MASTER DEVELOPMENT DRAINAGE PLAN
FOR
SOUTH ACADEMY STATION

SEPTEMBER 2006
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PREPARED FOR:
CS 2005 INVESTMENTS III, LLC
490 TOWER ROAD
DENVER, CO 80249
(303) 486-8567

PREPARED BY:
CLASSIC CONSULTING ENGINEERS & SURVEYORS, LLC
6385 CORPORATE DRIVE, SUITE 101
COLORADO SPRINGS, CO 80919
719-785-0790

2184.45

MASTER DEVELOPMENT DRAINAGE PLAN FOR SOUTH ACADEMY STATION

DRAINAGE REPORT STATEMENT

ENGINEER'S STATEMENT:
The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the City for drainage reports and said report is in conformity with the master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors, or omissions on my part in preparing this report.

COLORADO LICENSED KYLE CAMPBELL PROFESSIONAL ENGINEER

Kyle R. Campbell, Colorado P.E. #29794 — Date: 4-15-09

DEVELOPER'S STATEMENT:
I, the developer, have read and will comply with all of the requirements specified in this drainage report and plan.

Business Name: CS 2005 Investments III, LLC

By: Chad M. Elliott

Title: Vice President

Address: 490 Tower Road

Denver, CO 80249

CITY OF COLORADO SPRINGS ONLY:
Filed in accordance with Section 7-7-906 (Drainage Ordinance) of the Code of the City of Colorado Springs, 2001, as amended.

City Engineer — For: — Date: 4/28/09

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ENGINEERS & SURVEYORS

MASTER DEVELOPMENT DRAINAGE PLAN FOR SOUTH ACADEMY STATION

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CLASSIC CONSULTING ENGINEERS & SURVEYORS

MASTER DEVELOPMENT DRAINAGE PLAN FOR SOUTH ACADEMY STATION

PURPOSE

The purpose of this Master Development Drainage Plan (MDDP) is to identify the existing drainage patterns and present conceptual improvements to safely route runoff both on-site and tributary flows through the site to existing identified improved and unimproved facilities. The concepts presented in this report are preliminary in nature pending definition of both the upstream drainage improvements and regional alternatives and are intended to be further refined in individual final drainage reports submitted at the time of platting.

GENERAL DESCRIPTION

South Academy Station is an approximately 162.42-acre parcel located in the west half of Section 4, Township 15 South, and Range 66 West of the Sixth Principal Meridian, County of El Paso, and State of Colorado. The entire site is proposed to be annexed into the City of Colorado Springs. The site is bound on the north by B Street and Highway 85-87, to the west by single family subdivisions; College Park Subdivision No. 1, Stratmoor South Subdivision No. 2 & 3, and College View Estates Filing No. 1, to the south by Academy Blvd., and to the east by Interstate 25. Based on the proposed conceptual development plan the uses for the site include school, commercial, single family and multi-family residential.

The average soil condition reflects "Schamber-Razor Complex, " Hydrologic Group "C" as determined by the "Soil Survey of El Paso County Area," prepared by the Soil Conservation Service (see map in Appendix).

EXISTING DRAINAGE CONDITIONS

Currently the site consists of poorly defined to well-defined natural channels draining radically in the east, north and south directions from a high point in the approximate south center of the site. The existing drainage area is composed of both on-site and off-site basins. The drainage

map delineates the existing site into eight basins. Historically, the site drains to 5 outfall points as identified in the existing drainage map. The drainages are defined by existing culvert crossings of Interstate 25. The main crossing of Interstate 25 is a triple 10'x8' box culvert with a 100-year peak capacity of 2900 cfs as stated in the DBPS. The other culvert crossings of Interstate 25 from the west to east consist of 24" to 36" RCP.

Fishers Canyon tributary drains to the north along the westerly boundary of the site. It is proposed that the offsite flows from the South of Academy Blvd. conveyed in the existing 24" and 30" diameter RCP storm sewers be captured and conveyed to Fishers Canyon Drainageway in proposed storm sewers bypassing the channel. (Size to be determined) It is proposed that the flow in the tributary channel and the parallel storm sewer be combined in a storm main at the approximate location shown on this plan. This storm main shall discharge directly to the Fishers Canyon Drainageway.

Frequent flow - trickle flow shall be diverted from the proposed storm sewer to the upstream end of the existing tributary channel to promote growth of vegetation while protecting the channel from erosive peak flows. Tributary channel improvements are proposed in accordance with the intent of the D.B.P.S. to include sloping rock drops with dissipater pools in the steeper areas.

Basin FC0 (A = 11.41 acre, Q_5 = 9 cfs, Q_{100} = 22 cfs) is the northwestern portion of the site between Fishers Canyon Drainageway and the existing single family residential. The basin drains in the northerly direction and discharge into Fishers Canyon Drainageway by sheet flow.

Basin FC1 (A = 47.74 acre, Q_5 = 38 cfs, Q_{100} = 96 cfs) is the western portion of the site that drains in the westerly direction into Fishers Canyon Tributary, where it will combine with offsite flows from basin OS-1, OS-2 and OS-3 before releasing into Fishers Canyon Drainageway to the north.

Basin FC2 (A = 36.43 acre, Q_5 = 52 cfs, Q_{100} = 109 cfs) is the northerly portion of the site between Fishers Canyon Drainageway and existing commercial development and existing B

Street. This basin includes off-site commercial development. The basin discharges to Fishers Canyon Drainageway by sheet flow, existing swales and existing storm drains.

Basin FC 3 (A = 35.26 acre, Q_5 = 30 cfs, Q_{100} = 74 cfs), Basin FC 4 (A = 19.61 acre, Q_5 = 16 cfs, Q_{100} = 40 cfs), Basin FC 5 (A = 19.43 acre, Q_5 = 15 cfs, Q_{100} = 36 cfs), Basin FC 6 (A = 4.76 acre, Q_5 = 4 cfs, Q_{100} = 10 cfs), and Basin FC 7 (A = 17.96 acre, Q_5 = 15 cfs, Q_{100} = 38 cfs) comprise the eastern portion of the site and drain predominately to the east and outfall across I-25 in existing triple 10'x8' Box Culvert, 36" RCP storm sewer, 24" RCP storm sewer, 30" RCP storm sewer, and 36" RCP storm sewer respectively.

Off-Site Basins-

The Off-Site Basins OS-1, -2, -3, are defined by the general boundary lines associated with the TR-20 models in the Muller Report, and by the topography available for this project. Though Sub-basin boundary lines for this project are similar and generally follow the basin lines as generated for the DBPS, they differ in some regard due to the availability of better topography than what was available at the time of the DBPS.

OS-1 (68.38-Acres) is composed of part of the Stratmoor South Filing No. 8 and 3, College View Estates Filing No. 1, and part of the North Academy Blvd. ROW. Generally, the Area of OS-1 can be described as the DBPS Sub basin 4C minus the Site Basin of FC-1, and the Site Off-site basins OS-2 and OS-3. Flows from OS-1 discharge from the eastern terminus of College View Drive and the 4 easternmost cul-de-sacs of the residential subdivisions. The flows discharge easterly into the Fisher's Canyon Tributary.

OS-2 and OS-3 (16.73-Acres and 9.3-Acres respectively) are located south of Academy Blvd. and are composed of parts of the Pikes Peak Community College campus. The area tributary to the western 30" culvert crossing Academy is labels OS-2 and the area tributary to the eastern 24" culvert crossing Academy is labels OS-3. The flows from OS-2 and OS-3 both discharge into the north part of the Fishers Canyon Tributary.

None of the offsite areas defined here impact the developed flows for which on-site storm facilities will be designed, however, it is anticipated that minor channel improvements to the Fisher's Canyon Tributary may be necessary, which will need to consider those flows entering the channel from OS-1, and the flows from OS-1 and OS-2 will need to be considered when the storm line parallel and adjacent to the tributary channel is designed. The flows for OS-1, -2, and -3 are estimated in this report based on the data provided for sub basin 4C in the Muller Report associated with the DBPS. Later reports will quantify in more detail the flows from these off-site basins in order to properly assess and design on-site facilities.

Fisher's Canyon (Downstream of South Academy Station Development)-

The main Fisher's Canyon Drainageway corridor outfalls east under I-25. After exiting the existing triple box culvert under I-25, the flows continue approximately 900 L.F. where they enter Fountain Creek. An existing Triple Box Culvert structure under Maxwell Street (Q_{max} = 2,900 cfs) conveys the existing flows with some backwater ponding upstream of Maxwell St. An existing poorly maintained and eroded drainage channel connects the two box culverts and outfalls to Fountain Creek. The existing drainage channel is partly contained within old Highway-85/87 right-of-way and also with a drainage easement within the southerly adjacent lots. The existing channel between the I-25 Culvert discharge and the upstream invert of the Maxwell St. Culvert should be capable of carrying the existing condition flows (3090-cfs as identified by the DBPS). Since South Academy Station is controlling developed flow rates to historic levels, the development of the proposed site has no impact on these existing downstream conditions.

Per the channel analysis completed for the site; the channel immediately downstream of the Maxwell St. culvert has the capacity to convey the Existing 100-year flow to Fountain Creek. This condition is shown in cross sections included in the Appendix (Existing Fisher's Canyon Drainageway). The current condition where Fountain Creek backs up exists and is well documented in previous reports, and is indicated on current Effective FEMA maps included in the Appendix. Though the existing downstream channel itself has the capacity to convey developed flows, the Fountain Creek 100-year water surface elevation controls the limits of

flooding in this area. (See Channel Sections in Appendix.) The Fountain Creek 100-year floodwaters create a backwater affect in the subject channel, which would negate any subject channel improvements between Fountain Creek and the culverts under I-25. The channel downstream of South Academy Station can pass 100-yr storm events assuming Fountain Creek is not at the 100-yr flood level during a storm event (which caused the backwater effect up into the S.A.S. outfall channel). Normally, the 100-yr storm event flows from this tributary have already reached Fountain Creek before the 100-yr peak flow level in Fountain Creek is established.

Flooding downstream of I-25 is the result of existing subdivision grades below the FEMA 100-year flood elevation, flows within Fountain Creek, and flows resulting from the entire Fisher's Canyon Tributary Basin. The flooding downstream of South Acadamy Station cannot be mitigated by on-site measures. The South Academy Station development will adhere to DBPS recommendations upstream of I-25 as a part of its development. The improvements to be completed are described in the "Proposed Drainage Conditions" and "Fisher's Canyon Drainageway" sections of this report, and will be detailed further in later reports.

PREVIOUS STUDIES

This site lies within the Fishers Canyon Drainage Basin. The Drainage Basin Planning Study (DBPS) for Fishers Canyon defines developed upstream flows for the Stratmoor Hills and Stratmoor Valley. The DBPS was completed by Muller Engineering Company and approved on July 16, 1991.

PROPOSED DRAINAGE CONDITIONS

See the enclosed Drainage Map for South Academy Station Developed Condition for design information. A detailed description of the developed condition flows is as follows:

Off-site Drainage Basins

See the appendix for TR-20 models, information and calculations used to analyze all Offsite Basins that drain to the site, and see the "Existing Conditions" Section above for a description of the off-site basins considered for this report.

On-site Drainage Basins

It is proposed that developed flow rates match the historic release rates of existing drainage Basins FC1 and FC3 in an attempt to minimize the overall impact on Fishers Canyon Drainageway. Developing portions of the site that historically flowed off-site and rerouting the developed flows to detention ponds will reduce the impact of runoff on exiting downstream developments.

Basin A, 13.18 acre, is the portion of Basin FC-1, 47.74 acres, intended to remain tributary to the Fishers Canyon Tributary; this is a considerable reduction in basin area. Basin A (A = 13.18 acre, Q_5 =11 cfs, Q_{100} = 28 cfs) consists of the Fishers Canyon Tributary channel east slope that will remain undeveloped and continue its historic drainage pattern in to the tributary. The flow will combine with that from OS-1 and ultimately be captured in the previously discussed storm sewer and conveyed to Fishers Canyon Drainageway.

Basin B (A = 56.44 acre, Q_5 = 114 cfs, Q_{100} = 226 cfs) includes Existing Basin FC0 and FC1and is one of the two main developed basins that historically discharge directly into Fishers Canyon. Basin B's planned use is single-family residential, multi-family and a School Site. Developed flows will be routed to a 5.0 Ac-ft detention pond and water quality facility at Design Point #1, where flows will be released to match peak historic rates. The DBPS estimated developed flows being released into Fishers Canyon Drainageway from this basin based on a multi-family residential land use. A historic release from this basin will reduce the affect on Fishers Canyon Drainageway. Subsequent final drainage reports will detail the exact facility size as well as design an outfall to achieve historic release rates. At this time it is anticipated that the proposed detention facility will be contained within a tract owned by the City of Colorado Springs. Storm facilities entering and exiting the facility will be maintained by the City as public storm facilities. All surface maintenance (landscaping, etc.) will be by the created South Academy Station

(S.A.S.) Metro District. Maintenance access roads will be provided to all proposed public facilities.

Basin C (A = 16.28 acre, Q_5 = 43 cfs, Q_{100} = 84 cfs) is the northwestern portion of the site between Fishers Canyon Drainageway and existing commercial development. This basin includes off-site commercial development. The portion of the basin that is onsite will not be developed and will release into Fishers Canyon Drainageway by sheet flow and existing storm drains. Further drainage design of the Fishers Canyon Drainageway will reflect the existing northerly storm facilities.

Basin D (A = 4.63 acre, Q_5 = 13 cfs, Q_{100} = 24 cfs) and Basin E (A = 2.52 acre, Q_5 = 7 cfs, Q_{100} = 13 cfs) account for the proposed non-residential collector through the site. Its surface consists of asphalt pavement. The flow will be collected in inlets and routed to the proposed detention pond and water quality facility at Design Point #1.

Basin F (A = 8.52 acre, Q_5 = 27 cfs, Q_{100} = 52 cfs) is the north central portion of the site and its planned use is commercial. A future private detention pond will be needed to restrict flows to historic. The DBPS estimated developed flows being released into Fishers Canyon from this basin based on its land use being multi-family residential. This facility may be combined with the regional side channel detention facility. Subsequent final drainage reports will detail the exact facility size as well as design an outfall to achieve historic release rates.

Basin G (A = 8.48 acre, Q_5 = 9 cfs, Q_{100} = 21 cfs) is the northeastern portion of the site where it is proposed that the required side channel detention pond be located. Basin G, as stated on page VIII-5 of the D.B.P.S., will be used to provide side channel detention to reduce the peak 100-year discharge from 3,170 cfs to 2,900 cfs, the design capacity of the I-25 culvert. See the Fishers Canyon Drainageway section for further discussion.

Basin H (A = 60.59 acre, Q_5 = 165 cfs, Q_{100} = 317 cfs) corresponds to Existing Basin FC3 and is the second of the two main developed basins that historically discharge directly into Fishers

Canyon. Basin H's planned use is mixed residential and commercial. Developed flows will be routed to a proposed 13.0 Ac-ft detention pond and water quality facility at Design Point #2, where flows will be released to match peak historic rates. The DBPS estimated developed flows being released into Fishers Canyon from this basin based on its use being multi-family residential. Subsequent final drainage reports will detail the exact facility size as well as design an outfall to achieve historic release rates. At this time it is anticipated that the proposed detention facility will be contained within a tract owned by the City of Colorado Springs. Storm facilities entering and exiting the facility will be maintained by the City as public storm facilities. All surface maintenance (landscaping, etc.) will be by the created South Academy Station (S.A.S.) Metro District. Maintenance access roads will be provided to all proposed public facilities.

Basin I (A = 2.94 acre, Q_5 = 3 cfs, Q_{100} = 8 cfs) is a portion of the eastern slope of the site that will not be developed and will release into directly into Fishers Canyon. The pond release has been decreased to 64 cfs to allow for this direct release condition for Basin I.

Basin J (A = 3.81 acre, Q_5 = 4 cfs, Q_{100} = 9 cfs) is a portion of the eastern slope of the site that will not be developed and will flow through an exiting roadside ditch to a 36" RCP. Development and capturing of portions of the historic basin routed through the 36" RCP will reduce peak discharge rates and potentially reduce the burden on downstream facilities.

Basin K (A = 6.64 acre, Q_5 = 6 cfs, Q_{100} = 15 cfs) is a portion of the eastern slope of the site that will not be developed and will flow through an exiting roadside ditch to a 24" RCP. Development of a portion of the historic basin and routing it to the detention pond and water quality facility will reduce flow through the 24" RCP and potentially reduce the burden on downstream facilities.

Basin L (A = 2.49 acre, Q_5 = 2 cfs, Q_{100} = 6 cfs) is a portion of the eastern slope of the site that will not be developed and will flow through an existing roadside ditch to a 30" RCP. Reducing

the tributary basin being routed through the 30" RCP will reduce peak discharge rates and potentially reduce the burden on downstream facilities.

Basin M (A = 5.93 acre, Q_5 = 6 cfs, Q_{100} = 14 cfs) is the southeastern portion of the site that will not be developed and flows through an exiting 36" RCP located on the northwestern corner of I-25 and Academy Blvd. Reducing the tributary basin being routed through the 36" RCP will reduce peak discharge rates and potentially reduce the burden on downstream facilities.

The following is a summary comparison of the detention ponds and existing culvert crossings under I-25 and the design point discharge rates before and after development:

Design Point (Existing)	Design Point (Developed)	100-yr Flow (Existing)	100-yr Flow (Developed)	Existing Facility	Pipe Capacity
EX1	3	40	9	Existing 36" RCP	66 cfs
EX2	4	36	15	Existing 24" RCP	39 cfs
Ex3	5	10	6	Existing 30" RCP	41 cfs
EX4	6	38	14	Existing 36" RCP	66 cfs

Basin (Historic)	Basins (Developed)	100-yr Flow (Historic)	100-yr Flow (Pond Release)	Total Flow to Fishers Canyon
FC1	A, B, D, E	129	100	128*
FC3	H, I	74	64	72**

*Basins B, D, and E are captured and routed to the proposed detention pond and water quality facility at Design Point #1, while Basin A (Q_{100} = 28 cfs) will be collected in a storm drain and released into Fishers Canyon Drainageway.

** Basin H is captured and routed to the proposed detention pond and water quality facility at Design Point #2, while Basin I (Q_{100} = 8 cfs) is an undeveloped basin that is released to Fishers Canyon Drainageway. The pond release has been decreased from 74 to 64 cfs to allow for this direct release condition.

FISHERS CANYON DRAINAGEWAY

EXISTING CONDITION

As previously stated Fisher Canyon Drainageway crosses the project site from west to east. It is an unimproved natural channel. The existing 3-10'x8' reinforced concrete box culvert under I-25 provides a hard point at the easterly edge of the project preventing degradation of the channel from downstream.

The reach of the channel crossing the site is very sinuous, from up to down stream the following major channel centerline deflection angles were measured; 101, 72, 83, 50, 79, 69, 32, 115, 67 and 44 degrees. The radii at the centerline deflections are typically 30-35 feet, the smallest radius being 10+/- feet at the 79-degree deflection. The channel bottom width varies from a V shape to a width of 5 to 11 feet. There are areas with shallow banks on the south side. These areas provide a wider effective channel width above the low flow channel. A site visit confirmed the presence of near vertical banks 5 to 12 feet in height along the project site reach and in particular at the sharp bends noted above. These steep soil banks are being undercut by the low flow channel and sloughing off into the channel. There are cracks in the soil wall behind the vertical faces. The low flow channel has a gravel to cobble size bottom. At some locations concrete rubble has been dumped on the channel banks. For the most part this has been ineffective in reducing the bank erosion. The south channel bank has riprap for a short reach up stream of the existing I-25 box culvert. The channel bottom shows erosion from the recent rainfall. Storm drain outfalls are well above the channel invert. At the present there vegetated areas in the channel bottom. The side slopes are vegetated where stable. There are many areas of near vertical walls on both sides of the channel and many areas show the effects of mans' activities to include fill, dumping of concrete rubble, construction of a bridge made from a railroad flat-car, and all terrain vehicle traffic.

Across the site the channel drops from an invert elevation of 5812 +/- on the west side of the project site to the I-25 culvert inlet invert of 5774.90, a total of 37.1 vertical feet. The centerline length of the channel across the site is 3315 feet. The average slope is 1.12%.

PREVIOUS REPORTS

Fishers Canyon Drainageway was previously studied in the effective Drainage Basin Planning Study, D.B.P.S., prepared by Muller Engineering Company dated August 1991. The Technical Appendix was obtained for the preparation of this report. All input data for the TR-20 model was unavailable, it had to be recreated based on print out data contained within the DBPS. Cross-section data was unavailable for the Existing and Future conditions from the original TR-20 model, therefore the cross-section data was entered with approximate elevations at Highway 115 and B Street using the Proposed Channel Stabilization Typical Cross Section from the Fishers Canyon DBPS. The intent of this new TR-20 model was to re-create the existing conditions channel analysis approved within the D.B.P.S.; therefore assumptions in the data entry had to be made that closely match the D.B.P.S. model output information. While flows of the recreated model coincide with those obtained in the original DBPS model there is a variance of flow throughout the model. (See Appendix for new TR-20 Models)

The Future Conditions models have been edited to show current site conditions and have been updated with expected land use values. Straight addition shows that the projected size and volume of the two on-site detention ponds and the regional detention facility are adequately sized. Future analysis on outlet conditions will have to be done to ensure the peak flow does not exceed 2,900 cfs at the I-25 Outfall.

A corrective model was created for the 2&24 Hr storms for the future condition to account for updated land use CN values of Basin 1 & 2 changing from the existing conditions model. This change can be attributed to additional build-out of the basin. It does not appear in the DBPS as though these future conditions were applied at the time of their creation. A summary of the CN values is as follow:

Basin	Existing CN	Future CN used	Corrected Future CN
Basin 1	75	75	76.6
Basin 2	76	76	76.1

The portions of the D.B.P.S. applicable to the reach of channel on the project site can be summarized as follows: Page V-7, TableV-1, titled, " Fishers Canyon Basin 100-Year Flow Comparison" provides the following information:

	FEMA Report	**DBPS Study**		
Design Pt	(Existing Conditions)	Existing Condition	Future Condition	2009 Model
6	1,640 cfs	1,640 cfs	1,640 cfs	1,735 cfs
7	2,490 cfs	2,690 cfs	2,590 cfs	2,822 cfs
8	2,870 cfs	3,000 cfs	3,020 cfs	3,274 cfs
9	3,090 cfs	3,090 cfs	3,170 cfs	2,897 cfs

Design Point 6 is upstream of the proposed site and coincides with the location of the D.B.P.S. design point 6. Design Points 8 is on the project site at the confluence of Fishers Canyon Tributary and Fishers Canyon Drainageway. Design Point 9 is located at the I-25 3-cell box culvert discussed above.

On page VIII-5 of the D.B.P.S. it is stated that it is necessary to provide side channel detention to reduce the peak 100-year discharge from 3,170 cfs to 2,900 cfs, the design capacity of the culvert. It is also stated that the intent of the improvements is to avoid altering the stream from a natural to engineered character.

On page VI-2 it is stated that, " Flow within the 100-year floodplain on the Fishers Canyon Drainageway would be characterized by high velocities (up to 15 fps), turbulence and instability (critical flow is indicated in the HEC-2 model at a number of cross sections). Without improvements to stabilize the channel, significant bed and bank erosion and lost of existing vegetation would be expected during large runoff events in the Fishers Canyon Drainageway."

A proposed typical channel section is provided in the D.B.P.S. a copy is included in the appendix of this report. The typical section indicates an 80' bottom width, with riprap extending across the bottom and 2.5' up the side slopes and 3:1 vegetated side slopes above the riprap.

Selected Plan, Sheet 2 of 4 of the D.B.P.S. indicates three-proposed 4 foot drop structure in the project area; one approximately at the west boundary, one 2/3 of the distance across the site and one upstream the existing I-25 box culvert.

PRELIMINARY CHANNEL ANALYSIS - PROPOSED CONDITION

Preliminary analysis has been conducted for the on-site reach of channel. The statement quoted above from page VI-2 of the D.B.P.S. is easily confirmed. That coupled with the existing channel conditions outlined above lead to investigate whether or not realignment of the channel and cross section with greater hydraulic capacity would be required to stabilize the channel.

Normal and critical depth calculations were run on the existing channel assuming a bottom width of 10 feet and 3:1 side slopes. Velocities of 11 to 12 fps, and water depths of approximately 8 feet were predicted. The flow depths would be near critical adding the potential for turbulence as stated in the D.B.P.S.

The second analysis assumed the on-site channel slope would be reduced by the two proposed 4-foot drop structures. The resulting average slope would be 29.1/ 3315 = 0.009 ft/ft. Normal and critical depth calculations were run for the proposed D.B.P.S. channel section at a slope of 0.9%. The results indicated velocities of 10 to 12 fps and water depths of 8 to 9 feet. This combination of high velocity and water depths well above the proposed riprap would cause severe loss of vegetation and channel erosion.

Based on the design of similar channels in the Colorado Springs area it is proposed that a wider channel section at a slope of 0.4% to 0.5% be used. The design should target maximum velocities in the 100-year frequency event of 6 fps and water depths less than 5 feet. It is

proposed that the channel be realigned to provide sweeping bends, utilize buried riprap, where possible, and 8:1 sloping boulder drops to help avoid the engineered look. The section would provide a low-flow channel approximately 40 feet wide with a one-foot depth centered in an 80-foot channel bottom width. The channel bottom would slope at 1% from the top of the low flow channel to 3: 1 side slopes. This would allow planting of wetlands vegetation on the bottom area outside of the low flow channel. It is proposed that the channel section be armored with buried riprap on the outside bends to a level one-foot above the computed 10-year event water surface. Riprap at the toe of the bank would be exposed to prevent undermining of the channel bank. A proposed typical section is provided in the appendix of this report.

Three sloping boulder drop structures are proposed for the onsite reach for a total of 27 vertical feet. The realigned length of the proposed channel alignment is 2,600 feet. Subtracting the lengths of the drop structures and dissipater pool the average slope would be (37.7-27)/(2600-380) = 0.0046 ft/ft. A drawing of a typical sloping boulder drop and calculations are included in the appendix of this report, which also reflects the proposed maintenance access road along the south side of the channel. This road will also provide access to the detention facilities.

A final design report for the proposed Fishers Canyon Drainageway improvements shall be submitted with the construction plans. Preliminary design of the drainage way arterial culvert crossing resulted in the selection of a 3-14' x 6' cell RCB with a 9' high entrance to minimize entrance losses. Copies of the design data and a preliminary concept drawing are included in the appendix of this report. The channel is proposed to be contained within a tract to be owned by the City of Colorado Springs. Maintenance of all proposed structures will be by the City of Colorado Springs. Maintenance access roads shall be constructed with the channel. The created South Academy Station metro district will maintain all surface improvements along and in the channel (landscaping, trails).

The proposed channel designs, on-site developed flow detention, and off-channel detention will be utilized to allow the existing culvert under I-25 to convey no-more than 2900-cfs. This represents a reduction of the flow CURRENTLY being discharged from this culvert in a 100-

year event (3090-cfs). This reduction due to post-development discharges of historic peak rates or less and off-channel storage will result in a reduction in downstream peak flows in the 100-year event, but will NOT change the flooding in a 100-year event between Fountain Creek and I-25, as this is due primarily to Fountain Creek and existing condition grades in the area downstream of I-25.

STORMWATER QUALITY CALCULATIONS

In conjunction with the two detention facilities described above, stormwater quality volumes and outlet facilities will be installed. Subsequent final drainage reports will detail the exact facility size as well as design an outfall to achieve historic release rates.

DRAINAGE CRITERIA

Hydrologic calculations were performed using the City of Colorado Springs/El Paso County Drainage Criteria Manual, as revised in November 1991 and 1994. The Rational Method was used to estimate stormwater runoff from the proposed site and direct off-site basins. The Soil Conservation Service (SCS) method was used in the TR-20, overall drainage basin and channel analysis model.

It should be noted that the information in this report is preliminary in nature and shall be analyzed thoroughly in future drainage reports, based on final grading and street plans, etc..

FLOODPLAIN STATEMENT

Portions of this site are located within the floodplain as determined by the Flood Insurance Rate Map (F.I.R.M.) Panel #08041C 0743F, with an effective date March 17, 1997 (see map in Appendix). A future LOMR/CLOMR application will be submitted to define the floodplain based upon proposed channel improvements and road crossing(s).

DRAINAGE AND BRIDGE FEES

This area lies within Fishers Canyon Drainage Basin which is a closed (no-fee) basin within the City of Colorado Springs. Therefore there are no drainage and land fees required.

SUMMARY

All drainage facilities were sized using the current City of Colorado Springs/El Paso County Drainage Criteria and will safely discharge storm water runoff to adequate outfalls. Overall drainage patterns conform to the previous studies. Construction of the South Academy Station will not adversely affect the surrounding developments. It is also noted that this report is preliminary in nature and future developments of any portion of this project shall be analyzed thoroughly based upon final grading and/or street improvements for that particular development. The final location/routing of all storm water conveyances shall result from final drainage reports. At that time, the necessary drainage easements, tracts or rights of way shall be defined.

A future drainage report(s) shall address the final design of the on-site detention facilities, including outlet structures, and the side channel detention pond required by the D.B.P.S. The proposed condition shall be inserted into the D.P.B.S. model to confirm that the 100-year peak flow of 2,900 cfs, as per the D.B.P.S., is not exceeded.

PREPARED BY:

Classic Consulting, Engineers & Surveyors, LLC

Jeffrey W. Wilson, E.I.
Design Engineer

mal/2184.45/Reports/218400MDDP-CITY.doc

CLASSIC
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REFERENCES

1. El Paso County Drainage Criteria Manual dated September 30, 1990.

2. Soils Survey of El Paso County Area, Colorado Soil Conservation Service.

3. "Fishers Canyon Drainage Basin Planning Study," by Muller Engineering Company, dated July 16, 1991.

4. "Fishers Canyon Drainage Basin Planning Study Technical Appendix," by Muller Engineering Company, dated September 1991.

5. El Paso Engineering Criteria Manual dated January 9, 2006.

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APPENDIX

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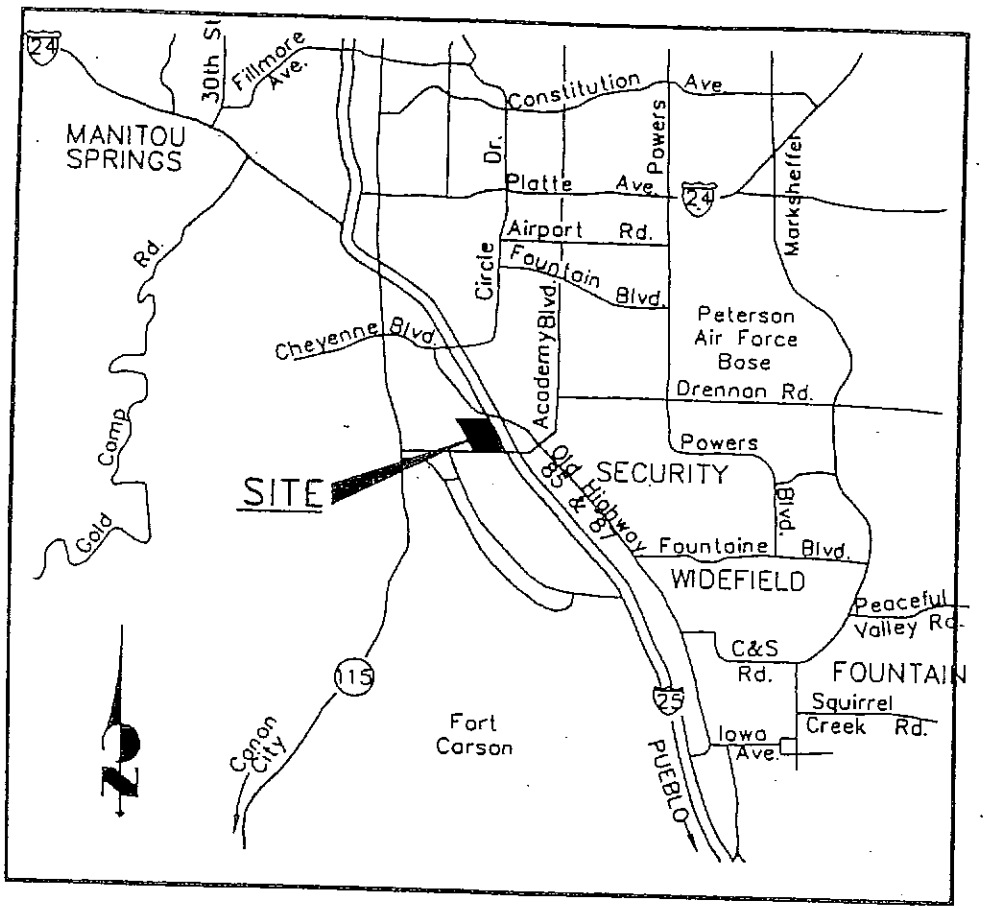
VICINITY MAP



VICINITY MAP

N.T.S.

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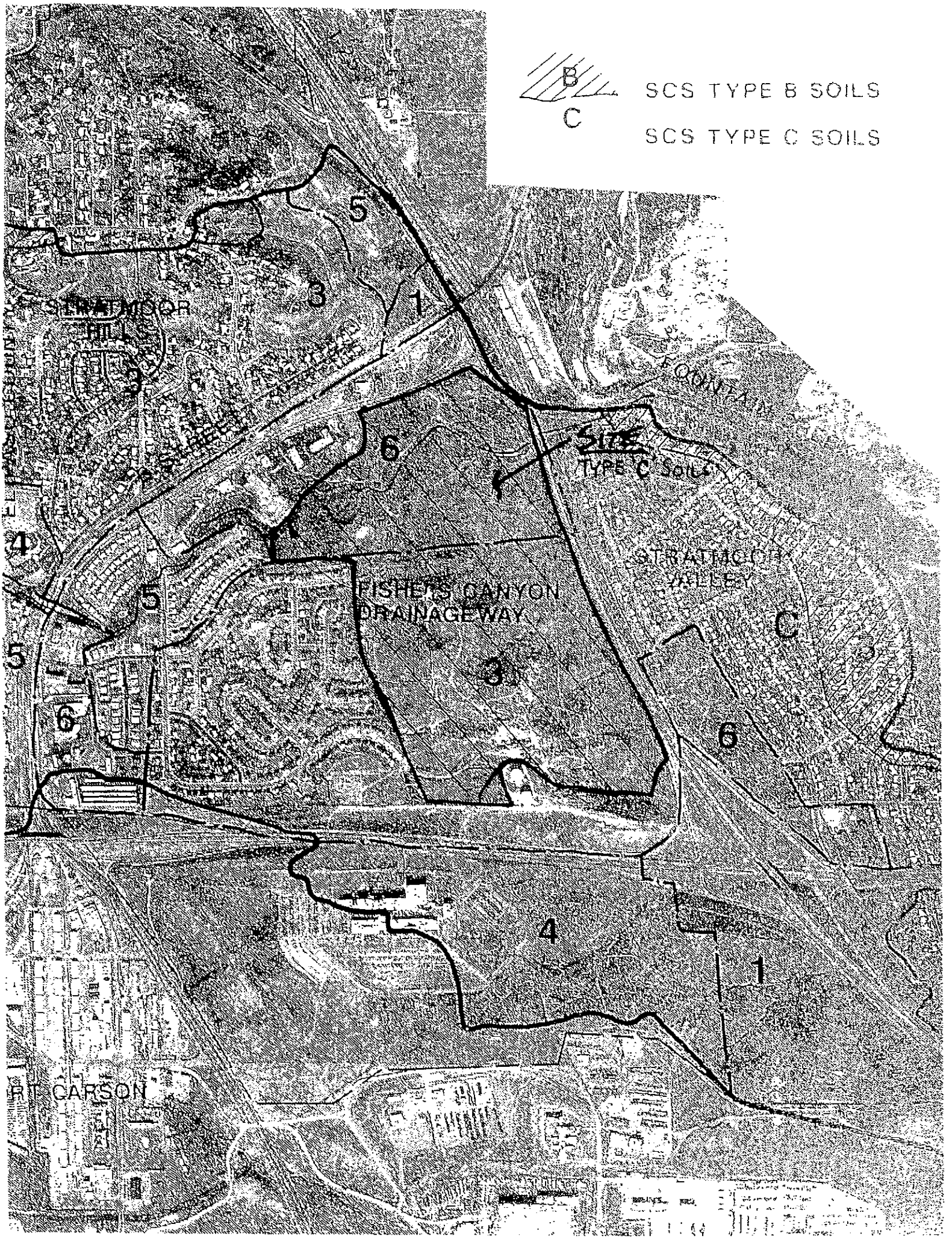
SOILS MAP (S.C.S SURVEY)


B
C
SCS TYPE B SOILS
SCS TYPE C SOILS
STRATMOOR HILLS
FISHER'S CANYON DRAINAGEWAY
STRATMOOR VALLEY
FT. CARSON
SITE
TYPE 'C' SOILS
1
3
4
5
6
C

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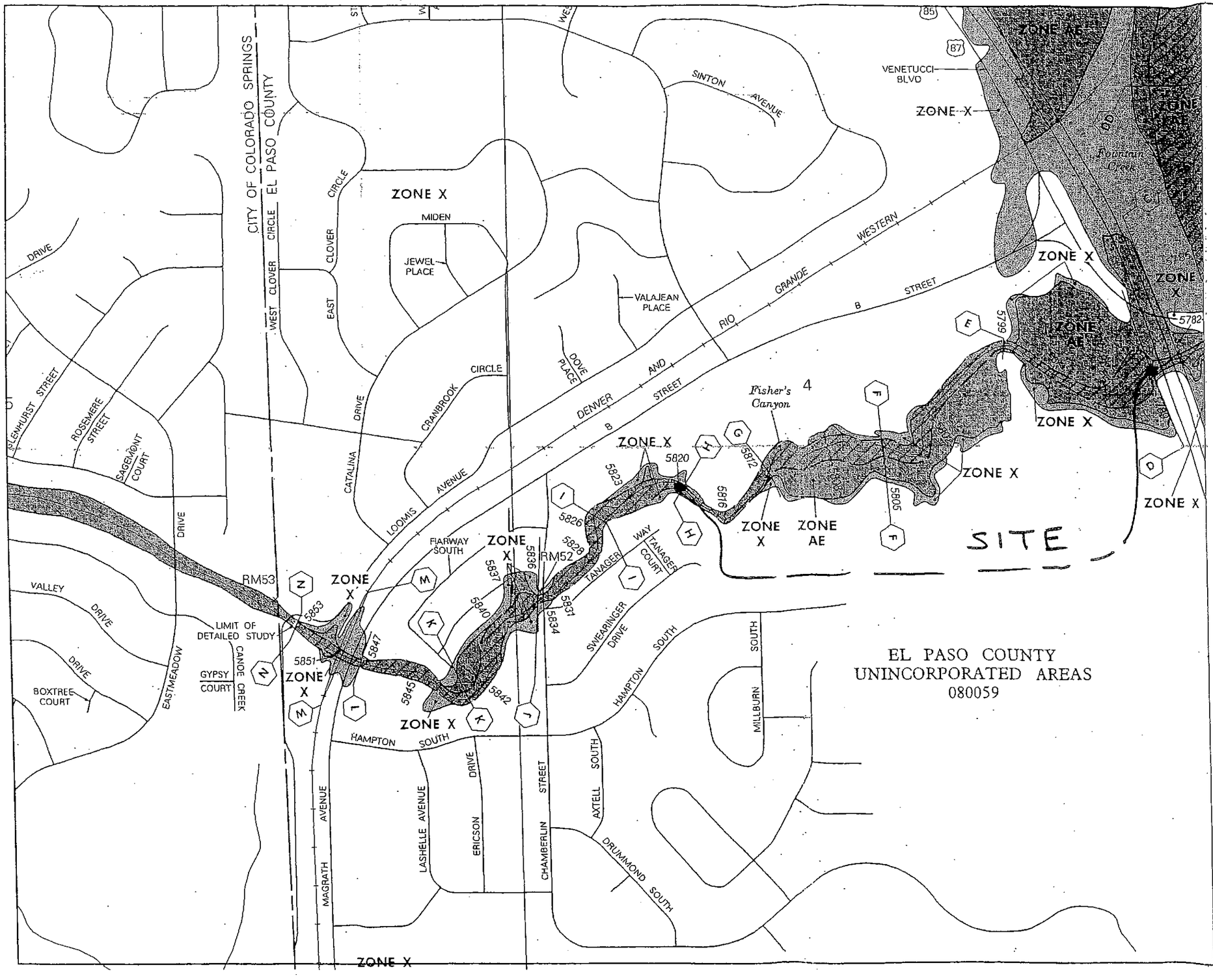
F.E.M.A. MAP



APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 743 OF 1300

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0743	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0743	F

MAP NUMBER
08041C0743 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

104°46'52"
38°46'52"

JOINS PANEL 0742

ZONE X
ZONE X
ZONE AE
(EL 5793)
ZONE X
ZONE X
ZONE X
ZONE X
ZONE X
ZONE X
ZONE X
ZONE X

DD
DC
DB
DA
CZ
CX
CW
CV
CU
CT
B

VENETUCCI BLVD.
85
87
25

CITY OF COLORADO SPRINGS
080060
CITY OF COLORADO SPRINGS
EL PASO COUNTY
CORPORATE LIMITS

NOTE: MAP AREA SHOWN ON TH
TOWNSHIP 15 SOUTH, RANGE 66

LAS VEGAS
DENVER AND RIO GRANDE WESTERN
STREET
GLENARM ROAD
NAPLES
LIVINGSTON AVENUE
CAMBRIDGE AVENUE
GLENWOOD
FILLMORE
5770
3

APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 744 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0744	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0744	F

MAP NUMBER
08041C0744 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

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HYDROLOGIC CALCULATIONS

JOB NAME:	*South Academy Station*
JOB NUMBER:	*2184.00*
DATE:	*12/04/07*
CALCULATED BY:	*JWW*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (EXISTING)

BASIN	TOTAL AREA (AC)	IMPERVIOUS AREA / STREETS			LANDSCAPE/UNDEVELOPED AREAS			WEIGHTED		WEIGHTED CA	
		AREA (AC)	C(5)	C(100)	AREA (AC)	C(5)	C(100)	C(5)	C(100)	CA(5)	CA(100)
FC0	11.41	0.00	0.90	0.95	11.41	0.25	0.35	0.25	0.35	**2.85**	**3.99**
FC1	47.74	0.00	0.90	0.95	47.74	0.25	0.35	0.25	0.35	**11.94**	**16.71**
FC2	36.43	11.00	0.90	0.95	25.43	0.25	0.35	0.45	0.53	**16.26**	**19.35**
FC3	35.26	0.00	0.90	0.95	35.26	0.25	0.35	0.25	0.35	**8.82**	**12.34**
FC4	19.61	0.00	0.90	0.95	19.61	0.25	0.35	0.25	0.35	**4.90**	**6.86**
FC5	19.43	0.00	0.90	0.95	19.43	0.25	0.35	0.25	0.35	**4.86**	**6.80**
FC6	4.76	0.00	0.90	0.95	4.76	0.25	0.35	0.25	0.35	**1.19**	**1.67**
FC7	17.96	0.00	0.90	0.95	17.96	0.25	0.35	0.25	0.35	**4.49**	**6.29**

JOB NAME:	*South Academy Station*
JOB NUMBER:	*2184.00*
DATE:	*12/04/07*
CALC'D BY:	*JWW*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (EXISTING)

BASIN	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS	
	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)
FC0	2.85	3.99	0.25	180	3	18.0	630	6.0%	8.6	1.2	19.2	3.07	5.46	9	22
FC1	11.94	16.71	0.25	100	4	10.1	3200	4.2%	7.2	7.4	17.5	3.22	5.73	38	96
FC2	16.26	19.35	0.25	90	6	8.1	2800	1.8%	4.7	9.9	18.0	3.18	5.65	52	109
FC3	8.82	12.34	0.25	180	8	13.0	1680	8.5%	10.2	2.7	15.8	3.38	6.01	30	74
FC4	4.90	6.86	0.25	270	18	14.0	1500	8.0%	9.9	2.5	16.5	3.31	5.89	16	40
FC5	4.86	6.80	0.25	240	6	18.2	1300	8.8%	10.4	2.1	20.3	2.99	5.32	15	36
FC6	1.19	1.67	0.25	165	6	13.3	850	10.7%	11.4	1.2	14.6	3.51	6.24	4	10
FC7	4.49	6.29	0.25	150	6	12.3	1600	6.0%	8.6	3.1	15.4	3.42	6.08	15	38
OS-1															128
OS-2															29
OS-3															16

JOB NAME: *South Academy Station*
JOB NUMBER: *2184.00*
DATE: *12/04/07*
CALCULATED BY: *JWW*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (EXISTING)

Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Description
					I(5)	I(100)	Q(5)	Q(100)	
EX1	Basin FC4	4.90	6.86	16.5	3.31	5.89	**16**	**40**	Existing 36" RCP
EX2	Basin FC5	4.86	6.80	20.3	2.99	5.32	**15**	**36**	Existing 24" RCP
EX3	Basin FC6	1.19	1.67	14.6	3.51	6.24	**4**	**10**	Existing 30" RCP
EX4	Basin FC7	4.49	6.29	15.4	3.42	6.08	**15**	**38**	Existing 36" RCP
7	DBPS-DP6, 3A, 3B, 4A, 4B							**2,676**	Existing DBPS Design Point
8	DBPS-DP7, 4C							**3,050**	Existing DBPS Design Point
9	DBPS-DP8, 4D							**3,163**	Existing DBPS Design Point
A	OS-3							**16**	Existing 24" RCP
B	OS-2							**29**	Existing 30" RCP
C	OS-1, DP-A, DP-B							**233**	Existing Tributary Flow

JOB NAME: *South Academy Station*
JOB NUMBER: *2184.00*
DATE: *12/04/07*
CALCULATED BY: *JWW*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF COEFFICIENT SUMMARY (DEVELOPED)

BASIN	TOTAL AREA (AC)	IMPERVIOUS AREA / STREETS			LANDSCAPE/UNDEVELOPED AREAS			WEIGHTED		WEIGHTED CA	
		AREA (AC)	C(5)	C(100)	AREA (AC)	C(5)	C(100)	C(5)	C(100)	CA(5)	CA(100)
Off-site Basins	See Appendix for TR-20 Modeling										
A	13.18	0.00	0.90	0.95	13.18	0.25	0.35	0.25	0.35	**3.30**	**4.61**
B	56.44	31.61	0.90	0.95	24.83	0.25	0.35	0.61	0.69	**34.65**	**38.72**
C	16.28	10.25	0.90	0.95	6.03	0.25	0.35	0.66	0.73	**10.73**	**11.85**
D	4.63	4.63	0.90	0.95	0.00	0.25	0.35	0.90	0.95	**4.17**	**4.40**
E	2.52	2.52	0.90	0.95	0.00	0.25	0.35	0.90	0.95	**2.27**	**2.39**
F	8.52	6.20	0.90	0.95	2.32	0.25	0.35	0.72	0.79	**6.16**	**6.70**
G	8.48	0.00	0.90	0.95	8.48	0.25	0.35	0.25	0.35	**2.12**	**2.97**
H	60.59	48.47	0.90	0.95	12.12	0.25	0.35	0.77	0.83	**46.65**	**50.29**
I	2.94	0.00	0.90	0.95	2.94	0.25	0.35	0.25	0.35	**0.74**	**1.03**
J	3.81	0.00	0.90	0.95	3.81	0.25	0.35	0.25	0.35	**0.95**	**1.33**
K	6.64	0.00	0.90	0.95	6.64	0.25	0.35	0.25	0.35	**1.66**	**2.32**
L	2.49	0.00	0.90	0.95	2.49	0.25	0.35	0.25	0.35	**0.62**	**0.87**
M	5.93	0.00	0.90	0.95	5.93	0.25	0.35	0.25	0.35	**1.48**	**2.08**
OS-1	68.38										
OS-2	16.73										
OS-3	9.30										

JOB NAME:	*South Academy Station*
JOB NUMBER:	*2184.00*
DATE:	*12/04/07*
CALC'D BY:	*JWW*

FINAL DRAINAGE REPORT ~ BASIN RUNOFF SUMMARY (DEVELOPED)

BASIN	WEIGHTED		OVERLAND				STREET / CHANNEL FLOW				Tc	INTENSITY		TOTAL FLOWS		OUTFALL
	CA(5)	CA(100)	C(5)	Length (ft)	Height (ft)	Tc (min)	Length (ft)	Slope (%)	Velocity (fps)	Tc (min)	TOTAL (min)	I(5) (in/hr)	I(100) (in/hr)	Q(5) (cfs)	Q(100) (cfs)	
A	3.30	4.61	0.25	67	1	11.4	1800	5.0%	7.8	3.8	15.2	3.44	6.11	11	28	Fishers Canyon Tributary Channel
B	34.65	38.72	0.25	67	2	9.1	2800	3.0%	6.1	7.7	16.8	3.29	5.84	114	226	Detention & WQ Facility #1 - Fishers Canyon
C	10.73	11.85	0.25	40	2	5.9	1545	2.3%	5.3	4.8	10.7	3.99	7.10	43	84	Fishers Canyon Drainageway
D	4.17	4.40	0.25	70	2	9.4	3500	2.6%	5.6	10.3	19.7	3.03	5.39	13	24	Detention & WQ Facility #1 - Fishers Canyon
E	2.27	2.39	0.25	70	2	9.4	3500	2.6%	5.6	10.3	19.7	3.03	5.39	7	13	Detention & WQ Facility #1 - Fishers Canyon
F	6.16	6.70	0.25	50	2	7.1	500	3.5%	6.5	1.3	8.4	4.37	7.77	27	52	Future Water Quality Pond - Fishers Canyon
G	2.12	2.97	0.25	40	2	5.9	1150	1.5%	4.3	4.5	10.4	4.04	7.19	9	21	Fishers Canyon Drainageway
H	46.65	50.29	0.25	30	2	4.7	3500	3.0%	6.1	9.6	14.3	3.54	6.29	165	317	Detention & WQ Facility #2 - Fishers Canyon
I	0.74	1.03	0.25	40	2	5.9	850	6.0%	8.6	1.7	7.6	4.53	8.05	3	8	Fishers Canyon Drainageway
J	0.95	1.33	0.25	60	1	10.4	500	10.0%	11.1	0.8	11.2	3.93	6.99	4	9	Exist. 36" RCP
K	1.66	2.32	0.25	60	1	10.4	1200	7.0%	9.3	2.2	12.6	3.74	6.65	6	15	Exist. 24" RCP
L	0.62	0.87	0.25	60	1	10.4	600	11.0%	11.6	0.9	11.3	3.92	6.96	2	6	Exist. 30" RCP
M	1.48	2.08	0.25	60	1	10.4	600	11.0%	11.6	0.9	11.3	3.92	6.96	6	14	Exist. 36" RCP
OS-1															128	Exist.Stratmoor South & College View Estates
OS-2															29	Existing 30" RCP
OS-3															16	Existing 24" RCP

JOB NAME: *South Academy Station*
JOB NUMBER: *2184.00*
DATE: *12/04/07*
CALCULATED BY: *JWW*

FINAL DRAINAGE REPORT ~ SURFACE ROUTING SUMMARY (DEVELOPED)

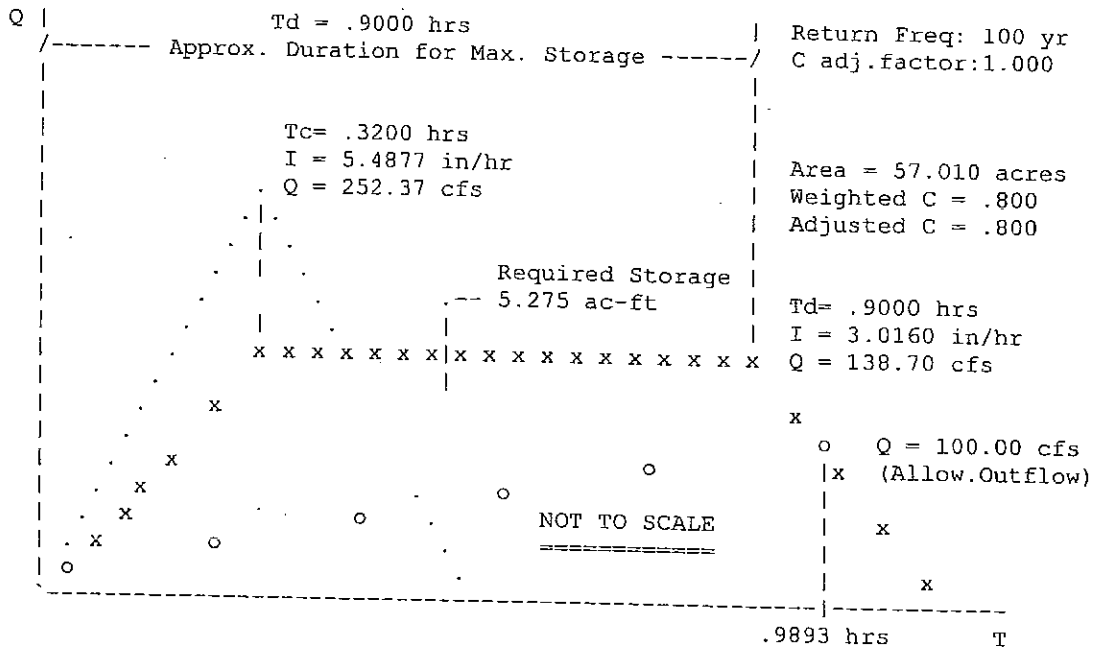
Design Point(s)	Contributing Basins	Equivalent CA(5)	Equivalent CA(100)	Maximum Tc	Intensity		Flow		Outfall
					I(5)	I(100)	Q(5)	Q(100)	
1	Basin B, Basin D & Basin E	41.09	45.51	19.7	3.03	5.39	**125**	**245**	Flow to Detention & Water Quality Facility Pond #1
1a	Detention & Water Quality Faciltiy #1						**51**	**100**	To Fishers Canyon Drainageway
2	Basin H	46.65	50.29	14.3	3.54	6.29	**165**	**317**	Flow to Detention & Water Quality Facility Pond #2
2a	Detention & Water Quality Faciltiy #2						**33**	**64**	To Fishers Canyon Drainageway
3	Basin J	0.95	1.33	11.2	3.93	6.99	**4**	**9**	Exist. 36" RCP to East
4	Basin K	0.95	2.32	12.6	3.74	6.65	**4**	**15**	Exist. 24" RCP to East
5	Basin L	0.62	0.87	11.3	3.92	6.96	**2**	**6**	Exist. 30" RCP to East
6	Basin M	1.48	2.08	11.3	3.92	6.96	**6**	**14**	Exist. 36" RCP to East
7	DBPS-DP6, 3A, 3B, 4A, 4B							**2,660**	Existing DBPS Design Point
7a	DBPS-DP6, C							**2,966**	Existing DBPS Design Point
8	DBPS-DP7a, DP-1a							**3,014**	Existing DBPS Design Point
9	DBPS-DP8, DP-2A, G, I							**2,896**	Existing DBPS Design Point
A	OS-3							**16**	Existing 24" RCP
B	OS-2							**29**	Existing 30" RCP
C	OS-1, DP-A, DP-B							**187**	Tributary Flow to Future Pipe

WATER QUALITY AND DET. POND #1

MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----
Method I

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

RETURN FREQUENCY: 100 yr	Allowable Outflow: 100.00 cfs
'C' Adjustment: 1.000	Required Storage: 5.275 ac-ft
Peak Inflow: 138.70 cfs	
.HYG File: 100	

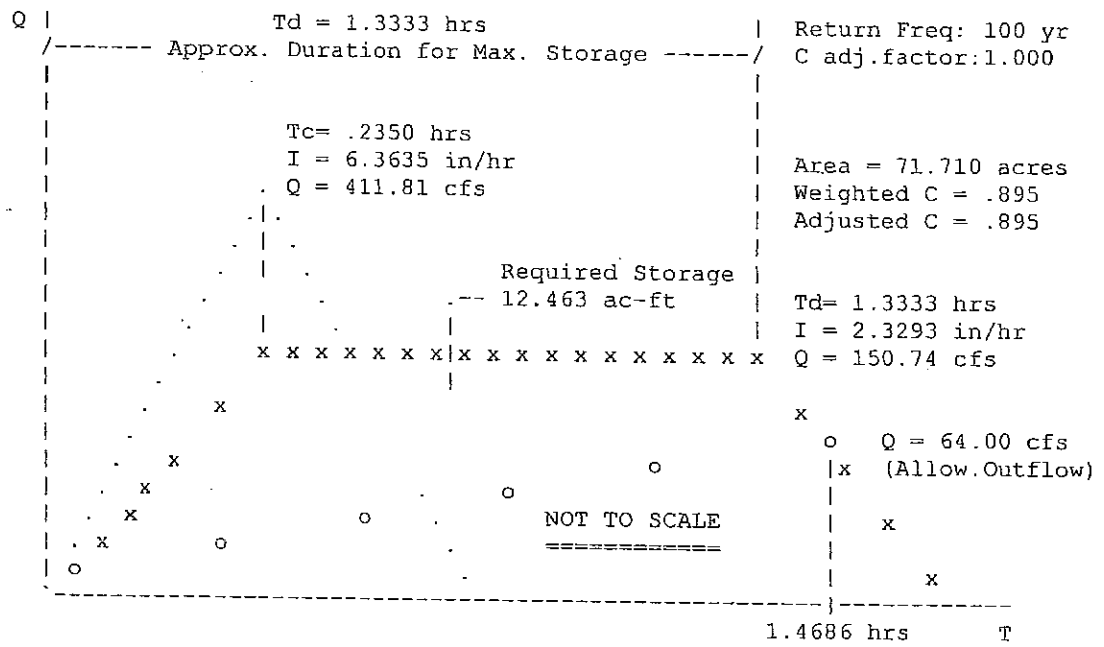


WATER QUALITY AND DET. POND #2

MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----
Method I

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

```
**************************************************************************
*  RETURN FREQUENCY: 100 yr     |  Allowable Outflow: 64.00 cfs        *
*  'C' Adjustment: 1.000        |  Required Storage: 12.463 ac-ft      *
*-------------------------------------------------------------------------*
*  Peak Inflow: 150.74 cfs                                               *
* .HYG File:   100                                                       *
**************************************************************************
```

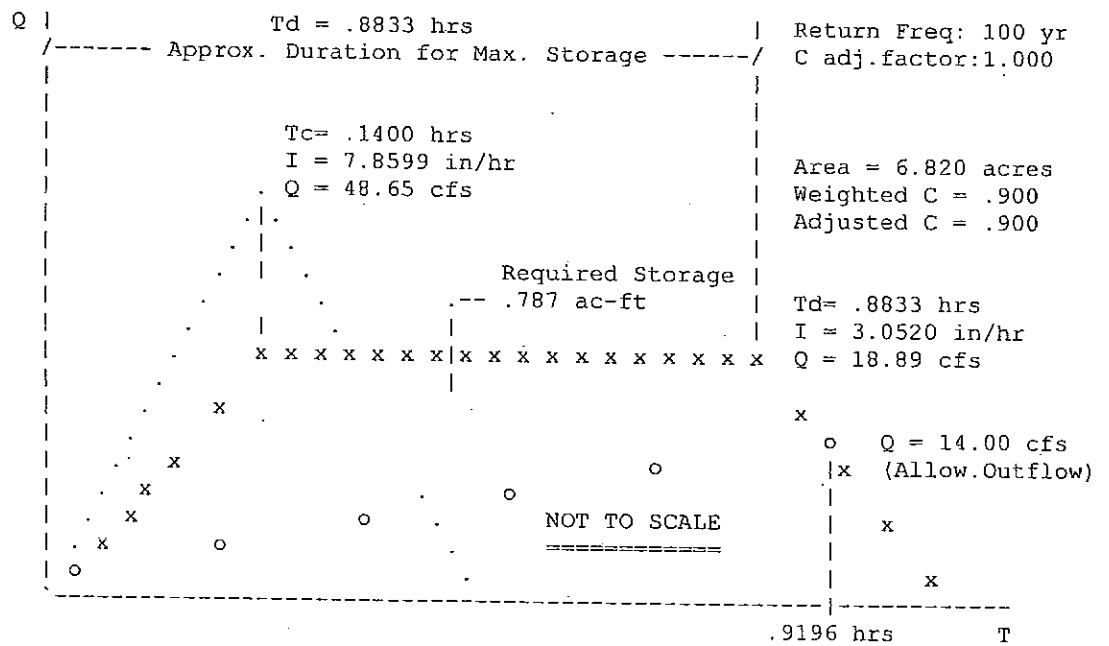


FUTURE MULTI-FAMILY

MODIFIED RATIONAL METHOD
---- Graphical Summary for Maximum Required Storage ----
Method I

Q = CiA * Units Conversion; Where Conversion = 43560 / (12 * 3600)

RETURN FREQUENCY: 100 yr	Allowable Outflow: 14.00 cfs
'C' Adjustment: 1.000	Required Storage: .787 ac-ft
Peak Inflow: 18.89 cfs	
.HYG File: 100	



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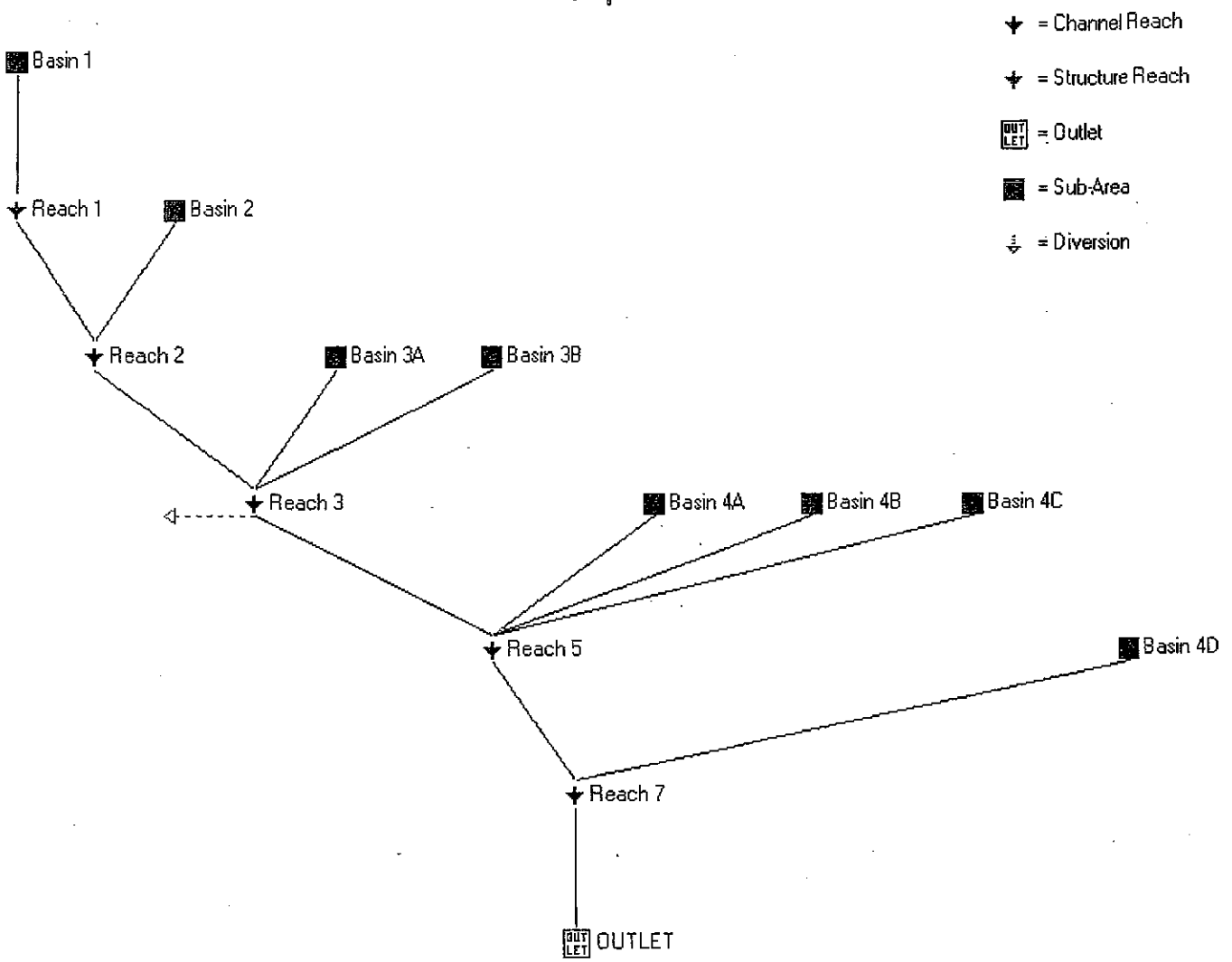
TR-20 MODELS

-Existing 2 & 24 Hr TR-20 Models

-Proposed 2 & 24 Hr TR-20 Models

-Corrected 2 & 24 Hr TR-20 Models

EXISTING


= Channel Reach
= Structure Reach
= Outlet
= Sub-Area
= Diversion
Basin 1
Reach 1
Basin 2
Reach 2
Basin 3A
Basin 3B
Reach 3
Basin 4A
Basin 4B
Basin 4C
Reach 5
Basin 4D
Reach 7
OUTLET

```
WinTR-20: Version 1.0                          0          0          5.         0
Fishers Canyon Drainage Basin - Existing Conditions 2-Hour

SUB-AREA:
          Basin 1   Reach 1                    2.357      75.        .76        Y
          Basin 2   Reach 2                    1.234      76.        .88        Y
          Basin 4A  Reach 5                    .186       81.        .22        Y
          Basin 4B  Reach 5                    .184       85.        .15        Y
          Basin 4C  Reach 5                    .198       78.        .22        Y
          Basin 4D  Reach 7                    .219       74.        .10        Y
          Basin 3A  Reach 3                    .235       76.6       .64        Y
          Basin 3B  Reach 3                    .96        81.        .55        Y

STREAM REACH:
          Reach 1   Reach 2                    Structure                        Y   Y
          Reach 2   Reach 3   XS 1                        4700.      4700.      Y   Y
          Reach 3   Reach 5   XS 1.5                      3500.      3500.      Y   Y
                    SPLIT FLOW                            0.         323.       .001
          Reach 5   Reach 7   XS 4                        1600.      1600.      Y   Y
          Reach 7   Outlet    XS 1.5                      2100.      2100.      Y   Y


STORM ANALYSIS:
          100-yr                               3.05       2h-100yr   3
          10-yr                                2.06       2h-10yr    3

STREAM CROSS SECTION:
          XS 1.5    5849.
                    5843.      0.         0.         0.         .01899
                    5849.28    1200.      164.       34.        .01899
                    5851.87    2300.      263.       42.        .01746
                    5852.89    2740.      322.       45.73      .01684
                    5853.81    4300.      403.       48.78      .01604
          XS 1      5927.
                    5920.      0.         0.         0.         .03404
                    5921.      19.        10.        11.        .03404
                    5922.      64.        22.        16.        .02790
                    5923.      132.       39.        19.        .02518
                    5924.      261.       61.        25.        .02307
                    5925.      542.       89.        31.        .02109
                    5926.      829.       123.       37.        .01995
                    5927.      1203.      164.       44.        .01899
                    5928.      2251.      263.       56.        .01746
                    5929.      2942.      322.       62.        .01684
          XS 4      5784.
                    5776.      0.         0.         0.         .03404
                    5777.      19.        10.        11.        .03404
                    5778.      64.        22.        16.        .02790
                    5779.      132.       39.        19.        .02518
                    5780.      261.       61.        25.        .02308
                    5781.      542.       89.        31.        .02109
                    5782.      829.       123.       37.        .01995
                    5783.      1203.      164.       44.        .01899
                    5784.      1675.      211.       50.        .01817
                    5785.      2251.      263.       56.        .01746
                    5786.      2942.      322.       62.        .01684
                    5787.      4300.      500.       68.        .01548

STRUCTURE RATING:
          Structure 5970.
                    5970.      0.         0.
                    5970.5     45.        18.
                    5971.      120.       35.
                    5971.5     240.       53.
                    5972.      365.       70.
```

```
                5973.     395.      108.
                5974.     425.      151.
                5975.     450.      195.
                5976.     473.      248.
                5977.     495.      302.
                5978.     1145.     357.


RAINFALL DISTRIBUTION:
        2h-10yr           .0833
                0.        .0173     .0493     .1201     .2498
                .4659     .5696     .6180     .6557     .6880
                .7156     .7433     .7710     .7986     .8263
                .8539     .8755     .8920     .9084     .9248
                .9421     .9576     .9741     .9888     1.0
        2h-100yr          .0833
                0.        .0087     .0346     .0744     .1436
                .2647     .4810     .6021     .6713     .7249
                .7682     .8028     .8374     .8720     .8893
                .9066     .9170     .9273     .9377     .9481
                .9585     .9689     .9792     .9896     1.0

DURATION INCREMENT:                 Hours     .05       .05       .05

GLOBAL OUTPUT:
        2         5.                YNNNN     YNNNNN

TIME ANALYSIS:
        ELEVATION 6000.
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Fishers Canyon Drainage Basin - Existing Conditions 2-Hour

Name of printed page file:
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STORM 100-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 1	2.357		1.862		1.08	2694.13	1143.03
Reach 1	2.357	Upstream	1.862		1.08	2694.13	1143.03
Reach 1	2.357	Downstream	1.846	5974.48	2.38	437.09	185.44
Basin 2	1.234		1.943		1.15	1360.49	1102.50
Reach 2	3.591	Upstream	1.879	5927.51	1.18	1734.96	483.14
Reach 2	3.591	Downstream	1.879	5927.51	1.28	1733.75	482.80
Basin 3A	0.235		1.937		0.95	312.13	1328.21
Basin 3B	0.960		2.207		0.87	1619.09	1686.55
Reach 3	4.786	Upstream	1.948	5853.05	1.15	3006.10	628.10
Reach 3	4.781	Downstream	1.115	5852.74	1.22	2676.34	559.76
Basin 4A	0.186		2.204		0.63	495.11	2661.87
Basin 4B	0.184		2.396		0.57	618.70	3362.50
Basin 4C	0.198		2.027		0.64	475.82	2403.14
Reach 5	5.349	Upstream	1.231	5786.08	1.14	3052.67	570.68
Reach 5	5.349	Downstream	1.231	5786.08	1.18	3050.57	570.28
Basin 4D	0.219		1.861		0.54	612.45	2796.56
Reach 7	5.568	Upstream	1.256	5853.14	1.13	3167.58	568.87
Reach 7	5.568	Downstream	1.256	5853.14	1.18	3163.06	568.06
OUTLET	5.568		1.256		1.18	3163.06	568.06

STORM 10-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 1	2.357		1.013		0.98	1149.65	487.76
Reach 1	2.357	Upstream	1.013		0.98	1149.65	487.76
Reach 1	2.357	Downstream	0.997	5972.29	2.37	373.75	158.57
Basin 2	1.234		1.077		1.08	597.49	484.19
Reach 2	3.591	Upstream	1.024	5925.88	1.60	793.20	220.89
Reach 2	3.591	Downstream	1.024	5925.87	1.70	792.89	220.80
Basin 3A	0.235		1.070		0.90	137.53	585.25
Basin 3B	0.960		1.290		0.76	788.31	821.16
Reach 3	4.786	Upstream	1.079	5849.50	1.11	1293.60	270.29
Reach 3	4.781	Downstream	0.528	5848.08	1.18	970.17	202.91
Basin 4A	0.186		1.287		0.54	258.27	1388.57
Basin 4B	0.184		1.450		0.48	351.90	1912.48
Basin 4C	0.198		1.142		0.56	232.21	1172.76
Reach 5	5.349	Upstream	0.609	5782.95	1.21	1185.25	221.58
Reach 5	5.349	Downstream	0.608	5782.95	1.26	1185.20	221.57
Basin 4D	0.219		1.012		0.46	291.31	1330.17
Reach 7	5.568	Upstream	0.624	5849.42	1.26	1258.82	226.07
Reach 7	5.568	Downstream	0.624	5849.42	1.31	1258.52	226.02
OUTLET	5.568		0.624		1.31	1258.52	226.02

Fishers Canyon Drainage Basin - Existing Conditions 2-Hour

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 100-yr (cfs)	10-yr (cfs)	(cfs)	(cfs)	(cfs)
Basin 1	2.36		2694.1	1149.6			
Basin 2	1.23		1360.5	597.5			
Basin 4A	0.19		495.1	258.3			
Basin 4B	0.18		618.7	351.9			
Basin 4C	0.20		475.8	232.2			
Basin 4D	0.22		612.4	291.3			
Basin 3A	0.23		312.1	137.5			
Basin 3B	0.96		1619.1	788.3			
Reach 1	2.36		2694.1	1149.6			
DOWNSTREAM			437.1	373.8			
Reach 2	3.59		1735.0	793.2			
DOWNSTREAM			1733.7	792.9			
Reach 3	4.78		3006.1	1293.6			
DOWNSTREAM			2676.3	970.2			
Reach 5	5.35		3052.7	1185.3			
DOWNSTREAM			3050.6	1185.2			
Reach 7	5.57		3167.6	1258.8			
DOWNSTREAM			3163.1	1258.5			
OUTLET	5.57		3163.1	1258.5			

WinTR-20: Version 1.0 0 0 5. 0

Fishers Canyon Drainage Basin - Existing Conditions 24-Hour

SUB-AREA:

Basin 1	Reach 1	1	2.357	75.	.76	Y
Basin 2	Reach 2	1	1.234	76.	.88	Y
Basin 4A	Reach 5	1	.186	81.	.22	Y
Basin 4B	Reach 5	1	.184	85.	.15	Y
Basin 4C	Reach 5	1	.198	78.	.22	Y
Basin 4D	Reach 7	1	.214	74.	.10	Y
Basin 3A	Reach 3	1	.235	76.6	.64	Y
Basin 3B	Reach 3	1	.96	81.	.55	Y

STREAM REACH:

Reach 1	Reach 2		Structure			Y Y
Reach 2	Reach 3	XS 1.5		2500.	2500.	Y Y
Reach 3	Reach 5	XS 2		4700.	4700.	Y Y
	SPLIT FLOW			0.	323.	.005
Reach 5	Reach 7	XS 2		3500.	3500.	Y Y
Reach 7	Outlet	XS 4		2100.	2100.	Y Y

STORM ANALYSIS:

100-yr	1	4.5	24h-100yr	2
10-yr	1	3.2	24h-100yr	2

STREAM CROSS SECTION:

XS 2	5819.3				
	5814.	0.	0.	0.	.02066
	5815.	112.	43.	46.	.02066
	5816.	382.	122.	85.	.02215
	5817.	894.	210.	91.	.01888
	5818.	1573.	304.	97.	.01710
	5819.	2410.	404.	103.	.01593
	5820.	3400.	510.	109.	.01510
	5821.	4542.	622.	115.	.01446
XS 1.5	5850.				
	5843.	0.	0.	0.	.01899
	5849.28	1200.	164.	34.	.01899
	5851.87	2300.	263.	42.	.01746
	5852.89	2740.	322.	45.73	.01684
	5853.81	4300.	403.	48.78	.01604
XS 1	5932.				
	5925.	0.	0.	0.	.03404
	5926.	19.	10.	11.	.03404
	5927.	64.	22.	16.	.02790
	5928.	132.	39.	19.	.02518
	5929.	261.	61.	25.	.02307
	5930.	542.	89.	31.	.02109
	5931.	829.	123.	37.	.01995
	5932.	1203.	164.	44.	.01899
	5933.	1675.	211.	50.	.01817
	5934.	2251.	263.	56.	.01746
	5935.	2942.	322.	62.	.01684
XS 4	5785.75				
	5776.	0.	0.	0.	.02066
	5777.	19.	10.	11.	.03404
	5778.	64.	22.	16.	.02790
	5779.	132.	39.	19.	.02518
	5780.	261.	61.	25.	.02307
	5781.	542.	89.	31.	.02109
	5782.	829.	123.	37.	.01995
	5783.	1203.	164.	44.	.01899
	5784.	1675.	211.	50.	.01817
	5785.	2251.	263.	56.	.01746

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                5786.     2942.     322.      62.       .01684
                5790.     4500.     650.      125.      .0152

STRUCTURE RATING:
        Structure 5970.
                5970.     0.        0.
                5970.5    45.       18.
                5971.     120.      35.
                5971.5    240.      53.
                5972.     365.      70.
                5973.     395.      108.
                5974.     425.      151.
                5975.     450.      195.
                5976.     473.      248.
                5977.     495.      302.
                5978.     1145.     357.


RAINFALL DISTRIBUTION:
        24h-100yr         .25
                0.        .0005     .0015     .0030     .0045
                .006      .008      .01       .012      .0143
                .0165     .0188     .021      .0233     .0255
                .0278     .032      .039      .046      .053
                .06       .075      .1        .4        .7
                .725      .75       .765      .78       .79
                .8        .81       .82       .825      .83
                .835      .84       .845      .85       .855
                .86       .8638     .8675     .8713     .875
                .8788     .8825     .8863     .89       .8938
                .8975     .9013     .905      .9083     .9115
                .9148     .918      .921      .924      .927
                .93       .9325     .935      .9375     .94
                .9425     .945      .9475     .95       .9525
                .955      .9575     .96       .9625     .965
                .9675     .97       .9725     .975      .9775
                .98       .9813     .9825     .9838     .985
                .9863     .9875     .9888     .99       .9913
                .9925     .9938     .995      .9963     .9975
                .9988     1.0       1.        1.        1.


GLOBAL OUTPUT:
        2         5.        .1        YNNNN     YNNNNN

TIME ANALYSIS:
        ELEVATION 6000.
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Fishers Canyon Drainage Basin - Existing Conditions 24-Hour

Name of printed page file:
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STORM 100-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 1	2.357	1	2.050		6.31	2361.82	1002.04
Reach 1	2.357	Upstream	2.050		6.31	2361.82	1002.04
Reach 1	2.357	Downstream	2.034	5973.28	7.32	403.31	171.11
Basin 2	1.234	1	2.128		6.37	1156.60	937.28
Reach 2	3.591	Upstream	2.066	5850.01	6.40	1510.33	420.59
Reach 2	3.591	Downstream	2.065	5850.00	6.50	1504.80	419.05
Basin 3A	0.235	1	2.097		6.26	287.46	1223.25
Basin 3B	0.960	1	2.546		6.20	1562.75	1627.86
Reach 3	4.786	Upstream	2.163	5819.39	6.30	2797.74	584.57
Reach 3	4.762	Downstream	0.939	5819.06	6.44	2465.37	517.71
Basin 4A	0.186	1	2.277		6.03	435.36	2340.64
Basin 4B	0.184	1	2.624		6.01	510.30	2773.36
Basin 4C	0.198	1	2.035		6.04	419.18	2117.07
Reach 5	5.330	Upstream	1.085	5819.20	6.43	2609.33	489.55
Reach 5	5.330	Downstream	1.085	5819.20	6.54	2603.18	488.39
Basin 4D	0.214	1	1.733		6.01	446.66	2087.22
Reach 7	5.544	Upstream	1.110	5785.57	6.53	2642.71	476.67
Reach 7	5.544	Downstream	1.109	5785.56	6.58	2639.94	476.17
OUTLET	5.544		1.109		6.58	2639.94	476.17

STORM 10-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 1	2.357	1	1.093		6.36	1162.96	493.41
Reach 1	2.357	Upstream	1.093		6.36	1162.96	493.41
Reach 1	2.357	Downstream	1.077	5971.62	7.17	271.18	115.05
Basin 2	1.234	1	1.150		6.41	580.80	470.66
Reach 2	3.591	Upstream	1.102	5846.72	6.50	711.20	198.05
Reach 2	3.591	Downstream	1.102	5846.72	6.60	709.99	197.71
Basin 3A	0.235	1	0.890		6.26	146.89	625.07
Basin 3B	0.960	1	1.467		6.20	867.02	903.15
Reach 3	4.786	Upstream	1.165	5817.79	6.30	1431.97	299.20
Reach 3	4.762	Downstream	0.319	5817.31	6.48	1104.58	231.95
Basin 4A	0.186	1	1.125		6.04	253.00	1360.22
Basin 4B	0.184	1	1.384		6.02	317.50	1725.56
Basin 4C	0.198	1	0.954		6.05	233.26	1178.06
Reach 5	5.330	Upstream	0.408	5817.44	6.47	1190.38	223.33
Reach 5	5.330	Downstream	0.407	5817.43	6.62	1185.95	222.50
Basin 4D	0.214	1	0.754		6.01	242.10	1131.30
Reach 7	5.544	Upstream	0.421	5783.00	6.61	1202.11	216.83
Reach 7	5.544	Downstream	0.420	5782.99	6.66	1200.88	216.61
OUTLET	5.544		0.420		6.66	1200.88	216.61

Fishers Canyon Drainage Basin - Existing Conditions 24-Hour

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 100-yr (cfs)	10-yr (cfs)	(cfs)	(cfs)	(cfs)
Basin 1	2.36		2361.8	1163.0			
Basin 2	1.23		1156.6	580.8			
Basin 4A	0.19		435.4	253.0			
Basin 4B	0.18		510.3	317.5			
Basin 4C	0.20		419.2	233.3			
Basin 4D	0.21		446.7	242.1			
Basin 3A	0.23		287.5	146.9			
Basin 3B	0.96		1562.7	867.0			
Reach 1	2.36		2361.8	1163.0			
DOWNSTREAM			403.3	271.2			
Reach 2	3.59		1510.3	711.2			
DOWNSTREAM			1504.8	710.0			
Reach 3	4.76		2797.7	1432.0			
DOWNSTREAM			2465.4	1104.6			
Reach 5	5.33		2609.3	1190.4			
DOWNSTREAM			2603.2	1186.0			
Reach 7	5.54		2642.7	1202.1			
DOWNSTREAM			2639.9	1200.9			
OUTLET	5.54		2639.9	1200.9			

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WinTR-20: Version 1.0 0 0 5. 0

Fishers Canyon Drainage Basin - Proposed Conditions 2-Hour

SUB-AREA:

Basin 1	Reach 1	2.357	75.	.761	Y
Basin 2	Reach 2	1.234	76.	.88	Y
Basin 4A	Reach 5	.186	81.	.22	Y
Basin 4B	Reach 5	.14	88.	.15	Y
SAS B	Reach 4	.08	92.	.28	Y
SAS A	Reach 5	.015	88.	.253	Y
SAS C	Reach 5	.028	92.	.18	Y
SAS D&E	Reach 5	.021	94.	.33	Y
SAS F	Reach 7	.011	92.	.14	Y
SAS G	Outlet	.023	88.	.016	Y
SAS H	Reach 6	.125	92.	.238	Y
SAS I	Outlet	.006	88.	.13	Y
Basin 4C	Reach 4.5	.130	81.	.22	Y
Basin 3A	Reach 2.5	.295	82.6	.64	Y
Basin 3B	Reach 3	.90	86.	.55	

STREAM REACH:

Reach 1	Reach 2		Structure			Y	Y
Reach 2	Reach 3	XS 1		4700.	4700.	Y	Y
Reach 3	Reach 5	XS 2		3500.	3500.	Y	Y
Reach 4	Reach 5		S Pond 1			Y	Y
Reach 5	Reach 7	XS 3		2100.	2100.	Y	Y
Reach 6	Reach 7		S Pond 2			Y	Y
Reach 7	Outlet		I-25			Y	Y
Reach 2.5	Reach 3	XS 1.5		2200.	2200.		
	SPLIT FLOW			0.	323.	.001	
Reach 4.5	Reach 5	Tributary		5500.	5500.	Y	Y

STORM ANALYSIS:

100-yr	3.05	2h-100yr	3
10-yr	2.06	2h-10yr	3

STREAM CROSS SECTION:

XS 2	5819.3				
	5814.	0.	0.	0.	.02066
	5815.	112.	43.	46.	.02066
	5816.	382.	122.	85.	.02215
	5817.	894.	210.	91.	.01888
	5818.	1573.	304.	97.	.01710
	5819.	2410.	404.	103.	.01593
	5820.	3400.	510.	109.	.01510
	5821.	4542.	622.	115.	.01446
XS 1.5	5850.				
	5843.	0.	0.	0.	.01899
	5849.28	1200.	164.	34.	.01899
	5851.87	2300.	263.	42.	.01746
	5852.89	2740.	322.	45.73	.01684
	5853.81	4300.	403.	48.78	.01604
XS 1	5932.				
	5925.	0.	0.	0.	.03404
	5926.	19.	10.	11.	.03404
	5927.	64.	22.	16.	.02790
	5928.	132.	39.	19.	.02518
	5929.	261.	61.	25.	.02307
	5930.	542.	89.	31.	.02109
	5931.	829.	123.	37.	.01995
	5932.	1203.	164.	44.	.01899
	5933.	1675.	211.	50.	.01817
	5934.	2251.	263.	56.	.01746
	5935.	2942.	322.	62.	.01684

XS 3	5803.5				
	5798.	0.	0.	0.	.02066
	5799.	112.	43.	46.	.02066
	5800.	382.	122.	85.	.02215
	5801.	894.	210.	91.	.01888
	5802.	1573.	304.	97.	.01710
	5803.	2410.	404.	103.	.01593
	5804.	3400.	510.	109.	.01510
	5805.	4542.	622.	115.	.01446
XS 4	5785.75				
	5776.	0.	0.	0.	.02066
	5777.	19.	10.	11.	.03404
	5778.	64.	22.	16.	.02790
	5779.	132.	39.	19.	.02518
	5780.	261.	61.	25.	.02307
	5781.	542.	89.	31.	.02109
	5782.	829.	123.	37.	.01995
	5783.	1203.	164.	44.	.01899
	5784.	1675.	211.	50.	.01817
	5785.	2251.	263.	56.	.01746
	5786.	2942.	322.	62.	.01684
	5790.	4500.	650.	125.	.0152
Tributary	5836.				
	5830.	0.	0.	0.	.02184
	5832.	28.	8.	12.	.02184
	5833.	124.	24.	20.	.01779
	5834.	314.	48.	28.	.01570
	5835.	622.	80.	36.	.01434
	5836.	1069.	120.	44.	.01334
	5837.	1676.	168.	52.	.01257
	5838.	2460.	224.	60.	.01195

STRUCTURE RATING:

Structure	5970.		
	5970.	0.	0.
	5970.5	45.	18.
	5971.	120.	35.
	5971.5	240.	53.
	5972.	365.	70.
	5973.	395.	108.
	5974.	425.	151.
	5975.	450.	195.
	5976.	473.	248.
	5977.	495.	302.
	5978.	1145.	357.
S Pond 1			
	5830.	0.	0.
	5832.	20.	.43
	5834.	40.	1.83
	5836.	60.	3.51
	5838.	80.	5.48
	5840.	100.	7.78
S Pond 2			
	5820.	0.	0.
	5822.	10.	0.69
	5824.	20.	2.92
	5826.	30.	5.49
	5828.	40.	8.43
	5830.	50.	11.75
	5832.	55.	15.48
	5834.	60.	19.65
I-25			
	5778.	0.	0.
	5780.	2860.	4.28
	5782.	2875.	9.10

```
                5784.     2890.     14.36
                5786.     2900.     30.


RAINFALL DISTRIBUTION:
          2h-10yr              .0833
                    0.        .0173     .0493     .1201     .2498
                   .4659      .5696     .6180     .6557     .6880
                   .7156      .7433     .7710     .7986     .8263
                   .8539      .8755     .8920     .9084     .9248
                   .9421      .9576     .9741     .9888     1.0
          2h-100yr             .0833
                    0.        .0087     .0346     .0744     .1436
                   .2647      .4810     .6021     .6713     .7249
                   .7682      .8028     .8374     .8720     .8893
                   .9066      .9170     .9273     .9377     .9481
                   .9585      .9689     .9792     .9896     1.0

DURATION INCREMENT:                     Hours     2.        2.        2.

GLOBAL OUTPUT:
          2         5.        .1        YNNNN     YNNNNN

TIME ANALYSIS:
          ELEVATION 6000.
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Fishers Canyon Drainage Basin - Proposed Conditions 2-Hour

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STORM 100-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 1	2.357		1.862		1.09	2692.01	1142.14
Reach 1	2.357	Upstream	1.862		1.09	2692.01	1142.14
Reach 1	2.357	Downstream	1.846	5974.48	2.38	437.08	185.44
Basin 2	1.234		1.943		1.15	1360.49	1102.50
Reach 2	3.591	Upstream	1.879	5933.10	1.18	1734.76	483.09
Reach 2	3.591	Downstream	1.879	5933.10	1.28	1733.82	482.82
Basin 3B	0.900		2.397		0.84	1668.34	1853.71
Basin 3A	0.295		2.258		0.93	468.35	1587.63
Reach 2.5	0.295	Upstream	2.258	5845.45	0.93	468.35	1587.63
Reach 2.5	0.295	Downstream	0.249	5843.75	1.01	143.83	488.05
Reach 3	4.786	Upstream	1.876	5819.42	1.12	2822.87	589.86
Reach 3	4.786	Downstream	1.876	5819.41	1.22	2818.55	588.95
Basin 4A	0.186		2.204		0.63	495.11	2661.87
Basin 4B	0.140		2.495		0.56	493.19	3522.76
SAS A	0.015		2.194		0.65	43.51	2900.54
SAS C	0.028		2.681		0.59	100.58	3592.05
SAS D&E	0.021		2.734		0.68	61.15	2911.86
SAS B	0.080		2.696		0.65	241.83	3022.84
Reach 4	0.080	Upstream	2.696		0.65	241.83	3022.84
Reach 4	0.080	Downstream	2.668	5837.94	1.08	79.44	992.99
Basin 4C	0.130		2.203		0.63	346.04	2661.86
Reach 4.5	0.130	Upstream	2.203	5834.10	0.63	346.04	2661.86
Reach 4.5	0.130	Downstream	2.189	5834.09	0.80	340.81	2621.58
Reach 5	5.386	Upstream	1.931	5803.88	1.13	3278.42	608.73
Reach 5	5.386	Downstream	1.931	5803.87	1.20	3275.48	608.18
SAS F	0.011		2.329		0.55	42.97	3906.53
SAS H	0.125		2.701		0.62	404.02	3232.14
Reach 6	0.125	Upstream	2.701		0.62	404.02	3232.14
Reach 6	0.125	Downstream	2.647	5830.49	1.38	51.21	409.71
Reach 7	5.522	Upstream	1.948		1.20	3332.40	603.51
Reach 7	5.522	Downstream	1.948	5784.38	1.48	2891.89	523.73
SAS G	0.023		2.487		0.50	107.34	4667.12
SAS I	0.006		1.793		0.55	22.12	3686.60
OUTLET	5.551		1.950		1.48	2897.40	521.99

STORM 10-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 1	2.357		1.013		0.98	1148.76	487.38
Reach 1	2.357	Upstream	1.013		0.98	1148.76	487.38
Reach 1	2.357	Downstream	0.997	5972.29	2.37	373.75	158.57
Basin 2	1.234		1.077		1.08	597.49	484.19
Reach 2	3.591	Upstream	1.024	5930.87	1.60	792.95	220.81
Reach 2	3.591	Downstream	1.024	5930.87	1.70	792.69	220.74

Fishers Canyon Drainage Basin - Proposed Conditions 2-Hour

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 3B	0.900		1.451		0.77	871.28	968.08
Basin 3A	0.295		1.332		0.85	231.20	783.73
Reach 2.5	0.295	Upstream	1.332	5844.21	0.85	231.20	783.73
Reach 2.5	0.295	Downstream	0.0	5843.00	0.40	0.0	0.0
Reach 3	4.786	Upstream	1.041	5817.46	1.12	1203.94	251.57
Reach 3	4.786	Downstream	1.041	5817.45	1.26	1202.82	251.34
Basin 4A	0.186		1.287		0.54	258.27	1388.57
Basin 4B	0.140		1.537		0.48	289.49	2067.82
SAS A	0.015		1.245		0.55	24.77	1651.62
SAS C	0.028		1.701		0.49	62.42	2229.44
SAS D&E	0.021		1.747		0.59	37.86	1802.97
SAS B	0.080		1.718		0.56	146.26	1828.20
Reach 4	0.080	Upstream	1.718		0.56	146.26	1828.20
Reach 4	0.080	Downstream	1.692	5835.06	0.89	50.62	632.77
Basin 4C	0.130		1.285		0.54	180.51	1388.57
Reach 4.5	0.130	Upstream	1.285	5833.30	0.54	180.51	1388.57
Reach 4.5	0.130	Downstream	1.270	5833.28	0.74	177.25	1363.43
Reach 5	5.386	Upstream	1.084	5801.85	1.04	1468.92	272.74
Reach 5	5.386	Downstream	1.084	5801.85	1.12	1468.19	272.61
SAS F	0.011		1.091		0.47	27.00	2454.50
SAS H	0.125		1.724		0.54	247.30	1978.37
Reach 6	0.125	Upstream	1.724		0.54	247.30	1978.37
Reach 6	0.125	Downstream	1.670	5827.07	1.57	35.34	282.72
Reach 7	5.522	Upstream	1.097		1.12	1501.73	271.97
Reach 7	5.522	Downstream	1.097	5779.05	1.14	1500.86	271.81
SAS G	0.023		1.510		0.42	66.58	2894.82
SAS I	0.006		0.686		0.46	13.09	2181.82
OUTLET	5.551		1.098		1.14	1510.39	272.11

Fishers Canyon Drainage Basin - Proposed Conditions 2-Hour

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 100-yr (cfs)	10-yr (cfs)	(cfs)	(cfs)	(cfs)
Basin 1	2.36		2692.0	1148.8			
Basin 2	1.23		1360.5	597.5			
Basin 4A	0.19		495.1	258.3			
Basin 4B	0.14		493.2	289.5			
SAS B	0.08		241.8	146.3			
SAS A	0.01		43.5	24.8			
SAS C	0.03		100.6	62.4			
SAS D&E	0.02		61.1	37.9			
SAS F	0.01		43.0	27.0			
SAS G	0.02		107.3	66.6			
SAS H	0.12		404.0	247.3			
SAS I	0.600E-02		22.1	13.1			
Basin 4C	0.13		346.0	180.5			
Basin 3A	0.29		468.4	231.2			
Basin 3B	0.90		1668.3	871.3			
Reach 1	2.36		2692.0	1148.8			
DOWNSTREAM			437.1	373.7			
Reach 2	3.59		1734.8	792.9			
DOWNSTREAM			1733.8	792.7			
Reach 3	4.79		2822.9	1203.9			
DOWNSTREAM			2818.6	1202.8			
Reach 4	0.08		241.8	146.3			
DOWNSTREAM			79.4	50.6			
Reach 5	5.39		3278.4	1468.9			
DOWNSTREAM			3275.5	1468.2			
Reach 6	0.12		404.0	247.3			
DOWNSTREAM			51.2	35.3			
Reach 7	5.52		3332.4	1501.7			
DOWNSTREAM			2891.9	1500.9			
Reach 2.5	0.29		468.4	231.2			
DOWNSTREAM			143.8	0.0			
Reach 4.5	0.13		346.0	180.5			
DOWNSTREAM			340.8	177.2			
OUTLET	5.55		2897.4	1510.4			

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Fishers Canyon Drainage Basin - Proposed Conditions 24-Hour

SUB-AREA:

Basin 1	Reach 1	2.357	75.	.761	Y
Basin 2	Reach 2	1.234	76.	.88	Y
Basin 4A	Reach 5	.186	81.	.22	Y
Basin 4B	Reach 5	.14	88.	.15	Y
SAS B	Reach 4	.08	88.	.28	Y
SAS A	Reach 5	.015	74.	.253	Y
SAS C	Reach 5	.028	88.	.18	Y
SAS D&E	Reach 5	.021	92.	.33	Y
SAS F	Reach 7	.011	88.	.14	Y
SAS G	Outlet	.023	74.	.016	Y
SAS H	Reach 6	.125	88.	.238	Y
SAS I	Outlet	.006	74.	.13	Y
Basin 4C	Reach 4.5	.130	81.	.22	Y
Basin 3A	Reach 2.5	.295	82.6	.64	Y
Basin 3B	Reach 3	.90	86.	.55	

STREAM REACH:

Reach 1	Reach 2		Structure			Y	Y
Reach 2	Reach 3	XS 1		4700.	4700.	Y	Y
Reach 3	Reach 5	XS 2		3500.	3500.	Y	Y
Reach 4	Reach 5		S Pond 1			Y	Y
Reach 5	Reach 7	XS 3		2100.	2100.	Y	Y
Reach 6	Reach 7		S Pond 2			Y	Y
Reach 7	Outlet		I-25			Y	Y
Reach 2.5	Reach 3	XS 1.5		2200.	2200.		
	SPLIT FLOW			0.	323.	.001	
Reach 4.5	Reach 5	Tributary		5000.	5000.	Y	Y

STORM ANALYSIS:

100-yr	4.5	24h-100yr	2
10-yr	3.2	24h-100yr	2

STREAM CROSS SECTION:

XS 2	5819.3				
	5814.	0.	0.	0.	.02066
	5815.	112.	43.	46.	.02066
	5816.	382.	122.	85.	.02215
	5817.	894.	210.	91.	.01888
	5818.	1573.	304.	97.	.01710
	5819.	2410.	404.	103.	.01593
	5820.	3400.	510.	109.	.01510
	5821.	4542.	622.	115.	.01446
XS 1.5	5850.				
	5843.	0.	0.	0.	.01899
	5849.28	1200.	164.	34.	.01899
	5851.87	2300.	263.	42.	.01746
	5852.89	2740.	322.	45.73	.01684
	5853.81	4300.	403.	48.78	.01604
XS 1	5932.				
	5925.	0.	0.	0.	.03404
	5926.	19.	10.	11.	.03404
	5927.	64.	22.	16.	.02790
	5928.	132.	39.	19.	.02518
	5929.	261.	61.	25.	.02307
	5930.	542.	89.	31.	.02109
	5931.	829.	123.	37.	.01995
	5932.	1203.	164.	44.	.01899
	5933.	1675.	211.	50.	.01817
	5934.	2251.	263.	56.	.01746
	5935.	2942.	322.	62.	.01684

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        XS 3        5803.5
                    5798.       0.          0.          0.          .02066
                    5799.       112.        43.         46.         .02066
                    5800.       382.        122.        85.         .02215
                    5801.       894.        210.        91.         .01888
                    5802.       1573.       304.        97.         .01710
                    5803.       2410.       404.        103.        .01593
                    5804.       3400.       510.        109.        .01510
                    5805.       4542.       622.        115.        .01446
        XS 4        5785.75
                    5776.       0.          0.          0.          .02066
                    5777.       19.         10.         11.         .03404
                    5778.       64.         22.         16.         .02790
                    5779.       132.        39.         19.         .02518
                    5780.       261.        61.         25.         .02307
                    5781.       542.        89.         31.         .02109
                    5782.       829.        123.        37.         .01995
                    5783.       1203.       164.        44.         .01899
                    5784.       1675.       211.        50.         .01817
                    5785.       2251.       263.        56.         .01746
                    5786.       2942.       322.        62.         .01684
                    5790.       4500.       650.        125.        .0152
        Tributary   5836.
                    5830.       0.          0.          0.          .02184
                    5832.       28.         8.          12.         .02184
                    5833.       124.        24.         20.         .01779
                    5834.       314.        48.         28.         .01570
                    5835.       622.        80.         36.         .01434
                    5836.       1069.       120.        44.         .01334
                    5837.       1676.       168.        52.         .01257
                    5838.       2460.       224.        60.         .01195

STRUCTURE RATING:
        Structure   5970.
                    5970.       0.          0.
                    5970.5      45.         18.
                    5971.       120.        35.
                    5971.5      240.        53.
                    5972.       365.        70.
                    5973.       395.        108.
                    5974.       425.        151.
                    5975.       450.        195.
                    5976.       473.        248.
                    5977.       495.        302.
                    5978.       1145.       357.
        S Pond 1
                    5830.       0.          0.
                    5832.       20.         .43
                    5834.       40.         1.83
                    5836.       60.         3.51
                    5838.       80.         5.48
                    5840.       100.        7.78
        S Pond 2
                    5820.       0.          0.
                    5822.       10.         0.69
                    5824.       20.         2.92
                    5826.       30.         5.49
                    5828.       40.         8.43
                    5830.       50.         11.75
                    5832.       55.         15.48
                    5834.       60.         19.65
        I-25
                    5778.       0.          0.
                    5780.       2860.       4.28
                    5782.       2875.       9.10
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                5784.       2880.       14.36
                5786.       2900.       30.


RAINFALL DISTRIBUTION:
        24h-100yr               .25
                        0.      .0005       .0015       .003        .0045
                        .006    .008        .01         .012        .0143
                        .0165   .0188       .021        .0233       .0255
                        .0278   .032        .039        .046        .053
                        .06     .075        .1          .4          .7
                        .725    .75         .765        .78         .79
                        .8      .81         .82         .825        .83
                        .835    .84         .845        .85         .855
                        .86     .8638       .8675       .8713       .875
                        .8788   .8825       .8863       .89         .8938
                        .8975   .9013       .905        .9083       .9115
                        .9148   .918        .921        .924        .927
                        .93     .9325       .935        .9375       .94
                        .9425   .945        .9475       .95         .9525
                        .955    .9575       .96         .9625       .965
                        .9675   .97         .9725       .975        .9775
                        .98     .9813       .9825       .9838       .985
                        .9863   .9875       .9888       .99         .9913
                        .9925   .9938       .995        .9963       .9975
                        .9988   1.          1.          1.          1.

GLOBAL OUTPUT:
        2               5.      .1          YNNNN       YNNNNN

TIME ANALYSIS:
        ELEVATION 6000.
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Fishers Canyon Drainage Basin - Proposed Conditions 24-Hour

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STORM 100-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 1	2.357		2.050		6.31	2359.61	1001.11
Reach 1	2.357	Upstream	2.050		6.31	2359.61	1001.11
Reach 1	2.357	Downstream	2.034	5973.28	7.32	403.30	171.11
Basin 2	1.234		2.128		6.37	1156.60	937.28
Reach 2	3.591	Upstream	2.066	5932.65	6.41	1510.77	420.71
Reach 2	3.591	Downstream	2.065	5932.64	6.55	1503.62	418.72
Basin 3B	0.900		3.001		6.18	1776.46	1973.84
Basin 3A	0.295		2.611		6.24	466.66	1581.91
Reach 2.5	0.295	Upstream	2.611	5845.44	6.24	466.66	1581.91
Reach 2.5	0.295	Downstream	0.204	5843.75	6.29	142.66	484.09
Reach 3	4.786	Upstream	2.127	5819.24	6.28	2644.55	552.59
Reach 3	4.786	Downstream	2.126	5819.23	6.39	2637.59	551.14
Basin 4A	0.186		2.277		6.03	435.36	2340.64
Basin 4B	0.140		2.799		6.01	416.38	2974.14
SAS A	0.015		1.009		6.06	26.29	1752.77
SAS C	0.028		2.154		6.01	82.06	2930.73
SAS D&E	0.021		2.460		6.05	61.17	2913.08
SAS B	0.080		2.441		6.05	218.61	2732.68
Reach 4	0.080	Upstream	2.441		6.05	218.61	2732.68
Reach 4	0.080	Downstream	2.415	5837.89	6.27	78.91	986.41
Basin 4C	0.130		2.017		6.03	304.28	2340.64
Reach 4.5	0.130	Upstream	2.017	5833.95	6.03	304.28	2340.64
Reach 4.5	0.130	Downstream	2.001	5833.93	6.20	300.57	2312.06
Reach 5	5.386	Upstream	2.148	5803.55	6.33	2952.12	548.14
Reach 5	5.386	Downstream	2.148	5803.54	6.39	2948.40	547.45
SAS F	0.011		1.952		6.01	32.90	2990.55
SAS H	0.125		2.780		6.03	353.04	2824.33
Reach 6	0.125	Upstream	2.780		6.03	353.04	2824.33
Reach 6	0.125	Downstream	2.727	5829.78	6.38	48.89	391.09
Reach 7	5.522	Upstream	2.161		6.40	2997.10	542.79
Reach 7	5.522	Downstream	2.161	5780.70	6.53	2865.28	518.91
SAS G	0.023		1.007		6.00	51.63	2244.81
SAS I	0.006		0.886		6.01	12.16	2026.62
OUTLET	5.551		2.155		6.53	2865.28	516.20

STORM 10-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 1	2.357		1.093		6.36	1161.68	492.86
Reach 1	2.357	Upstream	1.093		6.36	1161.68	492.86
Reach 1	2.357	Downstream	1.077	5971.62	7.18	271.15	115.04
Basin 2	1.234		1.150		6.41	580.80	470.66
Reach 2	3.591	Upstream	1.102	5930.59	6.50	710.92	197.97
Reach 2	3.591	Downstream	1.102	5930.58	6.65	708.67	197.35

Fishers Canyon Drainage Basin - Proposed Conditions 24-Hour

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 3B	0.900		1.833		6.20	1057.63	1175.14
Basin 3A	0.295		1.406		6.25	263.24	892.33
Reach 2.5	0.295	Upstream	1.406	5844.38	6.25	263.24	892.33
Reach 2.5	0.295	Downstream	0.0	5843.00	5.77	0.0	0.0
Reach 3	4.786	Upstream	1.171	5817.69	6.27	1361.64	284.52
Reach 3	4.786	Downstream	1.171	5817.68	6.40	1357.23	283.60
Basin 4A	0.186		1.125		6.04	253.00	1360.22
Basin 4B	0.140		1.594		6.02	268.52	1917.99
SAS A	0.015		0.415		6.06	13.55	903.06
SAS C	0.028		1.244		6.02	52.64	1879.94
SAS D&E	0.021		1.528		6.07	40.30	1918.93
SAS B	0.080		1.477		6.06	137.76	1721.97
Reach 4	0.080	Upstream	1.477		6.06	137.76	1721.97
Reach 4	0.080	Downstream	1.450	5835.41	6.25	54.07	675.82
Basin 4C	0.130		1.032		6.04	176.83	1360.22
Reach 4.5	0.130	Upstream	1.032	5833.28	6.04	176.83	1360.22
Reach 4.5	0.130	Downstream	1.012	5833.26	6.22	174.30	1340.76
Reach 5	5.386	Upstream	1.180	5801.99	6.34	1565.29	290.64
Reach 5	5.386	Downstream	1.180	5801.98	6.41	1562.63	290.14
SAS F	0.011		1.128		6.02	21.22	1929.53
SAS H	0.125		1.494		6.04	224.00	1792.02
Reach 6	0.125	Upstream	1.494		6.04	224.00	1792.02
Reach 6	0.125	Downstream	1.441	5826.80	6.37	33.98	271.84
Reach 7	5.522	Upstream	1.186		6.41	1596.58	289.15
Reach 7	5.522	Downstream	1.186	5779.11	6.43	1594.09	288.69
SAS G	0.023		0.461		6.00	28.87	1255.30
SAS I	0.006		0.248		6.02	6.52	1086.47
OUTLET	5.551		1.182		6.43	1594.08	287.19

Fishers Canyon Drainage Basin - Proposed Conditions 24-Hour

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 100-yr (cfs)	10-yr (cfs)	(cfs)	(cfs)	(cfs)
Basin 1	2.36		2359.6	1161.7			
Basin 2	1.23		1156.6	580.8			
Basin 4A	0.19		435.4	253.0			
Basin 4B	0.14		416.4	268.5			
SAS B	0.08		218.6	137.8			
SAS A	0.01		26.3	13.5			
SAS C	0.03		82.1	52.6			
SAS D&E	0.02		61.2	40.3			
SAS F	0.01		32.9	21.2			
SAS G	0.02		51.6	28.9			
SAS H	0.12		353.0	224.0			
SAS I	0.600E-02		12.2	6.5			
Basin 4C	0.13		304.3	176.8			
Basin 3A	0.29		466.7	263.2			
Basin 3B	0.90		1776.5	1057.6			
Reach 1	2.36		2359.6	1161.7			
DOWNSTREAM			403.3	271.1			
Reach 2	3.59		1510.8	710.9			
DOWNSTREAM			1503.6	708.7			
Reach 3	4.79		2644.5	1361.6			
DOWNSTREAM			2637.6	1357.2			
Reach 4	0.08		218.6	137.8			
DOWNSTREAM			78.9	54.1			
Reach 5	5.39		2952.1	1565.3			
DOWNSTREAM			2948.4	1562.6			
Reach 6	0.12		353.0	224.0			
DOWNSTREAM			48.9	34.0			
Reach 7	5.52		2997.1	1596.6			
DOWNSTREAM			2865.3	1594.1			
Reach 2.5	0.29		466.7	263.2			
DOWNSTREAM			142.7	0.0			
Reach 4.5	0.13		304.3	176.8			
DOWNSTREAM			300.6	174.3			
OUTLET	5.55		2865.3	1594.1			

SAS PR-2HR-TR-20-Corrected.inp

WinTR-20: Version 1.0 0 0 5. 0

Fishers Canyon Drainage Basin - Proposed Conditions 2-Hour Corrected

SUB-AREA:

Basin 1	Reach 1	2.357	76.6	.761	Y
Basin 2	Reach 2	1.234	76.1	.88	Y
Basin 4A	Reach 5	.186	81.	.22	Y
Basin 4B	Reach 5	.14	88.	.15	Y
SAS B	Reach 4	.08	92.	.28	Y
SAS A	Reach 5	.015	74.	.253	Y
SAS C	Reach 5	.028	92.	.18	Y
SAS D&E	Reach 5	.021	94.	.33	Y
SAS F	Reach 7	.011	92.	.14	Y
SAS G	Outlet	.023	74.	.016	Y
SAS H	Reach 6	.125	92.	.238	Y
SAS I	Outlet	.006	74.	.13	Y
Basin 4C	Reach 4.5	.130	81.	.22	Y
Basin 3A	Reach 2.5	.295	82.6	.64	Y
Basin 3B	Reach 3	.90	86.	.55	

STREAM REACH:

Reach 1	Reach 2		Structure			Y	Y
Reach 2	Reach 3	XS 1		4700.	4700.	Y	Y
Reach 3	Reach 5	XS 2		3500.	3500.	Y	Y
Reach 4	Reach 5		S Pond 1			Y	Y
Reach 5	Reach 7	XS 3		2100.	2100.	Y	Y
Reach 6	Reach 7		S Pond 2			Y	Y
Reach 7	Outlet		I-25			Y	Y
Reach 2.5	Reach 3	XS 1.5		2200.	2200.		
	SPLIT FLOW			0.	323.	.001	
Reach 4.5	Reach 5	Tributary		5000.	5000.	Y	Y

STORM ANALYSIS:

100-yr	3.05	2h-100yr	3
10-yr	2.06	2h-10yr	3

STREAM CROSS SECTION:

XS 2	5819.3				
	5814.	0.	0.	0.	.02066
	5815.	112.	43.	46.	.02066
	5816.	382.	122.	85.	.02215
	5817.	894.	210.	91.	.01888
	5818.	1573.	304.	97.	.01710
	5819.	2410.	404.	103.	.01593
	5820.	3400.	510.	109.	.01510
	5821.	4542.	622.	115.	.01446
XS 1.5	5850.				
	5843.	0.	0.	0.	.01899
	5849.28	1200.	164.	34.	.01899
	5851.87	2300.	263.	42.	.01746
	5852.89	2740.	322.	45.73	.01684
	5853.81	4300.	403.	48.78	.01604
XS 1	5932.				
	5925.	0.	0.	0.	.03404
	5926.	19.	10.	11.	.03404
	5927.	64.	22.	16.	.02790
	5928.	132.	39.	19.	.02518
	5929.	261.	61.	25.	.02307
	5930.	542.	89.	31.	.02109
	5931.	829.	123.	37.	.01995
	5932.	1203.	164.	44.	.01899
	5933.	1675.	211.	50.	.01817
	5934.	2251.	263.	56.	.01746
	5935.	2942.	322.	62.	.01684

	XS 3	5803.5			
		5798.	0.	0.	0.	.02066
		5799.	112.	43.	46.	.02066
		5800.	382.	122.	85.	.02215
		5801.	894.	210.	91.	.01888
		5802.	1573.	304.	97.	.01710
		5803.	2410.	404.	103.	.01593
		5804.	3400.	510.	109.	.01510
		5805.	4542.	622.	115.	.01446
	XS 4	5785.75			
		5776.	0.	0.	0.	.02066
		5777.	19.	10.	11.	.03404
		5778.	64.	22.	16.	.02790
		5779.	132.	39.	19.	.02518
		5780.	261.	61.	25.	.02307
		5781.	542.	89.	31.	.02109
		5782.	829.	123.	37.	.01995
		5783.	1203.	164.	44.	.01899
		5784.	1675.	211.	50.	.01817
		5785.	2251.	263.	56.	.01746
		5786.	2942.	322.	62.	.01684
		5790.	4500.	650.	125.	.0152
	Tributary	5836.			
		5830.	0.	0.	0.	.02184
		5832.	28.	8.	12.	.02184
		5833.	124.	24.	20.	.01779
		5834.	314.	48.	28.	.01570
		5835.	622.	80.	36.	.01434
		5836.	1069.	120.	44.	.01334
		5837.	1676.	168.	52.	.01257
		5838.	2460.	224.	60.	.01195

STRUCTURE RATING:

Structure	5970.		
	5970.	0.	0.
	5970.5	45.	18.
	5971.	120.	35.
	5971.5	240.	53.
	5972.	365.	70.
	5973.	395.	108.
	5974.	425.	151.
	5975.	450.	195.
	5976.	473.	248.
	5977.	495.	302.
	5978.	1145.	357.
S Pond 1			
	5830.	0.	0.
	5832.	20.	.43
	5834.	40.	1.83
	5836.	60.	3.51
	5838.	80.	5.48
	5840.	100.	7.78
S Pond 2			
	5820.	0.	0.
	5822.	10.	0.69
	5824.	20.	2.92
	5826.	30.	5.49
	5828.	40.	8.43
	5830.	50.	11.75
	5832.	55.	15.48
	5834.	60.	19.65
I-25			
	5778.	0.	0.
	5780.	2896.	4.28
	5782.	2897.	9.10

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                5784.     2899.     14.36
                5786.     2900.     30.


RAINFALL DISTRIBUTION:
          2h-10yr           .0833
                    0.      .0173     .0493     .1201     .2498
                    .4659   .5696     .6180     .6557     .6880
                    .7156   .7433     .7710     .7986     .8263
                    .8539   .8755     .8920     .9084     .9248
                    .9421   .9576     .9741     .9888     1.0
          2h-100yr          .0833
                    0.      .0087     .0346     .0744     .1436
                    .2647   .4810     .6021     .6713     .7249
                    .7682   .8028     .8374     .8720     .8893
                    .9066   .9170     .9273     .9377     .9481
                    .9585   .9689     .9792     .9896     1.0

GLOBAL OUTPUT:
          2         5.      .1        YNNNN     YNNNNN

TIME ANALYSIS:
          ELEVATION 6000.
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Fishers Canyon Drainage Basin - Proposed Conditions 2-Hour Corrected

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STORM 100-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Basin 1	2.357		1.945		1.07	2827.28	1199.53
Reach 1	2.357	Upstream	1.945		1.07	2827.28	1199.53
Reach 1	2.357	Downstream	1.929	5974.69	2.42	442.22	187.62
Basin 2	1.234		1.943		1.15	1360.49	1102.50
Reach 2	3.591	Upstream	1.934	5933.11	1.17	1739.93	484.52
Reach 2	3.591	Downstream	1.933	5933.10	1.27	1735.35	483.25
Basin 3B	0.900		2.397		0.84	1668.34	1853.71
Basin 3A	0.295		2.258		0.93	468.35	1587.63
Reach 2.5	0.295	Upstream	2.258	5845.45	0.93	468.35	1587.63
Reach 2.5	0.295	Downstream	0.249	5843.75	1.01	143.83	488.05
Reach 3	4.786	Upstream	1.917	5819.45	1.12	2852.65	596.08
Reach 3	4.786	Downstream	1.916	5819.44	1.22	2845.61	594.61
Basin 4A	0.186		2.204		0.63	495.11	2661.87
Basin 4B	0.140		2.495		0.56	493.19	3522.76
SAS A	0.015		1.564		0.67	30.56	2037.13
SAS C	0.028		2.681		0.59	100.58	3592.05
SAS D&E	0.021		2.734		0.68	61.15	2911.86
SAS B	0.080		2.696		0.65	241.83	3022.84
Reach 4	0.080	Upstream	2.696		0.65	241.83	3022.84
Reach 4	0.080	Downstream	2.668	5837.94	1.08	79.44	992.99
Basin 4C	0.130		2.203		0.63	346.04	2661.86
Reach 4.5	0.130	Upstream	2.203	5834.10	0.63	346.04	2661.86
Reach 4.5	0.130	Downstream	2.191	5834.09	0.78	341.33	2625.63
Reach 5	5.386	Upstream	1.965	5803.89	1.14	3294.80	611.77
Reach 5	5.386	Downstream	1.965	5803.89	1.21	3291.87	611.22
SAS F	0.011		2.329		0.55	42.97	3906.53
SAS H	0.125		2.701		0.62	404.02	3232.14
Reach 6	0.125	Upstream	2.701		0.62	404.02	3232.14
Reach 6	0.125	Downstream	2.647	5830.49	1.38	51.21	409.71
Reach 7	5.522	Upstream	1.981		1.21	3348.58	606.44
Reach 7	5.522	Downstream	1.981	5784.31	1.47	2899.15	525.05
SAS G	0.023		1.852		0.50	81.46	3541.82
SAS I	0.006		1.153		0.56	15.47	2578.20
OUTLET	5.551		1.980		1.08	2912.63	524.73

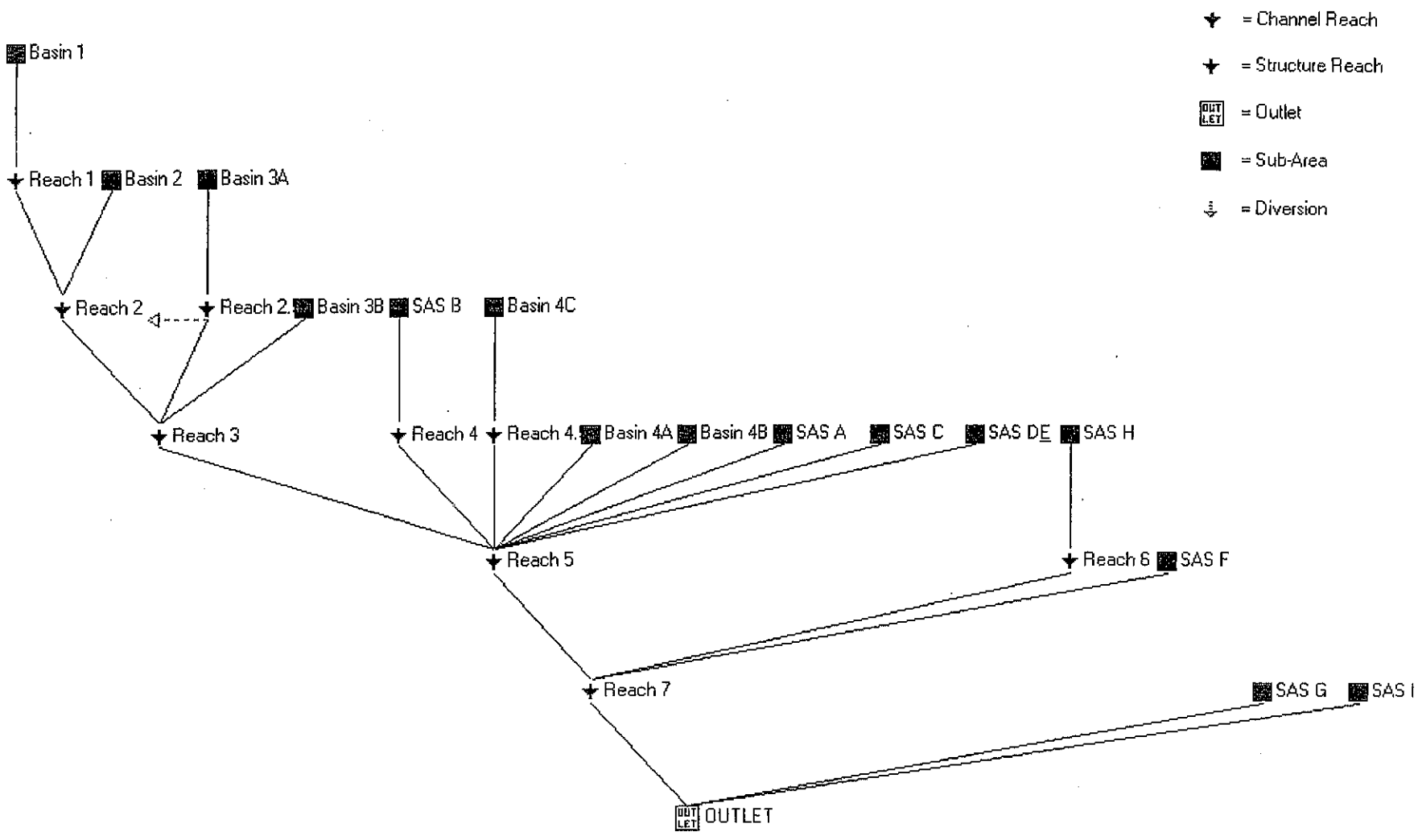
STORM 10-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Time (hr)	Rate (cfs)	Rate (csm)
Basin 1	2.357		1.077		0.97	1244.66	528.07
Reach 1	2.357	Upstream	1.077		0.97	1244.66	528.07
Reach 1	2.357	Downstream	1.061	5972.44	2.36	378.29	160.50
Basin 2	1.234		1.077		1.08	597.49	484.19
Reach 2	3.591	Upstream	1.066	5930.99	1.55	825.96	230.01
Reach 2	3.591	Downstream	1.066	5930.98	1.64	823.73	229.39

Fishers Canyon Drainage Basin - Proposed Conditions 2-Hour Corrected

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 3B	0.900		1.451		0.77	871.28	968.08
Basin 3A	0.295		1.332		0.85	231.20	783.73
Reach 2.5	0.295	Upstream	1.332	5844.21	0.85	231.20	783.73
Reach 2.5	0.295	Downstream	0.0	5843.00	0.40	0.0	0.0
Reach 3	4.786	Upstream	1.073	5817.49	1.26	1225.93	256.17
Reach 3	4.786	Downstream	1.072	5817.49	1.40	1223.99	255.76
Basin 4A	0.186		1.287		0.54	258.27	1388.57
Basin 4B	0.140		1.537		0.48	289.49	2067.82
SAS A	0.015		0.580		0.58	13.84	922.46
SAS C	0.028		1.701		0.49	62.42	2229.44
SAS D&E	0.021		1.747		0.59	37.86	1802.97
SAS B	0.080		1.718		0.56	146.26	1828.20
Reach 4	0.080	Upstream	1.718		0.56	146.26	1828.20
Reach 4	0.080	Downstream	1.692	5835.06	0.89	50.62	632.77
Basin 4C	0.130		1.285		0.54	180.51	1388.57
Reach 4.5	0.130	Upstream	1.285	5833.30	0.54	180.51	1388.57
Reach 4.5	0.130	Downstream	1.272	5833.28	0.72	177.60	1366.13
Reach 5	5.386	Upstream	1.110	5801.85	1.05	1468.51	272.67
Reach 5	5.386	Downstream	1.110	5801.85	1.13	1467.84	272.54
SAS F	0.011		1.091		0.47	27.00	2454.50
SAS H	0.125		1.724		0.54	247.30	1978.37
Reach 6	0.125	Upstream	1.724		0.54	247.30	1978.37
Reach 6	0.125	Downstream	1.670	5827.07	1.57	35.34	282.72
Reach 7	5.522	Upstream	1.123		1.12	1501.42	271.91
Reach 7	5.522	Downstream	1.123	5779.04	1.15	1500.71	271.78
SAS G	0.023		0.911		0.42	41.98	1825.09
SAS I	0.006		0.270		0.48	7.25	1208.22
OUTLET	5.551		1.121		1.15	1508.42	271.75

PROPOSED


= Channel Reach
= Structure Reach
= Outlet
= Sub-Area
= Diversion
Basin 1
Reach 1
Basin 2
Basin 3A
Reach 2
Reach 2.
Basin 3B
SAS B
Basin 4C
Reach 3
Reach 4
Reach 4.
Basin 4A
Basin 4B
SAS A
SAS C
SAS DE
SAS H
Reach 5
Reach 6
SAS F
Reach 7
SAS G
SAS I
OUTLET

Fishers Canyon Drainage Basin - Proposed Conditions 2-Hour Corrected

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 100-yr (cfs)	10-yr (cfs)	(cfs)	(cfs)	(cfs)
Basin 1	2.36		2827.3	1244.7			
Basin 2	1.23		1360.5	597.5			
Basin 4A	0.19		495.1	258.3			
Basin 4B	0.14		493.2	289.5			
SAS B	0.08		241.8	146.3			
SAS A	0.01		30.6	13.8			
SAS C	0.03		100.6	62.4			
SAS D&E	0.02		61.1	37.9			
SAS F	0.01		43.0	27.0			
SAS G	0.02		81.5	42.0			
SAS H	0.12		404.0	247.3			
SAS I	0.600E-02		15.5	7.2			
Basin 4C	0.13		346.0	180.5			
Basin 3A	0.29		468.4	231.2			
Basin 3B	0.90		1668.3	871.3			
Reach 1	2.36		2827.3	1244.7			
DOWNSTREAM			442.2	378.3			
Reach 2	3.59		1739.9	826.0			
DOWNSTREAM			1735.3	823.7			
Reach 3	4.79		2852.7	1225.9			
DOWNSTREAM			2845.6	1224.0			
Reach 4	0.08		241.8	146.3			
DOWNSTREAM			79.4	50.6			
Reach 5	5.39		3294.8	1468.5			
DOWNSTREAM			3291.9	1467.8			
Reach 6	0.12		404.0	247.3			
DOWNSTREAM			51.2	35.3			
Reach 7	5.52		3348.6	1501.4			
DOWNSTREAM			2899.2	1500.7			
Reach 2.5	0.29		468.4	231.2			
DOWNSTREAM			143.8	0.0			
Reach 4.5	0.13		346.0	180.5			
DOWNSTREAM			341.3	177.6			
OUTLET	5.55		2912.6	1508.4			

WinTR-20: Version 1.0 0 0 5. 0

Fishers Canyon Drainage Basin - Proposed Conditions 24-Hour Corrected

SUB-AREA:

Basin 1	Reach 1	2.357	76.6	.761	Y
Basin 2	Reach 2	1.234	76.1	.88	Y
Basin 4A	Reach 5	.186	81.	.22	Y
Basin 4B	Reach 5	.14	88.	.15	Y
SAS B	Reach 4	.08	88.	.28	Y
SAS A	Reach 5	.015	74.	.253	Y
SAS C	Reach 5	.028	88.	.18	Y
SAS D&E	Reach 5	.021	92.	.33	Y
SAS F	Reach 7	.011	88.	.14	Y
SAS G	Outlet	.023	74.	.016	Y
SAS H	Reach 6	.125	88.	.238	Y
SAS I	Outlet	.006	74.	.13	Y
Basin 4C	Reach 4.5	.130	81.	.22	Y
Basin 3A	Reach 2.5	.295	82.6	.64	Y
Basin 3B	Reach 3	.90	86.	.55	Y

STREAM REACH:

Reach 1	Reach 2		Structure			Y	Y
Reach 2	Reach 3	XS 1		4700.	4700.	Y	Y
Reach 3	Reach 5	XS 2		3500.	3500.	Y	Y
Reach 4	Reach 5		S Pond 1			Y	Y
Reach 5	Reach 7	XS 3		2100.	2100.	Y	Y
Reach 6	Reach 7		S Pond 2			Y	Y
Reach 7	Outlet		I-25			Y	Y
Reach 2.5	Reach 3	XS 1.5		2200.	2200.		
	SPLIT FLOW			0.	323.	.001	
Reach 4.5	Reach 5	Tributary		5000.	5000.	Y	Y

STORM ANALYSIS:

100-yr	4.5	24h-100yr	2
10-yr	3.2	24h-100yr	2

STREAM CROSS SECTION:

XS 2	5819.3				
	5814.	0.	0.	0.	.02066
	5815.	112.	43.	46.	.02066
	5816.	382.	122.	85.	.02215
	5817.	894.	210.	91.	.01888
	5818.	1573.	304.	97.	.01710
	5819.	2410.	404.	103.	.01593
	5820.	3400.	510.	109.	.01510
	5821.	4542.	622.	115.	.01446
XS 1.5	5850.				
	5843.	0.	0.	0.	.01899
	5849.28	1200.	164.	34.	.01899
	5851.87	2300.	263.	42.	.01746
	5852.89	2740.	322.	45.73	.01684
	5853.81	4300.	403.	48.78	.01604
XS 1	5932.				
	5925.	0.	0.	0.	.03404
	5926.	19.	10.	11.	.03404
	5927.	64.	22.	16.	.02790
	5928.	132.	39.	19.	.02518
	5929.	261.	61.	25.	.02307
	5930.	542.	89.	31.	.02109
	5931.	829.	123.	37.	.01995
	5932.	1203.	164.	44.	.01899
	5933.	1675.	211.	50.	.01817
	5934.	2251.	263.	56.	.01746
	5935.	2942.	322.	62.	.01684

	XS 3	5803.5			
		5798.	0.	0.	0.	.02066
		5799.	112.	43.	46.	.02066
		5800.	382.	122.	85.	.02215
		5801.	894.	210.	91.	.01888
		5802.	1573.	304.	97.	.01710
		5803.	2410.	404.	103.	.01593
		5804.	3400.	510.	109.	.01510
		5805.	4542.	622.	115.	.01446
	XS 4	5785.75			
		5776.	0.	0.	0.	.02066
		5777.	19.	10.	11.	.03404
		5778.	64.	22.	16.	.02790
		5779.	132.	39.	19.	.02518
		5780.	261.	61.	25.	.02307
		5781.	542.	89.	31.	.02109
		5782.	829.	123.	37.	.01995
		5783.	1203.	164.	44.	.01899
		5784.	1675.	211.	50.	.01817
		5785.	2251.	263.	56.	.01746
		5786.	2942.	322.	62.	.01684
		5790.	4500.	650.	125.	.0152
	Tributary	5836.			
		5830.	0.	0.	0.	.02184
		5832.	28.	8.	12.	.02184
		5833.	124.	24.	20.	.01779
		5834.	314.	48.	28.	.01570
		5835.	622.	80.	36.	.01434
		5836.	1069.	120.	44.	.01334
		5837.	1676.	168.	52.	.01257
		5838.	2460.	224.	60.	.01195

STRUCTURE RATING:

Structure	5970.		
	5970.	0.	0.
	5970.5	45.	18.
	5971.	120.	35.
	5971.5	240.	53.
	5972.	365.	70.
	5973.	395.	108.
	5974.	425.	151.
	5975.	450.	195.
	5976.	473.	248.
	5977.	495.	302.
	5978.	1145.	357.
S Pond 1			
	5830.	0.	0.
	5832.	20.	.43
	5834.	40.	1.83
	5836.	60.	3.51
	5838.	80.	5.48
	5840.	100.	7.78
S Pond 2			
	5820.	0.	0.
	5822.	10.	0.69
	5824.	20.	2.92
	5826.	30.	5.49
	5828.	40.	8.43
	5830.	50.	11.75
	5832.	55.	15.48
	5834.	60.	19.65
I-25			
	5778.	0.	0.
	5780.	2896.	4.28
	5782.	2897.	9.10

```
                5784.     2899.     14.36
                5786.     2900.     30.


RAINFALL DISTRIBUTION:
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                          .006    .008      .01       .012      .0143
                          .0165   .0188     .021      .0233     .0255
                          .0278   .032      .039      .046      .053
                          .06     .075      .1        .4        .7
                          .725    .75       .765      .78       .79
                          .8      .81       .82       .825      .83
                          .835    .84       .845      .85       .855
                          .86     .8638     .8675     .8713     .875
                          .8788   .8825     .8863     .89       .8938
                          .8975   .9013     .905      .9083     .9115
                          .9148   .918      .921      .924      .927
                          .93     .9325     .935      .9375     .94
                          .9425   .945      .9475     .95       .9525
                          .955    .9575     .96       .9625     .965
                          .9675   .97       .9725     .975      .9775
                          .98     .9813     .9825     .9838     .985
                          .9863   .9875     .9888     .99       .9913
                          .9925   .9938     .995      .9963     .9975
                          .9988   1.        1.        1.        1.

GLOBAL OUTPUT:
          2         5.        .1        YNNNN     YNNNNN

TIME ANALYSIS:
          ELEVATION 6000.
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Fishers Canyon Drainage Basin - Proposed Conditions 24-Hour Corrected

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STORM 100-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 1	2.357		2.177		6.30	2545.19	1079.84
Reach 1	2.357	Upstream	2.177		6.30	2545.19	1079.84
Reach 1	2.357	Downstream	2.161	5973.54	7.36	411.05	174.40
Basin 2	1.234		2.136		6.37	1162.02	941.67
Reach 2	3.591	Upstream	2.152	5932.69	6.39	1529.54	425.94
Reach 2	3.591	Downstream	2.152	5932.68	6.54	1524.42	424.51
Basin 3B	0.900		3.001		6.18	1776.46	1973.84
Basin 3A	0.295		2.611		6.24	466.66	1581.91
Reach 2.5	0.295	Upstream	2.611	5845.44	6.24	466.66	1581.91
Reach 2.5	0.295	Downstream	0.204	5843.75	6.29	142.66	484.09
Reach 3	4.786	Upstream	2.192	5819.26	6.28	2669.03	557.71
Reach 3	4.786	Downstream	2.191	5819.25	6.42	2659.80	555.78
Basin 4A	0.186		2.277		6.03	435.36	2340.64
Basin 4B	0.140		2.799		6.01	416.38	2974.14
SAS A	0.015		1.009		6.06	26.29	1752.77
SAS C	0.028		2.154		6.01	82.06	2930.73
SAS D&E	0.021		2.460		6.05	61.17	2913.08
SAS B	0.080		2.441		6.05	218.61	2732.68
Reach 4	0.080	Upstream	2.441		6.05	218.61	2732.68
Reach 4	0.080	Downstream	2.415	5837.89	6.27	78.91	986.41
Basin 4C	0.130		2.017		6.03	304.28	2340.64
Reach 4.5	0.130	Upstream	2.017	5833.95	6.03	304.28	2340.64
Reach 4.5	0.130	Downstream	2.001	5833.93	6.20	300.57	2312.06
Reach 5	5.386	Upstream	2.206	5803.57	6.35	2970.39	551.53
Reach 5	5.386	Downstream	2.206	5803.56	6.40	2965.82	550.68
SAS F	0.011		1.952		6.01	32.90	2990.55
SAS H	0.125		2.780		6.03	353.04	2824.33
Reach 6	0.125	Upstream	2.780		6.03	353.04	2824.33
Reach 6	0.125	Downstream	2.727	5829.78	6.38	48.89	391.09
Reach 7	5.522	Upstream	2.217		6.40	3014.45	545.93
Reach 7	5.522	Downstream	2.217	5780.60	6.53	2896.30	524.53
SAS G	0.023		1.007		6.00	51.63	2244.81
SAS I	0.006		0.886		6.01	12.16	2026.62
OUTLET	5.551		2.211		6.53	2896.30	521.79

STORM 10-yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 1	2.357		1.187		6.34	1294.89	549.38
Reach 1	2.357	Upstream	1.187		6.34	1294.89	549.38
Reach 1	2.357	Downstream	1.171	5971.79	7.16	311.75	132.27
Basin 2	1.234		1.156		6.41	584.68	473.81
Reach 2	3.591	Upstream	1.165	5930.72	6.54	749.20	208.63
Reach 2	3.591	Downstream	1.165	5930.72	6.63	748.35	208.40

Fishers Canyon Drainage Basin - Proposed Conditions 24-Hour Corrected

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Basin 3B	0.900		1.833		6.20	1057.63	1175.14
Basin 3A	0.295		1.406		6.25	263.24	892.33
Reach 2.5	0.295	Upstream	1.406	5844.38	6.25	263.24	892.33
Reach 2.5	0.295	Downstream	0.0	5843.00	5.77	0.0	0.0
Reach 3	4.786	Upstream	1.219	5817.70	6.27	1369.24	286.11
Reach 3	4.786	Downstream	1.218	5817.69	6.40	1365.07	285.24
Basin 4A	0.186		1.125		6.04	253.00	1360.22
Basin 4B	0.140		1.594		6.02	268.52	1917.99
SAS A	0.015		0.415		6.06	13.55	903.06
SAS C	0.028		1.244		6.02	52.64	1879.94
SAS D&E	0.021		1.528		6.07	40.30	1918.93
SAS B	0.080		1.477		6.06	137.76	1721.97
Reach 4	0.080	Upstream	1.477		6.06	137.76	1721.97
Reach 4	0.080	Downstream	1.450	5835.41	6.25	54.07	675.82
Basin 4C	0.130		1.032		6.04	176.83	1360.22
Reach 4.5	0.130	Upstream	1.032	5833.28	6.04	176.83	1360.22
Reach 4.5	0.130	Downstream	1.012	5833.26	6.22	174.30	1340.76
Reach 5	5.386	Upstream	1.222	5802.00	6.34	1571.77	291.84
Reach 5	5.386	Downstream	1.222	5801.99	6.41	1569.21	291.37
SAS F	0.011		1.128		6.02	21.22	1929.53
SAS H	0.125		1.494		6.04	224.00	1792.02
Reach 6	0.125	Upstream	1.494		6.04	224.00	1792.02
Reach 6	0.125	Downstream	1.441	5826.80	6.37	33.98	271.84
Reach 7	5.522	Upstream	1.227		6.41	1603.16	290.34
Reach 7	5.522	Downstream	1.227	5779.11	6.43	1600.73	289.90
SAS G	0.023		0.461		6.00	28.87	1255.30
SAS I	0.006		0.248		6.02	6.52	1086.47
OUTLET	5.551		1.223		6.43	1600.72	288.38

Fishers Canyon Drainage Basin - Proposed Conditions 24-Hour Corrected

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 100-yr (cfs)	10-yr (cfs)	(cfs)	(cfs)	(cfs)
Basin 1	2.36		2545.2	1294.9			
Basin 2	1.23		1162.0	584.7			
Basin 4A	0.19		435.4	253.0			
Basin 4B	0.14		416.4	268.5			
SAS B	0.08		218.6	137.8			
SAS A	0.01		26.3	13.5			
SAS C	0.03		82.1	52.6			
SAS D&E	0.02		61.2	40.3			
SAS F	0.01		32.9	21.2			
SAS G	0.02		51.6	28.9			
SAS H	0.12		353.0	224.0			
SAS I	0.600E-02		12.2	6.5			
Basin 4C	0.13		304.3	176.8			
Basin 3A	0.29		466.7	263.2			
Basin 3B	0.90		1776.5	1057.6			
Reach 1	2.36		2545.2	1294.9			
DOWNSTREAM			411.0	311.7			
Reach 2	3.59		1529.5	749.2			
DOWNSTREAM			1524.4	748.3			
Reach 3	4.79		2669.0	1369.2			
DOWNSTREAM			2659.8	1365.1			
Reach 4	0.08		218.6	137.8			
DOWNSTREAM			78.9	54.1			
Reach 5	5.39		2970.4	1571.8			
DOWNSTREAM			2965.8	1569.2			
Reach 6	0.12		353.0	224.0			
DOWNSTREAM			48.9	34.0			
Reach 7	5.52		3014.5	1603.2			
DOWNSTREAM			2896.3	1600.7			
Reach 2.5	0.29		466.7	263.2			
DOWNSTREAM			142.7	0.0			
Reach 4.5	0.13		304.3	176.8			
DOWNSTREAM			300.6	174.3			
OUTLET	5.55		2896.3	1600.7			

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EXISTING FISHERS CANYON DRAINAGEWAY

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FISHERS CANYON DRAINAGEWAY

EXISTING CHANNEL SECTION ANALYSIS

1. CRITICAL DEPTH CALCULATION
2. NORMAL DEPTH CALCULATION
3. SECTIONS AND WATER SURFACE ELEVATIONS EAST OF I-25

TRAPEZOIDAL CHANNEL ANALYSIS
CRITICAL DEPTH COMPUTATION

August 23, 2006

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	3,000.0
Channel Bottom Slope (ft/ft)	0.011
Manning's Roughness Coefficient (n-value)	0.04
Channel Left Side Slope (horizontal/vertical)	3.0
Channel Right Side Slope (horizontal/vertical)	3.0
Channel Bottom Width (ft)	10.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Critical Depth (ft)	7.61
Critical Slope (ft/ft)	0.015
Flow Velocity (fps)	12.02
Froude Number	1.0
Velocity Head (ft)	2.24
Energy Head (ft)	9.85
Cross-Sectional Area of Flow (sq ft)	249.68
Top Width of Flow (ft)	55.64

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

August 23, 2006

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	3,000.0
Channel Bottom Slope (ft/ft)	0.011
Manning's Roughness Coefficient (n-value)	0.04
Channel Left Side Slope (horizontal/vertical)	3.0
Channel Right Side Slope (horizontal/vertical)	3.0
Channel Bottom Width (ft)	10.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	8.14
Flow Velocity (fps)	10.71
Froude Number	0.865
Velocity Head (ft)	1.78
Energy Head (ft)	9.92
Cross-Sectional Area of Flow (sq ft)	280.18
Top Width of Flow (ft)	58.84

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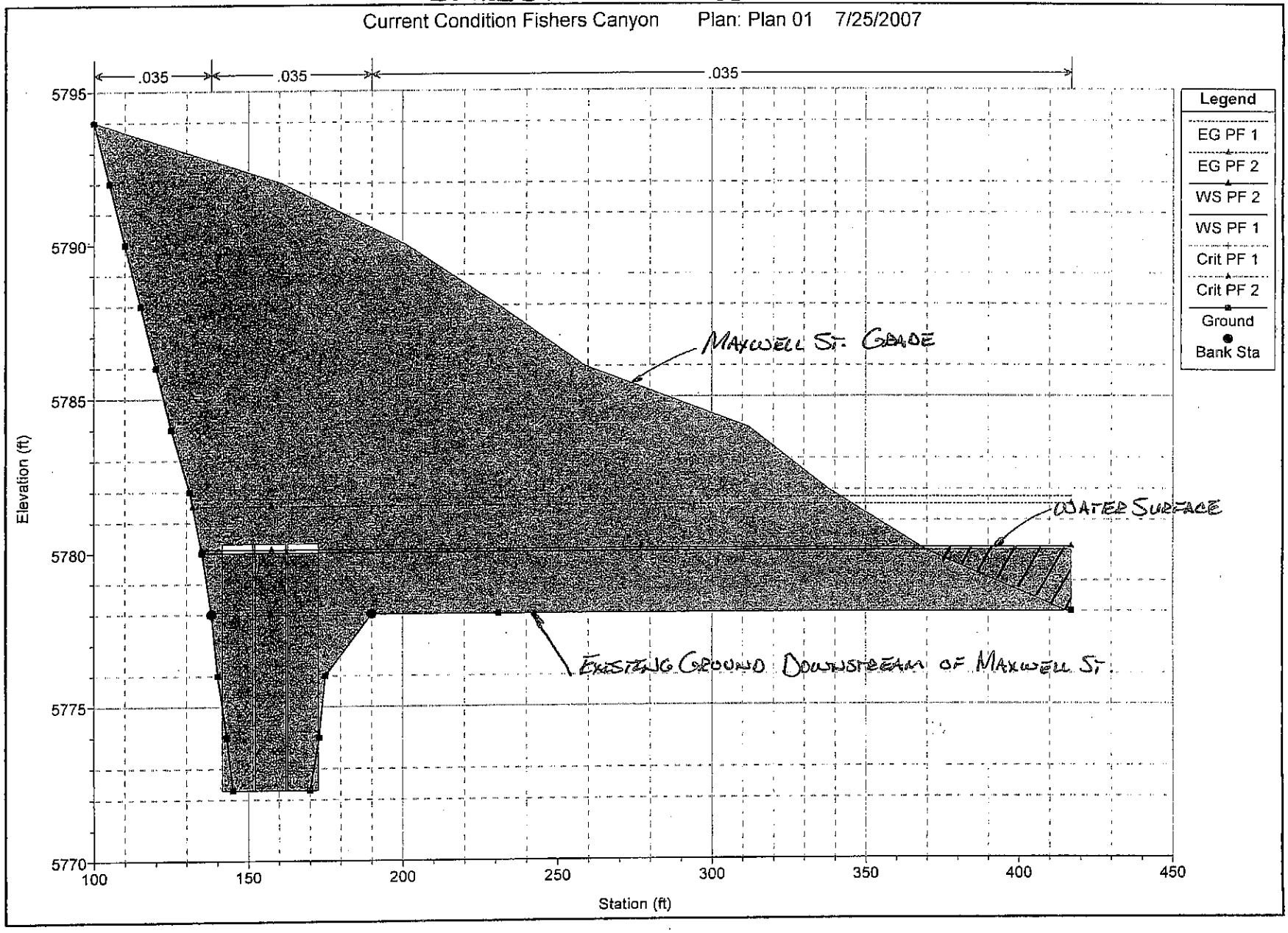
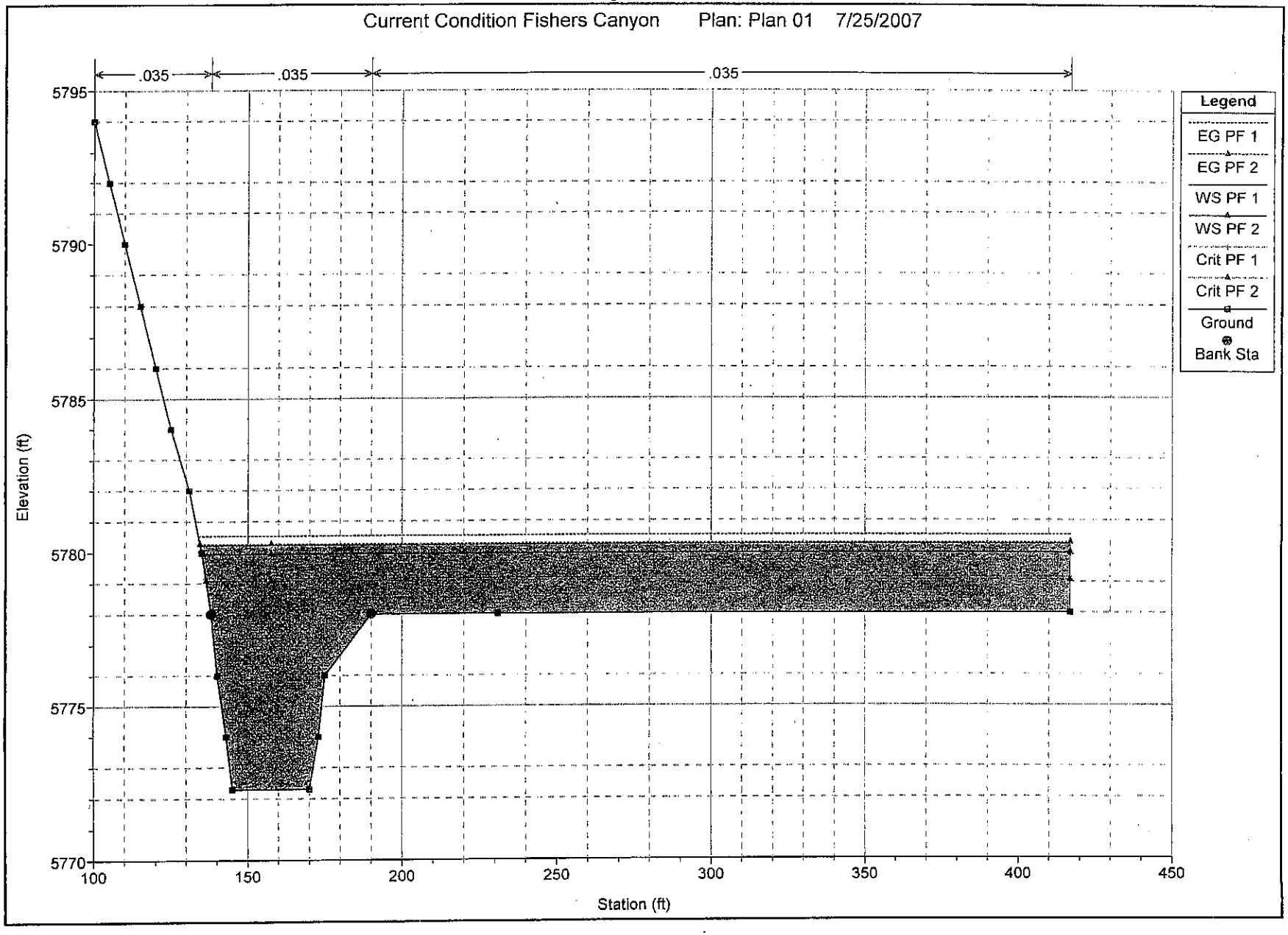
Downstream of Maxwell St. Culvert



SEC. 9520


Current Condition Fishers Canyon Plan: Plan 01 7/25/2007
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.035
.035
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5780
5775
5770
Elevation (ft)
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250
300
350
400
450
Station (ft)
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EG PF 1
EG PF 2
WS PF 1
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta

Cross Section for 315 LF from BNDY (Non-backwater condition)

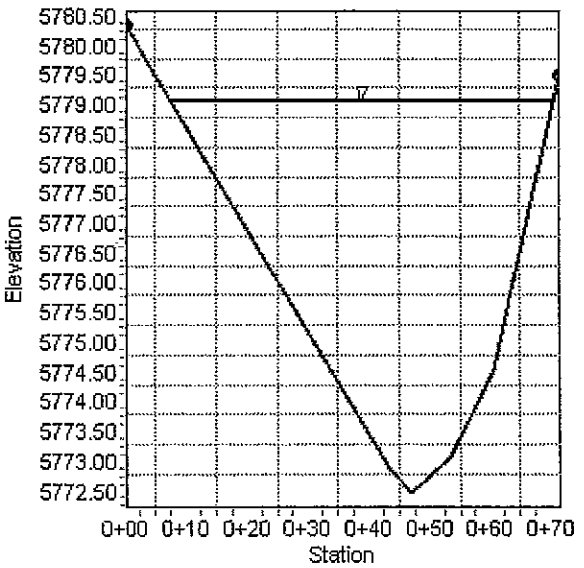
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01500	ft/ft
Normal Depth	6.60	ft
Discharge	2900.00	ft³/s

Cross Section Image



315 LF from BNDY (Non-backwater Condition)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01500	ft/ft
Discharge	2900.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	5780.33
0+43	5772.85
0+47	5772.45
0+53	5773.07
0+61	5774.51
0+71	5779.47

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5780.33)	(0+71, 5779.47)	0.035

Results

Normal Depth		6.60	ft
Elevation Range	5772.45 to 5780.33 ft		
Flow Area		235.58	ft²
Wetted Perimeter		64.67	ft
Top Width		62.93	ft
Normal Depth		6.60	ft
Critical Depth		6.95	ft
Critical Slope		0.01174	ft/ft
Velocity		12.31	ft/s
Velocity Head		2.35	ft
Specific Energy		8.96	ft
Froude Number		1.12	

315 LF from BNDY (Non-backwater Condition)

Results

Flow Type	Supercritical

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	6.60	ft
Critical Depth	6.95	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.01174	ft/ft

Cross Section for 460 LF from BNDY (Non-backwater Condition)

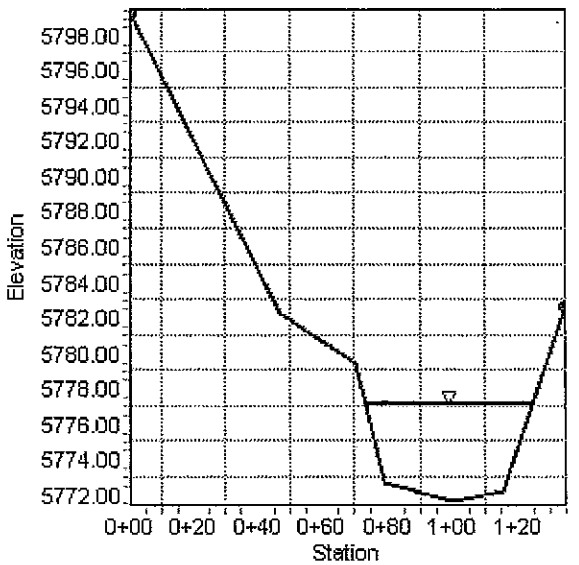
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01500	ft/ft
Normal Depth	5.50	ft
Discharge	2900.00	ft³/s

Cross Section Image



460 LF from BNDY (Non-backwater Condition)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01500	ft/ft
Discharge	2900.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	5799.24
0+47	5782.22
0+70	5779.42
0+79	5772.65
1+00	5771.62
1+15	5772.19
1+35	5782.64

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5799.24)	(1+35, 5782.64)	0.035

Results

Normal Depth		5.50	ft
Elevation Range	5771.62 to 5799.24 ft		
Flow Area		219.37	ft²
Wetted Perimeter		54.11	ft
Top Width		51.37	ft
Normal Depth		5.50	ft
Critical Depth		5.89	ft
Critical Slope		0.01159	ft/ft
Velocity		13.22	ft/s
Velocity Head		2.72	ft
Specific Energy		8.21	ft

460 LF from BNDY (Non-backwater Condition)

Results

Froude Number	1.13	
Flow Type	Supercritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	5.50	ft
Critical Depth	5.89	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.01159	ft/ft

Cross Section for 785 LF from BNDY (Non-backwater Condition)

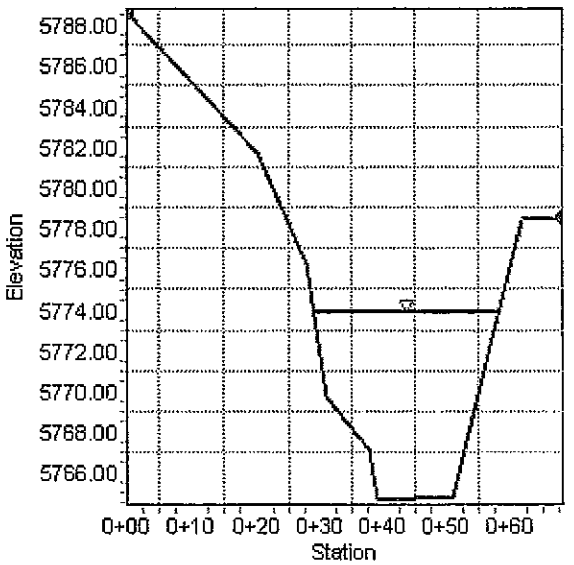
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01500	ft/ft
Normal Depth	9.18	ft
Discharge	2900.00	ft³/s

Cross Section Image



785 LF from BNDY (Non-backwater Condition)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01500	ft/ft
Discharge	2900.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	5788.61
0+20	5781.69
0+28	5776.20
0+31	5769.70
0+38	5767.17
0+39	5764.66
0+51	5764.89
0+62	5778.45
0+68	5778.55

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5788.61)	(0+68, 5778.55)	0.035

Results

Normal Depth		9.18	ft
Elevation Range	5764.66 to 5788.61 ft		
Flow Area		190.89	ft²
Wetted Perimeter		38.22	ft
Top Width		29.17	ft
Normal Depth		9.18	ft
Critical Depth		9.40	ft
Critical Slope		0.01365	ft/ft
Velocity		15.19	ft/s

785 LF from BNDY (Non-backwater Condition)

Results

Velocity Head		3.59	ft
Specific Energy		12.76	ft
Froude Number		1.05	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	9.18	ft
Critical Depth	9.40	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.01365	ft/ft

Cross Section for 890 LF from BNDY (Non-backwater Condition)

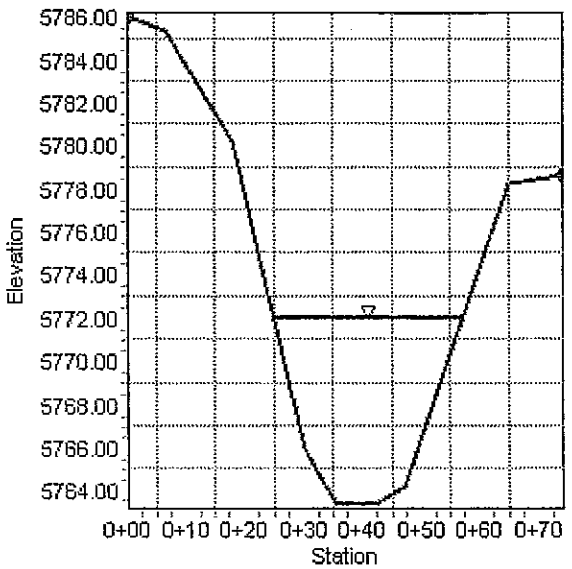
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01500	ft/ft
Normal Depth	8.56	ft
Discharge	2900.00	ft³/s

Cross Section Image



890 LF from BNDY (Non-backwater Condition)

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01500	ft/ft
Discharge	2900.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
0+00	5786.00
0+07	5785.33
0+18	5780.20
0+30	5765.87
0+35	5763.47
0+42	5763.39
0+47	5764.21
0+65	5778.23
0+74	5778.63

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(0+00, 5786.00)	(0+74, 5778.63)	0.035

Results

Normal Depth		8.56	ft
Elevation Range	5763.39 to 5786.00 ft		
Flow Area		190.73	ft²
Wetted Perimeter		38.14	ft
Top Width		32.03	ft
Normal Depth		8.56	ft
Critical Depth		9.00	ft
Critical Slope		0.01233	ft/ft
Velocity		15.20	ft/s

890 LF from BNDY (Non-backwater Condition)

Results

Velocity Head		3.59	ft
Specific Energy		12.15	ft
Froude Number		1.10	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	8.56	ft
Critical Depth	9.00	ft
Channel Slope	0.01500	ft/ft
Critical Slope	0.01233	ft/ft

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FISHERS CANYON DRAINAGEWAY

I-25

3 – 10' X 8' RCB

ANALYSIS

1. 3,090 cfs
2. 2,900 cfs

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

August 4, 2006

PROGRAM INPUT DATA

3,090 cfs

DESCRIPTION	VALUE
Culvert Span (ft)	10.0
Culvert Rise (ft)	8.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.012
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	150.0
Invert Elevation at Downstream end of Culvert (ft)	5,774.15
Invert Elevation at Upstream end of Culvert (ft)	5,774.9
Culvert Slope (ft/ft)	0.005
Starting Flow Rate (cfs)	1,030.0
Incremental Flow Rate (cfs)	0.0
Ending Flow Rate (cfs)	1,030.0
Starting Tailwater Depth (ft)	4.0
Incremental Tailwater Depth (ft)	1.0
Ending Tailwater Depth (ft)	4.0

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
1,030.0	4.0	12.84	0.0	6.02	6.91	6.02	17.11

INV. 5774.90
+ 12.84
W.S.E. 5787.74 VS. 5788.7 FEMA

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

August 4, 2006

PROGRAM INPUT DATA

2,900 cfs

DESCRIPTION	VALUE
Culvert Span (ft)	10.0
Culvert Rise (ft)	8.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.012
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	150.0
Invert Elevation at Downstream end of Culvert (ft)	5,774.15
Invert Elevation at Upstream end of Culvert (ft)	5,774.9
Culvert Slope (ft/ft)	0.005
Starting Flow Rate (cfs)	967.0
Incremental Flow Rate (cfs)	0.0
Ending Flow Rate (cfs)	967.0
Starting Tailwater Depth (ft)	4.0
Incremental Tailwater Depth (ft)	0.0
Ending Tailwater Depth (ft)	4.0

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
967.0	4.0	12.09	0.0	5.74	6.62	5.74	16.86

INV. 5774.90
+ 12.09
5786.99 W.S.E

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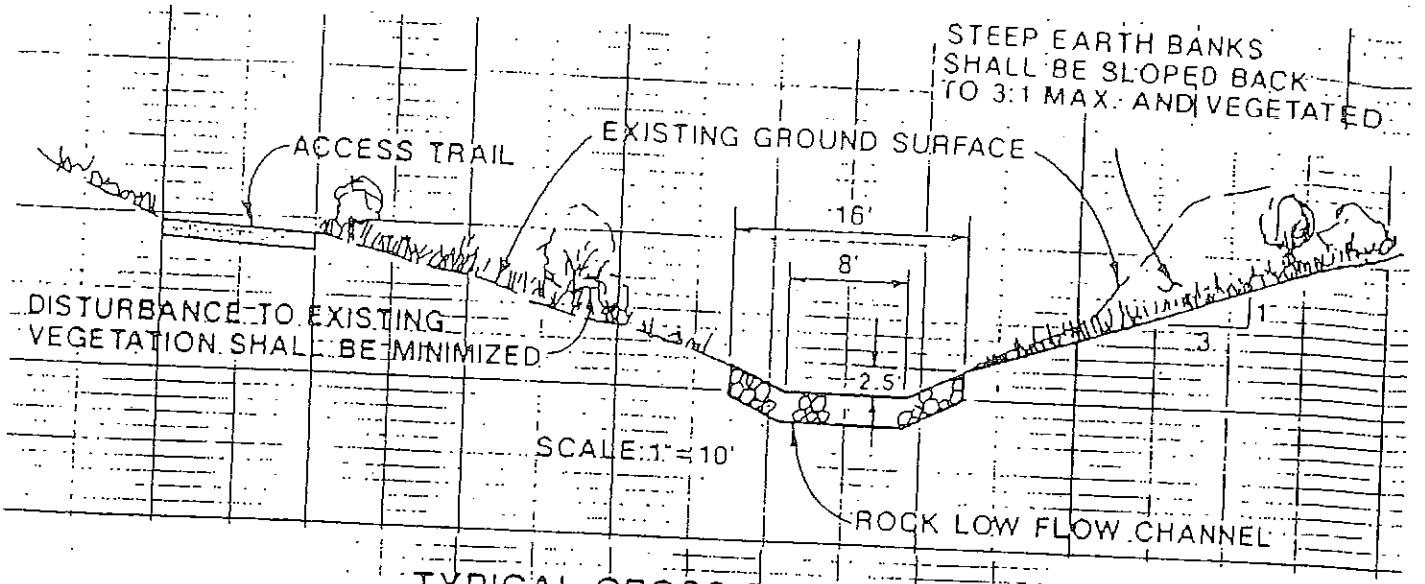
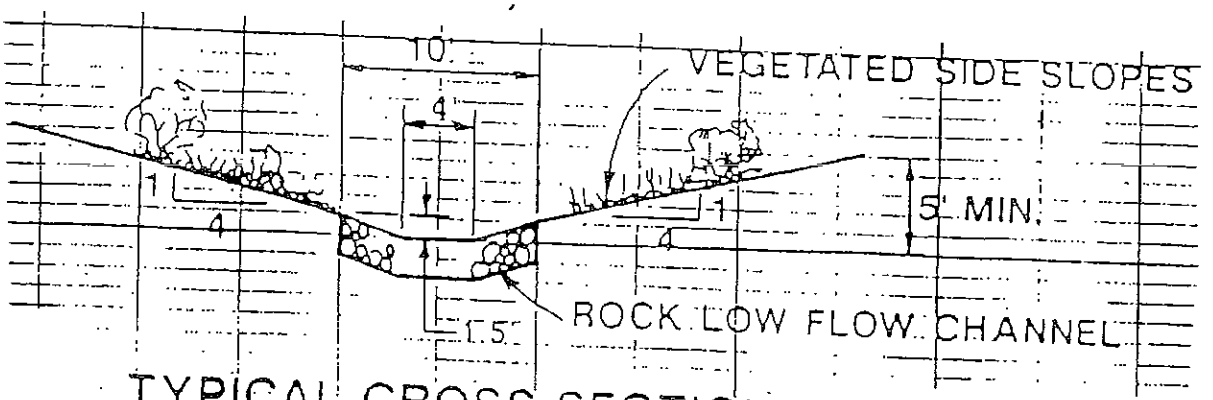
FISHERS CANYON DRAINAGEWAY

1. DBPS RECOMMENDED TYPICAL CROSS-SECTION
2. CRITICAL DEPTH CALCULATION
3. NORMAL DEPTH CALCULATION



TYPICAL CROSS SECTION
PROPOSED CHANNEL STABILIZATION
FISHERS CANYON DRAINAGEWAY



TYPICAL CROSS SECTION
PROPOSED CHANNEL
FISHERS CANYON TRIBUTARY

FISHERS CANYON DRAINAGE BASIN PLANNING STUDY	Proposed List of Categories of Activities No. CO-OYT-0618 for Fishers Canyon DBPS near Colorado Springs, El Paso County, CO Sheet 3 of 4 April 1991

TRAPEZOIDAL CHANNEL ANALYSIS
CRITICAL DEPTH COMPUTATION

August 23, 2006

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	3,000.0
Channel Bottom Slope (ft/ft)	0.009
Manning's Roughness Coefficient (n-value)	0.04
Channel Left Side Slope (horizontal/vertical)	3.0
Channel Right Side Slope (horizontal/vertical)	3.0
Channel Bottom Width (ft)	8.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Critical Depth (ft)	7.88
Critical Slope (ft/ft)	0.015
Flow Velocity (fps)	12.04
Froude Number	1.0
Velocity Head (ft)	2.25
Energy Head (ft)	10.13
Cross-Sectional Area of Flow (sq ft)	249.09
Top Width of Flow (ft)	55.26

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

August 23, 2006

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	3,000.0
Channel Bottom Slope (ft/ft)	0.009
Manning's Roughness Coefficient (n-value)	0.04
Channel Left Side Slope (horizontal/vertical)	3.0
Channel Right Side Slope (horizontal/vertical)	3.0
Channel Bottom Width (ft)	8.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	8.78
Flow Velocity (fps)	9.95
Froude Number	0.787
Velocity Head (ft)	1.54
Energy Head (ft)	10.32
Cross-Sectional Area of Flow (sq ft)	301.46
Top Width of Flow (ft)	60.68

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FEMA DATA

FISHERS CANYON DRAINAGEWAY

1. FIRM MAP NO. 08041C0743F
2. FLOODWAY DATA
3. FLOOD PROFILE

APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

EL PASO COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 743 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
COLORADO SPRINGS, CITY OF	080060	0743	F
EL PASO COUNTY, UNINCORPORATED AREAS	080059	0743	F

MAP NUMBER
08041C0743 F

EFFECTIVE DATE:
MARCH 17, 1997

Federal Emergency Management Agency

EL PASO COUNTY
UNINCORPORATED AREAS
080059

SITE

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Fisher's Canyon								
A	840	261	471	6.6	5,779.5	5,779.5	5,779.5	0.0
B	955	191	923	3.3	5,782.1	5,782.1	5,783.1	1.0
C	1,255	32	237	13.1	5,782.5	5,782.5	5,782.5	0.0
D	1,401	152	1,271	2.4	5,788.7	5,788.7	5,789.4	0.7
E	2,281	41	229	13.5	5,799.0	5,799.0	5,799.0	0.0
F	3,271	89	486	6.2	5,805.0	5,805.0	5,805.8	0.8
G	4,021	45	230	13.0	5,811.9	5,811.9	5,812.0	0.1
H	4,641	47	238	12.6	5,819.7	5,819.7	5,819.7	0.0
I	5,161	88	368	8.1	5,825.4	5,825.4	5,825.4	0.0
J	5,785	37	222	13.5	5,835.4	5,835.4	5,835.4	0.0
K	6,545	55	235	11.7	5,842.6	5,842.6	5,842.7	0.1
L	7,165	30	191	14.4	5,847.2	5,847.2	5,847.2	0.0
M	7,263	30	237	11.6	5,850.8	5,850.8	5,850.8	0.0
N	7,563	46	289	9.5	5,852.9	5,852.9	5,853.1	0.2

[1]Feet Above Confluence With Fountain Creek

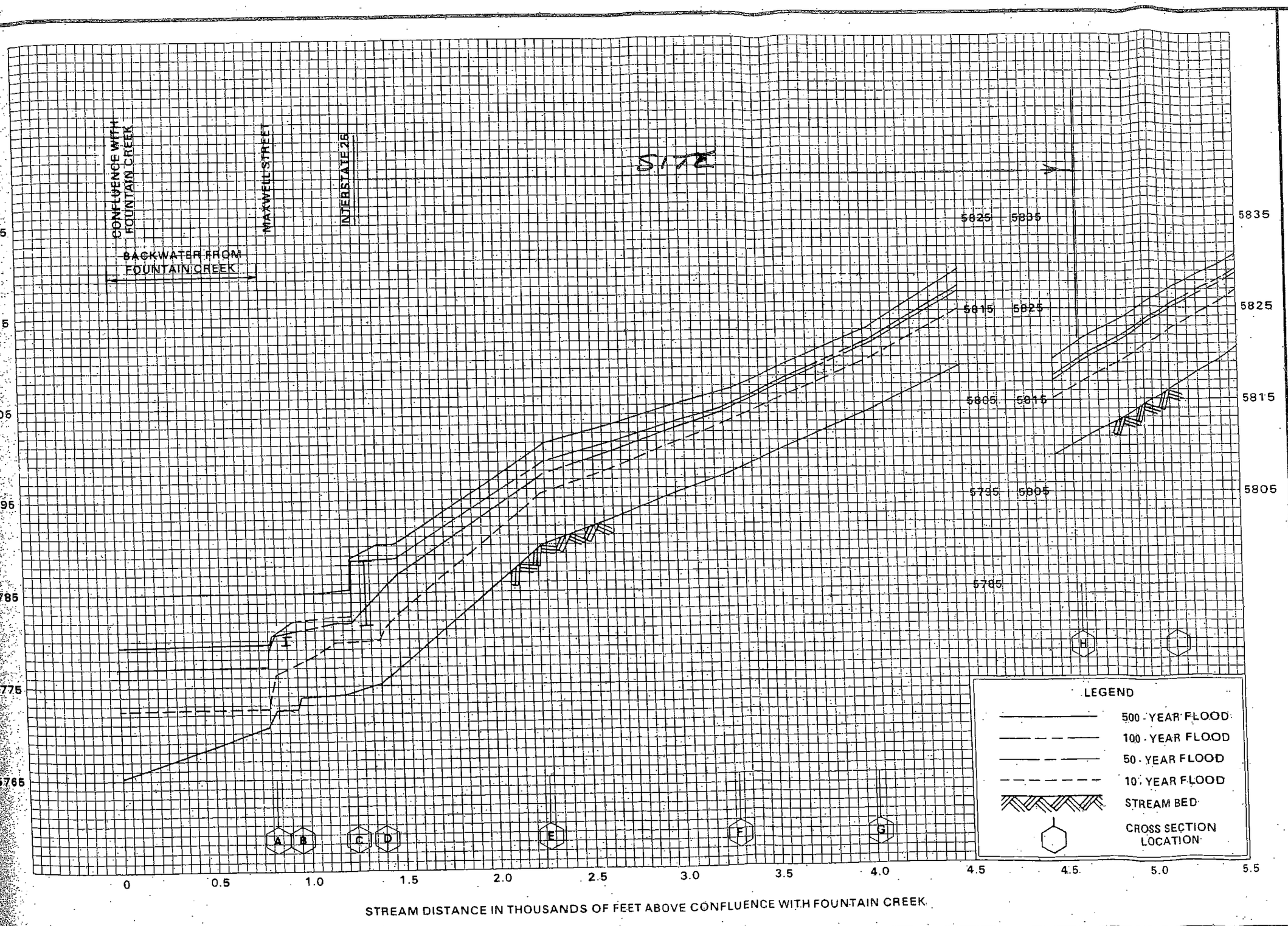
TABLE 5

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
AND INCORPORATED AREAS

FLOODWAY DATA

FISHER'S CANYON



FLOOD PROFILES

FISHER'S CANYON

FEDERAL EMERGENCY MANAGEMENT AGENCY

EL PASO COUNTY, CO
AND INCORPORATED AREAS

57P

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PROPOSED FISHERS CANYON DRAINAGEWAY

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FISHERS CANYON DRAINAGEWAY
SIDE CHANNEL DETENTION POND

FISHERS CANYON DRAINAGEWAY
SIDE CHANNEL DETENTION POND VOLUME

CONTOUR	AREA	AVERAGE AREA	INTERVAL	VOLUME	VOLUME	ACCUMULATIVE VOLUME	ACCUMULATIVE VOLUME
	sf	sf	ft	cu ft	ac- ft	cu ft	ac-ft
78.00	85878						
		93136.00	2.00	186272.00	4.28		
80.00	100394					186272.00	4.28
		105080.00	2.00	210160.00	4.82		
82.00	109766					396432.00	9.10
		114595.00	2.00	229190.00	5.26		
84.00	119424					625622.00	14.36
		122344.50	2.00	244689.00	5.62		
86.00	125265					870311.00	19.98
						TOTAL	19.98

THE D.B.P.S. REQUIRES 10 ac-ft OF STORAGE TOPPING OUT AT ELEVATION 5786.00. THE MOST EFFECTIVE VOLUME IN REDUCING PEAK FLOW WILL BE FROM 5784 TO 5786. THE D.B.P.S. TECHNICAL APPENDIX WAS NOT AVAILABLE TO CONFIRM THE DETAILED VOLUME Vs ELEVATION REQUIREMENTS.

THE DETENTION POND BOTTOM IS INTENDED AS A POTENTIAL WETLAND MITIGATION AREA.

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FISHERS CANYON DRAINAGEWAY

1. **PROPOSED TYPICAL SECTION**
2. **NORMAL DEPTH CALCULATION IRREGULAR SECTION**
3. **NORMAL DEPTH CALCULATION TRAPEZOIDAL SECTION**
   - **A. 3,000 cfs**
   - **B. 500 cfs**

Fishers Canyon Proposed Section

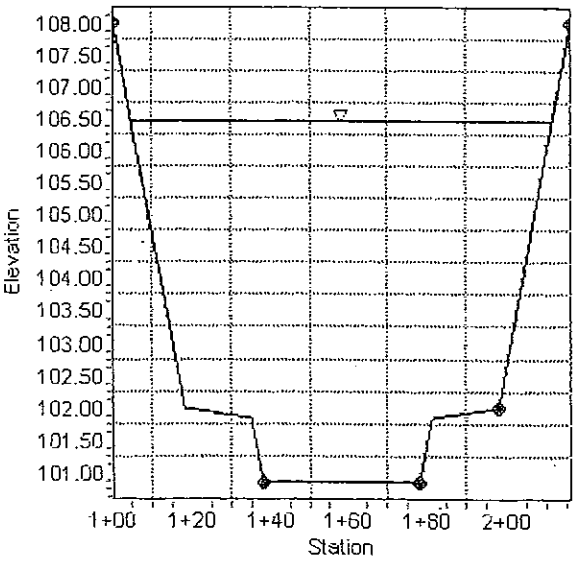
Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00400	ft/ft
Normal Depth	5.61	ft
Discharge	3000.00	ft³/s

Cross Section Image



Rating Table for Fisher Canyan Proposed Section

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.00400	ft/ft
Discharge	3000.00	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
1+00	108.00
1+18	102.00
1+35	101.83
1+38	100.83
1+78	100.83
1+81	101.83
1+98	102.00
2+16	108.00

Roughness Segment Definitions

Start Station, Elevation	End Station, Elevation	Roughness Coefficient
(1+00, 108.00)	(1+38, 100.83)	0.042
(1+38, 100.83)	(1+78, 100.83)	0.033
(1+78, 100.83)	(1+98, 102.00)	0.042
(1+98, 102.00)	(2+16, 108.00)	0.042

Discharge (ft³/s)	Water Surface Elevation (ft)	Velocity (ft/s)	Flow Area (ft²)	Wetted Perimeter (ft)	Top Width (ft)
250.00	102.49	2.67	93.54	83.42	82.93
500.00	103.09	3.45	144.77	87.24	86.56
750.00	103.58	4.00	187.63	90.32	89.48

Rating Table for Fisher Canyan Proposed Section

Input Data

Discharge (ft^3/s)	Water Surface Elevation (ft)	Velocity (ft/s)	Flow Area (ft^2)	Wetted Perimeter (ft)	Top Width (ft)
1000.00	104.00	4.42	225.99	92.99	92.02
1250.00	104.38	4.78	261.40	95.40	94.30
1500.00	104.73	5.09	294.69	97.61	96.39
1750.00	105.06	5.36	326.30	99.66	98.34
2000.00	105.36	5.61	356.63	101.59	100.18
2250.00	105.65	5.83	385.85	103.42	101.91
2500.00	105.93	6.04	414.12	105.16	103.56
2750.00	106.19	6.23	441.64	106.83	105.14
3000.00	106.44	6.40	468.43	108.43	106.66

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

August 22, 2006

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	3,000.0
Channel Bottom Slope (ft/ft)	0.004
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	3.0
Channel Right Side Slope (horizontal/vertical)	3.0
Channel Bottom Width (ft)	80.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	4.69
Flow Velocity (fps)	6.79
Froude Number	0.593
Velocity Head (ft)	0.72
Energy Head (ft)	5.41
Cross-Sectional Area of Flow (sq ft)	441.55
Top Width of Flow (ft)	108.16

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

August 22, 2006

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Flow Rate (cfs)	500.0
Channel Bottom Slope (ft/ft)	0.004
Manning's Roughness Coefficient (n-value)	0.035
Channel Left Side Slope (horizontal/vertical)	3.0
Channel Right Side Slope (horizontal/vertical)	3.0
Channel Bottom Width (ft)	80.0

COMPUTATION RESULTS

DESCRIPTION	VALUE
Normal Depth (ft)	1.64
Flow Velocity (fps)	3.58
Froude Number	0.507
Velocity Head (ft)	0.2
Energy Head (ft)	1.84
Cross-Sectional Area of Flow (sq ft)	139.49
Top Width of Flow (ft)	89.85

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FISHERS CANYON DRAINAGEWAY
TYPICAL SLOPING BOULDER DROP STRUCTURE

1. TYPICAL CALCULATION SPREADSHEETS
2. PLAN – TYPICAL DROP STRUCTURE

Design Values

Angular D_{50} dia. = 26.4 in.
$Rock_{chute}$ thickness = 52.7 in.
Inlet apron length = 40 ft.
Outlet apron length = 33 ft.
Radius = 73 ft.
Will bedding be used? Yes

Rock Gradation Envelope

% Passing	Diameter, in. (weight, lbs.)
D_{100}	40 - 53 (4525 - 10727)
D_{85}	34 - 48 (2946 - 7820)
D_{50}	26 - 40 (1341 - 4525)
D_{10}	21 - 34 (687 - 2946)

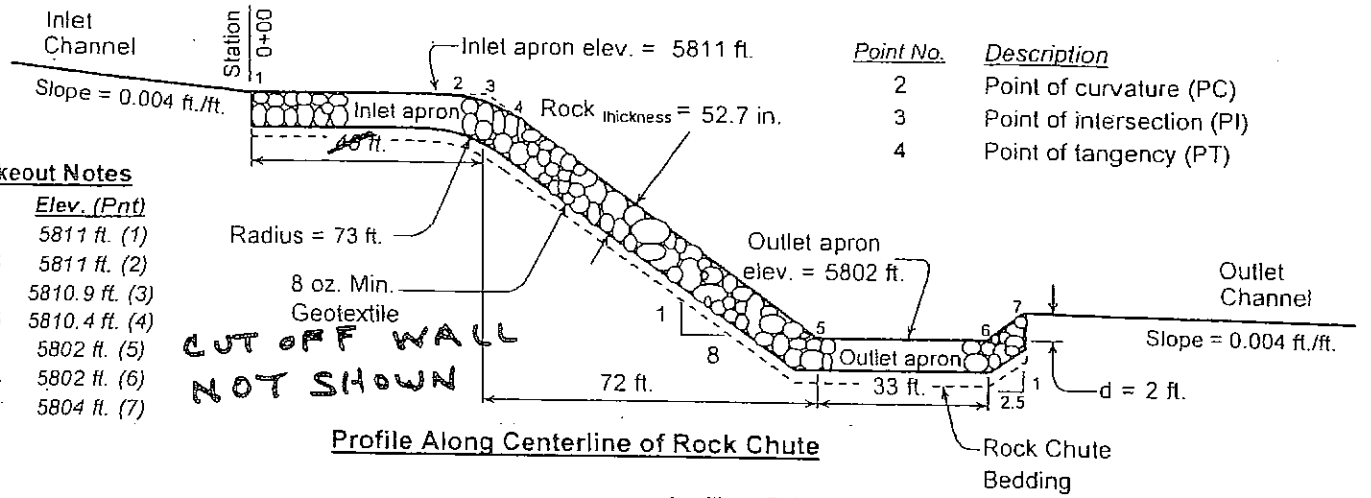
Coefficient of Uniformity, $(D_{60})/(D_{10}) \leq 2.0$

Quantities [a]

Angular Rock = 2741 yd^3
Geotextile (8 oz.)[b] = 2117 yd^2
Bedding (6 in.) = 358 yd^3
Excavation = 700 yd^3
Earthfill = 500 yd^3
Seeding = 1.0 acres

Notes: [a] *Rock, bedding, and geotextile quantities are determined from x-section below (neglect radius).*

[b] *Geotextile shall be overlapped (18-in. minimum) and anchored (18-in. minimum along sides and 24-in. minimum on the ends) --- quantity not included.*

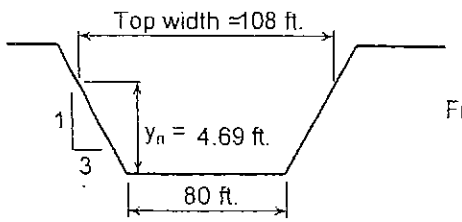


Point No.	Description
2	Point of curvature (PC)
3	Point of intersection (PI)
4	Point of tangency (PT)

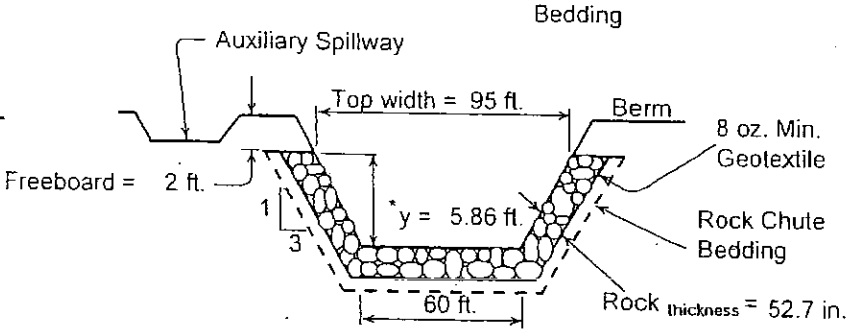
Stakeout Notes

Sta.	Elev. (Pnt)
0+00	5811 ft. (1)
0+35.5	5811 ft. (2)
0+40	5810.9 ft. (3)
0+44.5	5810.4 ft. (4)
1+12	5802 ft. (5)
1+45	5802 ft. (6)
1+50	5804 ft. (7)

Profile Along Centerline of Rock Chute

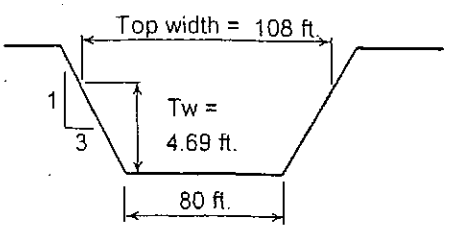


Inlet Channel Cross Section



Rock Chute Cross Section

* Use H_p throughout chute but not less than z_2.



Outlet Channel Cross Section

Profile, Cross Sections, and Quantities

Project: South Aceademy
Location: El Paso County

U.S. Department of Agriculture
Natural Resources Conservation Service

Designed: John B	Approved by:
Drawn: NRCS Standard Dwg.	Title:
Traced:	Title:
Checked:	Sheet No. / of / Drawing No.

Rock Chute Design Data

(Version 4.01 - 04/23/03, Based on Design of Rock Chutes by Robinson, Rice, Kadavy, ASAE, 1998)

Project: South Aceademy
Designer: John B
Date: 8/6/2006

County: El Paso
Checked by:
Date:

Input Channel Geometry

→ Inlet Channel	→ Chute	→ Outlet Channel
Bw = 80.0 ft.	Bw = 60.0 ft.	Bw = 80.0 ft.
Side slopes = 3.0 (m:1)	Factor of safety = 1.20 (F_s)	Side slopes = 3.0 (m:1)
n-value = 0.035	Side slopes = 3.0 (m:1) → 2.0:1 max.	n-value = 0.035
Bed slope = 0.0040 ft./ft.	Bed slope (8:1) = 0.125 ft./ft. → 2.5:1 max.	Bed slope = 0.0040 ft./ft.
Freeboard = 2.0 ft.	Outlet apron depth, d = 2.0 ft.	Base flow = 0.0 cfs

Design Storm Data (Table 2, NHCP, NRCS Grade Stabilization Structure No. 410)

Drainage area = 0.0 acres Rainfall = ○ 0 - 3 in. ◉ 3 - 5 in. ○ 5+ in.

Apron elev. --- Inlet = 5811.0 ft. --- Outlet = 5802.0 ft. --- (H_{drop} = 7 ft.)

Chute capacity = Q10-year
Total capacity = Q25-year
Minimum capacity (based on a 5-year, 24-hour storm with a 3 - 5 inch rainfall)

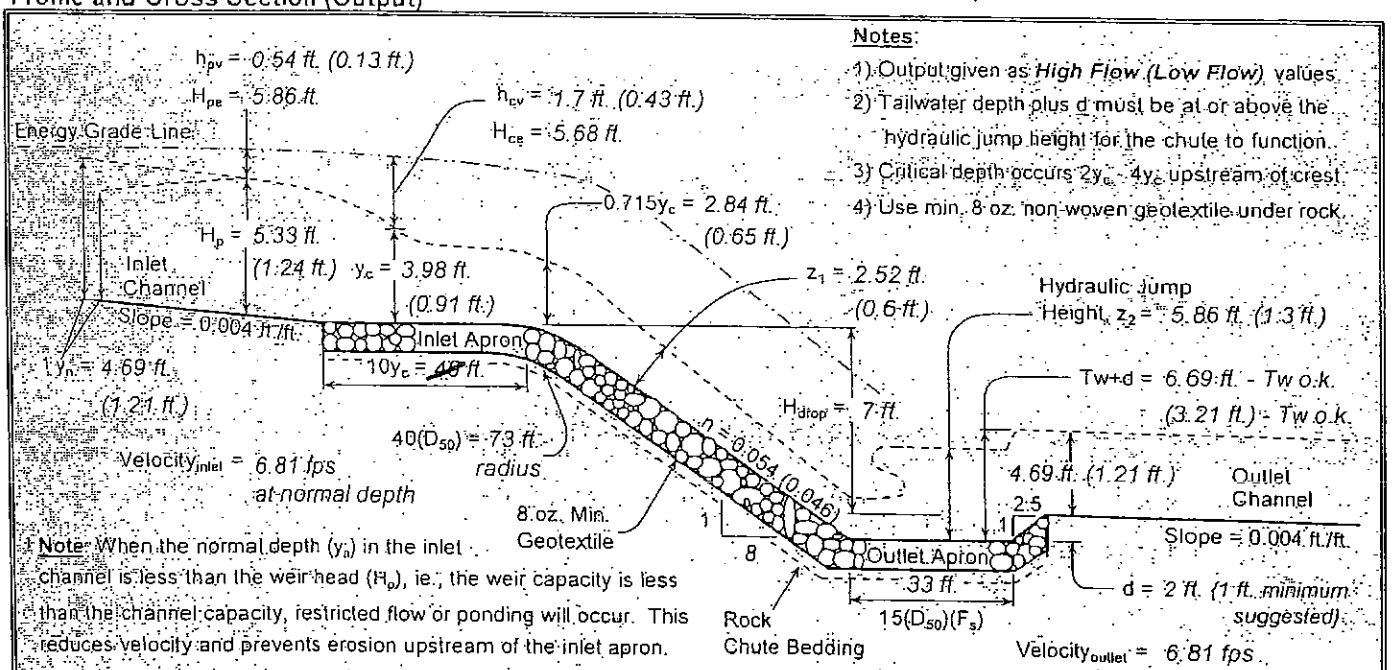
Q_{high} = 3000.0 cfs High flow storm through chute → Tw (ft.) = Program

Q_{low} = 300.0 cfs Low flow storm through chute → Tw (ft.) = Program

***Note**: The total required capacity is routed through the chute (principal spillway) or in combination with an auxiliary spillway.*

***Input tailwater (Tw)**:*

Profile and Cross Section (Output)

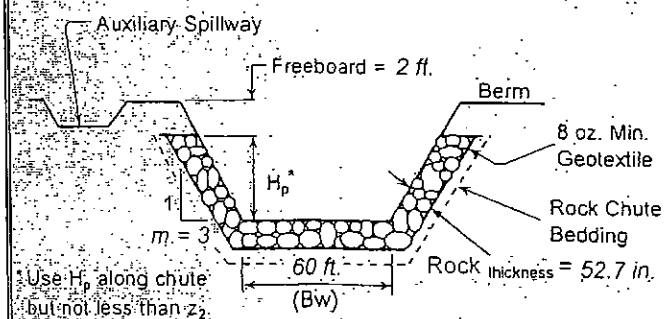


Notes:

1) Output given as *High Flow (Low Flow)* values.
2) Tailwater depth plus d must be at or above the hydraulic jump height for the chute to function.
3) Critical depth occurs 2y_c - 4y_c upstream of crest.
4) Use min. 8 oz. non-woven geotextile under rock.

Note: When the normal depth (y_n) in the inlet channel is less than the weir head (H_p), ie., the weir capacity is less than the channel capacity, restricted flow or ponding will occur. This reduces velocity and prevents erosion upstream of the inlet apron.

Profile Along Centerline of Chute



Typical Cross Section

q_t =	45.03 cfs/ft.	Equivalent unit discharge
F_s =	1.20	Factor of safety (multiplier)
z_1 =	2.52 ft.	Normal depth in chute
n-value =	0.054	Manning's roughness coefficient
$D_{50}(F_s)$ =	26.4 in. (1334 lbs. ~~50% round~~ / 50% angular)	
$2(D_{50})(F_s)$ =	52.7 in.	Rock chute thickness
Tw + d =	6.69 ft.	Tailwater above outlet apron
z_2 =	5.86 ft.	Hydraulic jump height
*** The outlet	will	*function adequately*

High Flow Storm Information

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FISHERS CANYON DRAINAGEWAY
PROPOSED ARTERIAL ROADWAY CROSSING
3 CELL – 14' X (9' to 6') RCB
1. CULVERT CALCULATION SHEETS
2. CULVERT DRAWING

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

August 22, 2006

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Culvert Span (ft)	14.0
Culvert Rise (ft)	6.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.012
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	150.0
Invert Elevation at Downstream end of Culvert (ft)	10.0
Invert Elevation at Upstream end of Culvert (ft)	10.75
Culvert Slope (ft/ft)	0.005
Starting Flow Rate (cfs)	167.0
Incremental Flow Rate (cfs)	167.0
Ending Flow Rate (cfs)	1,002.0
Starting Tailwater Depth (ft)	1.0
Incremental Tailwater Depth (ft)	0.7
Ending Tailwater Depth (ft)	4.5

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
167.0	1.0	2.57	0.0	1.29	1.64	1.29	9.26
334.0	1.7	4.15	0.0	2.02	2.61	2.02	11.82
501.0	2.4	5.49	0.0	2.65	3.41	2.65	13.53
668.0	3.1	6.7	0.0	3.22	4.14	3.22	14.83
835.0	3.8	8.65	0.0	3.75	4.8	3.75	15.88
1,002.0	4.5	10.32	0.0	4.27	5.42	4.27	16.77

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

August 22, 2006

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Culvert Span (ft)	14.0
Culvert Rise (ft)	8.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.012
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	150.0
Invert Elevation at Downstream end of Culvert (ft)	10.0
Invert Elevation at Upstream end of Culvert (ft)	10.75
Culvert Slope (ft/ft)	0.005
Starting Flow Rate (cfs)	167.0
Incremental Flow Rate (cfs)	167.0
Ending Flow Rate (cfs)	1,002.0
Starting Tailwater Depth (ft)	1.0
Incremental Tailwater Depth (ft)	0.7
Ending Tailwater Depth (ft)	4.5

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
167.0	1.0	2.55	0.0	1.29	1.64	1.29	9.26
334.0	1.7	4.11	0.0	2.02	2.61	2.02	11.82
501.0	2.4	5.43	0.0	2.65	3.41	2.65	13.53
668.0	3.1	6.62	0.0	3.22	4.14	3.22	14.83
835.0	3.8	7.73	0.0	3.75	4.8	3.75	15.89
1,002.0	4.5	8.77	0.0	4.27	5.42	4.27	16.77

BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

August 22, 2006

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Culvert Span (ft)	14.0
Culvert Rise (ft)	9.0
FHWA Chart Number	8
FHWA Scale Number (Type of Culvert Entrance)	1
Manning's Roughness Coefficient (n-value)	0.012
Entrance Loss Coefficient of Culvert Opening	0.5
Culvert Length (ft)	150.0
Invert Elevation at Downstream end of Culvert (ft)	10.0
Invert Elevation at Upstream end of Culvert (ft)	10.75
Culvert Slope (ft/ft)	0.005
Starting Flow Rate (cfs)	167.0
Incremental Flow Rate (cfs)	167.0
Ending Flow Rate (cfs)	1,002.0
Starting Tailwater Depth (ft)	1.0
Incremental Tailwater Depth (ft)	0.7
Ending Tailwater Depth (ft)	4.5

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
167.0	1.0	2.54	0.0	1.29	1.64	1.29	9.27
334.0	1.7	4.09	0.0	2.02	2.61	2.02	11.82
501.0	2.4	5.41	0.0	2.65	3.41	2.65	13.53
668.0	3.1	6.6	0.0	3.22	4.14	3.22	14.83
835.0	3.8	7.69	0.0	3.75	4.8	3.75	15.89
1,002.0	4.5	8.73	0.0	4.27	5.42	4.27	16.77

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DRAINAGE MAPS