER

_____ _____

Engineer's Name and Signature Date

CERTIFICATION BY OVERSIGHT ENGINEER (IF LOCAL AGENCY / PRIVATE ENTITY IS ADMINISTERING PROJECT)

_____ _____

OVERSIGHT ENGINEER'S NAME AND SIGNATURE

Annual Certification of Compliance Form

As applicable

Attachment N

Other Plans/Permits/Agreements

- RWQCB Waiver of Clean Water Act Section 401 Water Quality Certification.

Attachment O

Water Pollution Control Cost Breakdown

Project Name: _____

Contract Number: _____

ITEM	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	VALUE	AMOUNT
SS-3	Hydraulic Mulch	M^2			
SS-4	Hydroseeding	M^2			
SS-5	Soil Binders	M^2			
SS-6	Straw Mulch	M^2			
SS-7	Geotextiles	M^2			
SS-7	Plastic Covers	M^2			
SS-7	Erosion Control Blankets/Mats				
SS-8	Wood Mulching	M^2			
SS-9	Earth Dikes/Drainage Swales & Lined Ditches	M			
SS-10	Outlet Protection/Velocity Dissipation Devices	EA			
SS-11	Slope Drains	EA			
SS-12	Stream Bank Stabilization	LS			
SC-1	Silt Fence	M			
SC-2	Sediment/Desilting Basin	EA			
SC-3	Sediment Trap	EA			
SC-4	Check Dam	EA			
SC-5	Fiber Rolls	M			
SC-6	Gravel Bag Berm	M			
SC-7	Street Sweeping and Vacuuming	LS			
SC-8	Sandbag Barrier	M			
SC-9	Straw Bale Barrier	M			
SC-10	Storm Drain Inlet Protection – Type 1	EA			
SC-10	Storm Drain Inlet Protection – Type 2	EA			
SC-10	Storm Drain Inlet Protection – Type 3	EA			
WE-1	Wind Erosion Control	LS			
TC-1	Stabilized Construction Entrance/Exit	EA			

ITEM	ITEM DESCRIPTION	UNIT	ESTIMATED QUANTITY	VALUE	AMOUNT
TC-2	Stabilized Construction Roadway	EA			
TC-3	Entrance/Outlet Tire Wash	EA			
NS-1	Water Conservation Practices	LS			
NS-2	Dewatering Operations	EA			
NS-3	Paving and Grinding Operations	LS			
NS-4	Temporary Stream Crossing	EA			
NS-5	Clear Water Diversion	EA			
NS-6	Illicit Connection/Illegal Discharge Detection and Reporting	LS			
NS-7	Potable Water/Irrigation	LS			
NS-8	Vehicle and Equipment Cleaning	LS			
NS-9	Vehicle and Equipment Fueling	LS			
NS-10	Vehicle and Equipment Maintenance	LS			
NS-11	Pile Driving Operations	LS			
NS-12	Concrete Curing	LS			
NS-13	Material and Equipment Use Over Water	LS			
NS-14	Concrete Finishing	LS			
NS-15	Structure Demolition/Removal	LS			
WM-1	Material Delivery and Storage	LS			
WM-2	Material Use	LS			
WM-3	Stockpile Management	LS			
WM-4	Spill Prevention and Control	LS			
WM-5	Solid Waste Management	LS			
WM-6	Hazardous Waste Management	LS			
WM-7	Contaminated Soil Management	LS			
WM-8	Concrete Waste Management	LS			
WM-9	Sanitary/Septic Waste Management	LS			
WM-10	Liquid Waste Management	LS			
			TOTAL		

Attachment P

Notice of Completion of Construction / Notice of Termination

Local Agency / Private Entity Administered Projects:
The Notice of Termination (NOT) will be provided by the Local Agent

Attachment Q

Sampling Activity Log and Chain-of-Custody Forms

RAIN EVENT GENERAL INFORMATION				
Project Name				
Contract N°				
Contractor				
Sampler's Name				
Signature				
Date of Sampling				
Season (Check Applicable)	❒ Rainy		❒ Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (mm)	

For rainfall information: http://cdec.water.ca.gov/weather.html or http://www.wrh.noaa.gov/wrhq/nwspage.html

SAMPLE LOG		
Sample Identification	**Sample Location**	**Sample Collection Date and Time**

Specific sample locations descriptions may include: 30m upstream from discharge at eastern boundary, runoff from northern waste storage area, downgradient of inlet 57 at kilometer post 36, etc.

FIELD ANALYSIS		
	Yes No	
Sample Identification	**Test**	**Result**

Attachment R

Pollutant Testing Guidance Table

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
Asphalt Products (Sections 37, 39, 92, 93, 94, and Special Provisions)	Hot Asphalt	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
	Asphalt Emulsion				
	Liquid Asphalt (tack coat)				
	Cold Mix				
	Crumb Rubber	Yes – Black, solid material	Visually Observable - No Testing Required		
	Asphalt Concrete (Any Type)	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		
Cleaning Products	Acids	No	**pH** Acidity Anions (acetic acid, phosphoric acid, sulfuric acid, nitric acid, hydrogen chloride)	pH Meter Acidity Test Kit	EPA 150.1 (pH)
					SM 2310B (Acidity)
					EPA 300.0 (Anion)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
	Bleaches	No		Chlorine	SM 4500-CL G (Res. Chlorine)
	Detergents	Yes - Foam	Visually Observable - No Testing Required		
	TSP	No		Phosphate	EPA 365.3 (Phosphate)
	Solvents	No	**VOC**	None	EPA 601/602 or EPA 624 (VOC)
			SVOC	None	EPA 625 (SVOC)
Portland Concrete Cement & Masonry Products (Section 27, 28,	Portland Cement (PCC)	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Masonry products	No	**pH**	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Alkalinity		SM 2320 (Alkalinity)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
29, 40, 41, 42, 49, 50, 51, 53, 63, 65, 72, 73, 80, 81, 83, 90, and Special Provisions)	Sealant (Methyl Methacrylate - MMA)	No		None	EPA 625 (SVOC)
			Cobalt		EPA 200.8 (Metal)
			Zinc		
	Incinerator Bottom Ash Bottom Ash Steel Slag Foundry Sand Fly Ash Municipal Solid Waste	No	**Aluminum** **Calcium** **Vanadium** **Zinc**	Calcium Test	EPA 200.8 (Metal) EPA 200.7 (Calcium)
	Mortar	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Concrete Rinse Water	Yes - Milky Liquid	Visually Observable - No Testing Required		
	Non-Pigmented Curing Compounds	No	Acidity	pH Meter Alkalinity or Acidity Test Kit	SM 2310B (Acidity)
			Alkalinity		SM 2320 (Alkalinity)
			pH		EPA 150.1 (pH)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
Landscaping and Other Products (Section 20, 24, and Special Provisions)	Aluminum Sulfate	No	Aluminum	TDS Meter Sulfate	EPA 200.8 (Metal)
					EPA 160.1 (TDS)
			Sulfate		EPA 300.0 (Sulfate)
	Sulfur-Elemental	No		Sulfate	EPA 300.0 (Sulfate)
	Fertilizers-Inorganic [4]	No		Nitrate	EPA 300.0 (Nitrate)
			Phosphate	Phosphate	EPA 365.3 (Phosphate)
			Organic Nitrogen	None	EPA 351.3 (TKN)
			Potassium	None	EPA 200.8 (Metal)
	Fertilizers-Organic	No	TOC	Nitrate	EPA 415.1 (TOC)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
					EPA 300.0 (Nitrate)
			Organic Nitrogen		EPA 351.3 (TKN)
			COD		EPA 410.4 (COD)
	Natural Earth (Sand, Gravel, and Topsoil)	Yes - Cloudiness and turbidity	Visually Observable - No Testing Required		
	Herbicide	No		None	Check lab for specific herbicide or pesticide
	Pesticide		**Pesticide**		
	Lime		Alkalinity	pH Meter Alkalinity or Acidity Test Kit	SM 2320 (Alkalinity)
			pH		EPA 150.1 (pH)
Painting Products (Section 12-3.08, 20-2.32, 50-1.05, 59, 91, and Special Provisions)	Paint	Yes	Visually Observable - No Testing Required		
	Paint Strippers	No		None	EPA 601/602 or EPA 624 (VOC)
			SVOC	None	EPA 625 (SVOC)
	Resins	No		None	EPA 410.4 (COD)
			SVOC		EPA 625 (SVOC)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
	Sealants	No		None	EPA 410.4 (COD)
	Solvents	No		None	EPA 410.4 (COD)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
	Lacquers, Varnish, Enamels, and Turpentine	No		None	EPA 410.4 (COD)
			VOC		EPA 601/602 or EPA 624 (VOC)
			SVOC		EPA 625 (SVOC)
	Thinners	No	VOC	None	EPA 601/602 or EPA 624 (VOC)
					EPA 410.4 (COD)
Portable Toilet Waste Products	Portable Toilet Waste	Yes	Visually Observable - No Testing Required		
Contaminated Soil [5]	Aerially Deposited Lead[3]	No		None	EPA 200.8 (Metal)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
	Petroleum	Yes – Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required		
	Mining or Industrial Waste, etc.	No		Contaminant Specific – Check with laboratory	Contaminant Specific – Check with laboratory
Line Flushing Products	Chlorinated Water	No		Chlorine	SM 4500-CL G (Res. Chlorine)
Adhesives	Adhesives	No	COD	None	EPA 410.4 (COD)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
				Phenol	EPA 420.1 (Phenol)
			SVOC	None	EPA 625 (SVOC)
Dust Palliative Products (Section 18)	Salts (Magnesium Chloride, Calcium Chloride, and Natural Brines)	No	Chloride	Chloride	EPA 300.0 (Chloride)
				TDS Meter	EPA 160.1 (TDS)
			Cations (Sodium, Magnesium, Calcium)	None	EPA 200.7 (Cations)
Vehicle	Antifreeze and Other Vehicle Fluids	Yes - Colored Liquid	Visually Observable - No Testing Required		
	Batteries	No	Sulfuric Acid	None	EPA 300.0 (Sulfate)
			Lead	None	EPA 200.8 (Metal)
			pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
	Fuels, Oils, Lubricants	Yes - Rainbow Surface Sheen and Odor	Visually Observable - No Testing Required		

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
Soil Amendment/Stabilization Products	Polymer/Copolymer [6, 7]	No		None	EPA 351.3 (TKN)
			BOD	None	EPA 405.1 (BOD)
			COD	None	EPA 410.4 (COD)
			DOC	None	EPA 415.1 (DOC)
			Nitrate	Nitrate	EPA 300.0 (Nitrate)
			Sulfate	Sulfate	EPA 300.0 (Sulfate)
			Nickel	None	EPA 200.8 (Metal)
	Straw/Mulch	Yes - Solids	Visually Observable - No Testing Required		
	Lignin Sulfonate	No	Alkalinity	Alkalinity	SM 2320 (Alkalinity)
				TDS Meter	EPA 160.1 (TDS)
	Psyllium	No	COD	None	EPA 410.4 (COD)
					EPA 415.1 (TOC)
	Guar/Plant Gums	No	COD	None	EPA 410.4 (COD)

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
					EPA 415.1 (TOC)
			Nickel		EPA 200.8 (Metal)
	Gypsum	No	pH	pH Meter Alkalinity or Acidity Test Kit	EPA 150.1 (pH)
			Calcium	Calcium	EPA 200.7 (Calcium)
				Sulfate	EPA 300.0 (Sulfate)
			Aluminum	None	EPA 200.8 (Metal)
			Barium		
			Manganese		
			Vanadium		
Treated Wood Products (Section 58, 80-3.01B(2), and Special Provisions)	Ammoniacal-Copper-Zinc-Arsenate (ACZA) Copper-Chromium-Arsenic (CCA) Ammoniacal-Copper-Arsenate (ACA) Copper Naphthenate	No	Arsenic	Total Chromium	EPA 200.8 (Metal)
			Total Chromium		
			Zinc		

Attachment R
Pollutant Testing Guidance Table [1]

Category	Construction Site Material	**Visually Observable?**	**Pollutant Indicators [2]**	**Suggested Analyses Field [3]**	**Laboratory**
	Creosote	Yes - Rainbow Surface or Brown Suspension	Visually Observable - No Testing Required		

Notes:

1. 1 If specific pollutant is known, analyze only for that specific pollutant. See MSDS to verify.
2. For each construction material, test for one of the pollutant indicators. Bolded pollutant indicates lowest analysis cost or best indicator. However, the composition of the specific construction material, if known, is the first criterion for selecting which analysis to use.
3. See www.hach.com, www.lamotte.com, www.ysi.com and www.chemetrics.com for some of the test kits
4. If the type of inorganic fertilizer is unknown, analyze for all pollutant indicators listed.
5. Only if special handling requirements are required in the Standard Special Provisions for aerially deposited lead (ADL)
6. If used with a dye or fiber matrix, it is considered visually observable and no testing is required.
7. Based upon research conducted by Caltrans, the following copolymers/polymers do not discharge pollutants and water quality sampling and analysis is **not** required: Super Tak™, M-Binder™, Fish Stik™, Pro40dc™, Fisch-Bond™, and Soil Master WR™.

ACRONYMS:

BOD – Biochemical Oxygen Demand
COD – Chemical Oxygen Demand
DOC – Dissolved Organic Carbon
EPA – Environmental Protection Agency
HACH – Worldwide company that provides advanced analytical systems and technical support for water quality testing.
SM – Standard Method
SVOC – Semi-Volatile Organic Compounds
TDS – Total Dissolved Solids
TKN – Total Kjeldahl Nitrogen
TOC – Total Organic Carbon
TSP – Tri-Sodium Phosphate
VOC - Volatile Organic Compounds

REFERENCES:

Construction Storm Water Sampling and Analysis Guidance Document, California Stormwater Quality Task Force, October 2001.
Environmental Impact of Construction and Repair Materials on Surface and Ground Waters, Report 448, National Cooperative Highway Research Program, 2001
Soil Stabilization for Temporary Slopes, Environmental Programs, California Department of Transportation, October 1, 1999.
Statewide Storm Water Management Plan, Division of Environmental Analysis, California Department of Transportation, April 2002.
Statewide Storm Water Quality Practice Guidelines, Environmental Program, California Department of Transportation, August 2000.
Soil Stabilization for Temporary Slopes and District 7 Erosion Control Pilot Study, June 2000.
Stormwater Monitoring Protocols, Guidance Manual, California Department of Transportation, May 2000.

Attachment S

Discharge Reporting Log

RAIN EVENT GENERAL INFORMATION				
Project Name				
Contract N^{o}				
Contractor				
Sampler's Name				
Signature				
Date of Sampling				
Season (Check Applicable)	❒ Rainy		❒ Non-Rainy	
Storm Data	Storm Start Date & Time:		Storm Duration (hrs):	
	Time elapsed since last storm (Circle Applicable Units)	Min. Hr. Days	Approximate Rainfall Amount (mm)	

SAMPLE LOG		
Sample Identification	**Sample Location**	**Sample Collection Date and Time**

Specific sample locations descriptions may include: 30m upstream from discharge at eastern boundary, runoff from northern waste storage area, downgradient of inlet 57 at kilometer post 36, etc.

FIELD ANALYSIS		
	Yes No	
Sample Identification	**Test**	**Result**

"I certify under a penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to ensure that qualified personnel properly gather and evaluate the

information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Contractor's Signature	Date
Contractor's Name and Title	Contractor's Telephone Number

Appendix A

BMP FACT SHEETS ARE ON HOLD

Erosion Control
EC-1 to EC-6

Tracking Control
TC-1 to TC-3, SE-5

Non-stormwater
NS-1, NS-3, NS-6 to NS-12

Sediment Control
SE-1 to SE-5

Waste Mgmt…and MTLS Pol…..
WM-1 to WM-10

See Appendix A attachments

Appendix B
Post-Construction Control Practices

September 2008

TABLE OF CONTENTS

1.0 INTRODUCTION
2.0 POST-CONSTRUCTIONCONTROLPRACTICES
3.0 COMPLIANCE REVIEW METHODS
4.0 PROJECT PRIORITY STATUS AND INSPECTION FREQUENCY
5.0 PROJECT REVIEW CRITERIA
6.0 PROJECT PERFORMANCE REPORTING

LIST OF FIGURES

FIGURE 1 DESIGNATION OF RAINY SEASONS

LIST OF TABLES

TABLE 1 INSPECTION PARAMETERS BY PRIORITY STATUS

TABLE 2 RAINFALL AREA DESIGNATIONS

ATTACHMENTS

ATTACHMENT 1 - Project Information Summary Sheets and Inspection Checklist for rainy season

ATTACHMENT 2 - Project Information Summary Sheets and Inspection Checklist for non-rainy season

ATTACHMENT 3 - Appeal of Inspection

1.0 INTRODUCTION

The Annual Construction Compliance Review Plan (ACCRP) describes the program implemented by the Department for storm water compliance inspections at construction sites for the period of January 1, 2009 to (Date TBD (later)). This ACCRP has been prepared in accordance with the Project Storm Water Management Plan (PSWMP) to comply with the self-auditing and monitoring requirements of the permit. The ACCRP provides the Department and the State Water Resources Control Board (SWRCB) with information necessary to ensure that an appropriate level of water pollution control is being achieved on construction project sites.

2.0 COMPLIANCE REVIEW OBJECTIVES

Activities will focus on achieving the following objectives:

Continue to evaluate the compliance of the construction project with long term BMPs and requirements of the permit Storm Water Pollution Prevention Plan (SWPPP).
Report compliance status to Department management.
Implement a new compliance ratings system designed to use more objective criteria when describing the project's level of compliance.
Implement a new appeal process to resolve disputed ratings.
Monitor the use of the new ratings system, appeals process, and inspection forms to determine whether the new procedures reduce disputes between Contractors, compliance inspectors, and Department staff.

3.0 COMPLIANCE REVIEW METHODS

The Department will continue to use the following proven methods to achieve the compliance review objectives:

- Update the Project Information Summary Sheets and Compliance Inspection Checklists to incorporate any new requirements in NPDES permit(s), SWMP, and Storm Water Quality Handbooks (Handbooks). Attachments 1 and 2 provide inspection forms to be utilized in the Rainy and Non-Rainy Seasons, respectively.
- Use the updated checklists to inspect and document the compliance status of selected construction projects statewide.
- Review compliance results with Engineers or designated inspectors, at the time of the inspection.
- Analyze implemented BMPs for positive and negative trends.
- Prepare separate performance reports for each of the two review cycles (generally corresponding to the rainy season and the non-rainy season) that summarize area-wide results for the cycle.
- Prepare a year-end performance report that summarizes project-wide

results for the two review cycles.

4.0 PROJECT PRIORITY STATUS AND INSPECTION FREQUENCY

Once a project has been selected for inspection, it is assigned a priority status establishing inspection team size and inspection frequency. Table 1 indicates the planned inspection frequency by priority status for the rainy and non-rainy seasons. Rainy season dates are identified in Figure 1.

Priority Status Criteria: The initial priority status is determined by evaluating specific project parameters that impact the level of water pollution control requirements on the construction site: size of disturbed soil area, potential for polluting receiving waters, and designated rainfall area as shown in Figure 1 and defined in Table 2 of this report.

Initial priority status is determined regardless of the current season (rainy or non-rainy) using the following criteria:

- Priority 1 status is assigned to a SWPPP construction project with a high potential for storm water discharge into a receiving water, or any potential for storm water discharge into a receiving water that is on the EPA 303(d) list as an impaired water body. In general, this criterion encompasses projects with greater than 1 acre of soil disturbance, projects located within ¼ mile of a water body, all projects located within the Central Lahontan region, and SWPPP projects in Rainfall Areas 1 or 6.
- Priority 2 status is given to a SWPPP construction project not designated with a Priority 1 status that is located in Rainfall Areas 2, 3, 4, or 5.
- Priority 3 status is assigned to all remaining SWPPP construction projects initially selected for compliance inspection.

Inspection Parameters: The Department may adjust the project's priority status based on the results of compliance inspections, as outlined in Table 1.

Table 1 Inspection Parameters by Priority Status

Project Priority Status	Inspection Team Size	Rainfall Areas	Routine Inspection Frequency	Follow-up Inspection by Compliance Rating	Priority Status Adjustment Criteria
	Rating		Frequency *		

1	1	2, 3, 4, and 5	**Non-Rainy**	Every 2 months	1	Routine inspection	
					2	Routine inspection, or as determined by inspector	Following three consecutive rainy season inspections with a 1 or 2 rating, a project may be modified to Priority 2 status.
					3	Within two weeks	
					4	Within one week	
			Rainy	Every month			
	1 & 6		**Non-Rainy**	Every 1½ months			
			Rainy	Every month			
2	1	2, 3, 4, and 5	**Non-Rainy**	Every 3 months			Following two 3 or 4 ratings within a six-month period, a project may be modified to Priority 1 status. Following an uncontested Notice of Violation from a Regional Water Quality Control Board, the project will be modified to a priority 1 status.
			Rainy	Every 2 ½ months			
	1 & 6		**Non-Rainy**	Every 2 months			
			Rainy	Every 2 month			
3	1	2, 3, 4, and 5	**Non-Rainy**	Every 3 months			
			Rainy	Every 3 months			

1 & 6	**Non-Rainy**	Every 3 months
	Rainy	Every 3 months

* These frequencies are approximate time periods

6.0 PROJECT REVIEW CRITERIA

The project will be inspected in accordance with the NPDES permit (CAS000003), based on the criteria established in Sections 4 and 5 of this plan. Two inspection checklists have been developed to incorporate the applicable BMP requirements for inspections performed in either the Non-Rainy Season or the Rainy Season. Copies of the inspection checklists are provided in Attachments (later).

The results of each inspection is recorded on the appropriate checklist with a cover page that summarizes the findings of the inspection. This project information summarizes the overall effectiveness of BMPs on the project and critical areas in need of attention. Inspectors assign a numeric rating that identifies overall project compliance and may be used to adjust project priority status, if necessary. The rating represents a composite assessment of the following factors: level of construction activity, potential for discharges, extent of discharges observed, and implementation of BMPs.

Compliance Rating Criteria

1 Rating

There are no significant deficiencies that require correction. Criteria meeting this rating include:

- The approved SWPPP appropriately addresses all categories of BMPs and is applicable to the current project operations and season.
- Appropriate treatment control provided for dewatering operations.
- Non-storm water and waste management BMPs properly implemented.
- Sediment tracking is minimal to non-existent.
- No evidence of wind erosion.
- All temporary soil stabilization BMPs implemented in accordance with the project's SWPPP requirements.
- Sediment controls are implemented in accordance with the approved SWPPP.

2 Rating

The project has minor deficiencies. The inspector will list each of the minor deficiencies and can include corrective actions to be taken prior to the next scheduled inspection. Minor deficiencies include the following:

- Site inspections by project staff are not being conducted in accordance with expected frequencies
- Approved SWPPP does not reflect current operations and an amendment is recommended.
- Any non storm water or waste management BMPs improperly maintained
- Soil stabilization or sediment controls are not properly maintained.
- Evidence of active wind erosion on unstabilized slopes/stock piles.
- Minor tracking less than approximately 50 feet from project entrance or exit points.

3 Rating

Excessive **minor** deficiencies and/or **major** deficiencies are encountered. This rating will be applied if either a total of six or more minor deficiencies requiring correction are observed and/or **Major** deficiencies exist on the project.

Major deficiencies are defined as follows:

- Approved SWPPP does not reflect current operations and amending of the document is past due or needed ASAP.
- Hazardous materials or waste is stored within the project without implementation of BMPs.
- Any discharge of sediment or other deleterious substances resulting from dewatering operations conducted without implementation of required BMPs for dewatering.
- Sediment tracking from the project construction equipment or vehicles approximately 50 feet from project entrances or exits.
- Expansion of the active disturbed soil area limit without RE written approval.
- Soil stabilization and sediment controls are not installed in accordance with applicable construction site best management practices (BMPs) manual.
- Dust from construction visibly blowing off the site and into drainage conveyances or adjacent water bodies.

4 Rating

There are **critical** deficiencies that would likely result in a violation of the permit if a storm water runoff event were to occur. The inspector will note the deficiencies and make recommendations for corrective action. Critical deficiencies are defined as follows:

- No Approved SWPPP
- Any observed discharge of storm water or non-storm water from the project that, in the judgment of the inspector, is generated by the construction activity, and is uncontrolled.

- Absence of linear barriers and/or perimeter controls required by the applicable BMP implementation manual.
- There are identified storm water inlets or receiving waters within or adjacent to the project site in close proximity to DSAs without control measures in place that pose an immediate threat of untreated storm water discharges.
- Working in an active stream channel or other water body without proper implementation of required BMPs.
- No corrective action taken for potential hazardous materials / waste deficiencies noted in (3) above.
- Sampling and analysis plan (SAP) requirements have not been properly implemented.

5.0 PROJECT PERFORMANCE REPORTING

The Department will prepare a performance report that presents the area wide results of the construction project compliance inspections.

The performance report will include:

A description of the projects that were inspected during the cycle.
An assessment of overall compliance, including a compilation of all ratings received during the cycle, a summary of any items receiving Notice of Violations or observed uncontrolled discharges, an evaluation of individual BMP implementation and effectiveness, and a comparison with the results for the same period from previous fiscal years
A discussion of BMP implementation trends, including observations of good storm water pollution control practices and challenges encountered during project inspections.
A list of ongoing challenges to the construction storm water control program and possible solutions to the challenges.
An expanded inspection log that provides the entire compliance review ratings history of each project inspected during the review cycle.

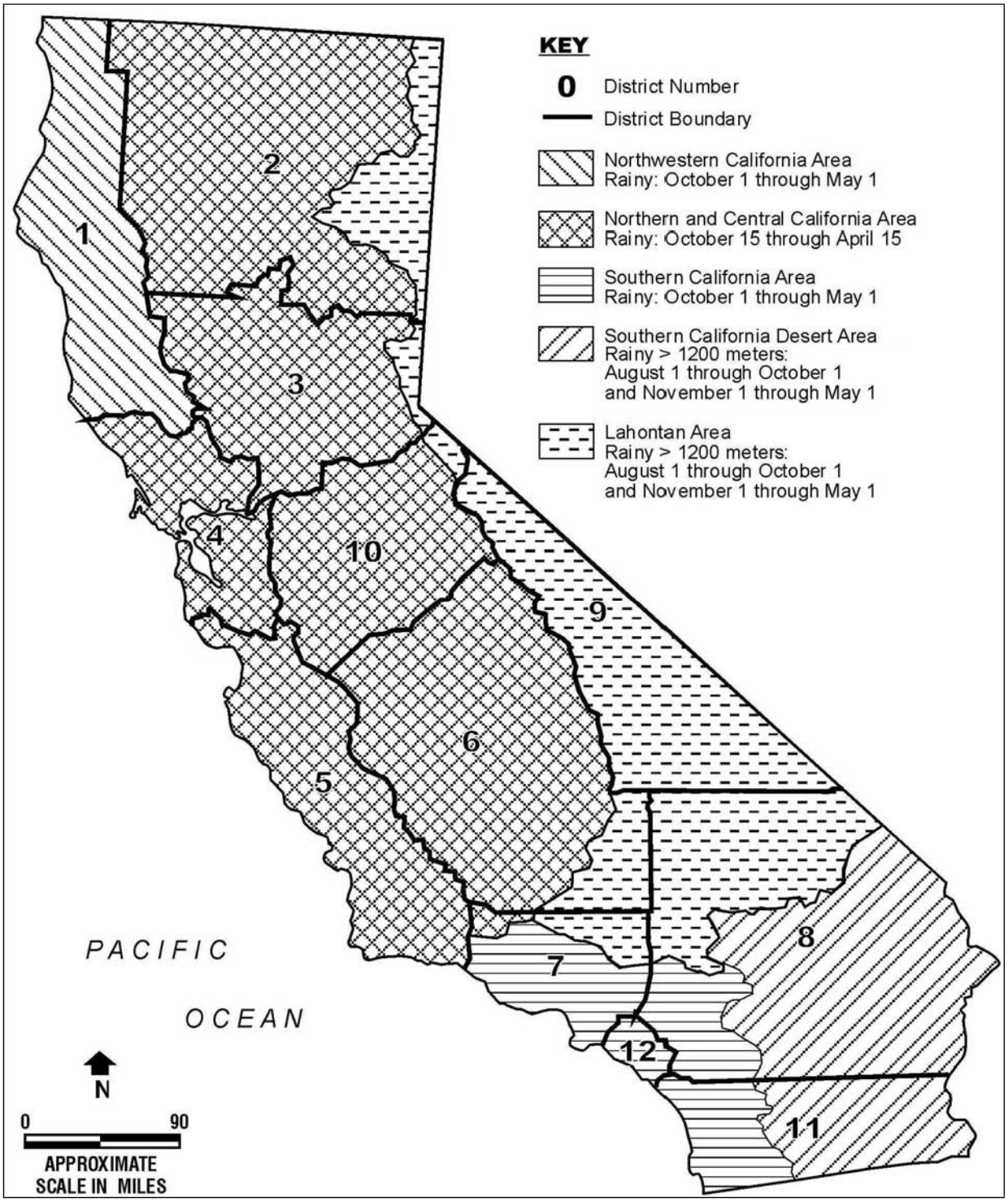


Figure 1 Designation of Rainy Seasons

Table 2 Rainfall Area Designations

RAINFALL AREA		DESCRIPTION
	Applicability	**Elevation**
1	District 1 within the following areas: all of Del Norte and Humboldt Counties and within 20 miles of the coast in Mendocino County	≤1200m
2	District 1 (except within Area 1) District 2 District 3 District 4 District 5	<250m
3	District 1 (except within Area 1) District 2 District 3 District 4 District 5 District 6 within the Central Valley RWQCB jurisdiction District 7 within the Central Coast, Los Angeles, and Central Valley RWQCB jurisdictions	250m–1200m
4	District 8 within the Santa Ana and San Diego RWQCB jurisdictions District 10 District 11 within the San Diego RWQCB jurisdiction District 12	<500m
5	District 6 within the Central Valley RWQCB jurisdiction District 7 within the Central Coast, Los Angeles, and Central Valley RWQCB jurisdictions District 8 within the Santa Ana and San Diego RWQCB jurisdictions District 10 District 11 within the San Diego RWQCB jurisdiction District 12	500m–1200m
6	Statewide	>1200m

m – meters
RWQCB – Regional Water Quality Control Board

Attachment 1

Project Information Summary Sheet

and

Compliance Inspection Checklist for the Rainy Season

SWPPP RAINY SEASON

CONSTRUCTION INSPECTION FORM

PROJECT INFORMATION SUMMARY SHEET **Rainfall Area Designation -**

Contract No: RE:

Co./ Rte / PM: Phone:

Project Description : Fax:

SW Inspector(s) :

Estimate Disturbed Soil Area (DSA) _____ Acres **Contractor:**

SWPPP Approved? **YES** **NO** WPCM:

Last Construction Site Inspection conducted by Construction Contractor on:

Last Construction Site Inspection conducted by Department personnel on:

Other Permits: Date of Inspection:

Inspection Participant(s): CSWC Superintendent **Storm Inspection Type:**

Other(s)–Name &Title: **None Pre During Post**

Inspection Description: Initial Revisit **Last Inspection Rating:**

PROJECT COMPLIANCE RATING **(See Rating Guidelinesfor detailed construction compliance criteria)**

1 FULL COMPLIANCE: The project has no significant deficiencies that require correction. Anticipated revisit date: _____

2 MINOR DEFICIENCIES: The project has minor deficiencies. There are no major deficiencies observed. Anticipated revisit date: _____

3 MAJOR DEFICIENCIES AND / OR

MINOR DEFICIENCIES: Excessive minor deficiencies and or major deficiencies are encountered. Total of six or more minor deficiencies and or one or more major deficiencies are observed. **Revisit within two (2) weeks**. Anticipated revisit date: _____

4 CRITICAL DEFICIENCIES: There are critical deficiencies that would likely result in a violation of the permit if there were a storm water runoff event to occur. **Revisit within one (1) week**. Anticipated revisit date: _____

UNCONTROLLED DISCHARGE OBSERVED; NOTIFY INSPECTOR'S MANAGER, R.E., AND DISTRICT CONSTRUCTION STORM WATER COORDINATOR ASSISTANCE RECOMMENDED

INNOVATIVE BMP USED (provide description below in comments)

SW Inspector Comments:

SWPPP Rainy Season - COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

1. SOIL STABILIZATION PRACTICES

For **NON-ACTIVE DSAs (ALL AREAS)**: Are soil stabilization measures properly implemented throughout all non-active DSAs?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation

For **ACTIVE DSAs (AREA 3 ONLY)** with a slope rate > 1:2 and a slope length > 15.0 m (50 ft): Are soil stabilization measures properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation

For **ACTIVE DSAs (AREAS 1 AND 6 ONLY)** with a slope rate > 1:20 and a slope length > 3.0 m (10 ft): Are soil stabilization measures properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation

For required DSAs: Are fiber rolls or gravel bag berms properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation

Are conveyances, top of slope diversions, and discharge points for concentrated storm water flows protected with additional BMPs, if needed, to reduce erosion?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation

For inspection during or immediately following a rain event, are the BMPs implemented at the site effective in controlling erosion?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Erosion Observed: None Minor Localized Widespread Major

Number of BMPs Observed: ***No. deficient due to:**
(1)_____ **(2)**_____ **(3)**_____ **(4)**_____ **(5)**_____

Comments / BMPs Observed:

Approved Soil Stabilization Measure(s): (A) Hydraulic Mulch, (B) Hydroseeding, (C) Soil Binders, (D) Straw Mulch, (E) Geotextiles, (F) Final Erosion Control Per Contract Plans & Specifications

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP Rainy Season - COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

2. SEDIMENT CONTROL PRACTICES

For DSAs with a slope rate > 1:20 and a slope length > 3.0 m (10 ft). Are linear sediment barriers properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Are sediment controls used in flow paths/conveyances properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Desilting Basins Only -For **ACTIVE AND NON-ACTIVE DSAs (AREAS 1 AND 6 ONLY)** with slope rate >1:20: and a slope length > 3.0 m (10 ft). Are desilting basins properly implemented in addition to linear sediment barriers?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Are sediment controls used in flow paths/conveyances properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Desilting Basins Only -For **ACTIVE** DSAs **(AREAS 2 ,3 ,4 , AND 5 ONLY)** with a slope rate > 1:2 and a slope length > 15.0 m (50 ft). Are desilting basins properly implemented in addition to linear sediment barriers?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Are desilting basins properly implemented in addition to other sediment controls?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Inspection performed during or immediately following a rain event, are the implemented BMPs effective in controlling sediment discharge? **YES** **NO**

Further Explanation:

Sediment Discharged: None Minor Localized Widespread Major

Number of BMPs observed: ***No. deficient due to:**
(1)_____ **(2)**_____ **(3)**_____ **(4)**_____ **(5)**_____

Comments / BMPs Observed:

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP Rainy Season - COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

3. WIND EROSION CONTROL

Are wind erosion control BMPs properly implemented throughout the construction site?

YES NO Deficiencies: No Significant Minor Major Critical

For active wind during time of inspection, are implemented BMPs effective in controlling wind erosion?

YES NO Deficiencies: No Significant Minor Major Critical

Number of BMPs observed: ***No. deficient due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

Comments / BMPs Observed:

Approved wind erosion control: (A) Hydraulic Mulch, (B) Hydroseeding, (C) Soil Binders, (D) Straw Mulch,
(E) Geotextiles, (F) Final Erosion Control Per the Plans and Specifications

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

4. TRACKING CONTROL PRACTICES

Project Related Non-Project Related

Are sediment tracking control BMPs properly implemented throughout the construction site?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For active construction during inspection, are implemented BMPs effective in controlling sediment tracking?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Number of BMPs observed: ***No. deficient due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

Further Explanation:

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP Rainy Season - COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

5. NON-STORM WATER CONTROL &

6. WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL

Are the following BMPs properly implemented where required?

Temporary Stream Crossing **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Clear Water Diversion **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Spill Prevention and Control **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Solid Waste Management **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Hazardous Waste Management **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Contaminated Soil Management **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Concrete Waste Management **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Sanitary/Septic Waste Management **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Liquid Waste Management **YES NO** **Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Materials Handling (Material Delivery & Storage and Material Use)

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Vehicle and Equipment Operations (Cleaning, Fueling, and Maintenance)

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Paving Operation **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Stockpile Management **Deficiencies: No Significant Minor Major Critical**

Further Explanation:

SWPPP Rainy Season - COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

5. NON-STORM WATER CONTROL &

6. WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL (Continued)

Are the following BMPs properly implemented where required?

Water Conservation **Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Potable Water/Irrigation **Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Dewatering Operation **Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Illicit Discharge/Illegal Dumping Observed? **YES NO**

Further Explanation:

Pile Driving Operations **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Concrete Curing **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Material and Equipment Use Over Water **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Concrete Finishing **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Structure Demolition/Removal Over or Adjacent to Water

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Were there any Non-Storm water discharges observed? **YES NO**

If Yes, Were implemented BMPs effective in controlling water pollution?

N /A Deficiencies: No Significant Minor Major Critical l

Further Explanation:

Number of BMPs observed: ***No. deficient due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP Rainy Season - COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

6. Project File Review

Documentation File Review Checklist:

Yes No N/A Documentation in Project Files:

All Contractor Inspection Reports as of 2 weeks prior to today's inspection
Last Inspection report dated:
Signed/Dated SWPPP (by Contractor in SECTION 100.1).
Approved Amendments for variances observed during inspection
Annual Certification(s)
Active DSAs comply with limits in Special Provisions?
If No, is RE approval of DSA modification on file? Date of approval:
Sampling and Analysis Plan

Dewatering:

Does Special Provisions and approved SWPPP address dewatering if applicable for project?
If yes, does plan address:

Discharge Points?
BMPs/Control Measures?
Monitoring Protocols?

Attachment 2

Project Information Summary Sheet

and

Compliance Inspection Checklist for the Non-Rainy Season

SWPPP NON-RAINY SEASON

CONSTRUCTION INSPECTION FORM

PROJECT INFORMATION SUMMARY SHEET **Rainfall Area Designation -**

Contract No.: RE:

CO. / RTE / PM.: Phone:

Project Description : Fax:

SW Inspector(s) :

Estimate Disturbed Soil Area (DSA) _____ Acres **Contractor:**

SWPPP Approved? **YES** **NO** WPCM:

Last Construction Site Inspection conducted by Construction Contractor on :

Last Construction Site Inspection conducted by Department personnel on :

Other Permits: **Date of Inspection:**

Inspection Participant(s): RE CSWC Superintendent **Storm Inspection Type: None Pre During Post**

Other(s)–Name/Title:

Inspection Description: Initial Revisit **Last Inspection Rating :**

PROJECT COMPLIANCE RATING **(See Rating Guidelines for detailed construction compliance criteria)**

1 FULL COMPLIANCE: The project has no significant deficiencies that require correction. Anticipated revisit date: _____

2 MINOR DEFICIENCIES: The project has minor deficiencies. There are no major deficiencies observed. Anticipated revisit date: _____ **3 MAJOR DEFICIENCIES AND / OR**

MINOR DEFICIENCIES: Excessive minor deficiencies and or major deficiencies are encountered. Total of six or more minor deficiencies and or one or more major deficiencies are observed. **Revisit within two (2) weeks**. Anticipated revisit date: _____

4 CRITICAL DEFICIENCIES: There are critical deficiencies that would likely result in a violation of the permit if there were a storm water runoff event to occur. **Revisit within one (1) week**. Anticipated revisit date: _____

UNCONTROLLED DISCHARGE OBSERVED; NOTIFY INSPECTOR'S MANAGER, R.E., AND DISTRICT CONSTRUCTION STORM WATER COORDINATOR ASSISTANCE RECOMMENDED

INNOVATIVE BMP USED (provide description below in comments)

SW Inspector Comments:

SWPPP NON-RAINY SEASON- COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

1. SOIL STABILIZATION PRACTICES

For all DSAs: Are soil stabilization measures properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For all **NON-ACTIVE DSAs**: **(AREAS 1 AND 6 ONLY)** Are soil stabilization measures properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For required DSAs: Are fiber rolls or gravel bag berms properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Are conveyances, top of slope diversions, and discharge points for concentrated storm water flows protected with additional BMPs, if needed, to reduce erosion?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For inspection during or immediately following a rain event, are the BMPs implemented at the site effective in controlling erosion?

YES NO

Further Explanation:

Erosion Observed: None Minor Localized Widespread Major

Number of BMPs observed: ***No. deficiencies due to:**

(1)_____ **(2)**_____ **(3)**_____ **(4)**_____ **(5)**_____

Comments / BMPs Observed :

Approved Soil Stabilization Measure(s): (A) Hydraulic Mulch, (B) Hydroseeding, (C) Soil Binders, (D) Straw Mulch, (E) Geotextiles, (F) Final Erosion Control Per Contract Plans & Specifications

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP NON-RAINY SEASON- COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

2. SEDIMENT CONTROL PRACTICES

For DSAs **(AREAS 1 and 6 ONLY)** with a slope rate > 1:20 and a slope length > 3.0 m (10 ft): Are linear sediment barriers properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For **NON-ACTIVE DSAs (AREAS 3 AND 5 ONLY)** with a slope rate > 1:2 and a slope length > 3.0 m (10 ft): Are linear sediment barriers properly implemented?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For **ACTIVE AND NON-ACTIVE DSAs (AREA 6 ONLY & DESILTING BASIN ONLY)** with slope rate > 1:2 and a slope length > 3.0 m (10 ft): Are desilting basins properly implemented in addition to linear sediment barriers?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For inspection performed during or immediately following a rain event, are the implemented BMPs effective in controlling sediment discharge?

YES NO

Further Explanation:

Sediment Discharged: None Minor Localized Widespread Major

Number of BMPs observed:

***No. deficiencies due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

Comments / BMPs Observed :

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

3. WIND EROSION CONTROL

Are wind erosion control BMPs properly implemented throughout the construction site?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For active wind during time of inspection, are implemented BMPs effective in controlling wind erosion?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Number of BMPs observed:

***No. deficiencies due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

Further Explanation:

Approved wind erosion control: (A) Hydraulic Mulch, (B) Hydroseeding, (C) Soil Binders, (D) Straw Mulch,
(E) Geotextiles, (F) Final Erosion Control Per the Plans and Specifications

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP NON-RAINY SEASON- COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

4. TRACKING CONTROL PRACTICES

Project Related Non- Project Related

Are sediment tracking control BMPs properly implemented throughout the construction site?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

For active construction during inspection, are implemented BMPs effective in controlling sediment tracking?

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Number of BMPs observed: ***No. deficiencies due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

Further Explanation:

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

5. NON-STORM WATER CONTROL &

6. WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL

Are the following BMPs properly implemented where required?
Temporary Stream Crossing

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Clear Water Diversion

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Spill Prevention and Control

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Solid Waste Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Hazardous Waste Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

SWPPP NON-RAINY SEASON- COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

5. NON-STORM WATER CONTROL &

6. WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL

Are the following BMPs properly implemented where required?
(Continued)

Contaminated Soil Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Concrete Waste Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Sanitary/Septic Waste Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Liquid Waste Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Materials Handling (Material Delivery & Storage and Material Use)

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Vehicle and Equipment Operations (Cleaning, Fueling, and Maintenance)

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Paving Operations

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Stockpile Management

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Water Conservation

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

SWPPP NON-RAINY SEASON- COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

5. NON-STORM WATER CONTROL &

6. WASTE MANAGEMENT AND MATERIALS POLLUTION CONTROL

Are the following BMPs properly implemented where required?
(Continued)
Potable Water/Irrigation

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Dewatering Operations

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Illicit Discharge/Illegal Dumping Observed?

YES NO

Further Explanation:

Pile Driving Operations **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Concrete Curing **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Material and Equipment Use Over Water **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Concrete Finishing **YES NO Deficiencies: No Significant Minor Major Critical**

Further Explanation:

Structure Demolition/Removal Over or Adjacent to Water

YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Were there any Non-Storm water discharges observed?

YES NO

If Yes, were implemented BMPs effective in controlling water pollution?

N /A YES NO Deficiencies: No Significant Minor Major Critical

Further Explanation:

Number of BMPs observed: ***No. deficiencies due to:**
(1)_____ (2)_____ (3)_____ (4)_____ (5)_____

***Key: (1) Installed Incorrectly (2) Wrong Location (3) Lack of Maintenance (4) Wrong Application (5) Indeterminate**

SWPPP NON-RAINY SEASON- COMPLIANCE INSPECTION CHECKLIST

Contract No.: Date:

6. Project File Review

Documentation File Review Checklist:

Yes No N/A Documentation in Project Files:

All Contractor Inspection Reports as of 2 weeks prior to today's inspection
Last Inspection report dated:
Signed/Dated
Approved Amendments for variances observed during inspection
Annual Certification(s)
Active DSAs comply with limits in Special Provisions?
If No, is RE approval of DSA modification on file? Date of approval:
Sampling and Analysis Plan

Dewatering:

Does Special Provisions and approved SWPPP address dewatering if applicable for project?
If Yes, does plan address:
Discharge Points?
BMPs/Control Measures?
Monitoring Protocols?

Attachments (later)

Appeal of Inspection

State of California Business, Transportation and Housing Agency

M e m o r a n d u m

To:

Date: xx/xx/xx

(916) xxx-4176 - Ofc
(916) xxx-4198 - Mobil
(916) xxx-6366 - Fax

File No.: Contract No. 00-123456

From: Engineer:
Phone No.:

Subject: **Appeal of inspection performed on xx/xx/xx**

Rating:
Reason of Appeal:

INFORMATION SUMMARY SHEET and COMPLIANCE INSPECTION CHECKLIST COMMENTS	RESPONSE/COMMENT