MASTER DEVELOPMENT DRAINAGE PLAN FOR ROCKRIMMON VISTA SUBDIVISION

AND

PRELIMINARY & FINAL DRAINAGE REPORT & PLAN

ROCKRIMMON VISTA SUBDIVISION FILING NO. 2

January, 1996

LWA Project No. 95122.02

INDEX

Leigh Whitehead & Associates, Inc.
ENGINEERS, SURVEYORS & PLANNERS

2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, CO 80909-5061
TELEPHONE 719-636-5179 / FAX 719-636-5199

January, 1996
LWA Project No. 95122.02

City of Colorado Springs
Stormwater and Subdivision
Engineering Division
101 W. Costilla, Suite 122
Colorado Springs, CO 80903

RE: Rockrimmon Vista Filing No. 2

Gentlemen:

In accordance with the requirements of the City of Colorado Springs Subdivision Ordinance, a drainage report and plan has been prepared for the proposed Rockrimmon Vista Filing No. 2.

This report has been prepared under the current City of Colorado Springs Drainage Criteria.

Seven (7) complete copies of the drainage report and plan are hereby transmitted for your review and approval. If there are any questions or comments concerning this report, please contact the undersigned.

Sincerely,

Leonard A. Beasley
Project Engineer

1-3-96
Date

Reviewed by:

David J. Whitehead, P.E.

January, 1996
Drainage Report & Plan
Rockrimmon Vista Filing No. 2
LWA Project No. 95122.02

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.

David J. Whitehead, P.E. (Colo. 25118)
1.9.96

DEVELOPER'S STATEMENT:

The Developer has read and will comply with all the requirements specified in this drainage report and plan.

By: R. W. Case II

Address: 102 E. Pikes Peak #601

Colo. Spgs., Co 80903

CITY OF COLORADO SPRINGS:

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

City Engineer

1/17/96
Date

Conditions:

January, 1996
LWA Project No. 95122.02

FLOODPLAIN STATEMENT

To the best of my knowledge and belief, Rockrimmon Vista Filing No. 2 is not located in a F.E.M.A. designated 100-year floodplain.

David J. Whitehead, P.E. (Colo. 25118)
1.9.96

PROJECT DESCRIPTION

Rockrimmon Vista Subdivision is located in the East half of Section 13, T13S, R67W of the 6th P.M. The property is bounded on the south by Rockrimmon Boulevard, and on the northwest by Saddleridge Subdivision Filings 1 and 2. The remaining surrounding portions are undeveloped and unplatted.

This property is zoned PUD and is within the hillside overlay zone. The grading and erosion control plans have been submitted to the City of Colorado Springs Planning Department for their review and comment.

The proposed improvements are for construction of eleven apartment building to be built in two phases. This preliminary and final drainage report and plan is for Rockrimmon Vista Filing No. 2. Rockrimmon Vista M.D.D.P. includes Rockrimmon Vista Filing No. 2 and the future filings (Phase II) and are shown on the attached drainage plan. The entire subdivision site lies within the "North Rockrimmon Drainage Basin" and contains 14.52 acres.

EXISTING CONDITIONS

The property is currently unimproved. The area to the northwest is improved with single family residences. Rockrimmon Boulevard is improved. The remaining area surrounding this site is unimproved. The ground cover across the site is native grasses. The soils are of the Chaseville-Midway complex and the razor clay loam which are in Hydrologic Groups A & D and C, respectively. For the purpose of this report, Group D was used. This site will be 45% impervious which puts it between the 1/8 acre and 1/4 acre recommended runoff coefficients. Based on this characteristic, a runoff coefficient of 0.63 for the 5-year event and 0.73 for the 100-year event was used. The site slopes in an easterly direction with moderate to severe slopes. To the north and east is North Rockrimmon Creek which has a designated FEMA 100-year floodplain. This floodplain is approximately 160 feet to the east of this site at its closest point. The proposed dam and detention pond location is shown on the attached drainage plan. Recommended improvements to North Rockrimmon Creek consist of armoring the outside curve of the creek with gabion mattresses to a height of approximately 5.0 feet, realigning the creek and installing 2' gabion drop structures. The approximate location of these improvements are shown on the attached drainage plan. The exact location will be determined at the time of final design.

OFFSITE CONDITIONS

Concentrated flows enter the site at three (3) locations. These flows discharge onto the property from 18" and 24" R.C.P.s under Rockrimmon Boulevard. These offsite flows were obtained from previously approved drainage reports prepared by Polok Engineering, Inc. for Bridgeport Subdivision, United Planning & Engineering for Rockrimmon Apartments, and Costin Engineering for Rockrimmon Boulevard and Saddleridge Filings 1 and 2. These locations are shown on the attached drainage plan. Minor amounts of sheet flow enter the property from the

west. This area was included with adjacent basins for the proposed conditions of the site. The two (2) existing 6.0' D10-Rs at the low point in Rockrimmon Boulevard were analyzed to determine capacities. The inlets have the ability to intercept most of the 5-year flows. The southerly inlet receives a peak 5-year flow of 15.6 cfs and intercepts 14.5 cfs at a depth of 0.78 feet which is the crown of Rockrimmon Boulevard. The remaining 1.1 cfs tops the crown and continues to the northerly inlet. The northerly inlet receives a peak flow of 7.2 cfs along with the 1.1 cfs overflow. This inlet will intercept the combined flow of 8.3 cfs at a depth of 0.53 feet. The combined 100-year peak flow received by both inlets is 41.4 cfs. A depth of 1.51 feet is required to intercept this flow. The calculations for these inlets are in the back of this report. The 100-year flow will be contained within Rockrimmon Boulevard. The proposed curb return for this development at this location is approximately 1.7 feet above the flow line of the existing northerly inlet. Therefore, no offsite flows from Rockrimmon Boulevard will be allowed to enter this site. Two existing 4' D10-Rs on a continuous grade near the southerly boundary of this project were analyzed to determine the interception capacities. The northerly inlet (No. 4) receives a peak 5-year and 100-year flow of 1.8 cfs and 3.2 cfs. This inlet intercepts 0.6 cfs and 0.8 cfs, thus allowing a 1.2 cfs and 2.4 cfs flowby for the 5-year and 100-year event, respectively. The southerly inlet (No. 3) receives a peak 5-year and 100-year flow of 7.7 cfs and 17.5 cfs. This inlet intercepts 1.6 cfs and 2.5 cfs, thus allowing a 6.1 cfs and 15.0 cfs flowby for the 5-year and 100-year event, respectively. The street flowby is shown on the attached drainage plan and the calculations for the flow intercepted by these inlets are in the back of this report.

BASIN CHARACTERISTICS

Rockrimmon Vista Subdivision was divided into nine (9) basins designated "A" through "I." Basin A was divided into four (4) sub-basins. Basin B was divided into four (4) sub-basins. Basin H was divided into two sub-basins. Basin B, Sub-basins A-1 and A-2 are located in Rockrimmon Vista Filing No. 2. The remaining basins were not divided up.

These basins will direct flow away from the buildings and are conveyed to the backyards by grass and rip-rap swales. Runoff then continues southerly and easterly as sheet flow. Runoff quantities for these basins are shown on the attached drainage plan and the calculations are in the back of this report. Basin A was divided into four (4) sub-basins. These flows are directed to the parking lot and then conveyed to the property line through a proposed 5' wide sidewalk chase, grass swale and a rock rip-rap swale. These improvements were sized using the peak flow at DP-2 of 11.2 cfs for the 5-year storm and 23.2 cfs for the 100-year storm. Basin B is also divided into four (4) sub-basins. Sub-basin B1 is an offsite basin that drains in an easterly direction to a proposed rock rip-rap swale in Sub-basin B3. This swale was sized using the peak 5-year flow of 12.5 cfs and the peak 100-year flow of 27.2 cfs from Sub-basin B1. Runoff from Sub-basin B2 is collected in a 5'x5' grated inlet in a sump condition. The location and flows are shown on the attached drainage plan. Basin F is a parking area that drains in a northeasterly direction. No additional flows enter this basin. Flows for Basin F are directed to a proposed 5' wide curb opening and rock rip-rap swale. These improvements were sized using the peak flow of 1.5 cfs for the 5-year event and 3.3 cfs for the 100-year event. The location and flows are shown on the attached drainage plan. Basin H has flows directed to a proposed 2' wide sidewalk

chase, grass swale and a rock rip-rap swale. These improvements were sized using the peak flow at Sub-basin H1 of 2.6 cfs for the 5-year event and 5.4 cfs for the 100-year event. All flows are shown on the attached plan and the calculations are in the back of this report. This site is in conformance with the adopted master drainage study for North Rockrimmon Drainage Study.

As mentioned previously, this site will be developed in two (2) phases. The first phase, Rockrimmon Vista Filing No. 2, will commence construction almost immediately. The remaining portion will begin construction at a later date which is unknown at this time. The only concentrated flows that are unprotected are at Sub-basin A2. The remaining concentrated flows in Phase 1 will have protection in accordance with this report and plan. A temporary grouted rock rip-rap pad is recommended where flows exit the parking lot in Sub-basin A2. This pad should be 10' wide and 45' long and 2' thick. The Phase 1 boundary, Rockrimmon Vista Filing No. 2, is close to the east boundary of Sub-basins A2 and B4. This phase line is shown on the attached drainage plan. Drainage improvements within Phase II, which include the armoring and drop structures for North Rockrimmon Creek, will be constructed when Phase II is developed.

PROPOSED IMPROVEMENTS

Improvements consist of 655 L.F. 12" grouted rip-rap swale, 250 L.F. x 5' high gabion slope protection, 2 - 2' gabion drop structures, 162 L.F. of 18" R.C.P., 780 L.F. of 24" R.C.P., and 150 L.F. of 36" R.C.P. These facilities convey public waters through this site. Reimbursable public improvements are those identified in the DBPS for the North Rockrimmon Drainage Basin. The appropriate drainage easements for conveying public runoff are shown on the attached drainage plan and will be delineated on the final plat. The remaining improvements consist of rock rip-rap swales which convey interior runoff and are non-reimbursable. A drainage acceptance letter from the adjacent property owner accepting public and private runoff is in the back of this report.

DRAINAGE FEES

This site lies within the North Rockrimmon Drainage Basin, Code #12. The current fees for the basin are $2,821.00/acre for drainage. There are no bridge fees. The drainage fee obligation per an agreement with City of Colorado Springs Engineering Division is being finalized.

PROPOSED FACILITIES (REIMBURSABLE)

18" RCP (162 L.F. @ $20.00/L.F.)		$ 3,240.00
24" RCP (780 L.F. @ $25.00/L.F.)		$19,500.00
36" RCP (150 L.F. @ $38.00/L.F.)		$ 5,700.00
5' Manhole (2 @ $2,000.00 ea.)		$ 4,000.00
Rip-Rap (1000 tons @ $30.00/ton)		$30,000.00
Gabion Slope Protection (150 CY @ $225.00/CY)		$33,750.00
Gabion Drop Structure (2 @ $5,000.00/ea.)		$10,000.00
	Subtotal -	$106,190.00
Engineering & Contingencies (10%)		$ 10,619.00
	TOTAL -	$116,809.00

PROPOSED FACILITIES (NON-REIMBURSABLE)

Rip-Rap (450 tons @ $30.00/ton)		$13,500.00
Engineering & Contingencies (10%)		$ 1,350.00
	TOTAL -	$14,850.00

The owner will post the appropriate financial assurances to cover the cost of constructing these drainage improvements.

DRAINAGE ACCEPTANCE AGREEMENT

Provided that the developer constructs the drainage facilities described in this report in accordance with plans and specifications approved by the undersigned, the undersigned does hereby accept public drainage flows from adjacent Rockrimmon Blvd., and allow such flows to be conveyed through the drainage facilities which Rockrimmon Vista Filing No. 2 will build, and to allow all such flows to be intercepted by the public drainage facility known as North Rockrimmon Creek.

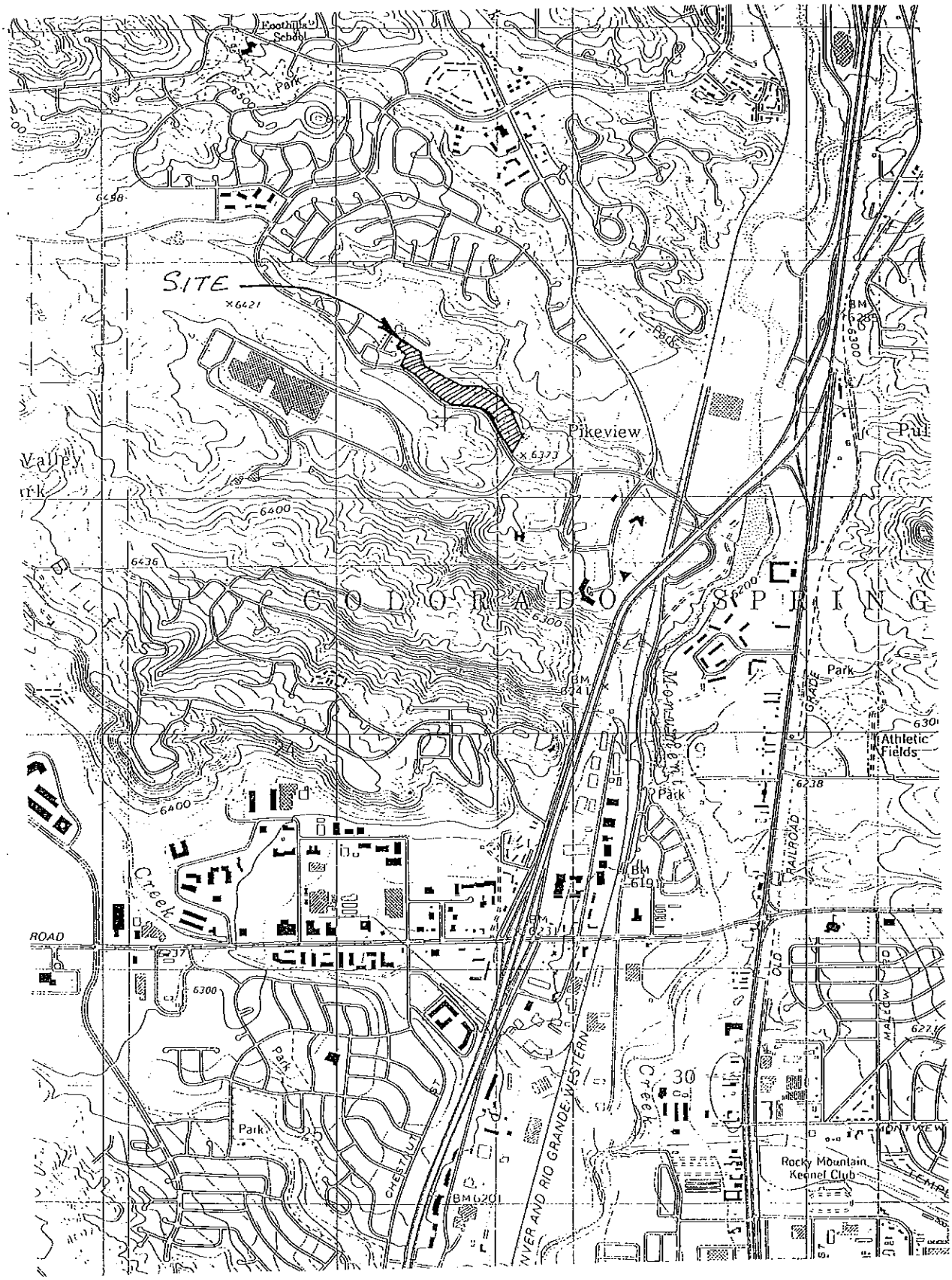
Signature of Owner or Authorized Representative:

owner

Name and Title

1/12/96

Date



LOCATION MAP

Leigh Whitehead & Associates, Inc.
CONSULTING CIVIL ENGINEERS & SURVEYORS
606 SOUTH TEJON STREET
COLORADO SPRINGS, CO 80903-4070

SOILS MAP

Leigh & Whitehead Associates, Inc.
CONSULTING CIVIL ENGINEERS & SURVEYORS
606 SOUTH TEJON STREET
COLORADO SPRINGS, CO 80903-4070

TABLE 16.--SOIL AND WATER FEATURES

[Absence of an entry indicates the feature is not a concern. See "flooding" in Glossary for definition of terms as "rare," "brief," and "very brief." The symbol > means greater than]

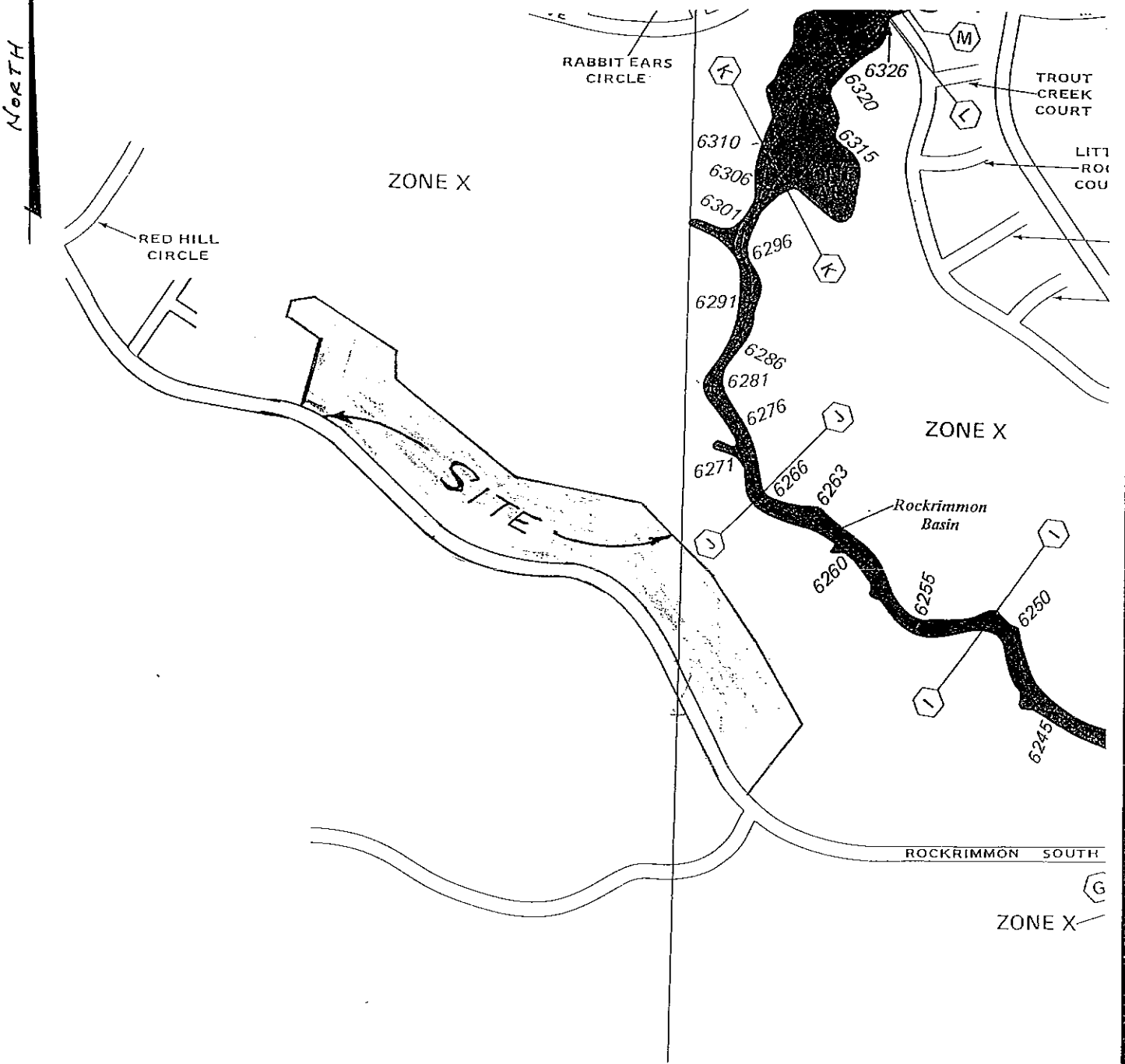
Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Hardness	
					In		
Alamosa: 1	C	Frequent	Brief	May-Jun	>60	---	High.
Ascalon: 2, 3	B	None	---	---	>60	---	Moderate.
Badland: 4	D	---	---	---	---	---	---
Bijou: 5, 6, 7	B	None	---	---	>60	---	Low.
Blakeland: 8	A	None	---	---	>60	---	Low.
[1]9: Blakeland part	A	None	---	---	>60	---	Low.
Fluvaquentic Haplaquolls part	D	Common	Very brief	Mar-Aug	>60	---	High.
Blendon: 10	B	None	---	---	>60	---	Moderate.
Bresser: 11, 12, 13	B	None	---	---	>60	---	Low.
Brussett: 14, 15	B	None	---	---	>60	---	Moderate.
Chaseville: 16, 17	A	None	---	---	>60	---	Low.
[1]18: Chaseville part	A	None	---	---	>60	---	Low.
Midway part	D	None	---	---	10-20	Rippable	Moderate.
Columbine: 19	A	None to rare	---	---	>60	---	Low.
Connerton: [1]20: Connerton part	B	None	---	---	>60	---	High.
Rock outcrop part	D	---	---	---	---	---	---
Cruckton: 21	B	None	---	---	>60	---	Moderate.
Cushman: 22, 23	C	None	---	---	20-40	Rippable	Moderate.
[1]24: Cushman part	C	None	---	---	20-40	Rippable	Moderate.
Kutch part	C	None	---	---	20-40	Rippable	Moderate.
Elbeth: 25, 26	B	None	---	---	>60	---	Moderate.
[1]27: Elbeth part	B	None	---	---	>60	---	Moderate.

See footnote at end of table.

TABLE 16.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Hardness	
					In		
Manvel:							
50	C	None	---	---	>60	---	High.
Manzanola:							
51, 52, 53	C	None to rare	---	---	>60	---	Moderate.
Midway:							
54	D	None	---	---	10-20	Rippable	Moderate.
Nederland:							
55	B	None	---	---	>60	---	Moderate.
Nelson:							
[1]56:							
Nelson part	B	None	---	---	20-40	Rippable	Low.
Tassel part	D	None	---	---	10-20	Rippable	Low.
Neville:							
57	B	None	---	---	>60	---	High.
[1]58:							
Neville part	B	None	---	---	>60	---	High.
Rednun part	C	None	---	---	>60	---	Moderate.
Nunn:							
59	C	None	---	---	>60	---	Moderate.
Olney:							
60, 61	B	None	---	---	>60	---	Moderate.
[1]62:							
Olney part	B	None	---	---	>60	---	Moderate.
Vona part	B	None	---	---	>60	---	Moderate.
Paunsaugunt:							
[1]63:							
Paunsaugunt part	D	None	---	---	10-20	Hard	Moderate.
Rock outcrop part	D	---	---	---	---	---	---
Penrose:							
[1]64:							
Penrose part	D	None	---	---	10-20	Rippable	Low.
Manvel part	C	None	---	---	>60	---	High.
Perrypark:							
65	B	None	---	---	>60	---	Moderate.
Peyton:							
66, 67	B	None	---	---	>60	---	Moderate.
[1]68, [1]69:							
Peyton part	B	None	---	---	>60	---	Moderate.
Pring part	B	None	---	---	>60	---	Moderate.
Pits, gravel:							
70	A	---	---	---	---	---	---
Pring:							
71, 72	B	None	---	---	>60	---	Moderate.
Razor:							
73, 74	C	None	---	---	20-40	Rippable	Moderate.

See footnote at end of table.



FEMA MAP

PLATE NO. 080060 0161 C
MAR. 2, 1989

Leigh & Whitehead Associates, Inc.
CONSULTING CIVIL ENGINEERS & SURVEYORS
606 SOUTH TEJON STREET
COLORADO SPRINGS, CO 80903-4070

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year flood plain.
ZONE D	Areas in which flood hazards are undetermined.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet*

D — D — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone*

RM7 X — Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

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.

Areas of special flood hazard (100-year flood) include Zones A, A1-30, AE, AH, AO, A99, V, V1-30 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.

Coastal base flood elevations apply only landward of the shoreline.

Elevations reference marks are described in the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index

MAP REPOSITORY
Colorado Springs
Planning Department, P.O. Box 1575,
30 South Nevada Avenue, Suite 301,
Colorado Springs, Colorado 80901
(Maps available for reference only, not for distribution.)

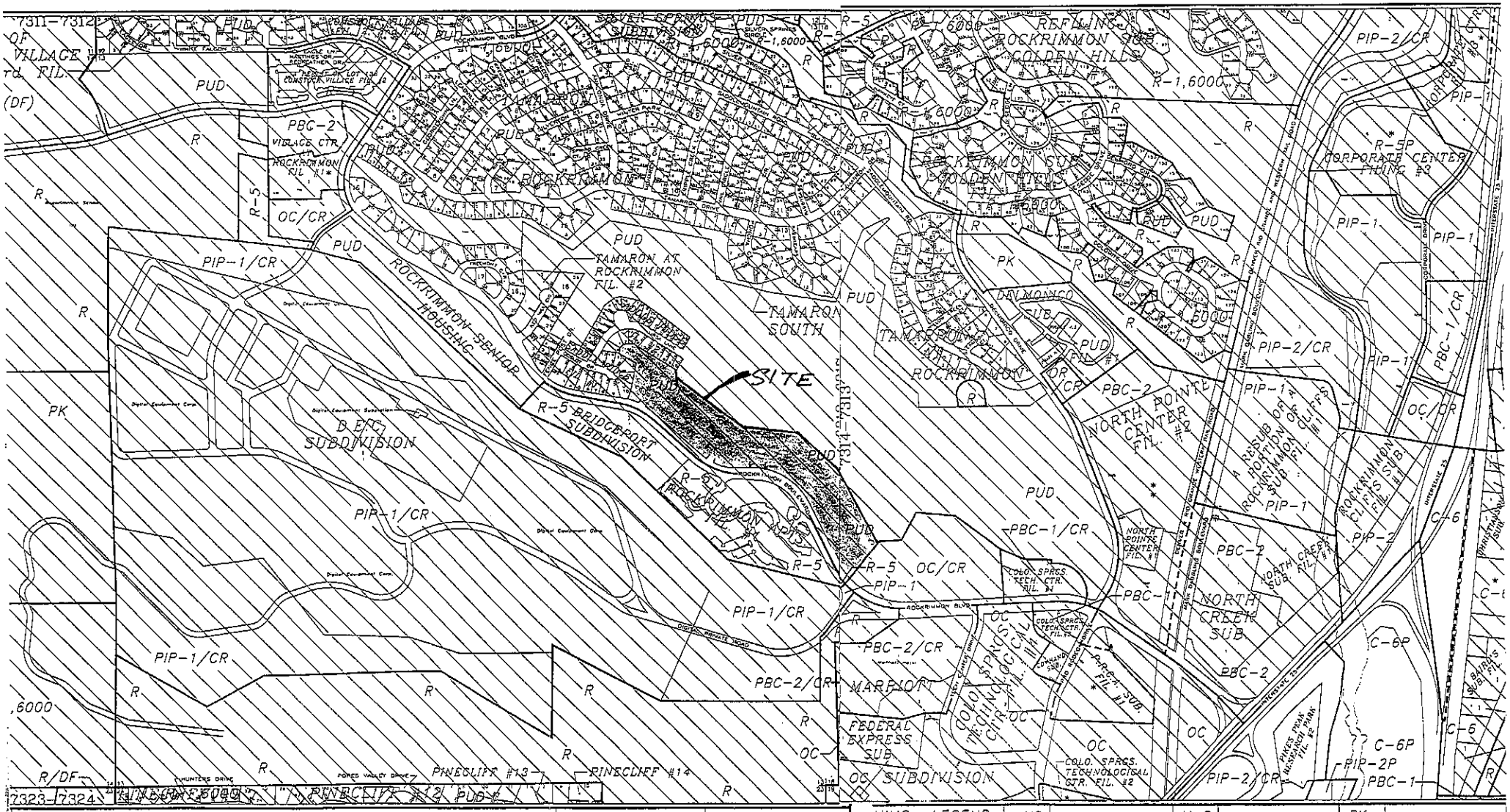
INITIAL IDENTIFICATION:
FEBRUARY 1, 1974

FLOOD HAZARD BOUNDARY MAP REVISIONS:
APRIL 4, 1978

FLOOD INSURANCE RATE MAP EFFECTIVE:
DECEMBER 18, 1986

FLOOD INSURANCE RATE MAP REVISIONS:
Map revised March 2, 1989 to change special flood hazard areas, base flood elevations, and to incorporate previously issued letters of map revision and map amendment.

Leigh & Whitehead Associates, Inc.
CONSULTING CIVIL ENGINEERS & SURVEYORS
606 SOUTH TEJON STREET
COLORADO SPRINGS, CO 80903-4070



PLANNING, DEVELOPMENT AND FINANCE DEPARTMENT
DEVELOPMENT SERVICES DIVISION
POST OFFICE BOX 1575 COLORADO SPRINGS, COLORADO 80901

ZONING MAP

NOTICE:
THE OFFICIAL ZONING MAP OF THE CITY IS MAINTAINED IN THE DEVELOPMENT SERVICES DIVISION AND IS AVAILABLE FOR INSPECTION DURING REGULAR BUSINESS HOURS. PLEASE BE ADVISED THAT ALL COPIES OF THE OFFICIAL ZONING MAP ARE HEREBY DEEMED UNNOFFICIAL, SHOULD NOT BE RELIED ON, AND MAY NOT ACCURATELY REFLECT CURRENT ZONING DISTRICTS DUE TO ZONE CHANGES AFTER THE EFFECTIVE DATE OF THE OFFICIAL ZONING MAP.

BASE MAP REVISION DATE: SEPTEMBER 1, 1990
ZONE MAP REVISION DATE: APRIL 30, 1993

7314-7313

ZONING	LEGEND						
PUD	PLANNED UNIT DEVELOPMENT	MHP	MOBILE HOME PARK	M-2	HEAVY INDUSTRIAL	PK	PUBLIC PARK
R	AGRICULTURAL	MHS	MOBILE HOME SUBDIVISION	APD	AIRPORT PLANNED DEVELOPMENT	DF	DESIGN FLEXIBILITY OVERLAY ZONE
R-1,6000	ESTATE-SINGLE FAMILY RES.	OR	OFFICE RESIDENTIAL	SU	SPECIAL USE	HP	HISTORIC PRESERVATION OVERLAY
R-5P	9,000 SQ. FT.-SINGLE FAMILY RES.	OC	OFFICE COMMERCIAL	RVP	RECREATIONAL VEHICLE PARK	PCR	PLANNED CULTURAL RESORT
R-5	6,000 SQ. FT.-SINGLE FAMILY RES.	PBC	PLANNED BUSINESS CTR. NOS. 1 & 2	PF	PUBLIC FACILITIES	*	CONDITIONAL USE
R/DF	TWO-FAMILY RES.	C-5	INTERMEDIATE BUSINESS	P	PLANNED PROVISIONAL OVERLAY ZONE	*	USE VARIANCE
R-6	EIGHT-FAMILY RES.	C-6	GENERAL BUSINESS		NAVIGATION PRESERV. OVERLAY ZONE	CR	CONDITIONS OF RECORD
R-8	MULTI-FAMILY RES.	PIP	PLANNED INDUSTRIAL PARK NOS. 1 & 2	HR	HIGH RISE		CITY LIMITS
		M-1	LIGHT INDUSTRIAL		HILLSIDE OVERLAY		

RUNOFF COMPUTATIONS

95122-2A.WK3

RATIONAL METHOD

LEIGH WHITEHEAD & ASSOCIATES, INC.
ENGINEERS, SURVEYORS & PLANNERS
2720 EAST YAMPA STREET, SUITE 1
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(719) 636-5179

ROCKRIMMON VISTA FILING NO. 2
ROCKRIMMON BOULEVARD
COLORADO SPRINGS, COLORADO

16-Dec-95

TABLE B: LWA #95122-02 SHT. 1 of 2

PROPOSED CONDITIONS

BASIN	AREA	SOIL GROUP	C 5 / C 100	GEOMETRY LENGTH / SLOPE	GEOMETRY HEIGHT	Tt 5 / Tt 100	V / Tt	tc 5 / tc 100	i 5 / i 100	Q5	Q100	COMMENTS
A1	1.31	73	0.63	30	0.7	3.64	2.28	7.64	4.51	3.7		
		C	0.73	2.33		2.87	4.00	6.87	8.14		7.8	
A2	1.49	73 & 18	0.63	300	1.3	20.06	3.16	20.17	2.95	2.8		
		C & D	0.73	0.43		15.79	0.11	15.90	5.81		6.3	
DP - 1	2.80	18	0.63	TT FROM A1		3.64	2.02	10.50	4.00	7.1		BASIN A1
		D	0.73			2.87	6.86	9.73	7.20		14.7	THRU A2
A3	2.26	18	0.63	200	1.4	13.98	VARIES	17.02	3.22	4.6		
		D	0.73	0.70		11.01	3.04	14.05	6.16		10.2	
DP - 2	5.06	18	0.63	TT FROM A1		3.64	VARIES	14.19	3.52	11.2		BASIN A1
		D	0.73			2.87	10.55	13.42	6.29		23.2	THRU A3
A4	1.22	18	0.63	200	4.0	9.89	VARIES	10.11	4.06	3.1		
		D	0.73	2.00		7.78	0.22	8.00	7.73		6.9	
A	6.28	73 & 18	0.63	TT FROM A1		3.64	VARIES	14.85	3.44	13.6		
		C & D	0.73			2.87	11.21	14.08	6.15		28.2	
B1	6.28	73	0.55	300	23.0	9.10	VARIES	13.38	3.61	12.5		
		C	0.65	7.67		7.44	4.28	11.72	6.67		27.2	
B2	2.44	18	0.63	230	4.0	11.10	2.96	12.90	3.67	5.6		
		D	0.73	1.74		8.74	1.80	10.54	6.97		12.4	
B3	1.44	18	0.55	275	11.5	10.64		10.64	3.98	3.2		
		D	0.65	4.18		8.70		8.70	7.50		7.0	

RUNOFF COMPUTATIONS

RATIONAL METHOD

ROCKRIMMON VISTA FILING NO. 2
ROCKRIMMON BOULEVARD
COLORADO SPRINGS, COLORADO

95122-2B.WK3

LEIGH WHITEHEAD & ASSOCIATES, INC.
ENGINEERS, SURVEYORS & PLANNERS
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

17-Dec-95

TABLE B: LWA #95122-02 SHT. 2 of 2
PROPOSED CONDITIONS

BASIN	AREA	SOIL GROUP	C 5 / C 100	GEOMETRY LENGTH / SLOPE	GEOMETRY HEIGHT	Tt 5 / Tt 100	V / Tt	tc 5 / tc 100	i 5 / i 100	Q5	Q100	COMMENTS
B4	2.78	18	0.63	240	6.5	9.80	7.45	10.14	4.06	7.1		
		D	0.73	2.71		7.72	0.34	8.06	7.72		15.7	
B	12.94	18	0.59	300	23	8.43	VARIES	14.74	3.45	26.4		
		D	0.69	7.67		6.78	6.31	13.09	6.36		56.8	
C	0.65	18	0.59	200	4.5	10.32	8.55	10.48	4.01	1.5		
		D	0.69	2.25		8.30	0.16	8.46	7.58		3.4	
D	1.16	18	0.63	210	4.2	10.13	8.57	10.37	4.02	2.9		
		D	0.73	2.00		7.98	0.24	8.22	7.66		6.5	
E	0.40	18	0.63	180	3.6	9.38	6.50	9.51	4.16	1.0		
		D	0.73	2.00		7.38	0.13	7.51	7.90		2.3	
F	0.50	18	0.63	65	2	4.89	VARIES	6.04	4.85	1.5		
		D	0.73	3.08		3.85	1.15	5.00	9.00		3.3	
G	0.43	18	0.63	190	4.0	9.48	6.71	9.69	4.13	1.1		
		D	0.73	2.11		7.46	0.21	7.67	7.85		2.5	
H1	0.82	18	0.63	80	3.2	4.98	4.10	5.39	5.02	2.6		
		D	0.73	4.00		3.92	0.41	4.33	9.00		5.4	
H2	1.08	18	0.63	145	3.0	8.33	6.53	8.82	4.28	2.9		
		D	0.73	2.07		6.55	0.49	7.04	8.07		6.4	
H	1.90	18	0.63	tc FROM H2				8.82	4.28	5.1		
		D	0.73					7.04	8.07		11.2	
I	0.41	18	0.63	285	10.0	9.81		9.81	4.11	1.1		
		D	0.73	3.51		7.72		7.72	7.83		2.3	

RUNOFF COMPUTATIONS

TRAVEL TIME CALCULATIONS (TR-55)

ROCKRIMMON VISTA FILING NO. 1
ROCKRIMMON BOULEVARD
COLORADO SPRINGS, COLORADO

95122-T1.WK3

LEIGH WHITEHEAD & ASSOCIATES, INC.
ENGINEERS, SURVEYORS & PLANNERS
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

17-Dec-95

PROPOSED CONDITIONS LWA #95122-02 SHT. 1 of 1

BASIN	"K"	HIGH ELEV.	LOW ELEV.	LENGTH	HEIGHT	SLOPE	"V"	"TT"	COMMENTS
A1	2.0	50.3	43.2	547	7.1	1.30%	2.28	4.00	
A2	2.0	42.3	41.8	20	0.5	2.50%	3.16	0.11	
DP-1	2.0	50.3	41.8	832	8.5	1.02%	2.02	6.86	DP-1 TOTAL
A3	2.0	41.6	40.9	135	0.7	0.52%	1.44	1.56	
	2.0	40.9	36.1	220	4.8	2.18%	2.95	1.24	
	2.0	36.1	35.3	40	0.8	2.00%	2.83	0.24	
								3.04	A3 TOTAL
DP-2	2.0	50.3	41.8	832	8.5	1.02%	2.02	6.86	FROM DP - 1
	2.0	41.8	40.9	185	0.9	0.49%	1.39	2.21	
	2.0	40.9	36.1	220	4.8	2.18%	2.95	1.24	
	2.0	36.1	35.3	40	0.8	2.00%	2.83	0.24	
								10.55	DP-2 TOTAL
A4	2.0	27.0	8.0	110	19.0	17.27%	8.31	0.22	
A	2.0	50.3	35.3	1277	15.0	VARIES	VARIES	10.56	
	2.0	35.3	27.0	130	8.3	6.38%	5.05	0.43	
	2.0	27.0	8.0	110	19.0	17.27%	8.31	0.22	
								11.21	A TOTAL (INCL. DP-1)
B1	1.5	77.0	58.0	240	19.0	7.92%	4.22	0.95	
	1.5	58.0	44.0	100	14.0	14.00%	5.61	0.30	
	1.5	44.0	40.0	310	4.0	1.29%	1.70	3.03	
								4.28	B1 TOTAL
B2	2.0	38.0	31.0	320	7.0	2.19%	2.96	1.80	
B4	1.5	130.0	93.0	150	37.0	24.67%	7.45	0.34	
B	1.5	77.0	40.0	650	37.0	VARIES	VARIES	4.28	
	2.0	40.0	16.0	280	24.0	8.57%	5.86	0.80	
	2.0	116.0	90.0	385	26.0	6.75%	5.20	1.23	
								6.31	B TOTAL
C	1.5	30.0	4.0	80	26.0	32.50%	8.55	0.16	
D	1.5	126.8	86.0	125	40.8	32.64%	8.57	0.24	
E	1.5	29.4	20.0	50	9.4	18.80%	6.50	0.13	
F	2.0	42.5	36.0	212	6.5	3.07%	3.50	1.01	
	1.5	36.0	11.0	75	25.0	33.33%	8.66	0.14	
								1.15	F TOTAL
G	1.5	29.0	12.0	85	17.0	20.00%	6.71	0.21	
H1	2.0	41.3	37.1	100	4.2	4.20%	4.10	0.41	
H2	1.5	130.0	94.0	190	36.0	18.94%	6.53	0.49	

12/17/95

DP-2

SIDEWALK CHASE

Open Channel Flow for Rectangular Channel

5 YR. FLOW

Input Quantities

	Bottom Width:	5.0000	ft ←
	Manning's n:	0.0150	
	Channel Slope:	2.0000	%
	Flow Rate:	11.2000	cfs ←
Calculated	Depth of Flow:	0.3486	ft ←

Calculated Quantities

Area Of Flow:	1.7432	sf
Wetted Perimeter:	5.6973	ft
Hydraulic Radius:	0.3060	ft
Velocity:	6.4249	ft/s
Critical Slope:	0.5231	%
Froude Number:	1.9176	
Critical Depth:	0.5381	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

DP-2
SIDEWALK CHASE
Open Channel Flow for Rectangular Channel
100 YR. FLOW

Input Quantities

	Bottom Width:	5.0000	ft ←
	Manning's n:	0.0150	
	Channel Slope:	2.0000	%
	Flow Rate:	23.2000	cfs ←
Calculated	Depth of Flow:	0.5604	ft ←

Calculated Quantities

Area Of Flow:	2.8019	sf
Wetted Perimeter:	6.1208	ft
Hydraulic Radius:	0.4578	ft
Velocity:	8.2800	ft/s
Critical Slope:	0.5118	%
Froude Number:	1.9492	
Critical Depth:	0.8744	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

BASIN "A"
RIP-RAP SWALE
Open Channel Flow for Triangular Channel
5 YR. FLOW

Input Quantities

	Manning's n:	0.0450	
	Channel Slope:	30.0000	%
	Flow Rate:	13.6000	cfs ←
	Side Slope:	4.0000	z
Calculated	Depth of Flow:	0.6375	ft ←

Calculated Quantities

Area Of Flow:	1.6255	sf
Wetted Perimeter:	5.2568	ft
Hydraulic Radius:	0.3092	ft
Velocity:	8.3667	ft/s ←
Critical Slope:	3.9603	%
Top Width:	5.0998	ft
Froude Number:	2.6116	
Critical Depth:	0.9359	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

BASIN "A"
RIP-RAP SWALE
Open Channel Flow for Triangular Channel
100 YR. FLOW

Input Quantities

	Manning's n:	0.0450	
	Channel Slope:	30.0000	%
	Flow Rate:	28.2000	cfs
	Side Slope:	4.0000	z
Calculated	Depth of Flow:	0.8411	ft

Calculated Quantities

Area Of Flow:	2.8301	sf
Wetted Perimeter:	6.9363	ft
Hydraulic Radius:	0.4080	ft
Velocity:	9.9642	ft/s ←
Critical Slope:	3.5934	%
Top Width:	6.7292	ft
Froude Number:	2.7077	
Critical Depth:	1.2529	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

BASIN "B3 & B4"
RIP-RAP SWALES

Open Channel Flow for Triangular Channel
5 YR. FLOW

Input Quantities

	Manning's n:	0.0450	
	Channel Slope:	7.5200	% ←
	Flow Rate:	12.5000	cfs
	Side Slope:	4.0000	z
Calculated	Depth of Flow:	0.8046	ft ←

Calculated Quantities

Area Of Flow:	2.5893	sf
Wetted Perimeter:	6.6346	ft
Hydraulic Radius:	0.3903	ft
Velocity:	4.8277	ft/s ←
Critical Slope:	4.0051	%
Top Width:	6.4365	ft
Froude Number:	1.3414	
Critical Depth:	0.9048	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

BASIN "B3 & B4"
RIP-RAP SWALE
Open Channel Flow for Triangular Channel
100 YR. FLOW

Input Quantities

	Manning's n:	0.0450	
	Channel Slope:	7.5200	%
	Flow Rate:	27.2000	cfs ←
	Side Slope:	4.0000	z
Calculated	Depth of Flow:	1.0752	ft ←

Calculated Quantities

Area Of Flow:	4.6239	sf
Wetted Perimeter:	8.8660	ft
Hydraulic Radius:	0.5215	ft
Velocity:	5.8825	ft/s ←
Critical Slope:	3.6107	%
Top Width:	8.6013	ft
Froude Number:	1.4139	
Critical Depth:	1.2349	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

BASIN "F"
CURB OPENING
Open Channel Flow for Rectangular Channel
5 YR. FLOW

Input Quantities

	Bottom Width:	5.0000	ft
	Manning's n:	0.0180	
	Channel Slope:	2.0000	%
	Flow Rate:	1.5000	cfs
Calculated	Depth of Flow:	0.1112	ft

Calculated Quantities

Area Of Flow:	0.5558	sf
Wetted Perimeter:	5.2223	ft
Hydraulic Radius:	0.1064	ft
Velocity:	2.6990	ft/s
Critical Slope:	0.9769	%
Froude Number:	1.4267	
Critical Depth:	0.1409	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

BASIN "E"
CURB OPENING
Open Channel Flow for Rectangular Channel
100 YR. FLOW

Input Quantities

	Bottom Width:	5.0000	ft ←
	Manning's n:	0.0180	
	Channel Slope:	2.0000	%
	Flow Rate:	3.3000	cfs ←
Calculated	Depth of Flow:	0.1840	ft ←

Calculated Quantities

Area Of Flow:	0.9198	sf
Wetted Perimeter:	5.3679	ft
Hydraulic Radius:	0.1714	ft
Velocity:	3.5877	ft/s
Critical Slope:	0.8604	%
Froude Number:	1.4741	
Critical Depth:	0.2383	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

BASIN "F"
RIP-RAP SWALE
Open Channel Flow for Triangular Channel
5 YR. FLOW

Input Quantities

	Manning's n:	0.0450	
	Channel Slope:	30.0000	%
	Flow Rate:	1.5000	cfs ←
	Side Slope:	4.0000	z
Calculated	Depth of Flow:	0.2747	ft ←

Calculated Quantities

Area Of Flow:	0.3019	sf
Wetted Perimeter:	2.2654	ft
Hydraulic Radius:	0.1333	ft
Velocity:	4.9688	ft/s ←
Critical Slope:	5.3137	%
Top Width:	2.1978	ft
Froude Number:	2.3626	
Critical Depth:	0.3875	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

BASIN "F"
RIP-RAP SWALE
Open Channel Flow for Triangular Channel
100 YR. FLOW

Input Quantities

	Manning's n:	0.0450	
	Channel Slope:	30.0000	%
	Flow Rate:	3.3000	cfs ←
	Side Slope:	4.0000	z
Calculated	Depth of Flow:	0.3796	ft ←

Calculated Quantities

Area Of Flow:	0.5765	sf
Wetted Perimeter:	3.1305	ft
Hydraulic Radius:	0.1841	ft
Velocity:	5.7245	ft/s ←
Critical Slope:	4.7834	%
Top Width:	3.0370	ft
Froude Number:	2.3155	
Critical Depth:	0.5311	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

BASIN "H-1"

SIDEWALK CHASE

Open Channel Flow for Rectangular Channel

5 YR. FLOW

Input Quantities

	Bottom Width:	2.0000	ft
	Manning's n:	0.0150	
	Channel Slope:	2.0000	%
	Flow Rate:	2.6000	cfs
Calculated	Depth of Flow:	0.2702	ft

Calculated Quantities

Area Of Flow:	0.5404	sf
Wetted Perimeter:	2.5404	ft
Hydraulic Radius:	0.2127	ft
Velocity:	4.8116	ft/s
Critical Slope:	0.6956	%
Froude Number:	1.6313	
Critical Depth:	0.3744	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

BASIN "H-1"
SIDEWALK CHASE
Open Channel Flow for Rectangular Channel
100 YR. FLOW

Input Quantities

	Bottom Width:	2.0000	ft
	Manning's n:	0.0150	
	Channel Slope:	2.0000	%
	Flow Rate:	5.4000	cfs
Calculated	Depth of Flow:	0.4320	ft

Calculated Quantities

Area Of Flow:	0.8640	sf
Wetted Perimeter:	2.8640	ft
Hydraulic Radius:	0.3017	ft
Velocity:	6.2502	ft/s
Critical Slope:	0.7299	%
Froude Number:	1.6758	
Critical Depth:	0.6095	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

BASIN "H"
RIP-RAP SWALE
Open Channel Flow for Triangular Channel
5 YR. FLOW

Input Quantities

	Manning's n:	0.0450	
	Channel Slope:	30.0000	%
	Flow Rate:	5.1000	cfs ←
	Side Slope:	4.0000	z
Calculated	Depth of Flow:	0.4389	ft ←

Calculated Quantities

Area Of Flow:	0.7706	sf
Wetted Perimeter:	3.6194	ft
Hydraulic Radius:	0.2129	ft
Velocity:	6.6185	ft/s ←
Critical Slope:	4.5137	%
Top Width:	3.5113	ft
Froude Number:	2.4898	
Critical Depth:	0.6322	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

12/17/95

BASIN "H"
RIP-RAP SWALE
Open Channel Flow for Triangular Channel
100 YR. FLOW

Input Quantities

	Manning's n:	0.0450	
	Channel Slope:	30.0000	%
	Flow Rate:	11.2000	cfs ←
	Side Slope:	4.0000	z
Calculated	Depth of Flow:	0.5975	ft ←

Calculated Quantities

Area Of Flow:	1.4282	sf
Wetted Perimeter:	4.9273	ft
Hydraulic Radius:	0.2898	ft
Velocity:	7.8423	ft/s ←
Critical Slope:	4.0642	%
Top Width:	4.7802	ft
Froude Number:	2.5284	
Critical Depth:	0.8660	ft

HHCalc, Version 7.0s
Eagle Point, 4131 WestMark Drive, Dubuque, IA, 52002, 1-800-678-6565

ROCKRIMMON VISTA FI. NO. 2
CATCH BASIN SIZE CALCULATIONS
Combination Inlet
(SUMP CONDITION)

LEIGH WHITEHEAD & ASSOCIATES, INC.
2720 E. YAMPA STREET, SUITE 1
COLORADO SPRINGS, CO. 80903
(719)636-5179

LWA #95122-02 19-Dec-95 95122-CB.WK3

BASIN NO.	CATCH BASIN SIZE	INLET LENGTH	INLET WIDTH	PERIMETER OF GRATE	CLEAR AREA OF GRATE	DEPTH	CLOG. FACTOR	INTERCEPT. FLOW (CB OPENING)	TOTAL FLOW cfs	5 Yr. FLOW cfs	100 Yr. FLOW cfs	
So. RD.	6.0	6.0				0.78	1.25	14.5	14.5	15.6		TOPS CROWN OVERFLOW = 1.1 cfs
So. RD.	6.0	6.0				0.78	1.25	14.5	14.5		28.9	TOPS CROWN OVERFLOW = 14.4 cfs
No. RD	6.0	6.0				0.53	1.25	8.3	8.3	8.3		FLOWS INTERCEPTED
No. RD	6.0	6.0				1.51	1.25	20.7	20.7		41.4	BOTHS CB's INTERCEPT ALL FLOWS
APT's	8.0	8.0				0.37	1.25	6.5	6.5	6.5		EXIST. WEST INLET
APT's	8.0	8.0				0.59	1.25	11.4	11.4		11.4	EXIST. WEST INLET
APT's	6.0	6.0				0.44	1.25	6.5	6.5	6.5		EXIST. EAST INLET
APT's	6.0	6.0				0.67	1.25	11.3	11.3		11.3	EXIST. EAST INLET
B2	5.0	5.0	5.0	10.0	10.00	0.52	2.0	5.6	5.6	5.6		PROPOSED GRATE INLET
B2	5.0	5.0	5.0	10.0	10.00	0.88	2.0	12.4	12.4		12.4	PROPOSED GRATE INLET

ROCKRIMMON VISTA FILING NO. 2
ROCKRIMMON BOULEVARD
COLORADO SPRINGS, COLORADO

CURB OPENING INLET COMPUTATIONS
CONTINUOUS GRADE
LWA #95122-02

LEIGH WHITEHEAD & ASSOCIATES
ENGINEERS, SURVEYORS & PLANNERS
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, CO. 80909
(719) 636-5179

95122-IN.WK3

02-Jan-96

SHT. 1 of 1

NO.	So	Sx	Q	T	Fw	FwT	L1 (0.770)	L2 (0.462)	L3 (1.65)	Qi/Q	Qi	Q2 (0.60)	Li (FT) Qi<Q2 Li<L2	Li (FT) Qi>Q2 Li>L2	USE Li (ft.)	ACT. Qi (cfs)	Q-Qi = Qc (cfs)
1	0.023	0.020	5.10	11.33	1.89	21.44	16.51	9.92	35.38	0.36	1.9	3.1	6.00		6.0	1.9	3.2
1	0.023	0.020	8.90	13.96	1.97	27.54	21.21	12.74	45.44	0.28	2.5	5.3	6.00		6.0	2.5	6.4
2	0.046	0.020	5.50	10.28	2.59	26.65	20.53	12.33	43.98	0.29	1.6	3.3	6.00		6.0	1.6	3.9
2	0.046	0.020	10.10	12.91	2.71	35.05	26.99	16.21	57.84	0.22	2.2	6.1	6.00		6.0	2.2	7.9
3	0.020	0.020	7.70	13.61	1.82	24.74	19.05	11.44	40.83	0.21	1.6	4.6	4.00		4.0	1.6	6.1
3	0.020	0.020	17.50	18.52	1.93	35.70	27.49	16.51	58.91	0.15	2.5	10.5	4.00		4.0	2.5	15.0
4	0.050	0.020	1.80	6.65	2.47	16.40	12.63	7.58	27.06	0.32	0.6	1.1	4.00		4.0	0.6	1.2
4	0.050	0.020	3.20	8.25	2.59	21.38	16.46	9.89	35.27	0.24	0.8	1.9	4.00		4.0	0.8	2.4

Qi/Q*L1 ERR ERR Qi/Q^2.5*L3
Li/L1*Q ERR ERR Li/L3^0.4*Q

ROCKRIMMON VISTA #2

OUTLET PAD IN BASIN B-4

95122-02 SHT. 1 of 2

1-2-96 / LAB

$Q_{100} = 93.8$ cfs

$Q/D^{2.5} = \frac{93.8}{3.0^{2.5}} = \frac{93.8}{(15.5885)} = 6.0 \leq 6$ in Fig. 5-7 OK

$D_a = (3 + 2.44)\,0.5 = 2.72$

$Q/D_a^{1.5} = 93.8/2.72^{1.5} = 93.8/4.4859 = 20.46$

$Y_t/D = 2.44/3.0 = 0.8133$, From Eq. E-7, 20.5 & 0.81 ~ TYPE "L" $d_{50} = 9"$

$V_p = 15.21$, Type "L", $d_{50} = 9"\phi$ to Small ∴ Use "M" $d_{50} = 12"\phi$

$L = (1/2 \tan\theta)\left(\frac{A_t}{Y_D} - W\right)$

$W = 3.0'$, $Y_t = 2.44$, $A_t = Q/V = 93.8/5.5 = 17.05$

$Q = 93.8$

$V_d = 5.5$; $\frac{1}{2\tan\theta} = 4.3$ from 5-9, $Y_t/D = 0.8$, $Q/D^{2.5} = 6.0 = 4.3$

Width $= D + 2D = 3' + (2 \times 3) = 9.0'$

$L = (4.3)\left(\frac{17.05}{2.44} \cdot 3\right) = (4.3)(6.9896 - 3) = 17.1551$ ←

$3D = 3 \times 3 = 9 < 17.2$

$10D = 3 \times 10 = 30 > 17.2$ ∴ 17.2 OK, Use 20'

Rip-Rap Pad: $d_{50} = 12"\phi \times 2 = 24"$ thick

$L = 20'$, $W = 9.0'$

BEDDING: 4" TYPE II BEDDING W/ FILTER FABRIC

OUTLET PAD IN BASIN F 1-2-96 / LAB

Q_{100} = 21.4 cfs (PER COSTIN RPT. FOR ROCKRIMMON BLVD.)

Q_{100} = 8.0 cfs (Per Actual C.B. Interception.)

USE 21.4 cfs TO CALC. PAD SIZE S_o = 3.6%

$Q/D^{1.5} = 21.4/1.5^{1.5} = \frac{21.4}{1.837} = 11.65$

$Y_t/D = \frac{1.38}{1.50} = 0.92$

From Fig. 5-7; 11.7 & 0.9 ~ Type "L", d_{50} = 9"ø

V_p = 12.6 fps; Type "L", d_{50} 9"ø: To Small ∴ Use "M", d_{50} = 12" ø

$L = \left(\frac{1}{Z \tan\theta}\right)\left(\frac{A_t}{Y_t} - W\right)$

$W = 1.5$, $Y_t = 1.38$, $A_t = \frac{Q}{V} = \frac{21.4}{12.6} = 1.70$, V_d = 6.5 fps

$Y_t/D = 0.92$; $Q/D^{2.5} = \frac{21.4}{1.5^{2.5}} = 7.77 > 6.0$ ∴ USE 6.0

$\frac{1}{Z \tan\theta} = 4.3$ from Fig. 5-9 (0.92 & 6.0)

$A_t = \frac{Q}{V_d} = \frac{21.4}{6.5} = 3.89$; $\frac{A_t}{Y_t} - D = \frac{3.89}{1.38} = 2.82 - 1.5 = 1.32$

$L = (4.3)(1.32) = 5.68$

3D = 3.0 × 1.5 = 4.5

10D = 10 × 1.5 = 15.0

$Q/D^{2.5} > 6$ ∴ Use $\left(2 \times \frac{D}{4}\right) + L$ ~ $\left(2 \times \frac{1.50}{4}\right) + 5.68$

$(2 \times 0.375) + 5.68 = 0.75 + 5.68 = 6.43$

$L = 6.43 > 4.5$ & < 15.0 ∴ 6.4 OK, USE 10'

Width = D + 2D = 1.5 + (2 × 1.5) = 1.5 + 3.0 = 4.5, USE 5'

RIP-RAP PAD: d_{50} = 12" ø × 2 = 24" Thick

L = 10', W = 5'

BEDDING: 4" Type II Bedding, W/ Filter Fabric