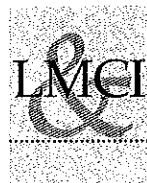


**MASTER DEVELOPMENT DRAINAGE PLAN
ROCKRIMMON VISTA FILING NO. 2
&
FINAL DRAINAGE REPORT
FOR
ROCKRIMMON VISTA FILING NO. 2, LOT 3**



**LAW & MARIOTTI
CONSULTANTS, INC.**
CIVIL ENGINEERING ■ LAND SURVEYING

619 N. Cascade Ave., Suite 206 Colorado Springs, CO 80903
719-442-1541 voice 719-442-1542 fax

**MASTER DEVELOPMENT DRAINAGE PLAN
ROCKRIMMON VISTA FILING NO. 2
&
FINAL DRAINAGE REPORT
FOR
ROCKRIMMON VISTA FILING NO. 2, LOT 3**

**July 31, 2000
December 20, 2000(rev)
April 4, 2001(rev)
May 15, 2001(rev)**

for:

**Concorde Capital Corporation
1340 East Broad Street
Columbus, OH 43205
(614) 253-9747**

Prepared by:

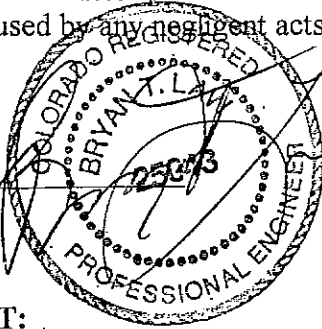
**Law & Mariotti Consultants, Inc.
619 North Cascade Avenue, Suite 206
Colorado Springs, CO 80903
(719) 442-1541**

LMCI PN 99-019

Rockrimmon Vista Filing No. 2

ENGINEERS 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/County 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.



Bryan T. Law, PE 25043 CO

DEVELOPERS STATEMENT:

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

Concorde Capital Corporation
Business Name

By: Phil C. Gunn 3-26-01

Title: Vice President

Address: 1349 East Broad
Columbus, OH 43205

CITY OF COLORADO SPRINGS ONLY:

Filed in accordance with Section 15-3-906 of the Code of the City of Colorado Springs, 1980, as amended.

For The A.B. Kuehls
City Engineer

6/18/01
Date

Conditions:

The developer/owner will be responsible for maintenance of all drainage facilities listed for this site (including the natural channels) until all proposed improvements per this MDDP are completed and accepted. The owner/developer is responsible for all permitting needed for this project.

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APPENDIX

Site Hydrologic and Hydraulic Calculations

FIRM/LOMR

Excerpt from Rockrimmon DBPS – channel recommendations

Existing Channel Conditions

Proposed Channel Conditions

Channel Plan and profile (Pocket)

Drainage Plan (Pocket)

**MDDP and FINAL DRAINAGE REPORT
FOR
ROCKRIMMON VISTA FILING NO. 2, LOT 3**

GENERAL LOCATION AND DESCRIPTION

Rockrimmon Vista Filing No. 2 is a proposed subdivision located in the east ½ of Section 13 and the west ½ of Section 18, Township 13 South, Range 66 West of the Sixth Principal Meridian in the City of Colorado Springs, County of El Paso, State of Colorado. More precisely, the parcel is bounded by Saddle Ridge Subdivision Filing No. 1, Rockrimmon Vista Filing No. 1 and unplatted land to the North, unplatted land to the East, South Rockrimmon Boulevard right-of-way to the South, and Saddle Ridge Subdivision Filing No. 1 to the West. The site lies within the Rockrimmon North Drainage Basin as designated by the City-County Drainage Basin Map, June 1985.

The 27.9 acre development is covered with native grasses and weeds, and occasional trees and shrubs. General topography at the site declines to the north to the Rockrimmon Floodway at moderate to severe slopes. Run-off from the site is directed easterly by the Rockrimmon Floodway located immediately North of the property. Review of the Soil Conservation Service Soil Survey indicates that Shaseville-Midway complex, hydrologic soil types "A" and "D" respectively, and Razor clay loam, hydrologic soil type "C" characteristics will be assumed across the entire site. The parcel is currently zoned PUD, Planned Urban Development, with no zoning change anticipated. The site lies within a hillside overlay district per the City Zoning Maps. The proposed development will consist of an apartment complex.

DRAINAGE BASINS AND SUB-BASINS

Rockrimmon Vista Filing No. 2 has been previously studied as part of the following Master Drainage Studies:

Hydrologic Engineering Study of the Rockrimmon North Drainage Basin, by United Western Engineers, March 1973.

Hydrologic Engineering Study of the Rockrimmon North and Rockrimmon South Drainage Basins, by Karcich and Weber, Inc., March 1967

Master Development Drainage Plan for Rockrimmon Vista Subdivision and Preliminary and Final Drainage Report and Plan, Rockrimmon Vista Subdivision Filing No.2, by Leigh Whitehead and Associates, Inc., January 1996.

Master Drainage Basin Study – Rockrimmon South Drainage Basin, by Karcich and Weber, Inc., October 1976.

Rockrimmon Drainage Basin Planning Study Alternative Analysis, by KLH Engineering, Inc., October 1990

Run-off from the site currently flows directly into the Rockrimmon Floodway located immediately North of the parcel. The Rockrimmon Floodway transports stormwater easterly to a box culvert under the intersection of Rockrimmon Boulevard and Delmonico Drive, under the Denver and Rio Grande Western Railroad, and under Interstate 25. The Floodway outfalls at Monument Creek located approximately one half mile due east from the site.

Run-off from surrounding properties has historically surfaced drained thorough the site to the Floodway, or has been transported via storm sewer with daylight points within the heart of the parcel. Concentrated flows from the storm sewers have entered the site at three locations. The flows discharge onto the property from 18" RCP and 24" RCP under South Rockrimmon Blvd. Off-site flows have been previously analyzed; however, an updated analysis using current City criteria has been done as a part of this Drainage Report. Off-site flows onto this property have been considered and drainage facilities adequately sized to safely convey run-off to the Rockrimmon Floodway. See attached drainage plan.

FLOODPLAIN STATEMENT

Small portions of Rockrimmon Vista Filing No.2 along the north property line lie within the 100-year Floodplain and Floodway as designated by the Federal Emergency Management Agency's Flood Insurance Rate Map, Community Panel Number 08041C0512 F, March 17, 1997. See Floodplain Map, Appendix.

DRAINAGE DESIGN CRITERIA

The criteria contained with the "City of Colorado Springs and El Paso County Drainage Criteria Manual" have been used to determine run-off rates and to analyze existing and proposed drainage facilities. The Rational Method has been used to analyze the 5-year and 100-year storm events. Portions of the site to be developed will use run-off composite coefficients of C_5 varying from 0.38 to 0.78 and C_{100} varying from 0.52 to 0.88. On hydrologic soil type "C", areas to be used as open areas, recreation areas, or to remain as historic will be analyzed with run-off coefficients of $C_5 = 0.30$ and $C_{100} = 0.45$.

Previous drainage studies done on Saddle Ridge Filings No. 1, 2, and 3 subdivisions located to the West and upstream of the site have also been considered:

Final Drainage Study – Saddle Ridge Filing No.1 and 2, by Costin Engineering Company, November 21, 1983.

Saddle Ridge Filing No.3 Final Drainage Report, by Leigh Whitehead and Associates, Inc., June 1994.

Run-off rates have been re-evaluated for all upstream basins draining through Rockrimmon Vista Filing No.2 to meet revised criteria for calculating run-off rates set forth in the latest revision of the City of Colorado Springs Drainage Criteria Manual.

DRAINAGE FACILITY DESIGN

Seven off-site drainage sub-basins, OS-1 through OS-7, and eleven on-site basins, A1 through I, have been established in this study to accurately evaluate stormwater flows traveling through the site to the Floodway.

OFF-SITE CONSIDERATIONS

Sub-basin OS-1 covers 2.98 acres in area and comprises the eastern half of View Point Senior Living Community. Calculated run-off rates for the 5-year and 100-year storm events are $Q_5 = 8$ cfs and $Q_{100} = 15$ cfs. Stormwater is directed to the right-of-way of South Rockrimmon Blvd. into sub-basin OS-6 by curb and gutter.

Sub-basin OS-2 is 2.12 acres in size and developed with The Ridge Apartment Complex on Bridgepoint Subdivision. Run-off is directed to the right-of-way of South Rockrimmon Blvd. into sub-basin OS-6. Calculated run-off rates are $Q_5 = 6$ cfs and $Q_{100} = 13$ cfs.

Sub-basin OS-3 covers 7.70 acres of the eastern side of The Ridge Apartment Complex. Concrete pans to a private grated sump inlet direct run-off within the sub-basin. Stormwater is then transported via a 24" RCP storm sewer under South Rockrimmon Blvd. and daylighting within Rockrimmon Vista Filing No. 2. Calculated run-off rates from the sub-basin are $Q_5 = 20$ cfs and $Q_{100} = 40$ cfs. The existing 24" RCP storm sewer under South Rockrimmon Blvd. does have the capacity to convey the flows from sub-basin OS-3 due to its flow line grade of 10.32% per the Final Drainage Plan for Rockrimmon Blvd. by Costin Engineering, July 12, 1983. The excessive stormwater velocities from the sewer have eroded away surrounding soil at the daylight point. A riprap pad called out in the Final Drainage Plan for Rockrimmon Blvd. has since been swept away. The problem of the excessive stormwater velocities will be eliminated at this point by continuation of the sewer through the site. The daylight point of the storm sewer is within on-site sub-basin A.

Sub-basin OS-4 is 5.48 acres in size and comprised the western half of the developed Rockrimmon Apartments Filing No. 1. Run-off is transported to a pair of 6' sump curb inlets by curb and gutter. An 18" RCP storm sewer transports the flows for the 5-year, $Q_5 = 16$ cfs, and the 100-year, $Q_{100} = 31$ cfs, under South Rockrimmon Blvd. to a manhole located within Rockrimmon Vista Filing No. 2. A 24" RCP connects the manhole to a daylight point on the site. A riprap pad at the daylight point called out in the Final Drainage Plan for Rockrimmon Blvd. no longer exists. This storm sewer will be extended through the proposed development.

Sub-basin OS-5 is 4.45 acres in size and comprises the eastern half of the developed Rockrimmon Apartments Filing No. 1. A pair of 4' flow-by curb inlets collects a portion of the stormwater. Approximately 4 cfs of run-off is collected by the inlets during the 5-year storm event and 8 cfs of run-off during the 100-year storm event. Total calculated

run-off from the sub-basin is $Q_5 = 13$ cfs and $Q_{100} = 25$ cfs. Stormwater not collected from the flow-by inlets enter South Rockrimmon Blvd. and sub-basin OS-7.

Sub-basin OS-6 covers approximately 6.22 acres in area and consists of part of South Rockrimmon Blvd. Calculated run-off rates for the 5-year and 100-year storm events are $Q_5 = 17$ cfs and $Q_{100} = 33$ cfs. Run-off flows to a sump area where a pair of 6' D-10-R inlets accepts the flow. At this point, run-off from sub-basins OS-1 and OS-2 have also been considered as Design Point 1. Run-off rates at this point are $Q_5 = 26$ cfs and $Q_{100} = 51$ cfs. An analysis on the existing inlets reveal that during the 5-year storm event, a maximum depth of 0.80' is reached and during the 100-year storm event, a depth of 1.26' is reached. An existing berm to the north of the inlets contains run-off within the sump area, which will prevent overtopping and avoid damage to the apartment complex below.

Sub-basin OS-7 is 1.80 acres in size and makes up a portion of South Rockrimmon Blvd. Calculated run-off rates from the sub-basin are $Q_5 = 5$ cfs for the 5-year storm event and $Q_{100} = 10$ cfs for the 100-year storm event. Run-off flows past a pair of 4' D-10-R flow-by curb inlets in Rockrimmon Blvd. Design Point 2 has been designated at these inlets and considers flow from sub-basins OS-5 and OS-6. Surface run-off rates at this point are calculated at $Q_5 = 14$ cfs and $Q_{100} = 27$ cfs. The 4' D-10-R inlets capture approximately 6 cfs during the 5-year storm and 8 cfs during the 100-year storm. The remaining stormwater flows to the east in the South Rockrimmon Blvd. right-of-way.

Rockrimmon Channel

The Rockrimmon DBPS Report by KLH Engineering, Inc., dated October 18, 1990, estimates the 100-year flow in the North Rockrimmon Floodway to be in a range between 2511 to 2742 cfs. A 5 year flow was not considered. For purposes of this report the 5 year flow is assumed to be 1097 cfs, 40% of the 100 year. The DBPS notes that the natural sandstone formations within the channel section is preventing all but minor erosion in isolated areas and that drops and outside bend erosion is necessary in some locations. CTL Thompson and the City regard this material as erodible and unstable over long periods. The report also recommends that drop structures be placed in such a way as to limit flow velocities to 3 fps. Our analysis shows the channel would have to be constructed to a 0.1% slope. This slope is impractical as it would require the entire reach to be reconstructed, thereby, placing it in conflict with the DBPS' intent of preserving existing conditions.

In order to minimize the impact to the natural stream channel, stabilization of the outside of an extreme bend with gabions along with 2 gabion drop structures located as shown. These types of improvements have successfully been installed on the same channel to the north.

Channel stabilization was designed using the Urban Drainage and Flood Control criteria with freeboard determined using criteria from the City of Colorado Springs and El Paso County Drainage Criteria Manual. Design details for the channel stabilization area are included in the Appendix.

The existing channel slope ranges from 1% to 4%. Analysis of existing conditions indicate a hydraulic jump occurs in the 4% section. The analysis assumed a normal depth, steady state flow boundary condition based on an existing 1% grade entering the study area. Two gabion drop structures are proposed to be installed in the 4% section of the channel. Portions of the channel will have to be reconstructed at the approaches and between the drops. The remaining channel is proposed to remain undisturbed. See attached plans and channel hydraulic sections. With the addition of the two drop structures and channel modifications the channel will be at a subcritical condition for the studied reach.

Final design of the drop structures shall be subject to geotechnical analysis and design recommendations for drop foundation.

ON-SITE SUB-BASIN CHARACTERISTICS

Sub-basin A-1 covers 6.82 acres of land making up a portion of the neighboring Saddle Ridge Subdivisions Filing No. 1 and 2 and some on-site area. The 5-year and 100-year storm events will produce developed flows of $Q_5 = 6.9$ cfs and $Q_{100} = 19.20$ cfs. Historic flows are $Q_5 = 6.9$ cfs and $Q_{100} = 19.2$ cfs. Run-off coefficients have been calculated to consider open space areas and proposed and existing development. Run-off from this area will enter a private D-9 inlet sump into a private 18" RCP and connect to the proposed 30" RCP public storm sewer under the private roadway. The public storm sewer will daylight at the Rockrimmon Floodway.

Concentrated public run-off flows from a 24" RCP from the developed Ridge Apartment Complex, sub-basin OS-3 daylights within the boundaries of sub-basin A. Instead of allowing the existing 24" RCP to daylight on the property, a manhole will be installed and the pipe tied into a proposed 30" RCP storm sewer system and connected to the Type 13 sump inlet in sub-basin C.

Sub-basin A-2 covers 3.91 acres of land within Rockrimmon Vista Filing No. 2. Run-off will surface flow by curb and gutter to a public storm sewer combination inlet at the low point in the private roadway of the development, as shown on the plan. Developed run-off rates are 9.8 cfs for the 5-year storm event and 20.3 cfs for the 100-year storm event.

Sub-basin B1 is 1.85 acres in size. Weighted run-off coefficients have been calculated to consider a significant area of open space. Developed run-off rates for the sub-basin are $Q_5 = 2.5$ cfs and $Q_{100} = 5.6$ cfs. Historic rates are $Q_5 = 1.9$ cfs and $Q_{100} = 4.9$ cfs. The developed flow will enter a Type 13 (S) sump inlet, into a private 18" RCP and connect to a proposed 42" public storm sewer out falling at the Rockrimmon Floodway.

Sub-basin B2 is 2.02 acres in size. Weighted run-off coefficients have been calculated to consider a significant area of open space. Developed run-off rates for the sub-basin are $Q_5 = 2.9$ cfs and $Q_{100} = 6.9$ cfs. Historic rates are $Q_5 = 2.2$ cfs and $Q_{100} = 6.1$ cfs. The developed flow will flow along a rock swale enter a Type 13 (S) sump inlet, into a 18"

RCP and connect to a proposed 42" public storm sewer out falling at the Rockrimmon Floodway.

Sub-basin C is approximately 2.53 acres in size. Developed run-off rates have been calculated at $Q_5 = 3.0$ cfs and $Q_{100} = 10.4$ cfs. Approximately one half of the flow will enter the Type 13 inlet sump at Design Point 6 and the remaining flow will enter the Type 13 inlet sump at Design Point 25 into a private 18" RCP and connect to a proposed 30" RCP public storm sewer. The maximum depth allowed at the inlet will be 0.5' during the 100-year storm event. Historic run-off rates have been calculated at $Q_5 = 2.6$ cfs and $Q_{100} = 7.7$ cfs.

Sub-basin D covers 1.32 acres of land with developed run-off rates of $Q_5 = 3.0$ cfs and $Q_{100} = 6.0$ cfs. Two Type 13 sump inlets will collect developed run-off. The maximum depth of 0.5' will be reached during the 100-year storm. The inlets will be connected to a proposed 42" RCP public storm sewer. Historic run-off rates for the basin are $Q_5 = 1.6$ cfs and $Q_{100} = 3.8$ cfs.

Concentrated run-off from the south side of Rockrimmon Blvd. daylights within sub-basin D through an existing 24" RCP. The existing 24" RCP storm sewer will be removed from its daylight point to the existing manhole. A proposed public 30" RCP will be realigned and installed to avoid conflicts with proposed buildings. The 30" RCP storm sewer will connect to the Type 13 sump inlet draining sub-basin D.

Sub-basin E is 1.75 acres in size. Run-off will flow to two Type 13 sump inlets. The run-off rates of $Q_5 = 5.0$ cfs and $Q_{100} = 9.0$ cfs will not exceed a maximum depth of 0.5' at the inlet. An 18" RCP private storm sewer will connect the inlet to a Type 13 inlet in sub-basin G.

Sub-basin F is 5.76 acres and will sheet flow directly into the Rockrimmon Floodway located to the north. Calculated developed run-off for the sub-basin is 8.8 cfs for the 5-year storm event and 21.7 cfs for the 100-year storm event.

Sub-basin G will drain to a Type 13 sump inlet. The 2.28 acre sub-basin will produce developed run-off rates of 6.3 cfs and 10.9 cfs for the 5-year and 100-year flows, respectively. Concentrated off-site run-off from sub-basins OS-5 and OS-7 enters the site within sub-basin G through an 18" RCP storm sewer. The existing 18" RCP will be removed, upgraded, and relocated to avoid conflicts with apartment units proposed at the site. The storm sewer will be realigned through the site to the manhole within sub-basin I and on to an out fall point at the Rockrimmon Floodway which dissipates onto the drop structure.

Sub-basin H covers 4.64 acres. Run-off will sheet flow and directly enter the Floodway located to the north. Developed run-off for the 5 and 100-year storm events have been calculated at $Q_5 = 7.6$ cfs and $Q_{100} = 16.0$ cfs.

Sub-basin I is 1.05 acres in size. A Type 13 sump inlet will collect run-off allowing a 1.0' depth at this point during the 100-year storm event. Developed flows at this point are $Q_5 = 3.6$ cfs and $Q_{100} = 6.3$ cfs. Run-off will be transported to the Rockrimmon Floodway via a private 18" RCP storm sewer and connected to a proposed 24" RCP storm sewer. The 24" storm sewer will daylight at a point along the north property line. Run-off will then enter the Rockrimmon Floodway and dissipate onto a drop structure.

All on-site public storm sewers will be located within a 30' drainage easement. The proposed drainage easements are shown on the Drainage Plan.

DRAINAGE FEES

Rockrimmon Vista Filing No. 2 is a 27.887-acre parcel of unplatted land located within the North Rockrimmon Drainage Basin as delineated by the City-County Drainage Map published by the City of Colorado Springs Planning Department, 1985. The developer is initially platting lot 3 only, which consists of 5.39 acres. Per the Drainage Fee Schedule distributed by the City of Colorado Springs Land Development Administration, dated 2001, the Drainage Fee for North Rockrimmon Drainage Basin is \$3,465.00/acre. The Drainage Fee due for lot 3 is calculated as follows:

$$5.39 \text{ acres} \times \$3,465/\text{acre} = \$18,676$$

No Bridge Fees or Pond Fees are required within the North Rockrimmon Drainage Basin.

The cost estimate of \$18,858 for the public drainage improvements at this site (see following page, lot 3) exceeds the fee required for the North Rockrimmon Drainage Basin of \$18,676. The difference in the cost of construction and Drainage Basin Fees is:

Estimated Construction Costs:	\$18,858
Drainage Fees:	\$18,676
Estimated Credit to Developer:	\$ 182

Per the City of Colorado Springs Criteria, as outlined in the "Subdivision Policy Manual and Public Works Design Manual" and the "Drainage Criteria Manual," when the cost estimate of public drainage facilities is greater than the Drainage Fees, no cash fees are to be paid at the time of platting. Actual construction costs in excess of the required Drainage Fees are eligible for credit within the same drainage basin or reimbursement as funds become available.

Per the agreement to be provided under separate cover, a parcel of land will be conveyed to the City for use as a regional detention facility.

Engineer's Cost Estimate

**For Rockrimmon Vista Filing, No. 2
Public Drainage Improvements**

<u>Item</u>	<u>Unit Cost</u>	<u>Quantity</u>	<u>Total Cost</u>
18" RCP	\$ 28.00/lf	575 lf	\$ 16,100.00
24" RCP	36.00/lf	640 lf	23,040.00
30" RCP	42.00/lf	900 lf	37,800.00
42" RCP	62.00/lf	800 lf	49,600.00
48" RCP	80.00/lf	405 lf	32,400.00
Manhole	2,000.00/ea.	12	24,000.00
Type 13 Inlet	750.00/ea.	4	3,000.00
10' D-10-R Inlet	2,000.00/ea.	2	4,000.00
Gabion Drop Structure	35,000.00/ea.	2 ea.	70,000.00
Channel Earthwork	\$50.00/lf	500 lf	<u>25,000.00</u>
		Subtotal:	\$284,940.00
		5% Contingency:	<u>14,247.00</u>
		GRAND TOTAL:	\$299,187.00

For Rockrimmon Vista Filing No. 2, Lot 3

<u>Item</u>	<u>Unit Cost</u>	<u>Quantity</u>	<u>Total Cost</u>
30" RCP	42.00/lf	380lf	15,960.00
Manhole	2,000.00/ea.	1	2,000.00
		Subtotal:	\$17,960.00
		5% Contingency:	<u>898.00</u>
		LOT 3 GRAND TOTAL:	\$18,858.00

NOTE: Law & Mariotti Consultants, Inc. cannot and does not guarantee that the construction costs will not vary from these opinions of probable construction costs. These opinions represent our best judgment as a design professional familiar with the construction industry and this development.

**Engineer's Cost Estimate
For
Private Drainage Improvements
Rockrimmon Vista Filing No. 2**

<u>Item</u>	<u>Unit Cost</u>	<u>Quantity</u>	<u>Total Cost</u>
18" RCP	\$ 28.00/lf	1560 lf	\$ 43,680.00
24" RCP	36.00/lf	110 lf	3,960.00
Rock Swale	25.00/cy	130 cy	3,250.00
Type 13 Inlet	750.00/ea.	8	6,000.00
D-9	1,500.00/ea.	1	1,500.00
4' D-10-R	2,000.00/ea	1	2000.00
Temp/ Interim Ph.1 rip-rap	25.00/cy	150	3,750.00
		Subtotal:	\$64,140.00
		5% Contingency:	<u>3,207.00</u>
		GRAND TOTAL:	\$67,347.00

NOTE: Law & Mariotti Consultants, Inc. cannot and does not guarantee that the construction costs will not vary from these opinions of probable construction costs. These opinions represent our best judgment as a design professional familiar with the construction industry and this development.

REFERENCES

1. City of Colorado Springs and El Paso County Drainage Criteria Manual, City of Colorado Springs.
2. City of Colorado Springs Planning Commission Development Plan Comments, File DS DP 83-209-A3(95), by the City of Colorado Springs Planning Department, December 5, 1995.
3. City of Colorado Springs Zoning Map, by the City of Colorado Springs Department of Planning, October 21, 1995.
4. Final Drainage Study – Saddle Ridge Filing No. 1 and 2, Costin Engineering Company, November 21, 1983.
5. Flood Insurance Rate Map, Community Panel Number 080060 0161D, Federal Emergency Management Agency, Revised August 16, 1995.
6. Hydrologic Engineering Study of the Rockrimmon North and Rockrimmon South Drainage Basins, Karcich and Weber, Inc., March 1967.
7. Hydrologic Engineering Study of the Rockrimmon North Drainage Basin, United Western Engineers, March 1973.
8. Hydrologic Engineering Study – Master Drainage Basin Study – Rockrimmon South Drainage Basin, Karcich and Weber, Inc., October 1976.
9. Master Development Drainage Plan for Rockrimmon Vista Subdivision and Preliminary and Final Drainage Report and Plan, Rockrimmon Vista Subdivision Filing No. 2, by Leigh-Whitehead and Associates, January 1996.
10. Pikeview, CO 7.5 Minute Quadrangle, United States Geological Survey, Revised 1994.
11. Rockrimmon Drainage Basin Planning Study Alternative Analysis, by KLH Engineering, Inc., October 18, 1990.
12. Rockrimmon Apartments Drainage Report, by United Planning and Engineering, February 10, 1984.
13. Saddle Ridge Subdivision Filing No. 3 Final Drainage Report, Leigh-Whitehead and Associates, Inc., June 1994.
14. Soil Survey of El Paso County Area, Colorado, United States Department of Agriculture.

APPENDICES

**ONSITE
HYDROLOGIC & HYDRAULIC
CALCULATIONS**

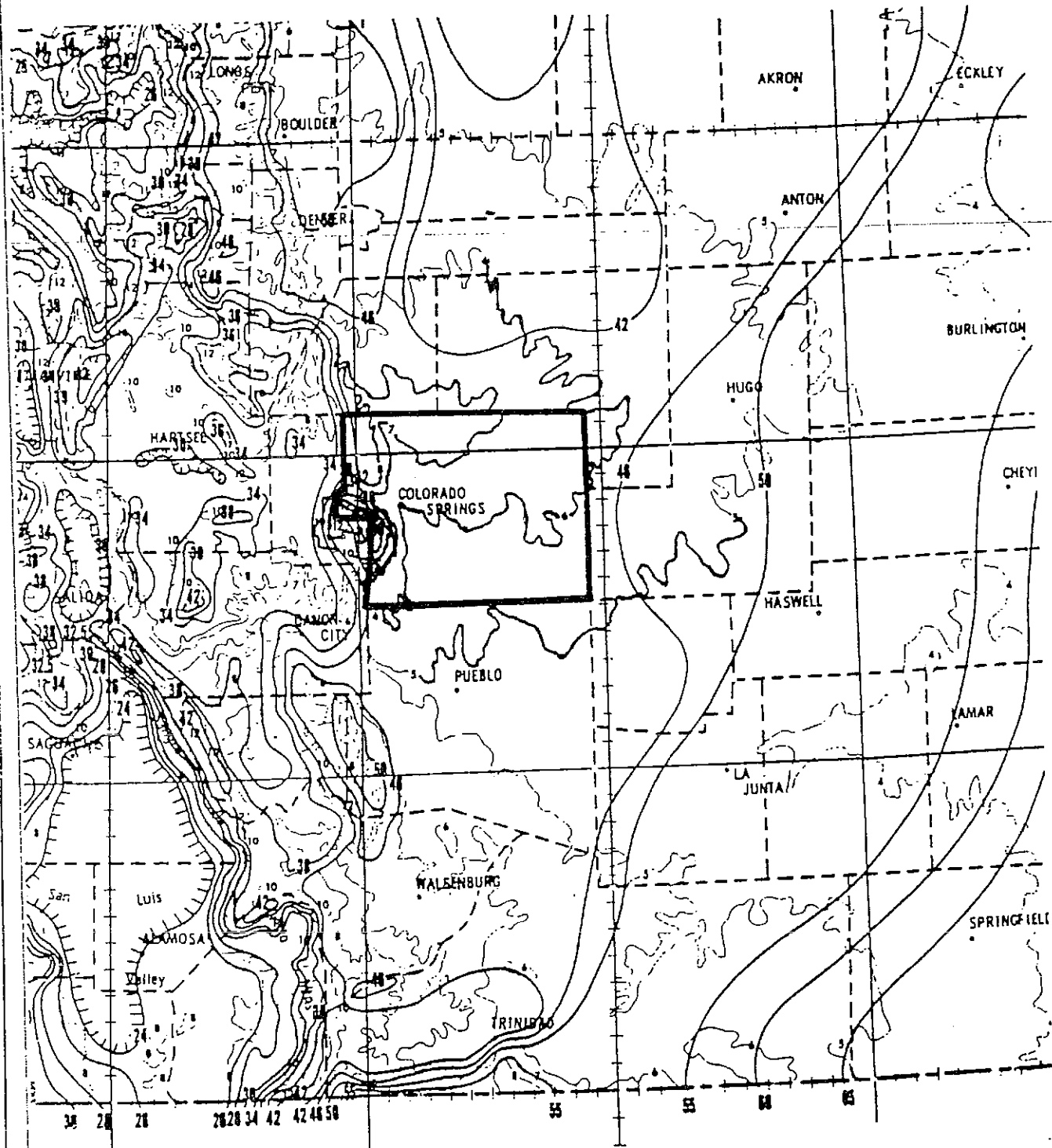
TABLE 5-1

RECOMMENDED AVERAGE RUNOFF COEFFICIENTS AND PERCENT IMPERVIOUS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	"C" FREQUENCY			
		10		100	
		A&B*	C&D*	A&B*	C&D*
Business					
Commercial Areas	95	0.90	0.90	0.90	0.90
Neighborhood Areas	70	0.75	0.75	0.80	0.80
Residential					
1/8 Acre or less	65	0.60	0.70	0.70	0.80
1/4 Acre	40	0.50	0.60	0.60	0.70
1/3 Acre	30	0.40	0.50	0.55	0.60
1/2 Acre	25	0.35	0.45	0.45	0.55
1 Acre	20	0.30	0.40	0.40	0.50
Industrial					
Light Areas	80	0.70	0.70	0.80	0.80
Heavy Areas	90	0.80	0.80	0.90	0.90
Parks and Cemeteries	7	0.30	0.35	0.55	0.60
Playgrounds	13	0.30	0.35	0.60	0.65
Railroad Yard Areas	40	0.50	0.55	0.60	0.65
Undeveloped Areas					
Historic Flow Analysis- Greenbelts, Agricultural	2	0.15	0.25	0.20	0.30
Pasture/Meadow	0	0.25	0.30	0.35	0.45
Forest	0	0.10	0.15	0.15	0.20
Exposed Rock	100	0.90	0.90	0.95	0.95
Offsite Flow Analysis (when land use not defined)	45	0.55	0.60	0.65	0.70
Streets					
Paved	100	0.90	0.90	0.95	0.95
Gravel	80	0.80	0.80	0.85	0.85
Drive and Walks	100	0.90	0.90	0.95	0.95
Roofs	90	0.90	0.90	0.95	0.95
Lawns	0	0.25	0.30	0.35	0.45

* Hydrologic Soil Group

9/30/90



NOAA ATLAS 2, Volume III
 Prepared by U.S. Department of Commerce
 National Oceanic and Atmospheric Administration
 National Weather Service, Office of Hydrology
 Prepared for U.S. Department of Agriculture,
 Soil Conservation Service, Engineering Division

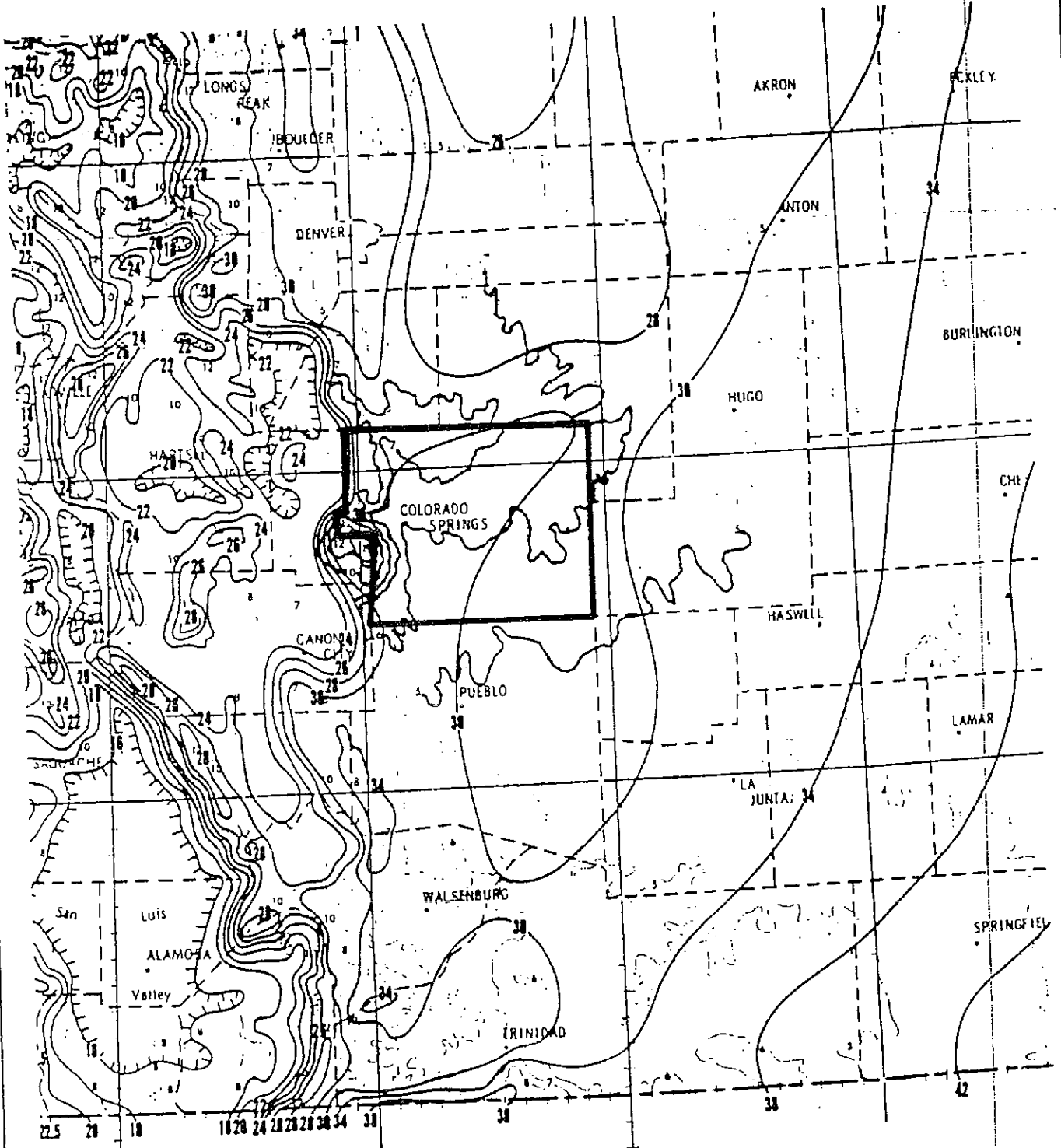
ISOPLUVIALS OF 100-YR 24-HR PRECIPITATION
 IN TENTHS OF AN INCH



HDR Infrastructure, Inc.
 A Centerra Company

The City of Colorado Springs / El Paso County
 Drainage Criteria Manual

Date	OCT. 1987
Figure	5-4e



NOAA ATLAS 2, Volume III
 Prepared by U.S. Department of Commerce
 National Oceanic and Atmospheric Administration
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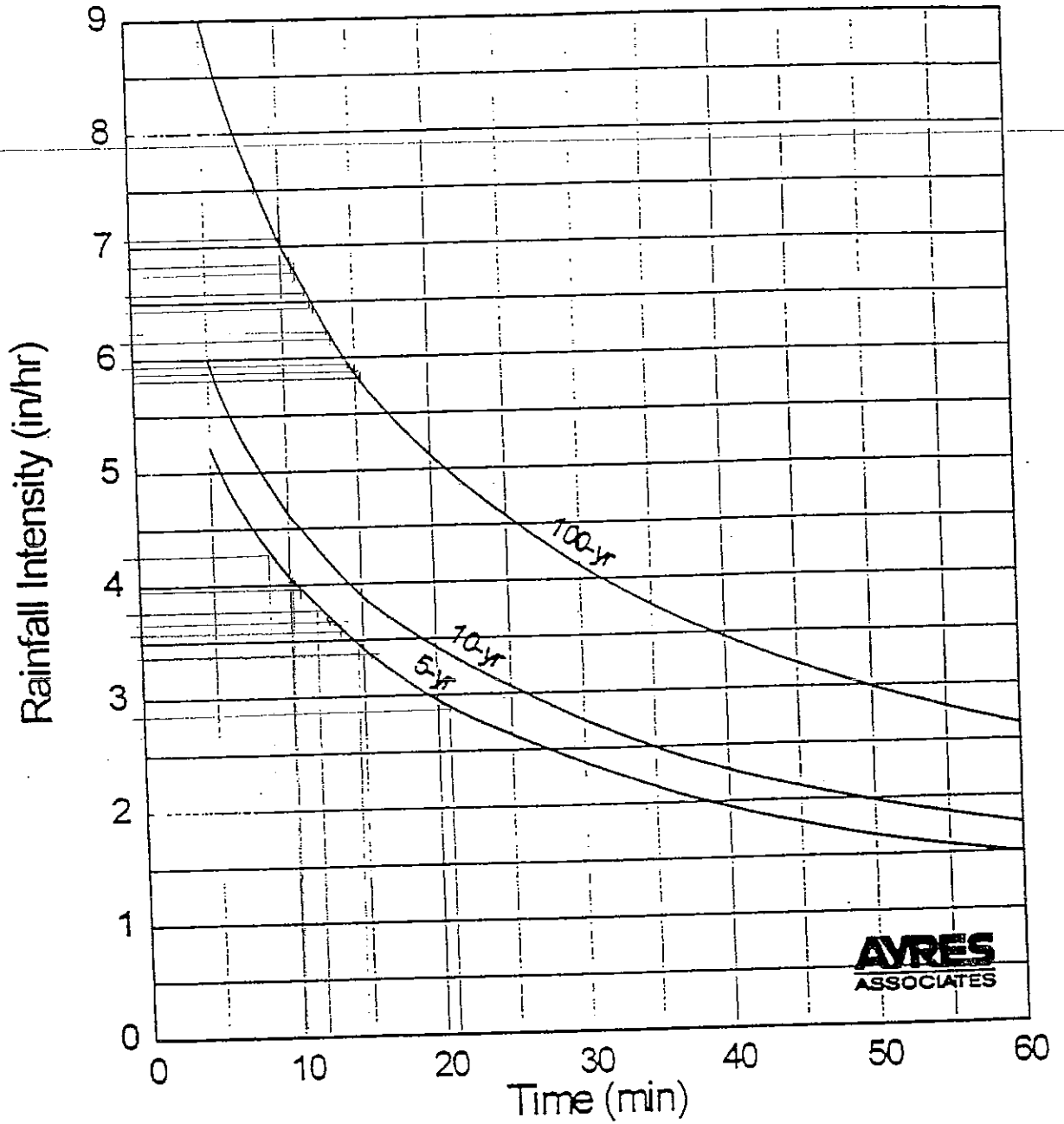
ISOPLUVIALS OF 10-YR 24-HR PRECIPITATION
 IN TENTHS OF AN INCH

The City of Colorado Springs / El Paso County
 Drainage Criteria Manual

Date
 OCT. 1987
 Figure
 5-4d



HDR Infrastructure, Inc.
 A Centerra Company



Interim Release October 12, 1994 , Rainfall Intensity Curves
 City Of Colorado Springs Drainage Criteria Manual

Rational Method

Given Input Data:

Description Rockrimmon Vista, 100yr storm

Area Description	Area acres	Coef	Tc min	Intensity in/hr	Flow cfs
A1-100YR HIST	6.8200	0.4500	13.6140	6.2500	19.1813
A1-100YR DEV	6.8200	0.4500	13.6140	6.2500	19.1813
C-100YR HIST	2.5300	0.4500	11.2800	6.7500	7.6849
C -100YR DEV	2.5300	0.5469	7.8840	7.5000	10.3774
D 100YR HIST	1.3200	0.4500	12.1345	6.4000	3.8016
D -100YR DEV	1.3200	0.6506	9.9301	7.0000	6.0115
A2+B1&2100HIST	7.7800	0.4500	15.1132	5.8000	20.3058
A2+B1&2100DEV	7.7800	0.6669	15.3813	5.7500	29.8316
E 100YR HIST	1.7500	0.4500	10.9555	6.8000	5.3550
E 100YR DEV	1.7500	0.8243	13.3509	6.2500	9.0156
G 100YR HIST	2.2800	0.4500	9.9756	7.1000	7.2846
G 100YR DEV	2.2800	0.8338	15.4702	5.7500	10.9308
I 100YR HIST	1.0500	0.4500	11.8363	6.6000	3.1185
I 100YR DEV	1.0500	0.8786	10.3213	6.8000	6.2730
H 100YR HIST	4.6400	0.4500	13.7771	6.2000	12.9456
H 100YR DEV	4.6400	0.5847	14.5797	5.9000	16.0067
B1 100YR HIST	1.8500	0.4500	14.7469	5.8500	4.8701
B1 100YR DEV	1.8500	0.5176	14.7469	5.8500	5.6014
B2 100 YR HIST	2.0200	0.4500	10.9149	6.7500	6.1357
B2 100 YR DEV	2.0200	0.5252	12.2580	6.5000	6.8962
A2 100 YR HIST	3.9100	0.4500	11.6453	6.7000	11.7887
A2 100YR DEV	3.9100	0.7697	10.8605	6.7500	20.3141
F 100 YR HIST	5.7600	0.4500	14.1979	6.9000	17.8848
F 100 YR DEV	5.7600	0.5455	14.1979	6.9000	21.6804

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
2 E-10-ROAD	0.5000	0.9500
LANDSCAP	0.5000	0.4500
UNDEV	1.5800	0.4500
Total Area	-----> 2.5800	0.5469 <----- Weighted Coefficient

***** Subarea Name: D 100YR HIST, Row: 5 *****

Computed Sheet flow time> 0.1973 hrs

Computed Shallow flow time> 0.0050 hrs

Total Time of Concentration> 0.2022 hrs

***** Subarea Name: D -100YR DEV, Row: 6 *****

Computed Sheet flow time> 0.1599 hrs

Computed Shallow flow time> 0.0056 hrs

Total Time of Concentration> 0.1655 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
E-5-ROAD	0.6700	0.9500
LANDSCAPING	1.0000	0.4500
Total Area	-----> 1.6700	0.6506 <----- Weighted Coefficient

***** Subarea Name: A2+B1&2100HIST, Row: 7 *****

Computed Sheet flow time> 0.2320 hrs

Computed Shallow flow time> 0.0199 hrs

Total Time of Concentration> 0.2519 hrs

***** Subarea Name: A2+B1&2100DEV, Row: 8 *****

Computed Sheet flow time> 0.2320 hrs

Computed Shallow flow time> 0.0243 hrs

Total Time of Concentration> 0.2564 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient	
BLDGS-ROADS	3.5000	0.9500	
LANDSCAP/UNDEV	4.5700	0.4500	
Total Area	-----> 8.0700	0.6669	<----- Weighted Coefficient

***** Subarea Name: E 100YR HIST, Row: 9 *****

Computed Sheet flow time> 0.1608 hrs

Computed Shallow flow time> 0.0218 hrs

Total Time of Concentration> 0.1826 hrs

***** Subarea Name: E 100YR DEV, Row: 10 *****

Computed Sheet flow time> 0.1881 hrs

Computed Shallow flow time> 0.0344 hrs

Total Time of Concentration> 0.2225 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BLDGS	1.3100	0.9500
LANDSCAPING	0.4400	0.4500
Total Area	----> 1.7500	0.8243 <----- Weighted Coefficient

***** Subarea Name: G 100YR HIST, Row: 11 *****

Computed Sheet flow time> 0.1608 hrs

Computed Shallow flow time> 0.0054 hrs

Total Time of Concentration> 0.1663 hrs

***** Subarea Name: G 100YR DEV, Row: 12 *****

Computed Sheet flow time> 0.2482 hrs

Computed Shallow flow time> 0.0097 hrs

Total Time of Concentration> 0.2578 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BLDGS	1.7500	0.9500
LANDSCAP	0.5300	0.4500
Total Area	----> 2.2800	0.8338 <----- Weighted Coefficient

***** Subarea Name: I 100YR HIST, Row: 13 *****

Computed Sheet flow time> 0.1973 hrs

Total Time of Concentration> 0.1973 hrs

***** Subarea Name: I 100YR DEV, Row: 14 *****

Computed Sheet flow time> 0.1720 hrs

Total Time of Concentration> 0.1720 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient	
BLDG-ROADS	0.9000	0.9500	
LANDSCAPING	0.1500	0.4500	
Total Area	----> 1.0500	0.8786	<---- Weighted Coefficient

***** Subarea Name: H 100YR HIST, Row: 15 *****

Computed Sheet flow time> 0.2122 hrs

Computed Shallow flow time> 0.0174 hrs

Total Time of Concentration> 0.2296 hrs

***** Subarea Name: H 100YR DEV, Row: 16 *****

Computed Sheet flow time> 0.2122 hrs

Computed Shallow flow time> 0.0308 hrs

Total Time of Concentration> 0.2430 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient	
BLDG	1.2500	0.9500	
LANDSCAPING	3.3900	0.4500	

Total Area ----> 4.6400 0.5847 <---- Weighted Coefficient

***** Subarea Name: B1 100YR HIST, Row: 17 *****

Computed Sheet flow time> 0.2080 hrs

Computed Shallow flow time> 0.0377 hrs

Total Time of Concentration> 0.2458 hrs

***** Subarea Name: B1 100YR DEV, Row: 18 *****

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BLDG	0.2500	0.9500
LANDSCAPING	1.6000	0.4500
Total Area ---->	1.8500	0.5176 <---- Weighted Coefficient

***** Subarea Name: B2 100 YR HIST, Row: 19 *****

Computed Sheet flow time> 0.1758 hrs

Computed Shallow flow time> 0.0061 hrs

Total Time of Concentration> 0.1819 hrs

***** Subarea Name: B2 100 YR DEV, Row: 20 *****

Computed Sheet flow time> 0.1973 hrs

Computed Shallow flow time> 0.0070 hrs

Total Time of Concentration> 0.2043 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BLDGS	0.3400	0.9500
UNDEV	1.9200	0.4500
Total Area	-----> 2.2600	0.5252 <----- Weighted Coefficient

***** Subarea Name: A2 100 YR HIST, Row: 21 *****

Computed Sheet flow time> 0.1758 hrs

Computed Shallow flow time> 0.0183 hrs

Total Time of Concentration> 0.1941 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BLDGS/ROADS	2.5000	0.9500
UNPAVED	1.4500	0.4500
Total Area	-----> 3.9500	0.7665 <----- Weighted Coefficient

***** Subarea Name: A2 100YR DEV, Row: 22 *****

Computed Sheet flow time> 0.1599 hrs

Computed Shallow flow time> 0.0211 hrs

Total Time of Concentration> 0.1810 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BLDGS	2.5000	0.9500
UNPAVED	1.4100	0.4500
Total Area	-----> 3.9100	0.7697 <----- Weighted Coefficient

***** Subarea Name: F 100 YR HIST, Row: 23 *****

Computed Sheet flow time> 0.1973 hrs

Computed Shallow flow time> 0.0394 hrs

Total Time of Concentration> 0.2366 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BLDGS/PARKING	1.1000	0.9500
UNDEV	4.6600	0.4500
Total Area ----->	5.7600	0.5455 <----- Weighted Coefficient

Support Data:

***** Subarea Name: A1-100YR HIST, Row: 1 *****

Computed Sheet flow time> 0.1855 hrs

Computed Shallow flow time> 0.0414 hrs

Total Time of Concentration> 0.2269 hrs

***** Subarea Name: C-100YR HIST, Row: 3 *****

Computed Sheet flow time> 0.1758 hrs

Computed Shallow flow time> 0.0122 hrs

Total Time of Concentration> 0.1880 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient	
2 E-10	320.0000	0.9000	
LANDSCAPING	320.0000	0.2500	
UNIMPROVED	1024.0000	0.2500	
Total Area	-----> 1664.0000	0.3750	<----- Weighted Coefficient

***** Subarea Name: C -100YR DEV, Row: 4 *****

Computed Sheet flow time> 0.1192 hrs

Computed Shallow flow time> 0.0122 hrs

Total Time of Concentration> 0.1314 hrs

Rational Method

Given Input Data:

DescriptionRockrimmon Vista, 100yr storm

Area Description	Area acres	Coef	Tc hours	Intensity in/hr	Flow cfs
A1-100YR HIST	6.8200	0.4500	0.2269	6.2500	19.1813
A1-100YR DEV	6.8200	0.4500	0.2269	6.2500	19.1813
C-100YR HIST	2.5300	0.4500	0.1880	6.7500	7.6849
C-100YR DEV	2.5300	0.5469	0.1314	7.5000	10.3774
D 100YR HIST	1.3200	0.4500	0.2022	6.4000	3.8016
D-100YR DEV	1.3200	0.6506	0.1655	7.0000	6.0115
A2+B1&2100HIST	7.7800	0.4500	0.2519	5.8000	20.3058
A2+B1&2100DEV	7.7800	0.6669	0.2564	5.7500	29.8316
E 100YR HIST	1.7500	0.4500	0.1826	6.8000	5.3550
E 100YR DEV	1.7500	0.8243	0.2225	6.2500	9.0156
G 100YR HIST	2.2800	0.4500	0.1663	7.1000	7.2846
G 100YR DEV	2.2800	0.8338	0.2578	5.7500	10.9308
I 100YR HIST	1.0500	0.4500	0.1973	6.6000	3.1185
I 100YR DEV	1.0500	0.8786	0.1720	6.8000	6.2730
H 100YR HIST	4.6400	0.4500	0.2296	6.2000	12.9456
H 100YR DEV	4.6400	0.5847	0.2430	5.9000	16.0067
B1 100YR HIST	1.8500	0.4500	0.2458	5.8500	4.8701
B1 100YR DEV	1.8500	0.5176	0.2458	5.8500	5.6014
B2 100 YR HIST	2.0200	0.4500	0.1819	6.7500	6.1357
B2 100 YR DEV	2.0200	0.5252	0.2043	6.5000	6.8962
A2 100 YR HIST	3.9100	0.4500	0.1941	6.7000	11.7887
A2 100YR DEV	3.9100	0.7697	0.1810	6.7500	20.3141
F 100 YR HIST	5.7600	0.4500	0.2366	6.9000	17.8848
F 100 YR DEV	5.7600	0.5455	0.2366	6.9000	21.6804

Rational Method

Given Input Data:

Description rockrimmon vista, 5 yr storm

Area Description	Area acres	Coef	Tc hours	Intensity in/hr	Flow cfs
A1-5YR HIST	6.8200	0.3000	0.2747	3.3500	6.8541
A1-5YR DEV	6.8200	0.3000	0.2747	3.3500	6.8541
C-5YR HIST	2.5300	0.3000	0.2455	3.4500	2.6185
C -5YR DEV	2.5300	0.4163	0.3519	2.8500	3.0016
D -5YR HIST	1.3200	0.3000	0.1819	3.9500	1.5642
D -5YR DEV	1.3200	0.5407	0.1472	4.2500	3.0334
A2+B1&2 5 HIST	7.7800	0.3000	0.1968	3.8000	8.8692
A2+B1&2 5 DEV	7.7800	0.5618	0.2324	3.6000	15.7362
E 5YR HIST	1.7500	0.3000	0.2214	3.6500	1.9162
E 5YR DEV	1.7500	0.7800	0.2135	3.6800	5.0232
G 5YR HIST	2.2800	0.3000	0.1884	3.9700	2.7155
G 5YR DEV	2.2800	0.7605	0.2210	3.6500	6.3291
I 5YR HIST	1.0500	0.3000	0.1713	4.0000	1.2600
I 5YR DEV	1.0500	0.8143	0.1472	4.2500	3.6338
H 5YR HIST	4.6400	0.3000	0.2615	3.3500	4.6632
H 5YR DEV	4.6400	0.4552	0.2323	3.6000	7.6032
B1 5YR HIST	1.8500	0.3000	0.2404	3.4800	1.9314
B1 5YR DEV	1.8500	0.3811	0.2404	3.4800	2.4534
B2 5 YR HIST	2.0200	0.3000	0.2178	3.7000	2.2422
B2 5YR DEV	2.0200	0.3903	0.2178	3.7000	2.9168
A2·5 YR HIST	3.9100	0.3000	0.2227	3.6500	4.2814
A2 5YR DEV	3.9100	0.6836	0.2211	3.6500	9.7564
F 5YR HIST	5.7600	0.3000	0.2178	3.7000	6.3936
F 5YR DEV	5.7600	0.4146	0.2188	3.6800	8.7878

Rational Method

Given Input Data:

Description rockrimmon vista, 5 yr storm

Area Description	Area acres	Coef	Tc min	Intensity in/hr	Flow cfs
A1-5YR HIST	6.8200	0.3000	16.4801	3.3500	6.8541
A1-5YR DEV	6.8200	0.3000	16.4801	3.3500	6.8541
C-5YR HIST	2.5300	0.3000	14.7300	3.4500	2.6185
C-5YR DEV	2.5300	0.4163	21.1158	2.8500	3.0016
D-5YR HIST	1.3200	0.3000	10.9119	3.9500	1.5642
D-5YR DEV	1.3200	0.5407	8.8301	4.2500	3.0334
A2+B1&2 5 HIST	7.7800	0.3000	11.8065	3.8000	8.8692
A2+B1&2 5 DEV	7.7800	0.5618	13.9435	3.6000	15.7362
E 5YR HIST	1.7500	0.3000	13.2854	3.6500	1.9162
E 5YR DEV	1.7500	0.7800	12.8093	3.6800	5.0232
G 5YR HIST	2.2800	0.3000	11.3011	3.9700	2.7155
G 5YR DEV	2.2800	0.7605	13.2621	3.6500	6.3291
I 5YR HIST	1.0500	0.3000	10.2772	4.0000	1.2600
I 5YR DEV	1.0500	0.8143	8.8301	4.2500	3.6338
H 5YR HIST	4.6400	0.3000	15.6918	3.3500	4.6632
H 5YR DEV	4.6400	0.4552	13.9398	3.6000	7.6032
B1 5YR HIST	1.8500	0.3000	14.4266	3.4800	1.9314
B1 5YR DEV	1.8500	0.3811	14.4266	3.4800	2.4534
B2 5 YR HIST	2.0200	0.3000	13.0669	3.7000	2.2422
B2 5YR DEV	2.0200	0.3903	13.0669	3.7000	2.9168
A2 5 YR HIST	3.9100	0.3000	13.3591	3.6500	4.2814
A2 5YR DEV	3.9100	0.6836	13.2650	3.6500	9.7564
F 5YR HIST	5.7600	0.3000	13.0669	3.7000	6.3936
F 5YR DEV	5.7600	0.4146	13.1294	3.6800	8.7878

Computed Sheet flow time> 0.2080 hrs

Computed Shallow flow time> 0.0097 hrs

Total Time of Concentration> 0.2178 hrs

***** Subarea Name: F 5YR DEV, Row: 24 *****

Computed Sheet flow time> 0.2042 hrs

Computed Shallow flow time> 0.0146 hrs

Total Time of Concentration> 0.2188 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient	
BLDGS/PARKING	1.1000	0.9000	
UNDEV	4.6600	0.3000	
Total Area	-----> 5.7600	0.4146	<----- Weighted Coefficient

Total Time of Concentration> 0.2178 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BUILDING	0.3400	0.9000
UNDEV	1.9200	0.3000
Total Area	-----> 2.2600	0.3903 <----- Weighted Coefficient

***** Subarea Name: A2 5 YR HIST, Row: 21 *****

Computed Sheet flow time> 0.2080 hrs

Computed Shallow flow time> 0.0146 hrs

Total Time of Concentration> 0.2227 hrs

***** Subarea Name: A2 5YR DEV, Row: 22 *****

Computed Sheet flow time> 0.2042 hrs

Computed Shallow flow time> 0.0169 hrs

Total Time of Concentration> 0.2211 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BLDGS/ROADS	2.5000	0.9000
UNPAVED	1.4100	0.3000
Total Area	-----> 3.9100	0.6836 <----- Weighted Coefficient

***** Subarea Name: F 5YR HIST, Row: 23 *****

Description	Area (ac)	Coefficient
BLDG	1.2000	0.9000
LANDSCAPING	3.4400	0.3000
Total Area	-----> 4.6400	0.4552 <----- Weighted Coefficient

***** Subarea Name: B1 5YR HIST, Row: 17 *****

Computed Sheet flow time> 0.2334 hrs

Computed Shallow flow time> 0.0070 hrs

Total Time of Concentration> 0.2404 hrs

***** Subarea Name: B1 5YR DEV, Row: 18 *****

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BLDG	0.2500	0.9000
LANDSCAPING	1.6000	0.3000
Total Area	-----> 1.8500	0.3811 <----- Weighted Coefficient

***** Subarea Name: B2 5 YR HIST , Row: 19 *****

Computed Sheet flow time> 0.2080 hrs

Computed Shallow flow time> 0.0097 hrs

Total Time of Concentration> 0.2178 hrs

***** Subarea Name: B2 5YR DEV, Row: 20 *****

Computed Sheet flow time> 0.2080 hrs

Computed Shallow flow time> 0.0097 hrs

Total Time of Concentration> 0.1713 hrs

***** Subarea Name: I 5YR DEV, Row: 14 *****

Computed Sheet flow time> 0.1411 hrs

Computed Shallow flow time> 0.0061 hrs

Total Time of Concentration> 0.1472 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient	
BLDG-ROADS	0.9000	0.9000	
LANDSCAPING	0.1500	0.3000	
Total Area	-----> 1.0500	0.8143	<----- Weighted Coefficient

***** Subarea Name: H 5YR HIST, Row: 15 *****

Computed Sheet flow time> 0.2334 hrs

Computed Shallow flow time> 0.0281 hrs

Total Time of Concentration> 0.2615 hrs

***** Subarea Name: H 5YR DEV, Row: 16 *****

Computed Sheet flow time> 0.2042 hrs

Computed Shallow flow time> 0.0281 hrs

Total Time of Concentration> 0.2323 hrs

Composite Runoff Coefficient Calculator

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BLDGS	1.4000	0.9000
LANDSCAPING	0.3500	0.3000
Total Area	-----> 1.7500	0.7800 <----- Weighted Coefficient

***** Subarea Name: G 5YR HIST, Row: 11 *****

Computed Sheet flow time> 0.1832 hrs

Computed Shallow flow time> 0.0052 hrs

Total Time of Concentration> 0.1884 hrs

***** Subarea Name: G 5YR DEV, Row: 12 *****

Computed Sheet flow time> 0.2089 hrs

Computed Shallow flow time> 0.0122 hrs

Total Time of Concentration> 0.2210 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BLDGS	1.7500	0.9000
LANDSCAP	0.5300	0.3000
Total Area	-----> 2.2800	0.7605 <----- Weighted Coefficient

***** Subarea Name: I 5YR HIST, Row: 13 *****

Computed Sheet flow time> 0.1663 hrs

Computed Shallow flow time> 0.0050 hrs

Total Time of Concentration> 0.1968 hrs

***** Subarea Name: A2+B1&2 5 DEV, Row: 8 *****

Computed Sheet flow time> 0.2080 hrs

Computed Shallow flow time> 0.0243 hrs

Total Time of Concentration> 0.2324 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
BLDGS-ROADS	3.5000	0.9000
LANDSCAP/UNDEV	4.5200	0.3000
Total Area	8.0200	0.5618 <----- Weighted Coefficient

***** Subarea Name: E 5YR HIST, Row: 9 *****

Computed Sheet flow time> 0.1985 hrs

Computed Shallow flow time> 0.0230 hrs

Total Time of Concentration> 0.2214 hrs

***** Subarea Name: E 5YR DEV, Row: 10 *****

Computed Sheet flow time> 0.1862 hrs

Computed Shallow flow time> 0.0273 hrs

Total Time of Concentration> 0.2135 hrs

Support Data:

***** Subarea Name: A1-5YR HIST, Row: 1 *****

Computed Sheet flow time> 0.2333 hrs

Computed Shallow flow time> 0.0414 hrs

Total Time of Concentration> 0.2747 hrs

***** Subarea Name: C-5YR HIST, Row: 3 *****

Computed Sheet flow time> 0.2333 hrs

Computed Shallow flow time> 0.0122 hrs

Total Time of Concentration> 0.2455 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient	
2 E-10	320.0000	0.9000	
LANDSCAPING	320.0000	0.2500	
UNIMPROVED	1024.0000	0.2500	
Total Area	-----> 1664.0000	0.3750	<----- Weighted Coefficient

***** Subarea Name: C -5YR DEV, Row: 4 *****

Computed Sheet flow time> 0.3398 hrs

Computed Shallow flow time> 0.0122 hrs

Total Time of Concentration> 0.3519 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
2 E-10-ROAD	0.5000	0.9000
LANDSCAP	0.5000	0.3000
UNDEV	1.5800	0.3000
Total Area ----->	2.5800	0.4163 <----- Weighted Coefficient

***** Subarea Name: D -5YR HIST, Row: 5 *****

Computed Sheet flow time> 0.1769 hrs

Computed Shallow flow time> 0.0050 hrs

Total Time of Concentration> 0.1819 hrs

***** Subarea Name: D -5YR DEV, Row: 6 *****

Computed Sheet flow time> 0.1411 hrs

Computed Shallow flow time> 0.0061 hrs

Total Time of Concentration> 0.1472 hrs

Composite Runoff Coefficient Calculator

Description	Area (ac)	Coefficient
E-5-ROAD	0.6700	0.9000
LANDSCAPING	1.0000	0.3000
Total Area ----->	1.6700	0.5407 <----- Weighted Coefficient

***** Subarea Name: A2+B1&2 5 HIST, Row: 7 *****

Computed Sheet flow time> 0.1769 hrs

Computed Shallow flow time> 0.0199 hrs

tmp#1

Manning Pipe Calculator

Given Input Data:

Shape	Circular
Solving for	Depth of Flow
Diameter	30.0000 in
Flowrate	59.2000 cfs
Slope	0.0300 ft/ft
Manning's n	0.0150

Computed Results:

Depth	23.6105 in
Area	4.9087 ft2
Wetted Area	4.1442 ft2
Wetted Perimeter	65.4666 in
Perimeter	94.2478 in
Velocity	14.2852 fps
Hydraulic Radius	9.1155 in
Percent Full	78.7017 %
Full flow Flowrate	61.5713 cfs
Full flow velocity	12.5432 fps

DP 16 to DP21

tmp#1

Manning Pipe Calculator

Given Input Data:

Shape	Circular
Solving for	Depth of Flow
Diameter	24.0000 in
Flowrate	20.0000 cfs
Slope	0.0200 ft/ft
Manning's n	0.0150

Computed Results:

Depth	15.0974 in
Area	3.1416 ft2
Wetted Area	2.0812 ft2
Wetted Perimeter	43.9649 in
Perimeter	75.3982 in
Velocity	9.6097 fps
Hydraulic Radius	6.8168 in
Percent Full	62.9059 %
Full flow Flowrate	27.7272 cfs
Full flow velocity	8.8258 fps

Critical Information

Critical depth	20.0876 in
Critical slope	0.0085 ft/ft
Critical velocity	6.8523 fps
Critical area	2.9187 ft2
Critical perimeter	53.8744 in
Critical hydraulic radius	7.8014 in
Critical top width	24.0000 in
Specific energy	2.6934 ft
Minimum energy	2.5110 ft
Froude number	1.6649
Flow condition	Supercritical

tmp#1

Manning Pipe Calculator

Given Input Data:

Shape	Circular
Solving for	Depth of Flow
Diameter	18.0000 in
Flowrate	9.0000 cfs
Slope	0.0400 ft/ft
Manning's n	0.0150

Computed Results:

Depth	8.9395 in
Area	1.7671 ft2
Wetted Area	0.8760 ft2
Wetted Perimeter	28.1534 in
Perimeter	56.5487 in
Velocity	10.2738 fps
Hydraulic Radius	4.4807 in
Percent Full	49.6640 %
Full flow Flowrate	18.2075 cfs
Full flow velocity	10.3033 fps

Critical Information

Critical depth	14.3894 in
Critical slope	0.0091 ft/ft
Critical velocity	5.7794 fps
Critical area	1.5572 ft2
Critical perimeter	39.0531 in
Critical hydraulic radius	5.7420 in
Critical top width	18.0000 in
Specific energy	2.3853 ft
Minimum energy	1.7987 ft
Froude number	2.3701
Flow condition	Supercritical

tmp#1

Flow from DP21 to DP23

Manning Pipe Calculator

Given Input Data:

Shape	Circular
Solving for	Depth of Flow
Diameter	24.0000 in
Flowrate	29.0000 cfs
Slope	0.0880 ft/ft
Manning's n	0.0150

Computed Results:

Depth	11.9804 in
Area	3.1416 ft2
Wetted Area	1.5675 ft2
Wetted Perimeter	37.6600 in
Perimeter	75.3982 in
Velocity	18.5004 fps
Hydraulic Radius	5.9938 in
Percent Full	49.9184 %
Full flow Flowrate	58.1610 cfs
Full flow velocity	18.5132 fps

tmp#1 PIPE from DP_A to DP_A

Manning Pipe Calculator

Given Input Data:

Shape	Circular
Solving for	Depth of Flow
Diameter	18.0000 in
Flowrate	7.0000 cfs
Slope	0.0100 ft/ft
Manning's n	0.0150

Computed Results:

Depth	11.8359 in
Area	1.7671 ft ²
Wetted Area	1.2321 ft ²
Wetted Perimeter	34.0445 in
Perimeter	56.5487 in
Velocity	5.6813 fps
Hydraulic Radius	5.2115 in
Percent Full	65.7552 %
Full flow Flowrate	9.1038 cfs
Full flow velocity	5.1517 fps

Critical Information

Critical depth	12.4676 in
Critical slope	0.0084 ft/ft
Critical velocity	5.3150 fps
Critical area	1.3170 ft ²
Critical perimeter	35.2096 in
Critical hydraulic radius	5.3864 in
Critical top width	18.0000 in
Specific energy	1.4845 ft
Minimum energy	1.5585 ft
Froude number	1.1101
Flow condition	Supercritical

tmp#1

Manning Pipe Calculator

Given Input Data:

Shape	Circular
Solving for	Depth of Flow
Diameter	24.0000 in
Flowrate	35.2200 cfs
Slope	0.0800 ft/ft
Manning's n	0.0150

Computed Results:

Depth	13.8873 in
Area	3.1416 ft2
Wetted Area	1.8841 ft2
Wetted Perimeter	41.4895 in
Perimeter	75.3982 in
Velocity	18.6937 fps
Hydraulic Radius	6.5391 in
Percent Full	57.8640 %
Full flow Flowrate	55.4544 cfs
Full flow velocity	17.6517 fps



SUBJECT SIZE INLETS

DP 13 $Q_{design} = \begin{matrix} 9.5 cfs (5yr) \\ 20.3 cfs (100yr) \end{matrix} \left. \vphantom{Q_{design}} \right\} \begin{matrix} 50\% CF \rightarrow 14.7 cfs \\ \rightarrow 30.5 cfs \end{matrix}$

TRY 10' D-12-IN (2) --- as from Fig 7-11 $Q_{cap} = 34.0 cfs$ OK
100% CAPTURE

DP 15 $Q_{design} = \begin{matrix} 5.0 cfs (5yr) \\ 9.0 cfs (100yr) \end{matrix} \left. \vphantom{Q_{design}} \right\} \begin{matrix} 50\% CF \rightarrow 7.5 cfs \\ \rightarrow 13.5 cfs \end{matrix}$

TRY TYPE 13 (?) $Q_{cap} = 16 cfs$ OK
6" depth 100 yr capture

DP 16 $Q_{design} = \begin{matrix} 6.3 cfs (5yr) \\ 10.9 cfs (100yr) \end{matrix} \left. \vphantom{Q_{design}} \right\} \begin{matrix} 50\% CF \rightarrow 9.5 cfs \\ \rightarrow 16.4 cfs \end{matrix}$

TRY TYPE 13 (2) $Q_{cap} = 22 cfs$ OK
12" depth 100 yr capture

DP 22 $Q_{design} = \begin{matrix} 3.6 cfs (5yr) \\ 6.3 cfs (100yr) \end{matrix} \left. \vphantom{Q_{design}} \right\} \begin{matrix} 50\% CF \rightarrow 5.4 cfs \\ \rightarrow 9.5 cfs \end{matrix}$

TRY TYPE 13 (1) $Q_{cap} = 11 cfs$ OK
12" depth 100 yr capture



SUBJECT SIZE INLETS

DP 4

D-9 Grate Inlet in sump Clear Head = 6.25' \uparrow
Assume: $p=15, k=0.5 \rightarrow$ from Fig 7.6 $\rightarrow Q_{cap} = 15 cfs$
for $d = 1'$ " $\rightarrow Q_{cap} = 35 cfs$

$Q_{DESIGN} = 17 cfs (5yr)$
 $6.1 cfs (5yr)$ } $<$ capacities OK
+ 50% CF
 $\rightarrow = 25.5 / 9.2$ CAPTURE 100% FLOW

DP 7

$Q_{DESIGN} = 3.8 cfs (5yr)$
 $7.6 cfs (100yr)$ } 50% CF $<$ $5.7 cfs$
 $11.4 cfs$

Try TYPE 13 (2) $Q_{cap} = 16 cfs$ for 100 yr pickup OK
6" Depth

DP 6

$Q_{DESIGN} = 3.1 cfs (5yr)$
 $10.6 cfs (100yr)$ } 50% CF $<$ $4.7 cfs$
 15.9

Try TYPE 13 (2) $Q_{cap} = 16 cfs$ for 100 yr pickup OK
6" Depth

DP 9

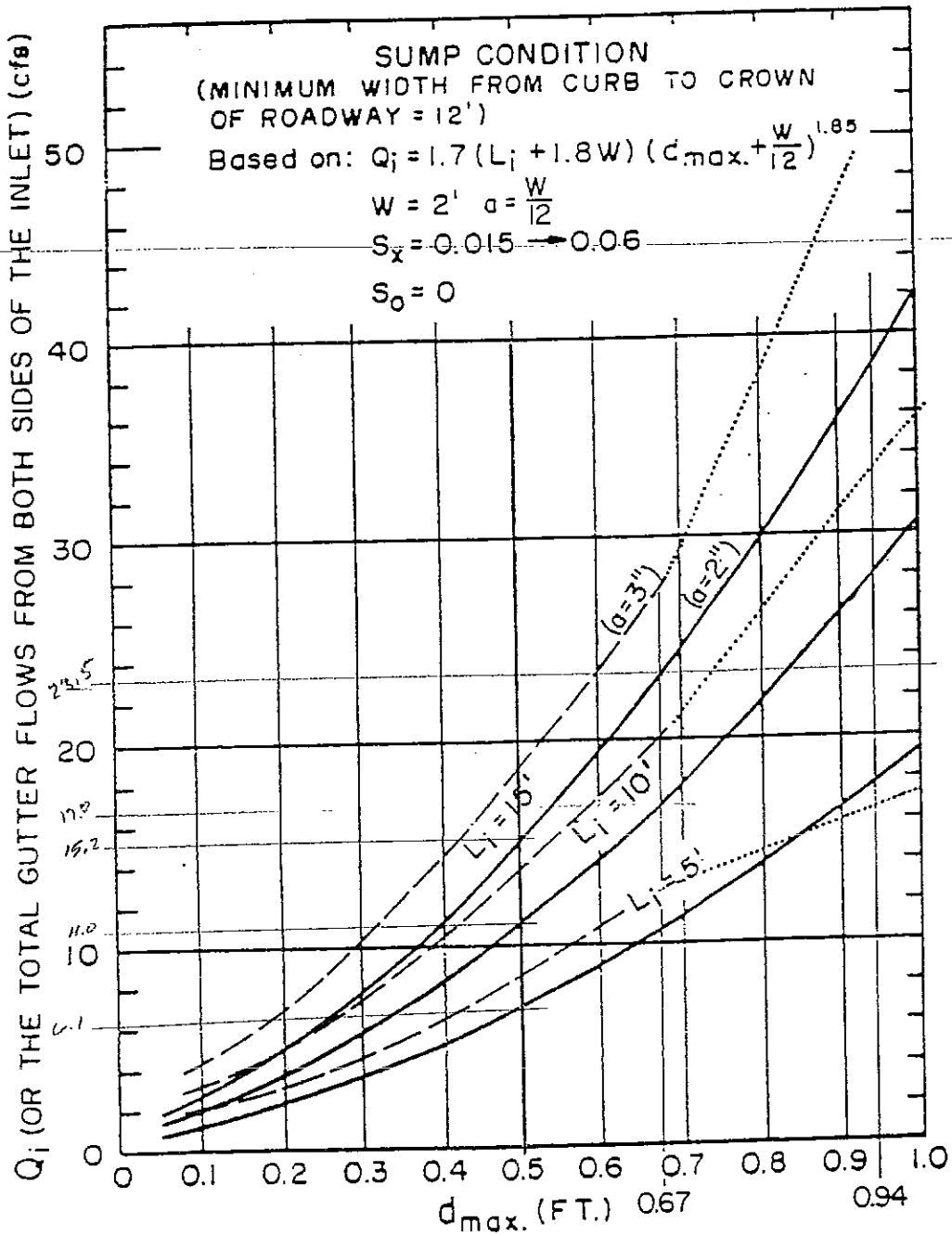
$Q_{DESIGN} = 3.3 cfs (5yr)$
 $7.7 cfs (100yr)$ } 50% CF $<$ $5.0 cfs$
 $11.6 cfs$

Try TYPE 13 (1) $Q_{cap} = 13.5 cfs$ OK
18" Depth CAPTURE 100% FLOW

DP 11

$Q_{DESIGN} = 2.6 cfs (5yr)$
 $5.6 cfs (100yr)$ } 50% CF $<$ $2.8 cfs$
 $5.6 cfs$

Try TYPE 13 (1) $Q_{cap} = 14.0 cfs$ OK
12" Depth CAPTURE 100% FLOW



REFERENCE : Izzard, Carl. I., Report presented at the Annual Meeting of the National Transportation Board, January 1977; Simplified Method For Design of Curb-opening Inlets
 ----- (As Modified by El Paso County, per Type R Inlet)
 Note: Depth of ponding measured at curb above depressed area ; $a = 3''$, For $d \leq .67$
 $Q_i = (1.7 L_i + 6.12)(d_{max} + .25)^{1.85}$; $Q_i = 3.60 L_i (d - .08)^{.5}$ For $d \geq .94$; Note : No Clogging Factor

9/30/90



HDR Infrastructure, Inc.
 A Centerra Company

The City of Colorado Springs / El Paso County
 Drainage Criteria Manual

Sump Capacity for Curb-opening Inlets

7-36

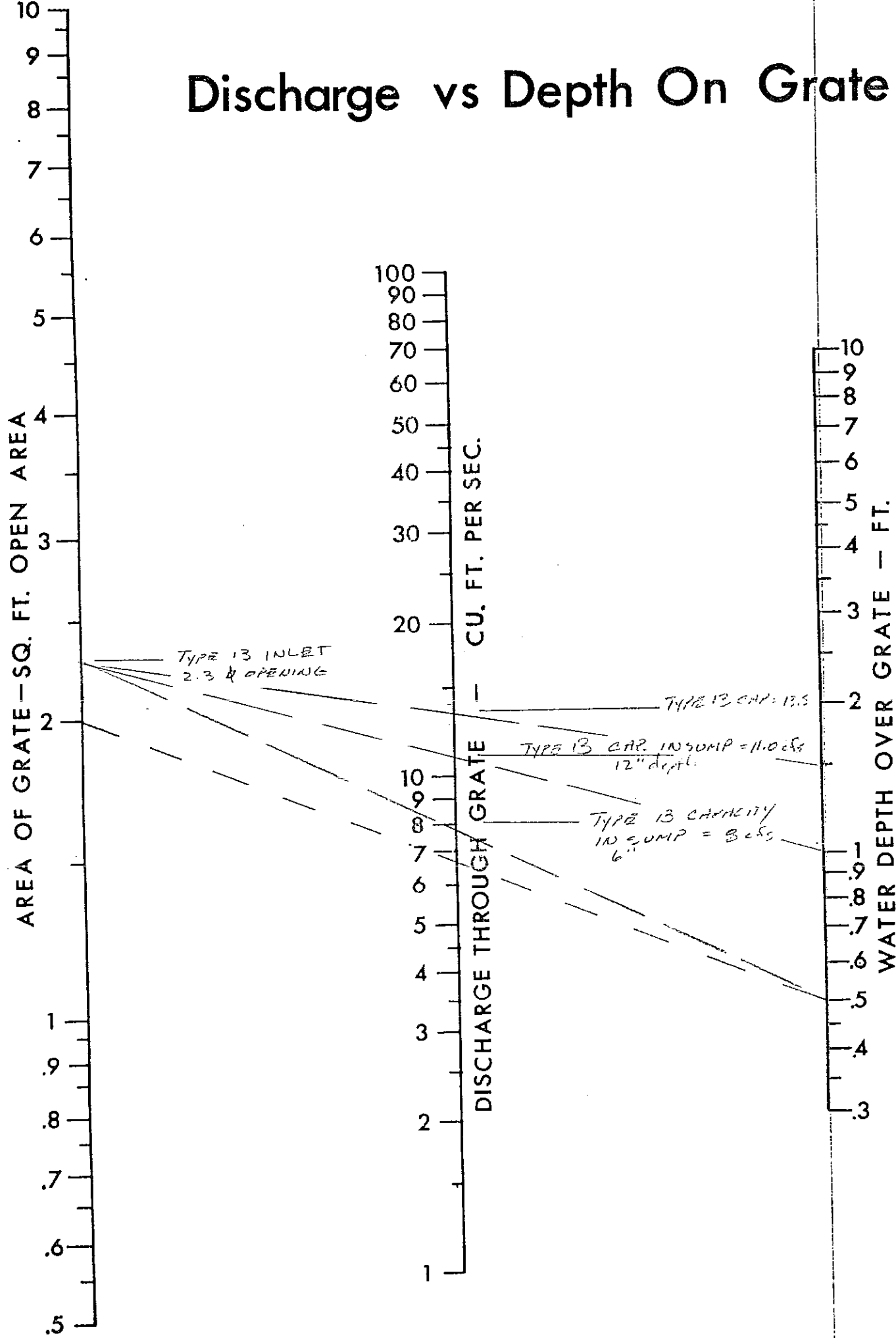
Date

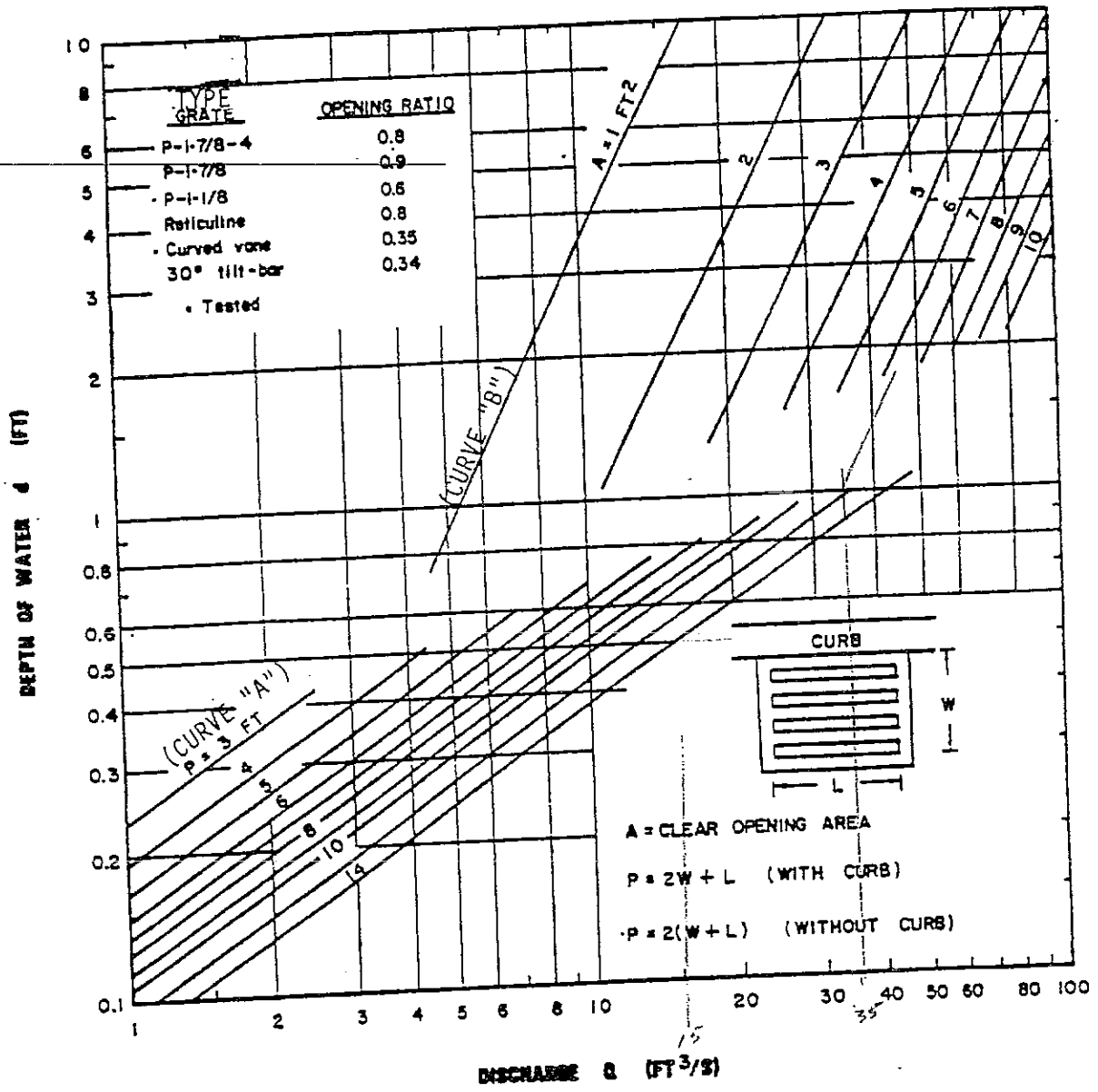
OCT. 1987

Figure

7-11

Discharge vs Depth On Grate





Reference: USDOT, March 1984
 HEC NO. 12

NOTE: Use with effective P or A

9/30/90



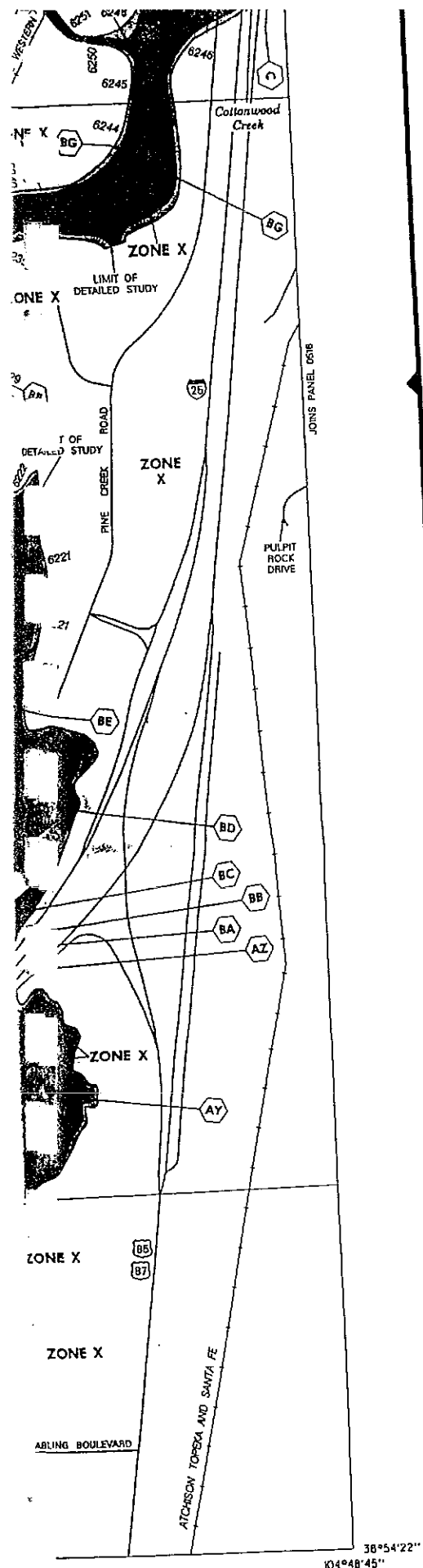
HDR Infrastructure, Inc.
 A Centerra Company

The City of Colorado Springs / El Paso County
 Drainage Criteria Manual

Hydraulic Capacity of Grate Inlet in Sump

Date
 OCT. 1987
 Figure
 7 - 8

FIRM/LOMR



38°54'22"
104°48'45"

97°07'30" W, 52°42'30" N

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AU, AB9, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

This map may incorporate approximately boundaries of Coastal Barrier Resource System Units and/or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1980 (PL 101-691).

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section B.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY

Refer to Repository listing on Map Index


EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP:

MARCH 17, 1997

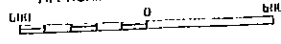
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actuarial rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (650) 638-6620.



APPROXIMATE SCALE IN FEET



NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP


**EL PASO COUNTY,
COLORADO AND
INCORPORATED AREAS**

PANEL 512 OF 1300
(SEE MAP INDEX FOR PANELS NOT PRINTED)

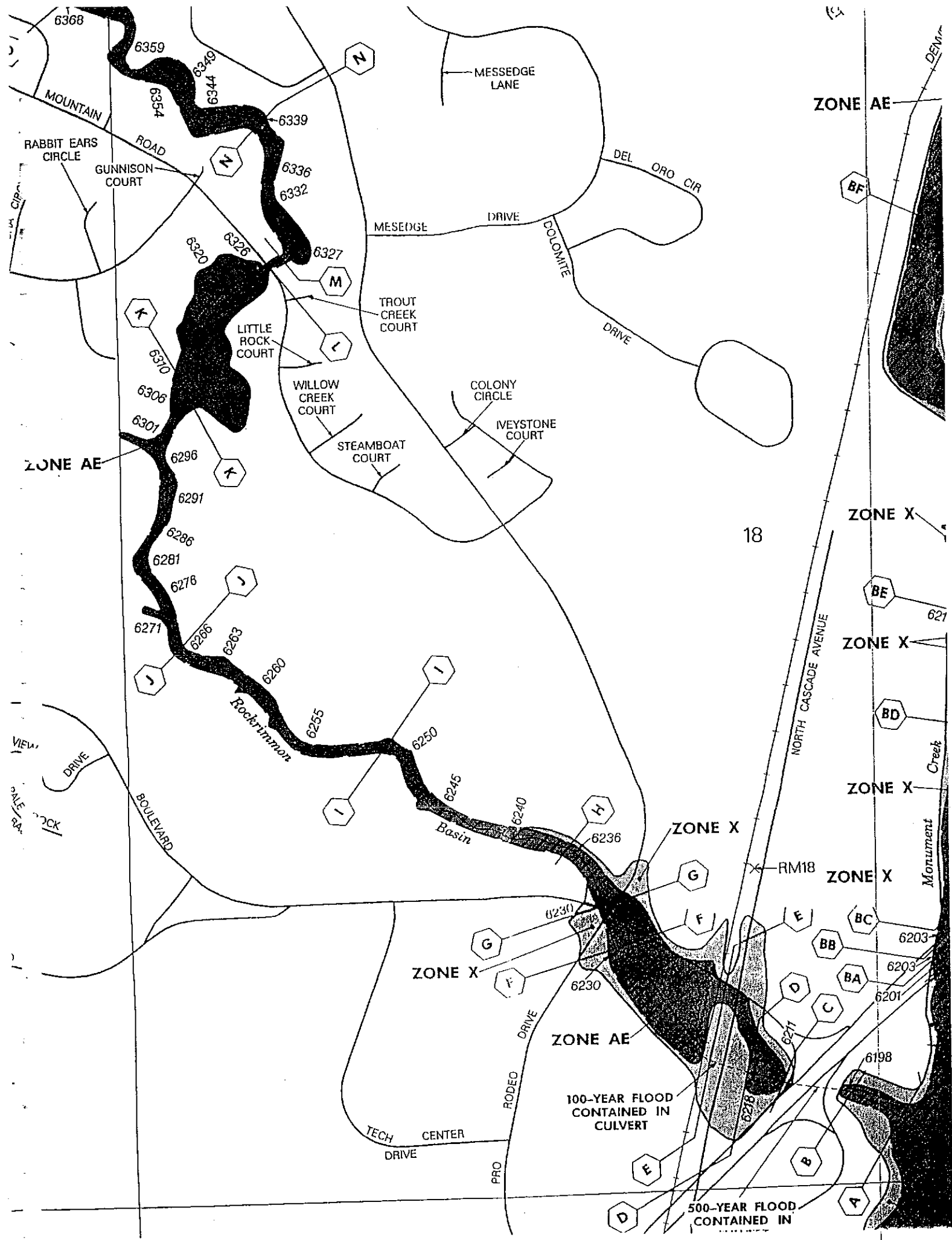
CONTAINS: COMMUNITY...	UNABLE	PANEL	SUFFIX
COLORADO SPRINGS, E-1, CP	UN000	0612	1
EL PASO COUNTY, UNINCORPORATED A-1, 25	UN000	0612	1

MAP NUMBER
08041C0512 F

EFFECTIVE DATE:
MARCH 17, 1997



Federal Emergency Management Agency



ROCKRIMMON DBPS – CHANNEL RECOMENDATIONS

ROCKRIMMON DBPS

KLH NO. 88-548-00

Summary of Alternatives

AREA 3

Rockrimmon South Channel
450' North of Rockrimmon to Rockrimmon North Channel

100-yr. flow ranges from 2511 to 2742 cfs
100-yr. velocity ranges from 7 to 14 fps

DESCRIPTION

Approximately the lower half of this reach has a relatively mild gradient and scattered sandstone formations which is preventing all but minor erosion in isolated areas. There is an adequately vegetated buffer area in these areas to accommodate minor erosion. The upper half of this reach is slightly steeper with sharper bends in the channel. Some more erosion is occurring here, particularly on the outside of curves. The main channel lies entirely on private property. Therefore, private developer(s) will need to construct selected improvements or R.O.W. acquired by the City of Colorado Springs. Two smaller channels entering the main channel from the west are experiencing major erosion. These areas will probably be improved when this land is developed by the land owner.

More diversity of vegetation, wildlife habitat, and variety of wildlife species is encountered along this reach. Vegetation mainly consists of native grasses with pockets of shrubs and scattered trees. Proposed surrounding land uses include commercial business uses along the southern portion of the corridor with higher density residential and private open space along the remaining portion. Because this channel is located on private lands, there is very limited potential for a coordinated trail development program along this section. To maintain and promote the environmental integrity of this area, the majority of this reach should be left in a natural or near natural condition. Any necessary spot improvements should be made to problem (erosion) areas by utilizing one of the various natural channel improvement treatments. The use of geofabrics, interlocking blocks, bio-engineering, or other "natural" bank stabilization methods should be explored as viable alternatives to a concrete or rip-rap lined channel.

Alternative

Advantages

A

Limited permitting involved.
No mitigation required.
Preserves wetland and wildlife habitat.
Use of drop structures could enhance wildlife and wetlands habitat.

B

Minimal additional right-of-way requirements.
Can control erosion currently occurring.
Most economical for isolated areas of erosion.
Use of drop structures can be very beneficial economically and environmentally.

C None This alternative eliminated due to high cost of construction.

Disadvantages

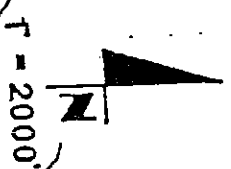
Some on-going maintenance will be required.
Not sufficient for all areas in this reach.

May require removal of some existing vegetation/trees.
May cause destruction of wildlife habitat.
Visually obtrusive.

RECOMMENDATIONS

It is recommended for this reach that the stream channel and banks be left in a natural state (Alternative A), except that drop structures be installed in such a way and at intervals to limit flow velocities to 3 fps. Also recommend that Alternative B be used on outside of a couple of sharp bends where erosion is currently occurring.

ROCKRIMMON DBPS
AREA 3



CENTENNIAL BLVD

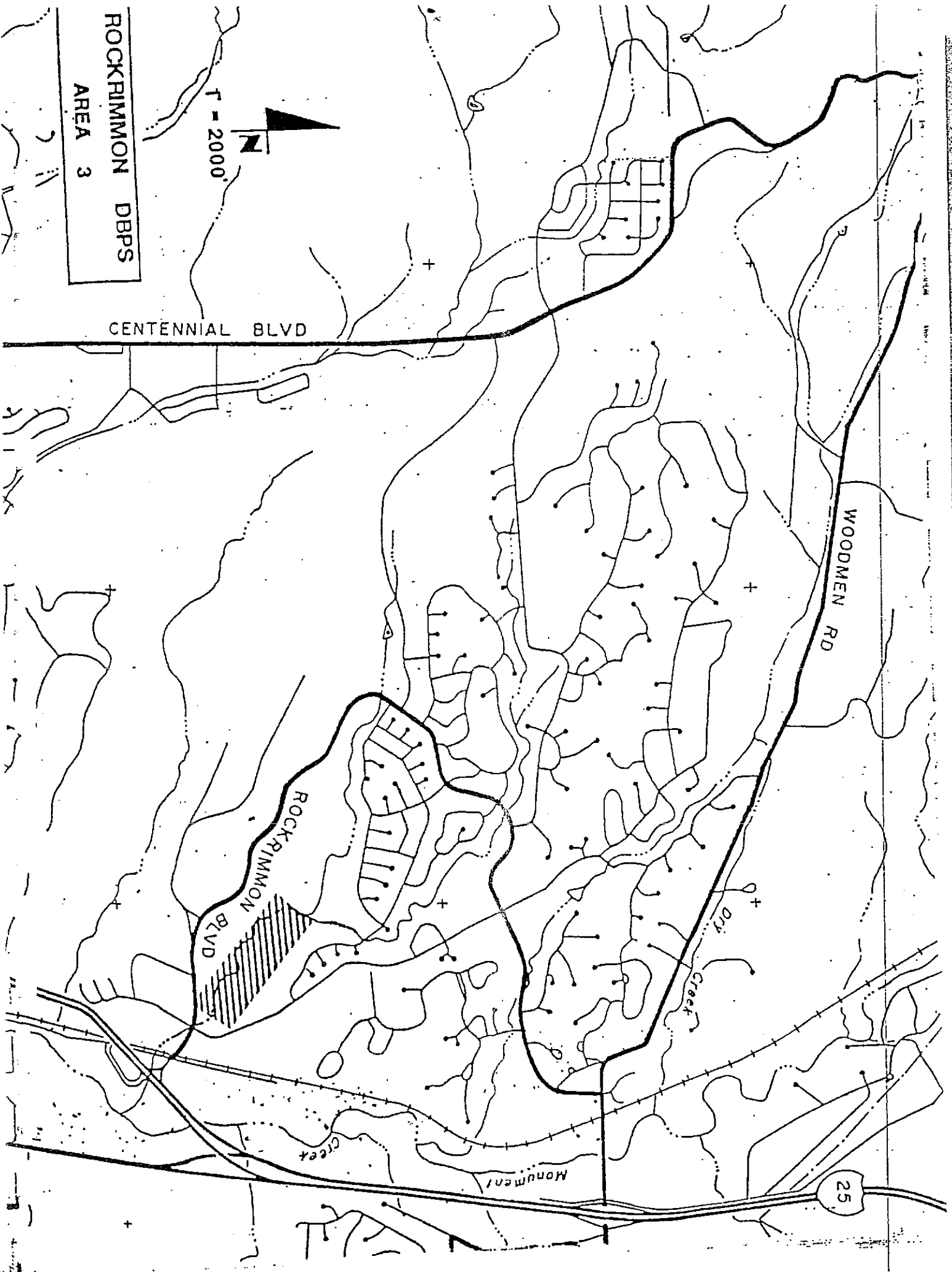
WOODMEN RD

ROCKRIMMON BLVD

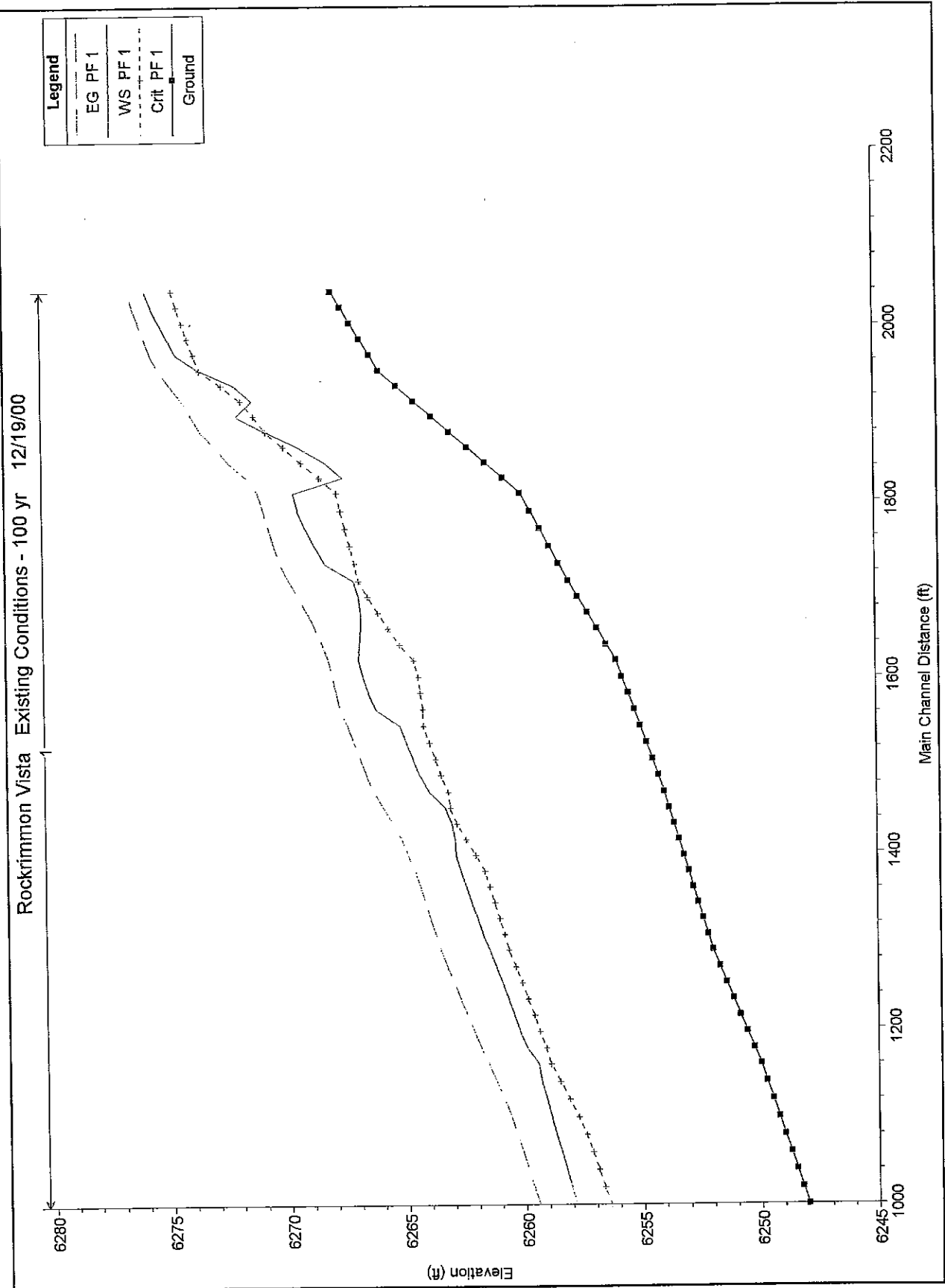
Dry Creek

Monument

25



EXISTING CHANNEL CONDITIONS



Errors Warnings and Notes for Plan : EX100

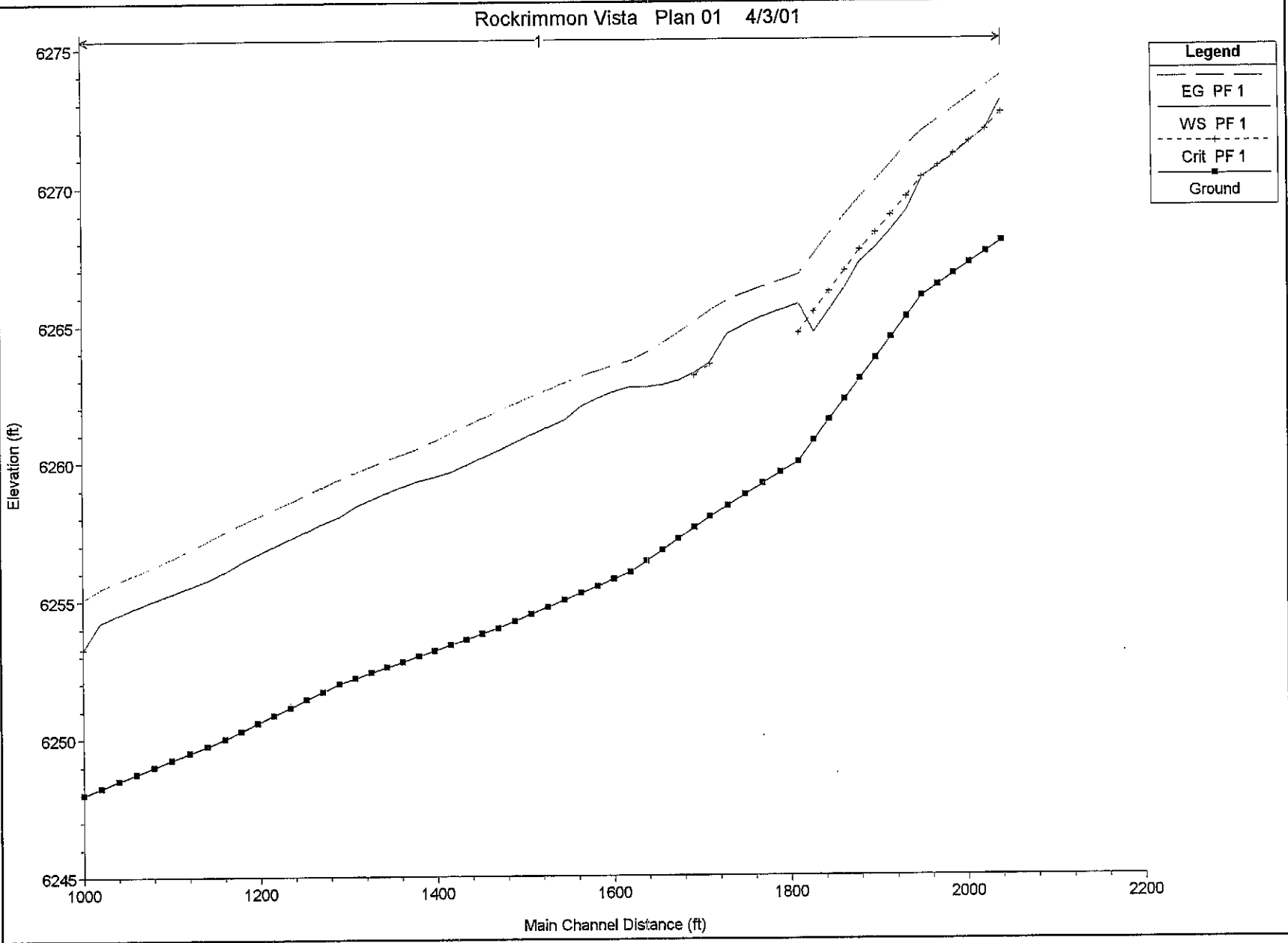
Location:	River: North Rockrimmon Reach: 1 RS: 1968.* Profile: PF 1
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Location:	River: North Rockrimmon Reach: 1 RS: 1950 Profile: PF 1
Warning:	The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: North Rockrimmon Reach: 1 RS: 1932.5* Profile: PF 1
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note:	Program found supercritical flow starting at this cross section.
Location:	River: North Rockrimmon Reach: 1 RS: 1897.5* Profile: PF 1
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: North Rockrimmon Reach: 1 RS: 1880 Profile: PF 1
Warning:	The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:	During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Location:	River: North Rockrimmon Reach: 1 RS: 1862.5* Profile: PF 1
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note:	Program found supercritical flow starting at this cross section.
Location:	River: North Rockrimmon Reach: 1 RS: 1845.* Profile: PF 1
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Location:	River: North Rockrimmon Reach: 1 RS: 1810 Profile: PF 1
Note:	Hydraulic jump has occurred between this cross section and the previous upstream section.
Location:	River: North Rockrimmon Reach: 1 RS: 1730.* Profile: PF 1
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Location:	River: North Rockrimmon Reach: 1 RS: 1563.75* Profile: PF 1
Warning:	The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

HEC-RAS Plan: EX100 River: North Rockrimmon Reach: 1

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev. (ft)	Crit.W.S (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq. ft)	Top Width (ft)	Froude # Chl
1	2040	2742.00	6268.00	6275.89	6274.78	6276.62	0.009266	6.86	399.70	123.33	0.67
1	1950	2742.00	6266.00	6273.61	6273.61	6275.33	0.020818	10.52	260.56	75.71	1.00
1	1880	2742.00	6263.00	6270.83	6270.83	6273.60	0.020038	13.36	205.16	37.43	1.01
1	1810	2742.00	6260.00	6269.68	6267.84	6271.17	0.008651	9.81	279.43	42.74	0.68
1	1710	2742.00	6258.00	6267.15	6266.95	6269.88	0.018824	13.28	206.44	35.15	0.97
1	1620	2742.00	6256.00	6266.97	6264.61	6268.24	0.007343	9.05	303.09	45.26	0.62
1	1545	2742.00	6255.00	6265.22	6264.22	6267.44	0.014387	11.97	229.07	36.22	0.84
1	1470	2742.00	6254.00	6264.00	6263.17	6266.38	0.015138	12.39	221.34	34.28	0.86
1	1380	2742.00	6253.00	6262.67	6261.65	6264.62	0.012447	11.19	244.95	40.64	0.80
1	1290	2742.00	6252.00	6261.47	6260.65	6263.56	0.013624	11.58	236.84	40.00	0.84
1	1160	2742.00	6250.00	6259.44	6258.91	6261.55	0.015518	11.66	235.20	43.84	0.89
1	1080	2742.00	6249.00	6258.70	6257.42	6260.37	0.010813	10.37	264.53	45.42	0.76
1	1000	2742.00	6248.00	6257.87	6256.41	6259.45	0.010005	10.06	272.49	46.14	0.73

Ex. 5 yr

Rockrimmon Vista Plan 01 4/3/01

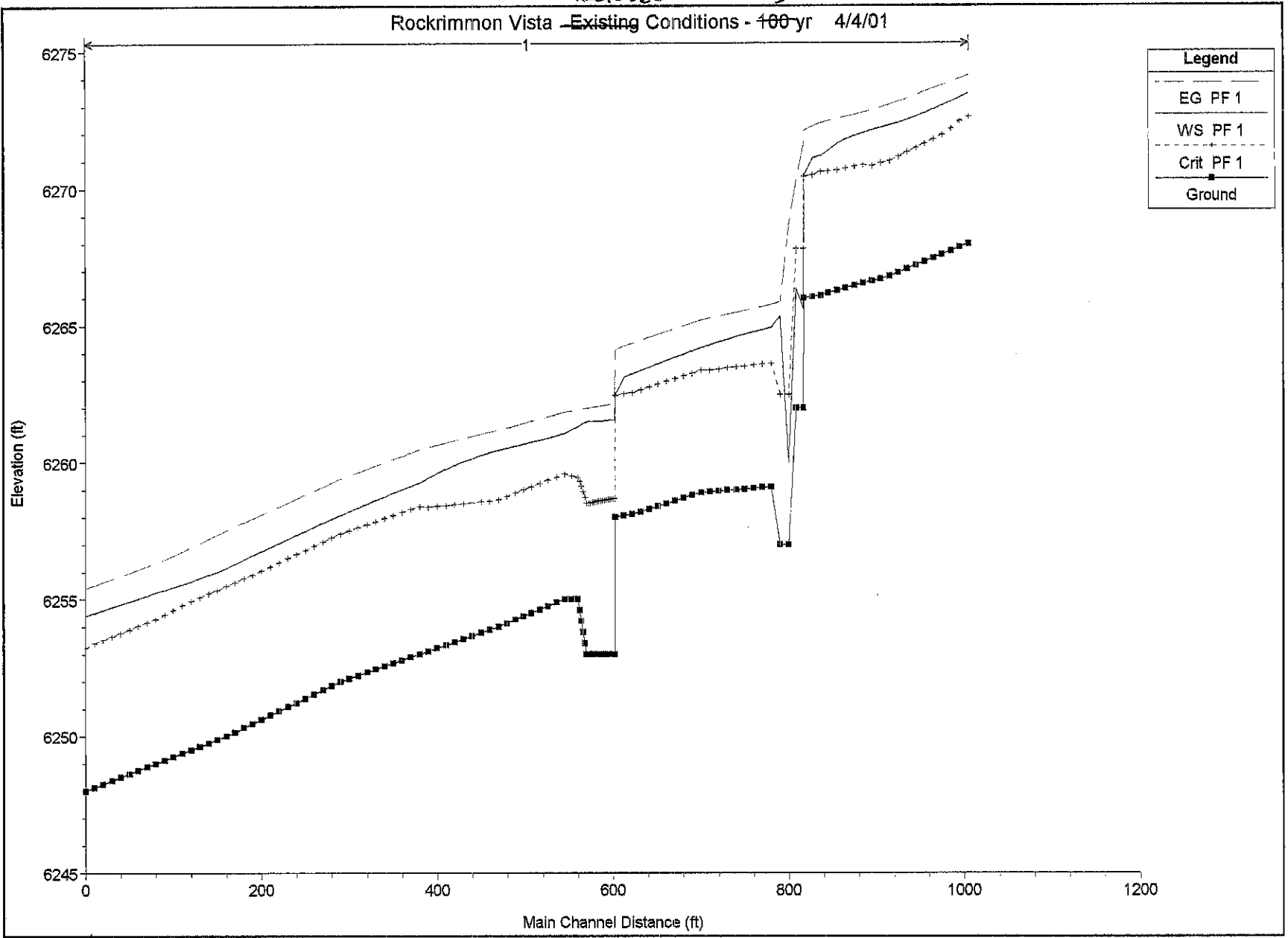


Legend
EG PF 1
WS PF 1
Crit PF 1
Ground

PROPOSED CHANNEL CONDITIONS

Proposed 5

Rockrimmon Vista - Existing Conditions - 100 yr 4/4/01



Legend	
---	EG PF 1
—	WS PF 1
-+-	Crit PF 1
■	Ground

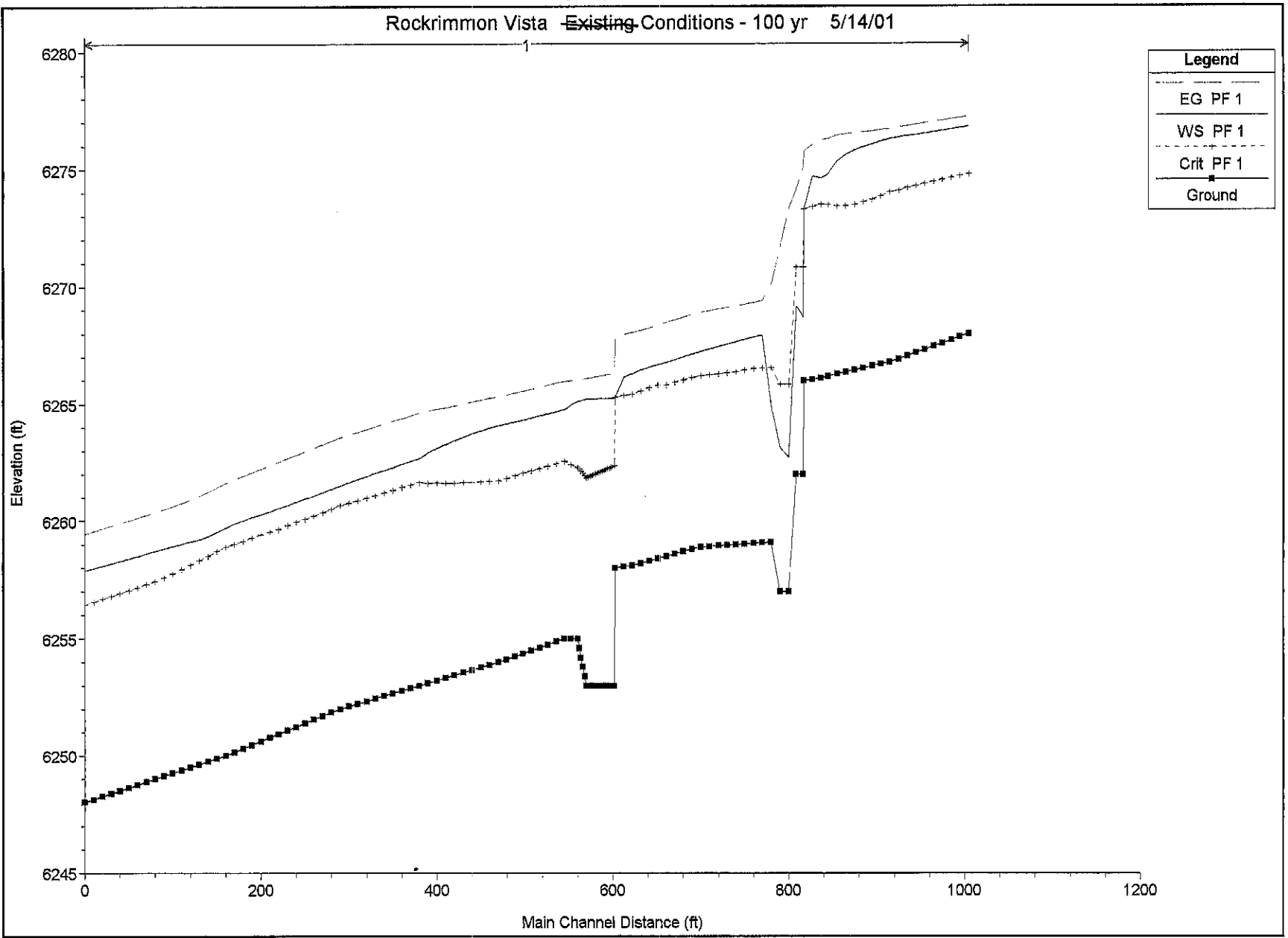
HEC-RAS Plan: Prop 5 yr River North Rockimmon Reach: 1

Reach	River Sta	Q Total (cfs)	Min Ch Elev (ft)	WS Elev (ft)	Ch Elev (ft)	EG Elev (ft)	EG Slope (ft/m)	Total Chm (ft)	Flow Area (sq ft)	Top Width (ft)	Froude # Ch
	2040	1097.00	6268.00	6273.44	6272.62	6274.11	0.011878	6.53	167.95	66.59	0.72
	2030	1097.00	6267.87	6273.30	6272.43	6273.99	0.012066	6.67	164.49	63.85	0.73
	2020	1097.00	6267.73	6273.15	6272.17	6273.87	0.012160	6.80	161.22	60.92	0.74
	2010	1097.00	6267.60	6273.01	6271.95	6273.75	0.012112	6.92	158.84	58.24	0.74
	2000	1097.00	6267.47	6272.88	6271.80	6273.64	0.011947	7.00	158.65	55.73	0.74
	1990	1097.00	6267.33	6272.74	6271.64	6273.52	0.011580	7.07	155.21	53.04	0.73
	1980	1097.00	6267.20	6272.62	6271.48	6273.40	0.011139	7.10	154.57	50.85	0.72
	1970	1097.00	6267.07	6272.50	6271.33	6273.28	0.010599	7.10	154.52	48.79	0.70
	1960	1097.00	6266.93	6272.39	6271.17	6273.18	0.009914	7.07	155.14	46.71	0.68
	1950	1097.00	6266.80	6272.29	6271.01	6273.05	0.009263	7.02	156.35	45.10	0.68
	1940	1097.00	6266.71	6272.21	6270.94	6272.95	0.009522	6.91	158.85	48.07	0.67
	1930	1097.00	6266.63	6272.12	6270.84	6272.86	0.009314	6.87	159.68	48.16	0.66
	1920	1097.00	6266.54	6272.03	6270.87	6272.77	0.009120	6.90	158.95	46.87	0.66
	1910	1097.00	6266.46	6271.92	6270.81	6272.68	0.009155	7.03	156.03	44.81	0.68
	1900	1097.00	6266.37	6271.79	6270.74	6272.61	0.009472	7.28	151.03	42.24	0.68
	1890	1097.00	6266.29	6271.63	6270.68	6272.54	0.010266	7.64	143.59	39.33	0.70
	1880	1097.00	6266.20	6271.37	6270.63	6272.45	0.012356	8.35	131.40	35.86	0.77
	1872	1097.00	6266.10	6271.20	6270.63	6272.38	0.012417	9.09	128.47	35.39	0.79
	1862.25	1097.00	6266.05	6271.11	6270.51	6272.27	0.013580	8.64	127.03	35.40	0.80
	1852.5	1097.00	6266.00	6270.45	6270.45	6272.10	0.022091	10.32	106.35	32.80	1.01
	1852	1097.00	6266.00	6265.61	6267.81	6271.82	0.104340	19.67	55.78	15.90	1.85
	1842.5	1097.00	6262.00	6266.37	6267.81	6270.35	0.065038	16.01	68.52	18.98	1.49
	1842	1097.00	6257.00	6259.99	6262.49	6268.70	0.179840	23.68	46.32	16.00	2.45
	1832	1097.00	6257.00	6265.35	6262.49	6265.67	0.004545	5.80	189.17	37.38	0.45
	1810	1097.00	6257.00	6264.92	6263.62	6265.76	0.008322	7.34	149.52	36.36	0.64
	1790	1097.00	6259.08	6264.84	6263.59	6265.69	0.008566	7.39	148.40	36.56	0.65
	1780	1097.00	6259.05	6264.76	6263.58	6265.62	0.008782	7.45	147.21	36.55	0.65
	1770	1097.00	6259.02	6264.68	6263.51	6265.55	0.009044	7.52	145.90	36.59	0.66
	1760	1097.00	6259.00	6264.59	6263.49	6265.49	0.009397	7.81	144.14	36.59	0.68
	1750	1097.00	6258.98	6264.50	6263.45	6265.42	0.009819	7.72	142.08	36.52	0.69
	1740	1097.00	6258.95	6264.40	6263.42	6265.35	0.010244	7.83	140.09	36.44	0.70
	1730	1097.00	6258.92	6264.29	6263.38	6265.28	0.010738	7.96	137.89	36.32	0.72
	1720	1097.00	6258.92	6264.29	6263.38	6265.21	0.011394	8.12	135.12	36.14	0.74
	1710	1097.00	6258.90	6264.07	6263.28	6265.10	0.011513	8.15	134.58	36.08	0.74
	1700.25	1097.00	6258.80	6263.84	6263.16	6265.00	0.011659	8.19	133.94	35.97	0.75
	1690.6	1097.00	6258.70	6263.64	6263.03	6264.89	0.011805	8.23	133.31	35.88	0.75
	1680.75	1097.00	6258.60	6263.42	6262.98	6264.78	0.011968	8.27	132.63	35.79	0.76
	1671	1097.00	6258.50	6263.20	6262.87	6264.68	0.012151	8.32	131.87	35.69	0.76
	1661.25	1097.00	6258.40	6263.06	6262.76	6264.57	0.012340	8.37	131.13	35.61	0.77
	1651.5	1097.00	6258.30	6262.94	6262.66	6264.46	0.012539	8.41	130.47	35.61	0.77
	1641.75	1097.00	6258.20	6262.83	6262.56	6264.35	0.012891	8.44	129.91	35.56	0.78
	1632	1097.00	6258.10	6262.74	6262.46	6264.27	0.013503	8.64	127.02	35.23	0.80
	1622.25	1097.00	6258.05	6262.63	6262.35	6264.19	0.014317	10.31	106.38	32.80	1.01
	1612.5	1097.00	6258.00	6262.55	6262.25	6264.10	0.022072	10.31	106.38	32.80	1.01
	1612	1097.00	6253.00	6261.55	6258.66	6262.15	0.005489	6.23	176.22	34.20	0.48
	1600.37	1097.00	6253.00	6261.54	6258.67	6262.14	0.005413	6.19	177.16	34.42	0.48
	1600	1097.00	6253.00	6261.54	6258.66	6262.13	0.005337	6.16	178.12	34.64	0.48
	1600.75	1097.00	6253.00	6261.54	6258.65	6262.12	0.005244	6.12	179.31	34.90	0.48
	1604.12	1097.00	6253.00	6261.54	6258.65	6262.12	0.005169	6.08	180.29	35.12	0.47
	1601.5	1097.00	6253.00	6261.53	6258.64	6262.10	0.005094	6.05	181.29	35.34	0.47
	1688.87	1097.00	6253.00	6261.52	6258.64	6262.09	0.005002	6.01	182.55	35.60	0.47
	1596.25	1097.00	6253.00	6261.52	6258.62	6262.08	0.004927	5.98	183.59	35.82	0.47
	1583.62	1097.00	6253.00	6261.52	6258.62	6262.07	0.004853	5.94	184.84	36.04	0.46
	1581	1097.00	6253.00	6261.51	6258.60	6262.06	0.004778	5.91	185.72	36.27	0.46
	1588.37	1097.00	6253.00	6261.51	6258.59	6262.05	0.004704	5.87	186.81	36.49	0.46
	1595.75	1097.00	6253.00	6261.50	6258.58	6262.04	0.004614	5.83	188.16	36.75	0.45
	1583.12	1097.00	6253.00	6261.50	6258.58	6262.03	0.004540	5.79	189.30	36.98	0.45
	1580.5	1097.00	6253.00	6261.49	6258.54	6262.02	0.004466	5.78	190.45	37.20	0.45
	1577.87	1097.00	6253.00	6261.49	6258.54	6262.01	0.004378	5.72	191.87	37.47	0.45
	1576.25	1097.00	6253.00	6261.49	6258.52	6262.00	0.004306	5.68	193.05	37.70	0.44
	1572.62	1097.00	6253.00	6261.48	6258.50	6261.99	0.004235	5.65	194.24	37.92	0.44
	1570	1097.00	6253.00	6261.48	6258.51	6261.98	0.004163	5.61	195.42	38.14	0.44
	1588	1097.00	6253.40	6261.45	6258.72	6261.97	0.004465	5.77	190.26	38.40	0.46
	1568	1097.00	6253.80	6261.42	6258.94	6261.96	0.004712	5.89	186.32	38.88	0.47
	1564	1097.00	6254.20	6261.38	6259.12	6261.94	0.004990	6.02	182.24	39.33	0.49
	1562	1097.00	6254.60	6261.34	6259.30	6261.93	0.005297	6.15	178.23	39.79	0.51
	1560	1097.00	6255.00	6261.30	6259.44	6261.92	0.005682	6.30	174.05	40.22	0.53
	1552.5	1097.00	6255.00	6261.18	6259.51	6261.88	0.006572	6.73	163.06	37.77	0.57
	1545	1097.00	6255.00	6261.05	6259.57	6261.84	0.007576	7.15	153.37	35.73	0.61
	1636.62	1097.00	6254.88	6260.96	6259.45	6261.78	0.007488	7.14	153.71	35.52	0.60

Reach	River Sta	Q Total (cfs)	Min Chl El (ft)	W/S Elev (ft)	Crit W/S (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Ch
	1526.25*	1097.00	6254.75	6260.89	6259.34	6261.67	0.007345	7.10	154.50	35.36	0.60
	1518.67*	1097.00	6254.62	6260.81	6259.22	6261.58	0.007193	7.06	155.41	35.23	0.59
	1507.5*	1097.00	6254.50	6260.73	6259.10	6261.50	0.007072	7.03	156.13	35.10	0.59
	1498.12*	1097.00	6254.38	6260.68	6259.00	6261.42	0.006943	6.99	156.96	34.99	0.58
	1488.75*	1097.00	6254.25	6260.59	6258.87	6261.33	0.006771	6.94	158.18	34.92	0.57
	1479.57*	1097.00	6254.12	6260.52	6258.75	6261.25	0.006590	6.88	159.56	34.87	0.57
	1470	1097.00	6254.00	6260.45	6258.63	6261.18	0.006444	6.83	160.70	34.82	0.56
	1460	1097.00	6253.89	6260.35	6258.58	6261.10	0.006731	6.95	157.85	34.40	0.57
	1450*	1097.00	6253.78	6260.25	6258.56	6261.03	0.007073	7.09	154.70	33.94	0.59
	1440*	1097.00	6253.67	6260.14	6258.52	6260.95	0.007471	7.25	151.36	33.48	0.60
	1430*	1097.00	6253.56	6260.02	6258.48	6260.88	0.007935	7.42	147.77	32.98	0.62
	1420*	1097.00	6253.44	6259.89	6258.46	6260.79	0.008448	7.61	144.14	32.46	0.64
	1410*	1097.00	6253.33	6259.75	6258.43	6260.71	0.009119	7.84	139.88	31.87	0.66
	1400*	1097.00	6253.22	6259.60	6258.40	6260.63	0.009946	8.11	135.26	31.26	0.69
	1390*	1097.00	6253.11	6259.44	6258.38	6260.54	0.011019	8.44	130.02	30.55	0.72
	1380	1097.00	6253.00	6259.25	6258.39	6260.46	0.012393	8.83	124.29	29.79	0.76
	1370*	1097.00	6252.89	6259.12	6258.28	6260.34	0.012516	8.86	123.84	29.74	0.76
	1360*	1097.00	6252.78	6259.00	6258.17	6260.22	0.012648	8.89	123.36	29.69	0.77
	1350*	1097.00	6252.67	6258.87	6258.06	6260.11	0.012798	8.93	122.83	29.63	0.77
	1340*	1097.00	6252.56	6258.74	6257.95	6259.99	0.012967	8.97	122.23	29.57	0.78
	1330*	1097.00	6252.44	6258.61	6257.83	6259.87	0.013054	9.00	121.93	29.53	0.78
	1320	1097.00	6252.33	6258.48	6257.72	6259.75	0.013248	9.05	121.27	29.46	0.79
	1310*	1097.00	6252.22	6258.34	6257.61	6259.63	0.013468	9.10	120.53	29.38	0.79
	1300*	1097.00	6252.11	6258.20	6257.50	6259.51	0.013710	9.16	119.75	29.30	0.80
	1290	1097.00	6252.00	6258.06	6257.39	6259.39	0.013984	9.23	118.88	29.20	0.81
	1280*	1097.00	6251.85	6257.92	6257.25	6259.24	0.013983	9.23	118.83	29.16	0.81
	1270*	1097.00	6251.69	6257.78	6257.09	6259.09	0.013886	9.21	119.09	29.15	0.80
	1260*	1097.00	6251.54	6257.63	6256.95	6258.95	0.013897	9.22	119.01	29.10	0.80
	1250*	1097.00	6251.38	6257.49	6256.79	6258.80	0.013811	9.20	119.24	29.08	0.80
	1240*	1097.00	6251.23	6257.34	6256.64	6258.66	0.013633	9.21	119.12	29.02	0.80
	1230*	1097.00	6251.08	6257.20	6256.50	6258.52	0.013856	9.22	119.00	28.96	0.80
	1220*	1097.00	6250.92	6257.05	6256.34	6258.37	0.013819	9.21	119.08	28.92	0.80
	1210*	1097.00	6250.77	6256.91	6256.20	6258.23	0.013678	9.23	118.84	28.84	0.80
	1200*	1097.00	6250.62	6256.76	6256.06	6258.09	0.013978	9.26	118.47	28.73	0.80
	1190*	1097.00	6250.46	6256.61	6255.90	6257.94	0.014019	9.27	118.29	28.65	0.80
	1180*	1097.00	6250.31	6256.45	6255.76	6257.80	0.014192	9.32	117.67	28.50	0.81
	1170*	1097.00	6250.15	6256.30	6255.62	6257.66	0.014324	9.36	117.21	28.36	0.81
	1160	1097.00	6250.00	6256.13	6255.49	6257.52	0.014612	9.44	116.24	28.14	0.82
	1150*	1097.00	6249.88	6256.01	6255.34	6257.37	0.014642	9.35	117.28	29.03	0.82
	1140*	1097.00	6249.75	6255.89	6255.21	6257.21	0.014368	9.22	118.96	29.83	0.81
	1130*	1097.00	6249.62	6255.77	6255.07	6257.05	0.013964	9.08	120.78	30.48	0.80
	1120*	1097.00	6249.50	6255.66	6254.93	6256.89	0.013440	8.93	122.67	31.05	0.79
	1110*	1097.00	6249.38	6255.55	6254.78	6256.75	0.012686	8.78	124.95	31.48	0.78
	1100*	1097.00	6249.25	6255.44	6254.61	6256.60	0.012236	8.62	127.32	31.82	0.76
	1090*	1097.00	6249.12	6255.34	6254.44	6256.46	0.011644	8.47	129.47	32.00	0.74
	1080	1097.00	6249.00	6255.24	6254.27	6256.33	0.011101	8.34	131.48	32.11	0.73
	1070*	1097.00	6248.88	6255.13	6254.15	6256.21	0.011029	8.32	131.80	32.15	0.72
	1060*	1097.00	6248.75	6255.02	6254.02	6256.09	0.010876	8.28	132.47	32.22	0.72
	1050*	1097.00	6248.62	6254.92	6253.89	6255.97	0.010718	8.24	133.20	32.30	0.71
	1040*	1097.00	6248.50	6254.81	6253.77	6255.86	0.010523	8.21	133.64	32.35	0.71
	1030*	1097.00	6248.38	6254.71	6253.65	6255.74	0.010518	8.18	134.13	32.41	0.71
	1020*	1097.00	6248.25	6254.60	6253.52	6255.63	0.010339	8.13	134.99	32.50	0.70
	1010*	1097.00	6248.12	6254.50	6253.40	6255.51	0.010150	8.07	135.91	32.60	0.70
	1000	1097.00	6248.00	6254.40	6253.23	6255.40	0.010019	8.03	136.56	32.67	0.69

Proposed

Rockrimmon Vista Existing Conditions - 100 yr 5/14/01



HEC-RAS Plan: Proposed100 River: North Rockrimmon Reach: 1

Reach	River Sta	Q Total (cfs)	Min. Ch. El. (ft)	W.S. Elev. (ft)	Crit. W.S. (ft)	E.G. Elev. (ft)	E.G. Slope (ft/ft)	Vel. Chnl. (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl.
	2040	2742.00	6268.00	6276.82	6274.82	6277.25	0.004176	5.28	519.34	130.38	0.47
	2030	2742.00	6267.87	6276.76	6274.74	6277.20	0.004190	5.28	519.09	130.51	0.47
	2020	2742.00	6267.73	6276.70	6274.65	6277.14	0.004203	5.28	518.97	130.69	0.47
	2010	2742.00	6267.60	6276.65	6274.58	6277.08	0.004218	5.29	518.74	130.86	0.47
	2000	2742.00	6267.47	6276.59	6274.48	6277.02	0.004220	5.28	519.19	131.15	0.47
	1990	2742.00	6267.33	6276.53	6274.40	6276.96	0.004252	5.29	518.70	131.50	0.47
	1980	2742.00	6267.20	6276.47	6274.30	6276.90	0.004262	5.28	519.28	132.05	0.47
	1970	2742.00	6267.07	6276.41	6274.21	6276.85	0.004272	5.28	519.37	132.24	0.47
	1960	2742.00	6266.93	6276.35	6274.11	6276.78	0.004294	5.28	519.07	132.44	0.47
	1950	2742.00	6266.80	6276.29	6274.04	6276.73	0.004285	5.28	519.80	132.57	0.47
	1940	2742.00	6266.71	6276.19	6273.86	6276.68	0.004612	5.62	487.48	119.34	0.49
	1930	2742.00	6266.63	6276.08	6273.71	6276.63	0.004812	5.98	458.37	105.46	0.51
	1920	2742.00	6266.54	6275.95	6273.60	6276.58	0.005169	6.37	430.18	94.72	0.53
	1910	2742.00	6266.46	6275.81	6273.50	6276.54	0.005732	6.84	400.71	85.40	0.56
	1900	2742.00	6266.37	6275.64	6273.44	6276.49	0.006582	7.44	368.67	76.47	0.60
	1890	2742.00	6266.29	6275.37	6273.44	6276.43	0.007918	8.29	330.66	66.25	0.65
	1880	2742.00	6266.20	6274.82	6273.50	6276.30	0.010092	9.76	281.07	51.82	0.74
	1872	2742.00	6266.10	6274.63	6273.52	6276.25	0.009958	10.75	273.44	49.12	0.76
	1862.25	2742.00	6266.05	6274.71	6273.40	6276.06	0.008739	9.33	295.81	55.64	0.69
	1852.5	2742.00	6266.00	6273.31	6273.31	6275.80	0.019607	12.67	216.35	44.22	1.01
	1852	2742.00	6262.00	6268.69	6270.82	6275.18	0.090056	20.44	134.15	37.55	1.91
	1832.5	2742.00	6262.00	6269.16	6270.82	6274.18	0.065521	17.99	152.45	41.27	1.65
	1832	2742.00	6257.00	6262.72	6265.85	6273.35	0.135929	26.17	104.77	26.87	2.34
	1810	2742.00	6257.00	6263.14	6265.84	6271.76	0.103089	23.57	116.35	28.54	2.06
	1790	2742.00	6259.10	6264.95	6266.56	6270.10	0.051100	18.22	150.46	36.46	1.58
	1780	2742.00	6259.08	6267.94	6266.53	6269.40	0.009637	9.72	281.99	50.04	0.72
	1770	2742.00	6259.05	6267.85	6266.51	6269.32	0.009963	9.72	282.10	51.61	0.73
	1760	2742.00	6259.02	6267.76	6266.45	6269.25	0.010375	9.80	279.66	52.15	0.75
	1750	2742.00	6259.00	6267.65	6266.37	6269.19	0.010691	9.94	275.74	51.43	0.76
	1740	2742.00	6258.98	6267.55	6266.34	6269.13	0.010678	10.07	272.29	49.61	0.76
	1730	2742.00	6258.95	6267.45	6266.30	6269.06	0.010792	10.16	269.77	48.81	0.76
	1720	2742.00	6258.92	6267.35	6266.26	6268.98	0.011000	10.26	267.38	48.44	0.77
	1710	2742.00	6258.90	6267.25	6266.22	6268.91	0.011372	10.37	264.47	48.38	0.78
	1700.25	2742.00	6258.80	6267.13	6266.12	6268.81	0.011461	10.40	263.66	48.29	0.78
	1690.5	2742.00	6258.70	6267.02	6266.02	6268.71	0.011686	10.44	262.70	48.60	0.79
	1680.75	2742.00	6258.60	6266.90	6265.92	6268.60	0.011981	10.45	262.31	49.44	0.80

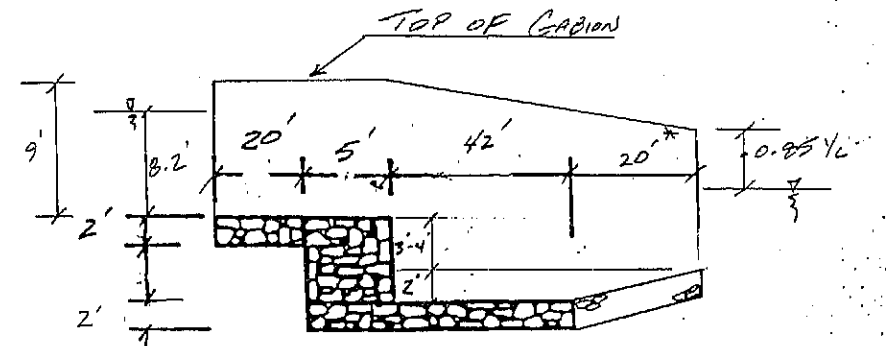
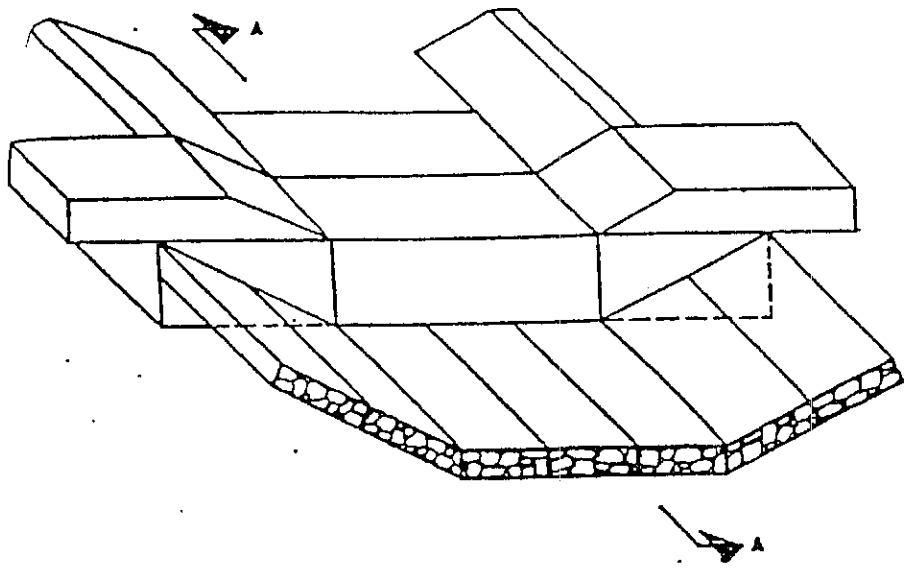
Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W/S Elev (ft)	Crit W/S (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	1671	2742.00	6258.50	6266.79	6265.80	6268.48	0.012462	10.44	262.61	51.33	0.81
1	1661.25*	2742.00	6258.40	6266.68	6265.79	6268.36	0.012504	10.39	263.95	52.28	0.81
1	1651.5*	2742.00	6258.30	6266.57	6265.69	6268.24	0.012281	10.36	264.60	51.90	0.81
1	1641.75*	2742.00	6258.20	6266.45	6265.56	6268.14	0.012104	10.43	262.84	50.32	0.80
1	1632	2742.00	6258.10	6266.28	6265.42	6268.06	0.012322	10.68	256.70	47.73	0.81
1	1622.25*	2742.00	6258.05	6266.16	6265.37	6267.98	0.012794	10.83	253.16	47.44	0.83
1	1612.5	2742.00	6258.00	6265.31	6265.31	6267.80	0.019607	12.67	216.35	44.22	1.01
1	1612	2742.00	6253.00	6265.26	6262.36	6266.32	0.006494	8.30	330.39	49.02	0.56
1	1609.37*	2742.00	6253.00	6265.25	6262.33	6266.31	0.006393	8.25	332.24	49.25	0.56
1	1606.75*	2742.00	6253.00	6265.25	6262.30	6266.29	0.006295	8.21	334.08	49.47	0.56
1	1604.12*	2742.00	6253.00	6265.25	6262.26	6266.28	0.006177	8.15	336.34	49.74	0.55
1	1601.5*	2742.00	6253.00	6265.24	6262.24	6266.26	0.006081	8.11	338.23	49.97	0.55
1	1598.87*	2742.00	6253.00	6265.24	6262.21	6266.25	0.005985	8.06	340.14	50.20	0.55
1	1596.25*	2742.00	6253.00	6265.24	6262.18	6266.23	0.005872	8.01	342.47	50.47	0.54
1	1593.62*	2742.00	6253.00	6265.23	6262.14	6266.22	0.005778	7.96	344.43	50.70	0.54
1	1591*	2742.00	6253.00	6265.23	6262.11	6266.20	0.005686	7.92	346.40	50.92	0.53
1	1588.37*	2742.00	6253.00	6265.23	6262.08	6266.19	0.005596	7.87	348.39	51.15	0.53
1	1585.75*	2742.00	6253.00	6265.23	6262.05	6266.18	0.005506	7.83	350.39	51.38	0.53
1	1583.12*	2742.00	6253.00	6265.22	6262.02	6266.16	0.005400	7.77	352.83	51.65	0.52
1	1580.5*	2742.00	6253.00	6265.22	6261.98	6266.15	0.005313	7.73	354.88	51.88	0.52
1	1577.87*	2742.00	6253.00	6265.22	6261.96	6266.13	0.005228	7.68	356.92	52.11	0.52
1	1575.25*	2742.00	6253.00	6265.22	6261.92	6266.12	0.005125	7.63	359.43	52.39	0.51
1	1572.62*	2742.00	6253.00	6265.21	6261.89	6266.11	0.005042	7.58	361.53	52.62	0.51
1	1570	2742.00	6253.00	6265.21	6261.84	6266.10	0.004960	7.54	363.64	52.85	0.51
1	1568*	2742.00	6253.40	6265.19	6261.95	6266.08	0.004976	7.57	362.14	53.38	0.51
1	1566*	2742.00	6253.80	6265.18	6262.05	6266.07	0.004986	7.60	360.84	53.93	0.52
1	1564*	2742.00	6254.20	6265.16	6262.14	6266.06	0.005003	7.63	359.34	54.44	0.52
1	1562*	2742.00	6254.60	6265.14	6262.23	6266.05	0.005014	7.65	358.22	54.99	0.53
1	1560	2742.00	6255.00	6265.13	6262.30	6266.04	0.005104	7.68	356.96	56.00	0.54
1	1552.5*	2742.00	6255.00	6264.98	6262.41	6266.01	0.006098	8.15	336.49	55.01	0.58
1	1545	2742.00	6255.00	6264.76	6262.55	6265.98	0.006980	8.86	309.64	48.46	0.62
1	1535.62*	2742.00	6254.88	6264.67	6262.46	6265.90	0.007011	8.89	308.49	48.02	0.62
1	1526.25*	2742.00	6254.75	6264.58	6262.36	6265.81	0.007008	8.90	307.94	47.64	0.62
1	1516.87*	2742.00	6254.62	6264.50	6262.25	6265.73	0.006997	8.92	307.56	47.29	0.62
1	1507.5*	2742.00	6254.50	6264.41	6262.15	6265.65	0.006999	8.93	307.06	46.96	0.62
1	1498.12*	2742.00	6254.38	6264.33	6262.05	6265.57	0.006993	8.94	306.73	46.66	0.61

Reach	River Sta	Q Total (cfs)	Min. Ch El (ft)	W/S Elev (ft)	Crit W/S (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Ch
1	1488.75*	2742.00	6254.25	6264.25	6261.94	6265.48	0.006956	8.93	306.92	46.41	0.61
1	1479.37*	2742.00	6254.12	6264.17	6261.83	6265.40	0.006939	8.92	307.35	46.38	0.61
1	1470	2742.00	6254.00	6264.09	6261.71	6265.32	0.006939	8.92	307.50	46.34	0.61
1	1460	2742.00	6253.89	6263.97	6261.69	6265.25	0.007348	9.06	302.73	46.67	0.63
1	1450	2742.00	6253.78	6263.85	6261.67	6265.17	0.007734	9.21	297.59	46.54	0.64
1	1440	2742.00	6253.67	6263.73	6261.66	6265.09	0.008123	9.39	292.16	46.16	0.66
1	1430	2742.00	6253.56	6263.59	6261.65	6265.02	0.008545	9.58	286.24	45.57	0.67
1	1420	2742.00	6253.44	6263.45	6261.62	6264.93	0.009000	9.79	280.05	44.84	0.69
1	1410	2742.00	6253.33	6263.29	6261.62	6264.86	0.009570	10.05	272.89	43.96	0.71
1	1400	2742.00	6253.22	6263.12	6261.63	6264.78	0.010242	10.34	265.21	43.01	0.73
1	1390	2742.00	6253.11	6262.93	6261.62	6264.71	0.011107	10.69	256.44	41.94	0.76
1	1380	2742.00	6253.00	6262.67	6261.65	6264.62	0.012447	11.19	244.95	40.64	0.80
1	1370	2742.00	6252.89	6262.55	6261.54	6264.51	0.012534	11.22	244.32	40.59	0.81
1	1360	2742.00	6252.78	6262.42	6261.43	6264.39	0.012622	11.25	243.68	40.54	0.81
1	1350	2742.00	6252.67	6262.30	6261.32	6264.27	0.012721	11.29	242.97	40.48	0.81
1	1340	2742.00	6252.56	6262.17	6261.21	6264.16	0.012827	11.32	242.22	40.42	0.81
1	1330	2742.00	6252.44	6262.04	6261.09	6264.03	0.012878	11.34	241.86	40.40	0.82
1	1320	2742.00	6252.33	6261.91	6260.98	6263.92	0.012994	11.37	241.06	40.33	0.82
1	1310	2742.00	6252.22	6261.78	6260.87	6263.80	0.013120	11.42	240.19	40.26	0.82
1	1300	2742.00	6252.11	6261.65	6260.76	6263.68	0.013250	11.46	239.31	40.19	0.83
1	1290	2742.00	6252.00	6261.50	6260.65	6263.56	0.013486	11.53	237.74	40.07	0.83
1	1280	2742.00	6251.85	6261.35	6260.51	6263.41	0.013541	11.53	237.74	40.23	0.84
1	1270	2742.00	6251.69	6261.21	6260.36	6263.26	0.013467	11.49	238.58	40.44	0.83
1	1260	2742.00	6251.54	6261.07	6260.22	6263.11	0.013479	11.48	238.94	40.66	0.83
1	1250	2742.00	6251.38	6260.93	6260.07	6262.96	0.013406	11.43	239.88	40.92	0.83
1	1240	2742.00	6251.23	6260.80	6259.94	6262.82	0.013394	11.40	240.52	41.20	0.83
1	1230	2742.00	6251.08	6260.67	6259.81	6262.67	0.013445	11.36	241.28	41.73	0.83
1	1220	2742.00	6250.92	6260.54	6259.65	6262.52	0.013479	11.30	242.57	42.50	0.83
1	1210	2742.00	6250.77	6260.41	6259.54	6262.37	0.013486	11.25	243.77	43.15	0.83
1	1200	2742.00	6250.62	6260.27	6259.41	6262.22	0.013470	11.20	244.83	43.65	0.83
1	1190	2742.00	6250.46	6260.14	6259.28	6262.07	0.013410	11.13	246.28	44.20	0.83
1	1180	2742.00	6250.31	6260.01	6259.14	6261.92	0.013462	11.10	247.01	44.67	0.83
1	1170	2742.00	6250.15	6259.87	6259.00	6261.77	0.013436	11.05	248.04	45.05	0.83
1	1160	2742.00	6250.00	6259.71	6258.90	6261.62	0.013678	11.10	247.01	45.10	0.84
1	1150	2742.00	6249.88	6259.51	6258.71	6261.42	0.013597	11.10	247.12	45.08	0.84
1	1140	2742.00	6249.75	6259.33	6258.51	6261.23	0.013401	11.06	247.88	45.04	0.83

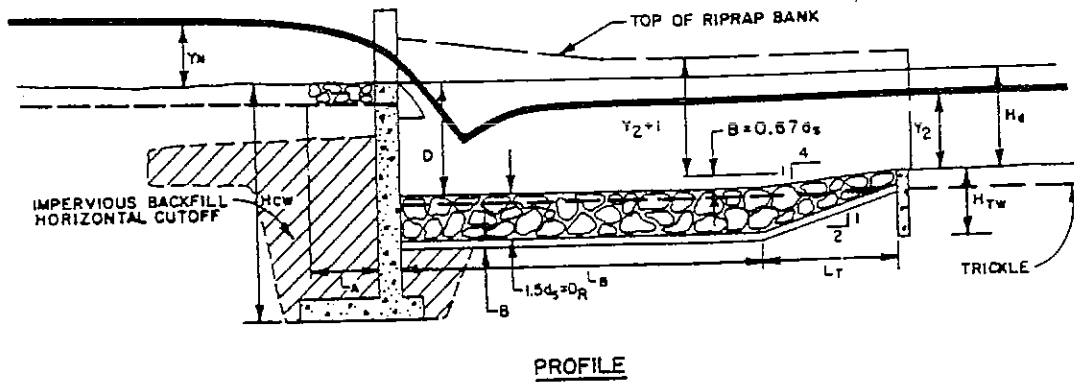
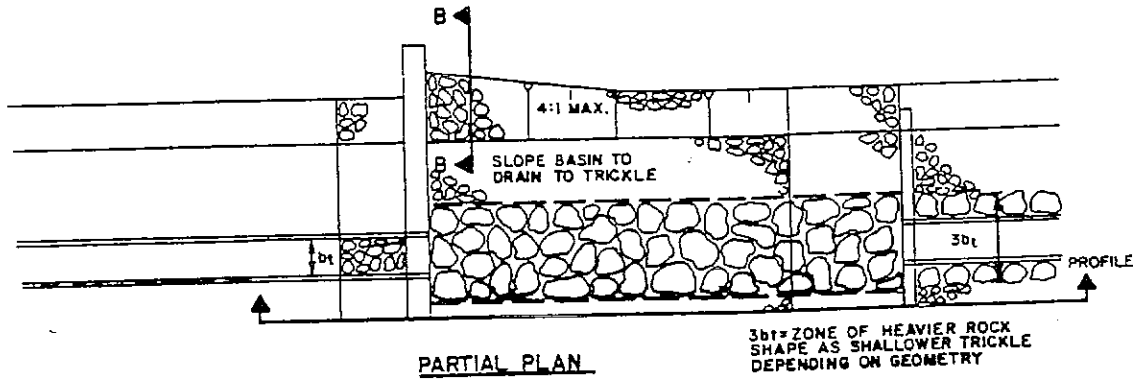
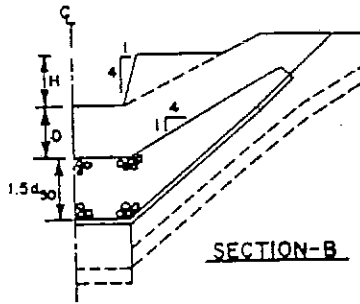
HIC-RA3 Flac Proposed00 River North Redefinon Reach 3 (Continued)

Reach	River Sta	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
1	1130*	2742.00	6249.62	6259.20	6258.32	6261.06	0.012914	10.94	250.62	45.11	0.82
1	1120*	2742.00	6249.50	6259.10	6258.13	6260.91	0.012319	10.78	254.32	45.26	0.80
1	1110*	2742.00	6249.38	6259.01	6257.94	6260.77	0.011850	10.65	257.47	45.40	0.79
1	1100*	2742.00	6249.25	6258.91	6257.75	6260.63	0.011411	10.52	260.53	45.50	0.78
1	1090*	2742.00	6249.12	6258.80	6257.58	6260.49	0.011078	10.43	262.81	45.50	0.77
1	1080*	2742.00	6249.00	6258.70	6257.42	6260.37	0.010796	10.36	264.68	45.43	0.76
1	1070*	2742.00	6248.88	6258.60	6257.30	6260.26	0.010734	10.34	265.26	45.48	0.75
1	1060*	2742.00	6248.75	6258.49	6257.17	6260.14	0.010620	10.29	266.35	45.58	0.75
1	1050*	2742.00	6248.62	6258.39	6257.04	6260.02	0.010502	10.25	267.49	45.69	0.75
1	1040*	2742.00	6248.50	6258.28	6256.92	6259.90	0.010429	10.22	268.20	45.75	0.74
1	1030*	2742.00	6248.38	6258.18	6256.80	6259.79	0.010352	10.19	268.96	45.82	0.74
1	1020*	2742.00	6248.25	6258.08	6256.67	6259.67	0.010224	10.15	270.24	45.94	0.74
1	1010*	2742.00	6248.12	6257.97	6256.55	6259.56	0.010094	10.10	271.56	46.06	0.73
1	1000*	2742.00	6248.00	6257.87	6256.41	6259.45	0.010005	10.06	272.49	46.14	0.73

GABION DROP STRUCTURE



SECTION A-A



VRR - Vertical Riprap Drop

REFERENCE : McLaughlin Water Engineers, Dec. 1986; Drop Structures in the Denver Metropolitan Area



HDR Infrastructure, Inc.
A Centerra Company

The City of Colorado Springs / El Paso County
Drainage Criteria Manual

Date
OCT. 1987

Figure
10-11



SUBJECT SIZE DROP STRUCTURES IN NORTH ROCKRIMMON

GIVEN: $Q_{100} = 2742 \text{ cfs}$ $S_o = 0.0044$
 15' BOTTOM 2:1 SS $n = 0.045$
 $y_o = 8.15'$ $V_o = 10 \text{ fps}$

ASSUME: DROP HT = 5'

DROP @ STA. 18+00

1. $H = 8.15 + \frac{10^3}{44.4} = 9.7'$

2. $y_c = (\frac{2}{3})(9.7) = 6.5'$

3. $y_s = 2.15(6.5) = 14'$

4. $h_2 = -(5 - 8.15) = 3.15$

5. $h_o = 3.15 - 14 = -10.85$ \therefore BASIN FLOOR IS $(-10.85 + 5) = -5.85'$ BELOW GRADE LINE OF D.S. CHANNEL

6. $h_o/y_c = -10.85/6.5 = -1.67$

$h_2/y_c = 3.15/6.5 = 0.48$

FROM FIG. 10-D.2

$L_1/y_c = 3.9 \rightarrow L_1 = 25'$

$L_2 = 0.8 y_c = 0.8(6.5) = 5.2'$

$L_3 = \geq 1.75 y_c = 1.75(6.5) = 11.4$

$L_B = 25 + 5.2 + 11.4 = 41.6$ or 42'

7. FLOOR BLOCKS

$HH = 0.8 y_c = 0.8(6.5) = 5.2'$

WIDTH & SPACING = $0.4 y_c = 0.4(6.5) = 2.6'$

} ASSUME THAT PERMANENT POOL @ BASIN BACK SLOPE WILL PROVIDE

8. SILL HT = $0.4 y_c = 0.4(6.5) = 2.6'$ → *MODIFY TO A 2:1 SLOPE FROM BOTTOM OF BASIN
 $5.85' \times 2 = 11.7$ or 12'

9. NOT USED

10. SIDEWALL HT = $0.85 y_c = 0.85(6.5) = 5.5'$
 ABOVE TW



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CONSULTANTS, INC.
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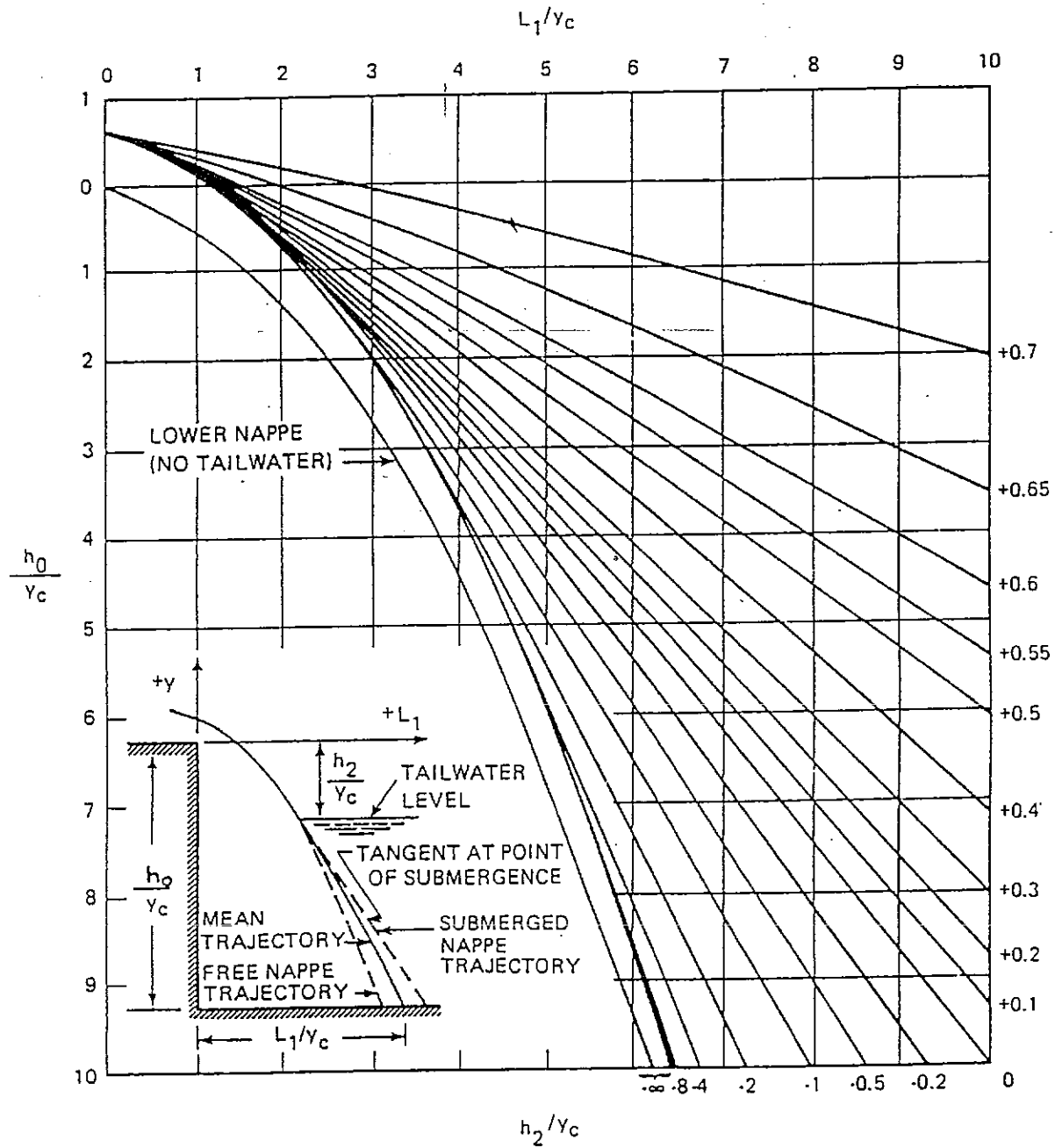
JOB NO. _____ PAGE _____ OF _____
DATE _____ BY _____ CHECKED BY _____
(date)
CLIENT _____
PROJECT _____

SUBJECT _____

11. WINGWALLS TO MATCH CHANNEL

12. APPROACH TO DROP

$$3 \times \frac{1}{2} = 3(6.5) = 19.5 \text{ or } 20'$$



The City of Colorado Springs / El Paso County Drainage Criteria Manual Design Chart for Determination of L_1 10-57	Date
	9-30-90
	Figure
	10-D.2



SUBJECT SUPER ELEVATION CALC STA 4+00 DIAP STRUCTURE

Additional ht. of Franchise, $H = \frac{C V^2 W}{g R}$
(outside edge)

$C = 1.0$ (for supercritical flow)

$V = 10 \text{ fps}$

$W = 50'$

$g = 32.2 \text{ f/s}^2$

$R = 50'$

$$H = \frac{(1)(10)^2(50')}{(32.2)(50)}$$
$$= 3.1'$$