
**MASTER DEVELOPMENT
DRAINAGE PLAN
FOR
STETSON RIDGE**

January, 2001

***Leigh
& Whitehead
Associates, Inc.***

CONSULTING CIVIL ENGINEERS & SURVEYORS
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, CO 80909-5061

LWA Project No. 98079.61

**RETURN WITHIN 2 WEEKS TO:
CITY OF COLORADO SPRINGS
SUBDIVISION ENGINEERING
30 SOUTH NEVADA AVE., SUITE 702
COLORADO SPRINGS, CO 80903
(719) 385-5979**

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TRANSMITTAL LETTER

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SITE LOCATION

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EXISTING CONDITIONS DRAINAGE PLAN (ENVELOPE)

PROPOSED CONDITIONS DRAINAGE PLAN (ENVELOPE)

January, 2001

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

RE: Stetson Ridge

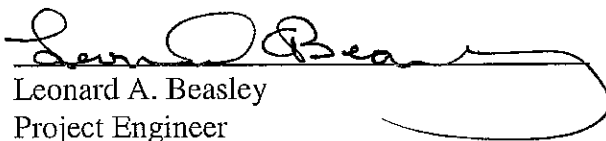
Dear Representative:

In accordance with the requirements of the City of Colorado Springs Subdivision Ordinance, a master development drainage plan has been prepared for the proposed Stetson Ridge development.

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

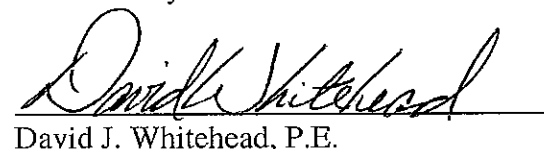
Seven (7) complete copies of the drainage report and plan are hereby transmitted for your review and approval. If there are any questions or comments concerning this report, please contact the undersigned.

Sincerely,


Leonard A. Beasley
Project Engineer

1-31-01
Date

Reviewed by:


David J. Whitehead, P.E.

cc: Client

SIGNATURES AND STATEMENTS

Engineer's Statement:

The attached master development 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 master development drainage plans and said plan 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)

Developer's Statement:

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

By: _____

(signature)

L. J. Case

Printed Name

102 East Pikes Peak Avenue, Suite 200
Colorado Springs, 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

Date

2/2/01

Conditions: _____

MASTER DEVELOPMENT DRAINAGE PLAN

Introduction:

Stetson Ridge is located in the east one-half of Section 17 and a portion of the east one-half of Section 8, Township 13 South, Range 65 West of the 6th P.M., El Paso County, Colorado Springs, Colorado. The property is bounded on the east by Marksheffel Road, on the south by Stetson Hills Boulevard (extended), and the northerly boundary is approximately one quarter of a mile south of Woodmen Road. Stetson Ridge contains approximately 480 acres and has a multi-use zoning and master plan approved by the City of Colorado Springs. The attached Proposed Conditions MDDP shows the various types of zoning within this development. The property is located within the Sand Creek Drainage Basin. The drainage basin fee for Sand Creek is \$6,714.00 per acre, \$400.00 per acre bridge fee, and the pond fee is \$427.00 for the land fee and \$1,498.00 for the facilities fee. This adds up to \$9,039.00 per acre combined fee for drainage, bridge and pond. The City has also indicated that this area may require a pond surcharge fee for Sky Sox Pond #2 of \$750.00 per acre. This is in and above the normal drainage, bridge and pond fees required for the site.

Soils:

The majority of the soils within this site consist of the Truckton Series. This soil is located on approximately 3/4 of the site. The other portion of the site within the northeast quarter consists of the Blakeland Series. Along the northwesterly edge of the property is a major drainage conveyance channel. This area also has a soil type from the Blakeland Series. These three types of soil are in Hydrologic Group A and B which has a permeability that is moderately rapid which gives it the Hydrologic Group A and B rating. These types of ratings will be used in the Existing Conditions Drainage Plan and a minimum of Group B rating will be used for the Proposed Conditions Drainage Plan.

Methodology:

The HEC-1 methodology was used for this project using a 2.6" precipitation depth for the 5-year event and 4.4" precipitation depth for the 100-year event. This methodology was used for areas in excess of 100 acres. For any basins or sub-basins less than 100 acres, the City/County criteria for the rational method was used as required by this criteria manual. The site contains approximately 480 acres.

Hydraulic Calculations

Pipe diameters, reinforce concrete box culvert dimensions, and channel sections were estimated with Haestad Methods, Inc. StormCad v1.0 software using the Manning's Formula, pertinent data sheets are included in the back of this report.

Street capacities were estimated using the City of Colorado Drainage Criteria manual graph of Discharge vs. Street Slope for collector streets (major and minor) and Flow Master 5.17 for irregular sections. The graph and data sheets are included in the appendix of this report.

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

Floodplain Statement

A portion of Stetson Ridge is located in a FEMA designated 100-year floodplain, as shown on F.I.R.M. Panel Number 08041C0537 F dated March 17, 1997.

Offsite Conditions:

Sand Creek, a major drainage conveyance channel, is located on the northwesterly boundary of this site. Runoff enters the site from this channel and also some runoff from properties to the northwest. This channel and areas are indicated on the attached Existing Conditions Drainage Plan as Sub-basin H. No other offsite flow enters this development.

Current Conditions:

This site was developed into seven major drainage basins with the majority of the basins draining to the west. A small portion drains to the east towards Marksheffel Road and another basin drains southerly into property adjacent on the south. Basin A drains southerly to the south boundary line of Stetson Ridge. This basin has an area of 81.91 acres and generates a peak flow of 21.2 cfs for the 5-year event and 50.4 cfs for the 100-year event. Flows exit this basin and development via an existing drainage channel that flows southerly and southwesterly to eventually connect with Sand Creek.

Basin B is located at the southwest portion of the development and contains 27.68 acres. The peak runoff generated from this basin is 6.6 cfs for the 5-year event and 15.6 cfs for the 100-year event. The majority of this runoff is collected from the offsite area to the west into an existing natural drainage channel that flows in a southerly direction. Flows are directed toward Stetson Hills. Based on the information obtained from the MDDP prepared for Stetson Hills, they are willing to accept these flows and the developed flows from this basin.

Basin C flows in a westerly direction to the proposed Ridgeview development. Runoff that is directed to that development indicate that these flows will be accepted by the Ridgeview development and conveyed westerly to the Sand Creek Drainage Channel. Existing condition flows that enter Ridgeview from Stetson Ridge are Sub-basins C1, C2 and C3. Sub-basin C1 generates a peak flow of 2.2 cfs for the 5-year event and 5.3 cfs for the 100-year event. This sub-basin contains 7.06 acres. Sub-basin C2 is the largest of the three and contains 67.17 acres and generates a peak flow of 17.5 cfs for the 5-year event and 41.8 cfs for the 100-year event. Sub-basin C3 is a small area and contains 4.39 acres. The runoff generated from this sub-basin is 1.8 cfs for the 5-year event and 4.2 cfs for the 100-year event. These flows are then conveyed through offsite sub-basin OS-C4 which contains 27.67 acres. The overall Basin C has an area of 106.29 acres and generates a peak flow of 17.0 cfs for the 5-year event and 91.0 cfs for the 100-year event.

Basin D is a small area located on the easterly edge of the site and runoff is directed easterly to two existing 30" C.M.P.s that direct runoff under Marksheffel Road. Basin D contains 17.67 acres and generates a peak flow of 6.4 cfs for the 5-year event and 15.3 cfs for the 100-year event. Basin E is also located on the easterly edge of the property and runoff is directed to two existing 30" R.C.P.s that convey flow under Marksheffel Road. Basin E contains 54.5 acres and generates a peak flow of 12.4 cfs for the 5-year event and 29.6 cfs for the 100-year event.

Basin F is a very small basin which contains 0.41 acres and is located on the easterly edge of the property. Runoff is directed in sheetflow westerly to the Ridgeview development. The peak flow generated from this basin is 0.2 cfs for the 5-year event and 0.5 cfs for the 100-year event.

Basin G was divided into four sub-basins of which three are within the Stetson Ridge development. Flows are directed westerly towards Ridgeview. Sub-basin G1 contains 77.81 acres and generates a peak flow of 19.8 cfs for the 5-year event and 47.3 cfs for the 100-year event. Flows exit Stetson Ridge via an existing drainage channel. Sub-basin G2 contains 101.24 acres and generates a peak flow of 16.0 cfs for the 5-year event and 82.0 cfs for the 100-year event. These flows exit Stetson Ridge and enter Ridgeview via an existing drainage channel. Sub-basin G3 contains 4.13 acres and generates a peak flow of 1.4 cfs for the 5-year event and 3.3 cfs for the 100-year event. Runoff is directed toward Ridgeview in sheetflow.

Basin H is located along the northwesterly portion of the site. Sub-basins H1, H4, H5 and H6 direct runoff in sheetflow to Sand Creek. Offsite Sub-basin H3 directs runoff to Sand Creek which also allows offsite flows to enter the Stetson Ridge development. Sub-basin H1 contains 2.04 acres and generates a peak flow of 0.8 cfs for the 5-year event and 2.0 cfs for the 100-year event. These flows are directed toward Sand Creek. Sub-basin H2 contains 0.71 acres and generates a peak flow of 0.3 cfs for the 5-year event and 0.8 cfs for the 100-year event. Flows are directed toward Sand Creek. Sub-basin OS-H3 contains 2.52 acres and generates a peak flow of 1.0 cfs for the 5-year event and 2.4 cfs for the 100-year event. Sub-basin H4 contains 3.94 acres, directs runoff to Sand Creek, and generates a peak flow of 1.5 cfs for the 5-year event and

3.6 cfs for the 100-year event. Sub-basin H5 contains 0.3 acres and generates a peak flow of 0.2 cfs for the 5-year event and 0.4 cfs for the 100-year event. Sub-basins H1, H2, OS-H3, OS-H4, and H5 are areas on the northerly side of Sand Creek and direct runoff to Sand Creek. Sub-basin H6 is located on the southerly side of Sand Creek and directs runoff to Sand Creek. The peak flow generated for this sub-basin which contains 53.95 acres is 13.7 cfs for the 5-year event and 32.5 cfs for the 100-year event. Runoff from Sub-basin H6 is directed to Sand Creek in sheetflow. Basin H contains 63.46 acres and generates a peak flow of 16.1 cfs for the 5-year event and 38.2 cfs for the 100-year event. These flows for existing conditions are based on the runoff directed and collected and then conveyed through this site via Sand Creek. This does not include any offsite upstream flows entering the site.

Developed Conditions:

Development of this site was divided into nine basins and eleven design points. The locations of basins designated on the attached Proposed Conditions Drainage Plan are delineated as A through I. The offsite basins that contribute flows to this site are indicated as OS prefix. Flows that exit the site into adjacent developments are also indicated with the OS prefix within that major basin delineation. Included with this drainage plan is a proposed storm drainage system, preliminary inlet sizing and pipe sizing, culverts necessary to convey runoff under the roadway, and the sizes of proposed ditches to safely convey runoff to pertinent outfall points.

Basin A was divided into five sub-basins. These sub-basins were dictated by existing ridge lines throughout the site and divisions of the proposed road network. Calculations were determined based on assumed slopes of the roads to determine the maximum capacity of these roadways. Flows match the maximum runoff allowed by the City criteria manual. Inlets were proposed to be installed and runoff conveyed underground to the appropriate outlet points. The peak flow generated in Basin A which contains 71.49 acres is 94.6 cfs for the 5-year event and 205.6 cfs for the 100-year event. These flows were determined by weighting the coefficient numbers based on the development being proposed within this basin. Basin A contains one design point which is shown on the attached Proposed Conditions MDDP as DP-1. DP-1 contains 35.02 acres and

generates a peak flow of 58.8 cfs for the 5-year event and 127.5 cfs for the 100-year event. The inlets and pipe system in Antelope Ridge Drive and Stetson Hills Boulevard will intercept and convey underground the 5-year flow. This system will convey underground 82.0 cfs of the 100-year flow, the remaining flow will pond at the low point in Stetson Hills Boulevard and be intercepted by inlets. Runoff will be directed to the 60" R.C.P. This 60" R.C.P. has the capacity to collect the 100-year flow of 206 cfs and has a maximum capacity of 236 cfs at a headwater depth of 8'.

Basin B was divided into two sub-basins. Sub-basin B1 is onsite and Sub-basin B2 is offsite. This offsite information was obtained from the Ridgeview MDDP proposed conditions drainage plan. Flows from Sub-basin B1 are directed to Stetson Hills Boulevard and then westerly to a proposed 48" R.C.P. which was included in the Ridgeview MDDP. This MDDP was prepared by URS-Greiner. Based on this plan, this development has sized this 48" R.C.P. to collect runoff from the Stetson Ridge development. Flows that exit Sub-basin B1 which contains 7.52 acres are 10.5 cfs for the 5-year event and 23.7 cfs for the 100-year event. Offsite sub-basin OS-B2 which is located on the northerly side of the proposed Stetson Hills Boulevard contains 15.60 acres and generates a peak flow of 22.2 cfs for the 5-year event and 50.0 cfs for the 100-year event. Runoff is directed to a proposed 48" R.C.P. which was included in the Ridgeview MDDP. Their MDDP includes runoff from Sub-basin B1. This proposed 48" R.C.P. has the capacity to intercept and convey the peak 100-year flow from Basin B of 70.2 cfs at a headwater depth of 4.2' and a minimum slope of 0.50%.

Basin C was divided into six sub-basins which are shown on the attached Proposed Conditions Drainage Plan. Sub-basins C1 and C4 direct runoff to a low point in a proposed roadway that runs in a north-south direction. Two inlets, 20' D-10Rs in a sump condition, are proposed at this location and flows will be conveyed underground via a 42" and 54" storm drain system to the future location of Peterson Road at a 2% slope. The capacity of those pipes are adequate to handle the developed flow from Sub-basins C1 and C4. Runoff will then continue in a westerly direction to the Ridgeview development. Sub-basins C2, C3, C5 and C6 will direct runoff to the

proposed roadway that runs in an east-west direction. Flows will be collected at the westerly boundary in two 20' D-10R inlets in a sump condition. The peak flow at this location for Basin C which contains 96.95 acres, is 121.0 cfs for the 5-year event and 256.7 cfs for the 100-year event. This system will connect to the future 60" storm drain that will convey runoff through the Ridgeview development and outlet into Sand Creek. The future 60" storm, based on preliminary analysis appears to have the capacity to collect the flows from Basin C in Stetson Ridge. Flows generated from Basin C are being accepted by the Ridgeview development and will be conveyed safely through their site to Sand Creek.

Basin D and E consist of Marksheffel Road flows only. Runoff is directed to a low point in Marksheffel Road and then to two existing 30" C.M.P.s. The area within Basin D is 6.20 acres and the peak flow generated is 21.8 cfs for the 5-year event and 41.1 cfs for the 100-year event.

Basin E contains 10.83 acres and generates a peak flow of 28.4 cfs for the 5-year event and 53.2 cfs for the 100-year event. This basin directs runoff to two existing 30" R.C.P.s and flows are then conveyed under Marksheffel Road in an easterly direction. Preliminary location of two future inlets are shown on Marksheffel Road. Location will be determined when Marksheffel Road, which is classified as a major arterial, is in its final design stage. No runoff from Stetson Ridge will be directed to Marksheffel Road.

Basin F is a small triangular piece located on the southerly portion of the site just south of Stetson Hills Boulevard. This area contains 3.51 acres and generates a peak flow of 5.3 cfs for the 5-year event and 11.9 cfs for the 100-year event. Flows from this basin are directed southeasterly to an existing drainage channel.

Basin G contains 17 sub-basins and eight design points. Sub-basins G1 through G9 and G16 direct runoff to Antelope Ridge Drive. Runoff is then directed westerly to Peterson Road and then continues westerly within a 78" storm drain to Sand Creek. The area at DP-7 is 81.96 acres and generates a peak flow of 79.5 cfs for the 5-year event and 172.5 cfs for the 100-year event.

Proposed inlets are anticipated along this roadway to pick up surface flow and convey it underground to this design point. The peak flow conveyed within this storm system at this point would be 106.0 cfs. Flows from this design point are directed within the storm drain system toward the Ridgeview development. Design points 8 and 9 are points along Antelope Ridge Drive to determine the size of the underground facility to collect and safely convey runoff from the sub-basins contributing flow to this area. DP-8 contains 81.40 acres and generates a peak flow of 99.9 cfs for the 5-year event and 213.3 cfs for the 100-year event. An underground pipe (42" R.C.P.) is proposed at this location which would safely convey underground 128.3 cfs. Flows then continue through this pipe and within Antelope Ridge Drive to a proposed east-west street that connects to Peterson Road. This intersection is shown on the attached Proposed Conditions Drainage Plan as DP-11. This design point collects flows from Sub-basins G1 through G9 and G12 through G16. DP-11 will require two 15' D-10Rs to collect surface flow and direct it to the proposed underground storm system. This 66" R.C.P. will continue westerly to a proposed 78" storm drain that will convey runoff to Sand Creek. This 66" R.C.P. has a pipe capacity of 362.7 cfs. At the intersection of the proposed Peterson Road, flows will be directed westerly to Sand Creek in a 78" storm drain which will have the capacity to safely convey flows from Basin G in Stetson Ridge. Basin G, which contains 229.45 acres, generates a peak flow of 157.0 cfs for the 5-year event and 399.0 cfs for the 100-year event. This system will connect to the future 78" storm drain that will convey runoff through the Ridgeview development and outlet into Sand Creek. The future 78" storm drain, based on preliminary analysis, appears to have the capacity to safely convey the flows from Basin G in Stetson Ridge. Flows generated from Basin G are being accepted by the Ridgeview development and will be conveyed safely through their site to Sand Creek.

Basin H will direct runoff to Sand Creek. The existing storm drainage conveyance channel that collects and conveys runoff through the northwesterly portion of this property. This major drainage conveyance channel flows in a southwesterly direction. The peak flow generated from Basin H which contains 64.65 acres is 66.6 cfs for the 5-year event and 149.3 cfs for the 100-year event. Shown within this major drainage conveyance channel are slope protection areas and drop

structures as recommended by the drainage basin planning study for Sand Creek. Also shown on Sand Creek is the limits of the FEMA floodplain area which has base flood elevations determined.

Basin I will direct runoff to the proposed Dublin Boulevard and then be conveyed westerly to Sand Creek. The peak flow generated from Basin I, which contains 7.44 acres, is 12.5 cfs for the 5-year event and 28.0 cfs for the 100-year event.

Proposed Improvements:

Planned development for this site to construct various types of development ranging from office space, park areas, commercial areas, single family residential, and multi family residential. This property does have an approved master plan for this area. The runoff calculations for this site were performed based on the area and type of development with related runoff coefficients. The calculations for these runoff flows are in the back of this report. This area is compatible for the type of development. The surface runoff will be conveyed through a series of underground storm drain system and culverts and directed to existing drainage conveyance channels. The overlot grading within this area should be anticipated to direct flow from all proposed structures through various side lot and rear lot swales and conveyed to the underground storm system, major drainage conveyance channels, or the roadway network. Preliminary details for the ditches, swales, and underground storm drain system and inlets, are shown on the attached Proposed Conditions Drainage Plan and in the back of this report. Runoff calculations for both the existing conditions and proposed conditions are in the back of this report.

Facilities:

Some of the facilities proposed for this site are not included within the drainage basin planning study for Sand Creek. Some improvements are included. At this time, it is felt that some of these major drainage improvements should be reimbursable items. The cost of public vs. private facilities will be discussed in greater detail at the time of the preliminary and final drainage report and plan stage.

Drainage Fees:

Stetson Ridge is located within the Sand Creek Drainage Basin. Currently, this is a drainage bridge and pond fee basin. Following is a breakdown of fees per acre for 2001. Also included within this area is the pond surcharge fee. This fee (if required) is \$714.00 per acre.

Drainage Fee (\$6,714.00/acre x 480)	\$3,222,720.00
Bridge Fee (\$400.00/acre x 480)	192,000.00
Pond Fee (Land - \$427.00/acre x 480)	204,960.00
Pond Fee (Facilities - \$1,498.00/acre x 480)	<u>719,040.00</u>
TOTAL (Drainage, Bridge & Pond Fee):	\$4,338,720.00
Pond Surcharge Fee (\$750.00/acre x 480)	<u>360,000.00</u>
TOTAL (with Surcharge Fee):	\$4,698,720.00

Proposed Drainage Facilities:

10' D10R (3 @ \$3,400.00/ea.)	\$10,200.00
12' D10R (1 @ \$3,900.00/ea.)	3,900.00
15' D10R (5 @ \$4,600.00/ea.)	23,000.00
20' D10R (14 @ \$5,300.00/ea.)	74,200.00
21" R.C.P. (350 L.F. @ \$29.00/ft.)	10,150.00
24" R.C.P. (1500 L.F. @ \$32.00/ft.)	48,000.00
30" R.C.P. (1100 L.F. @ \$40.00/ft.)	44,000.00
36" R.C.P. (3775 L.F. @ \$52.00/ft.)	196,300.00
42" R.C.P. (2325 L.F. @ \$59.00/ft.)	137,175.00
48" R.C.P. (1050 L.F. @ \$70.00/ft.)	73,500.00
54" R.C.P. (400 L.F. @ \$96.00/ft.)	38,400.00
60" R.C.P. (100 L.F. @ \$127.00/ft.)	12,700.00
66" R.C.P. (600 L.F. @ \$143.00/ft.)	85,800.00
Manholes (24 @ \$5,100.00/ea.)	<u>122,400.00</u>
Subtotal:	\$879,725.00
Engineering & Contingencies (15%):	<u>132,000.00</u>
TOTAL:	\$1,011,725.00

Proposed Sand Creek Improvements:

Located in Reach SC-7, Segments 148-1 and 148-2.

Six Grade Control Structures (650 L.F. @ \$170.00/ft.)	\$110,500.00
Select Rip-Rap Lining (2360 L.F. @ \$145.00/ft.)	<u>342,200.00</u>
Subtotal:	\$452,700.00
Engineering & Contingencies (15%):	<u>67,900.00</u>
TOTAL:	\$520,600.00

Drainage fees must be paid prior to recordation of plat. The owner will post the appropriate financial assurances to cover the cost of constructing these drainage improvements prior to the issuance of a building permit. Leigh Whitehead & Associates, Inc. cannot and will not guarantee that the actual construction cost will not vary from this estimate of probable costs for constructing these facilities.

Major Channel Improvements Phasing - Sand Creek:

The adopted Sand Creek Drainage Basin Planning Study recommends a selective channel improvement concept for Sand Creek. The study represents rip-rap bank lining at selected locations along with grade control structures. Development will be set back from the channel banks to reduce the possibility of property damage and allow a more natural channel. Areas of high bank velocity and the outside of curves will also require proper bank lining. The banks will be graded as necessary to provide a stable slope for rip-rap placement. Grade control structures will be placed across the channel at select locations to control long term erosion of the channel invert. The remainder of the channel will remain undisturbed in its natural state as open space, habitat and wetlands. Sand Creek channel has been divided into phases which will be constructed when an associated parcel is developed. Recommended phasing for improvements to Sand Creek Channel are as follows:

Basin H is located along the northerly portion of this site. This basin contains approximately 64.7 acres and planned development consists of low density, office development, and single

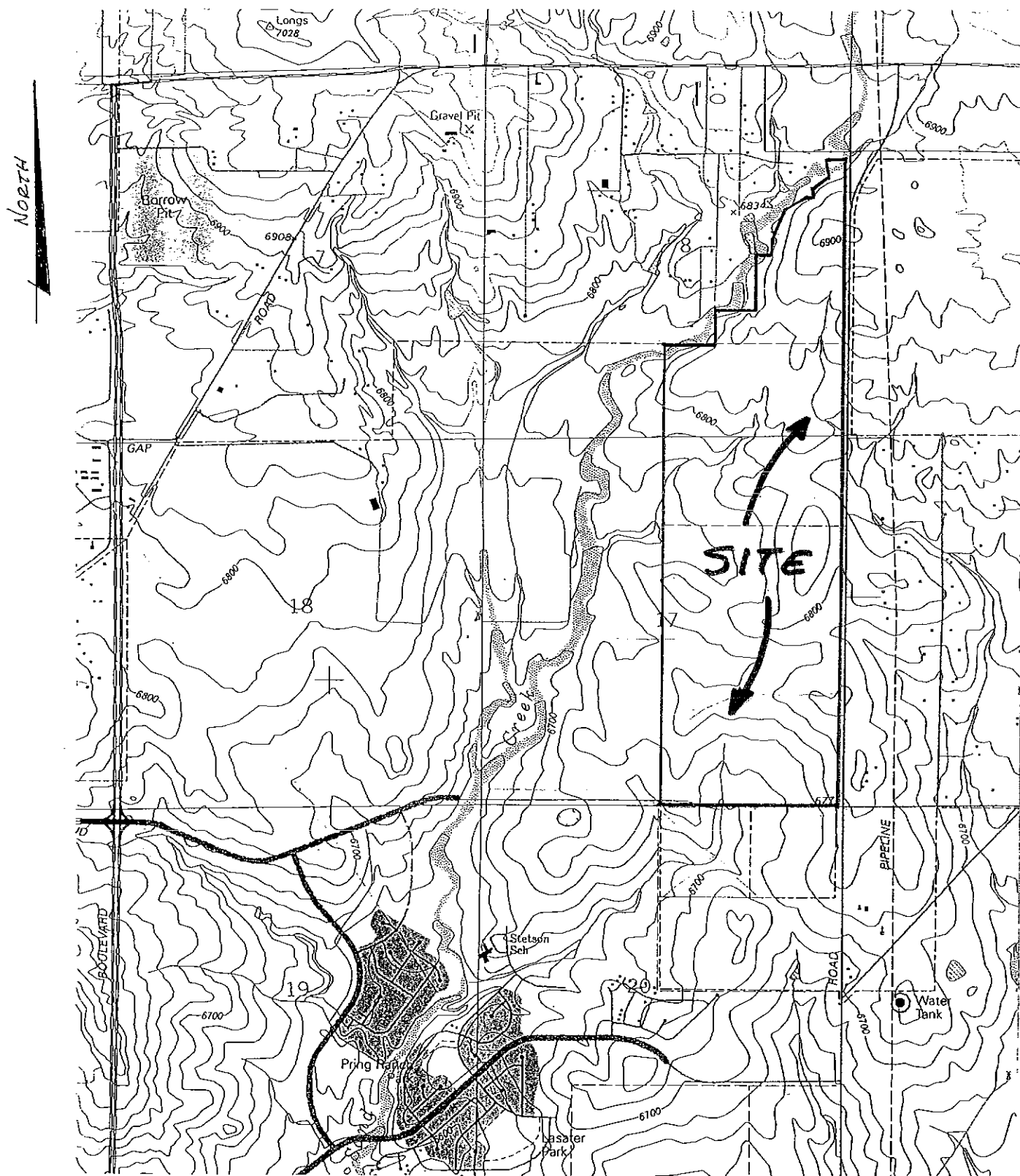
family residential use, and a park property. Runoff within this basin will be directed to Sand Creek. Estimated costs for improvements to Sand Creek are \$520,600.00. The drainage fee generated from Basin H would be approximately \$434,400.00. As the area develops, improvements to the Sand Creek channel will be the responsibility of the adjacent property owner. If the channel improvements exceed the drainage fee obligation, the owner/developer will receive credit for the overage. This overage will be reimbursed to the owner/developer from the Sand Creek drainage fund. Currently, it is unknown what the time frame for reimbursements are. This is dictated by previous reimbursement requests and available funds in the basin.

Basins A, C and G will require onsite storm drain systems. As development occurs in these basins, it will be necessary to evaluate the pertinent basin and determine what facilities (temporary or permanent) will be required to facilitate stormwater flows to their outlet locations. Phasing and implementation of these facilities will be determined by the preliminary/final drainage report when development occurs.

As mentioned previously, it is felt that some of the drainage facilities being recommended within this MDDP should be reimbursable items. These will be evaluated in greater detail when the Preliminary and Final Drainage Report and Plan are prepared. As a matter of information, the intent of the system is to collect the 100-year flow and safely convey it underground through the property to the west and outlet into Sand Creek. A majority of the system has been sized to handle the 100-year flow. Further, the proposed 60" storm drain and 78" storm drain within the Ridgeview Development has been recommended for reimbursement.

Summary:

This MDDP is part of the submittal requirement for the amendment to the master plan of this area. This MDDP is being submitted to the City of Colorado Springs Engineering Division. Construction of this development will not adversely affect this property or downstream facilities. With the proper design and construction of drainage facilities, it should safely convey storm runoff to appropriate outlet points.



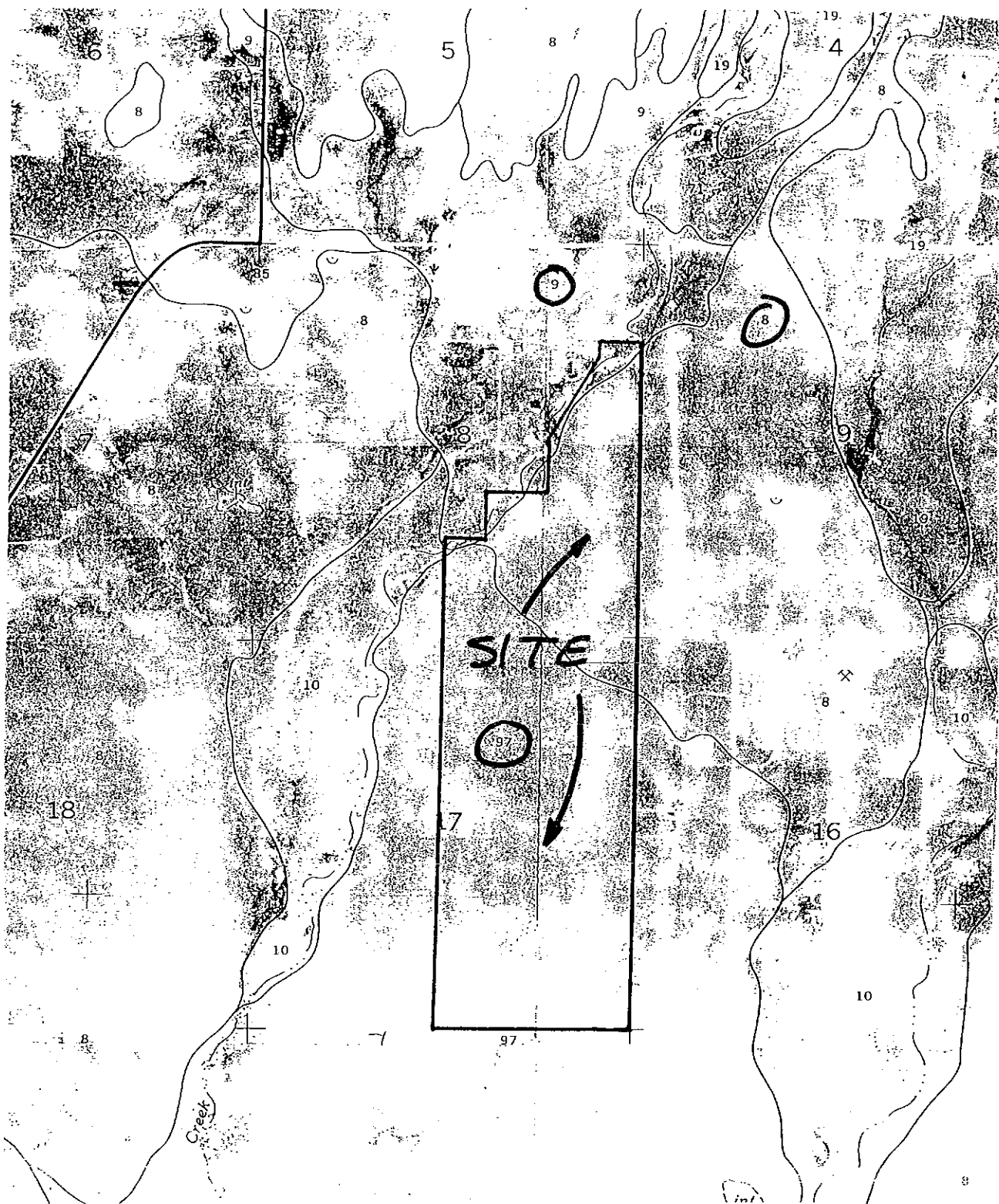
REF: FALCON NW "QUAD" 1994

LOCATION MAP

**Leigh
& Whitehead
Associates, Inc.**

CONSULTING CIVIL ENGINEERS & SURVEYORS
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, CO 80909-5061

NORTH



REF: FALCON NW, SES SHE 9

SOILS MAP

Leigh
& Whitehead
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CONSULTING CIVIL ENGINEERS & SURVEYORS
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, CO 80909-5061

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	Hydro-logic group	Flooding			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Hardness	
Alamosa: 1-----	C	Frequent	Brief	May-Jun	In	---	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.
19: 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.
118: Chaseville part-----	A	None	---	---	>60	---	Low.
Midway part-----	D	None	---	---	10-20	Rippable	Moderate.
Columbine: 19-----	A	None to rare	---	---	>60	---	Low.
Connerton: 120: Connerton part-----	B	None	---	---	>60	---	High.
Rock outcrop part-----	D	---	---	---	---	---	---
Cruetton: 21-----	B	None	---	---	>60	---	Moderate.
Cushman: 22, 23-----	C	None	---	---	20-40	Rippable	Moderate.
124: Cushman part-----	C	None	---	---	20-40	Rippable	Moderate.
Kutch part-----	C	None	---	---	20-40	Rippable	Moderate.
Elbeth: 25, 26-----	B	None	---	---	>60	---	Moderate.
127: Elbeth part-----	B	None	---	---	>60	---	Moderate.

See footnote at end of table.

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COLORADO SPRINGS, CO 80909-5061

EL PASO COUNTY AREA, COLORADO

211

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

Soil name and map symbol	Hydro-logic group	Flooding			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth In	Hardness	
Omaha: 192, 193: Tomah part----	B	None-----	---	---	>60	---	Moderate.
Crowfoot part--	B	None-----	---	---	>60	---	Moderate.
Travessilla: 194: Travessilla part-----	D	None-----	---	---	6-20	Hard	Low.
Rock outcrop part-----	D	---	---	---	---	---	---
Truckton: 95, 96, 97-----	B	None-----	---	---	>60	---	Moderate.
198: Truckton part--	B	None-----	---	---	>60	---	Moderate.
Blakeland part-	A	None-----	---	---	>60	---	Low.
199, 100: Truckton part--	B	None-----	---	---	>60	---	Moderate.
Bresser part---	B	None-----	---	---	>60	---	Low.
Astic Torrifluvents: 101-----	B	Occasional--	Very brief---	Mar-Aug	>60	---	Moderate.
Valent: 102, 103-----	A	None-----	---	---	>60	---	Low.
Donat: 104, 105-----	B	None-----	---	---	>60	---	Moderate.
Wigton: 106-----	A	None-----	---	---	>60	---	Low.
Wiley: 107, 108-----	B	None-----	---	---	>60	---	Low.
Woder: 109, 110-----	B	None-----	---	---	>60	---	Low.

¹This map unit is made up of two or more dominant kinds of soil. See map unit description for the composition and behavior characteristics of the map unit.

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COLORADO SPRINGS, CO 80909-5061

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

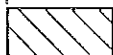
- ZONE X** Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.



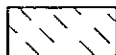
OTHER AREAS

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

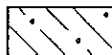
UNDEVELOPED COASTAL BARRIERS



Identified
1983

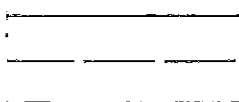


Identified
1990



Otherwise
Protected Areas

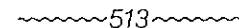
Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.



- 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.



Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.



(EL 987)

RM7 X

• M2

Cross Section Line
Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.
Elevation Reference Mark

River Mile

Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

97°07'30", 32°22'30"

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 (800) 638-6620.

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, AO, A99, 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 approximate boundaries of Coastal Barrier Resource System Units and/or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-591).

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 6.0 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:

ELEVATION DATUM

Flood elevations on this map are referenced to the National Geodetic Vertical Datum of 1929. These flood elevations must be compared to structure and ground elevations referenced to the same datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, contact the National Geodetic Survey at the following address:

The Vertical Network Branch, NCG13
National Geodetic Survey, NOAA
Silver Spring Metro Center 3
1315 East West Highway
Silver Spring, Maryland 20910
(301) 713-3191

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& Whitehead
Associates, Inc.*

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COLORADO SPRINGS, CO 80909-5061

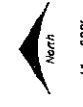
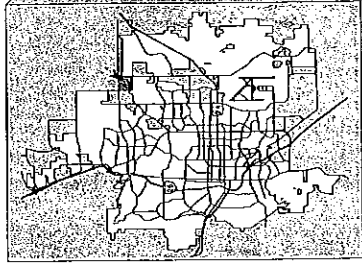
ZONING MAP

DEPARTMENT OF PLANNING, DEVELOPMENT AND FINANCE

ENVIRONMENTAL SERVICES AND
COMPREHENSIVE PLANNING DIVISION
CITY OF COLORADO SPRINGS
Plan Office Box 1573, Colorado Springs, CO 80902

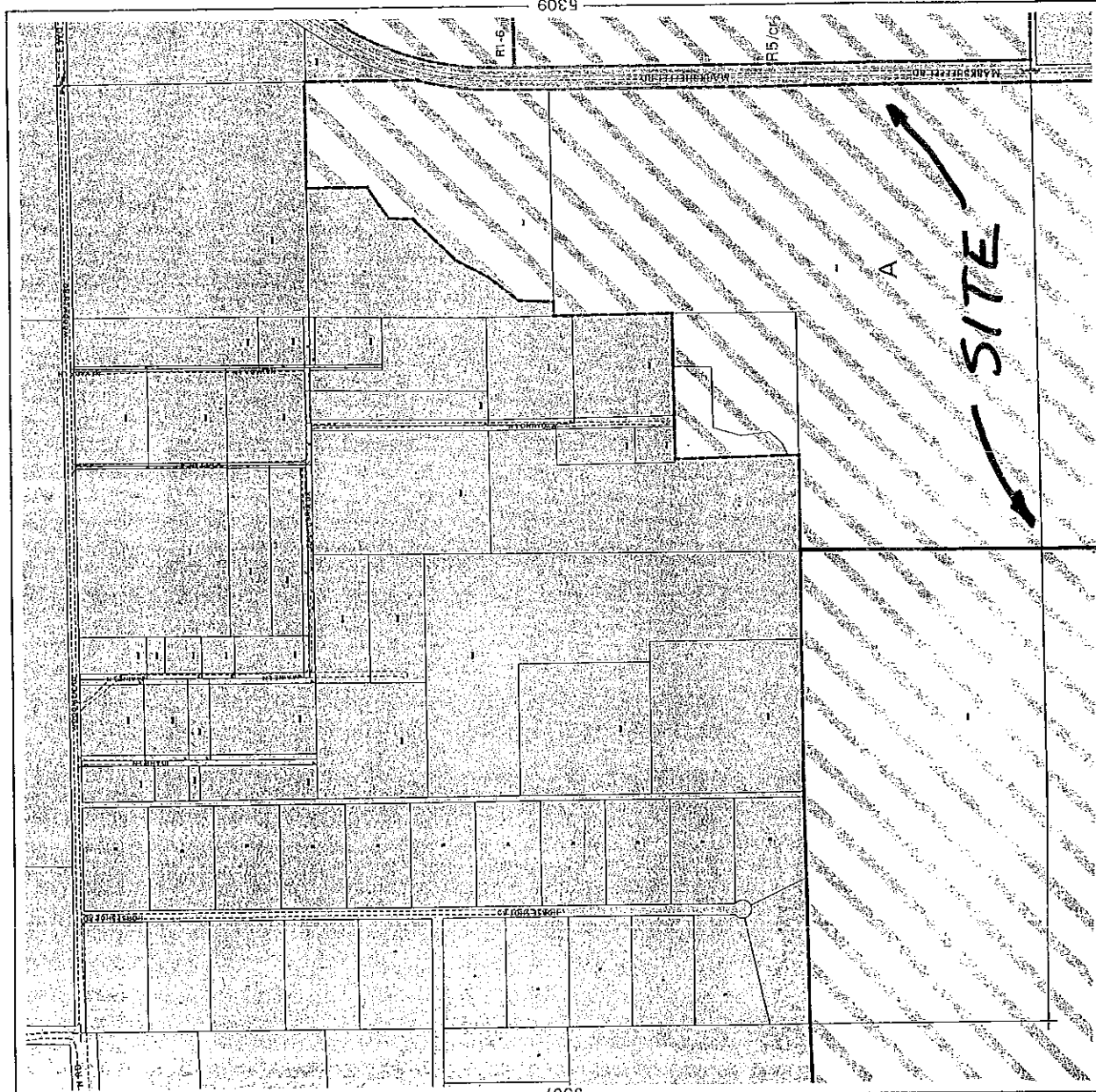
ZONING LEGEND

A Agricultural	RT-9 Single-Family Residential - 9,000 sq. ft.
APD Airport Planned Development	R2 Two-Family Residential
C5 Intermediate Business	R4 Eight-Family Residential
C6 General Business	R5 Multi-Family Residential
M1 Light Industrial	SU Special Use
M2 Heavy Industrial	UND Zoning Undetermined at time of publication
OC Office Complex	Zone Subject to Conditions of Record
OR Office Residential	— Zoning Boundary
PBC Planned Business Center	Conditional Use
PCR Planned Cultural Resort	Use Variance
PF Public Facilities	Design Flexibility Overlay
PIP1 Planned Industrial Park No. 1	Highrise Overlay
PIP2 Planned Industrial Park No. 2	Hillside Overlay
PK Public Park	Historic Preservation Overlay
PUD Planned Unit Development	Navigation Preservation Overlay
R Single-Family Residential	Planned Provisional Overlay
RT-6 Single-Family Residential - 6,000 sq. ft.	Not in City



1" = 500'
0 500 1000 Feet

Zoning information is current through December 31, 1996.
The Office of Planning and Development is the designated authority for zoning information and a professional seal is required for all zoning information. This document was prepared from the best data available at the time of publication and the City of Colorado Springs does not warrant the accuracy of the information. The City of Colorado Springs may not be responsible for any errors or omissions in this document. The City of Colorado Springs may not be responsible for any errors or omissions in this document. The City of Colorado Springs may not be responsible for any errors or omissions in this document.



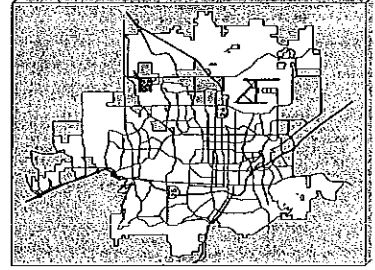
ZONING MAP

DEPARTMENT OF PLANNING, DEVELOPMENT AND FINANCE

DEVELOPMENT SERVICES AND
COMPREHENSIVE PLANNING DIVISION
Post Office Box 875 Colorado Springs, CO 80901

ZONING LEGEND

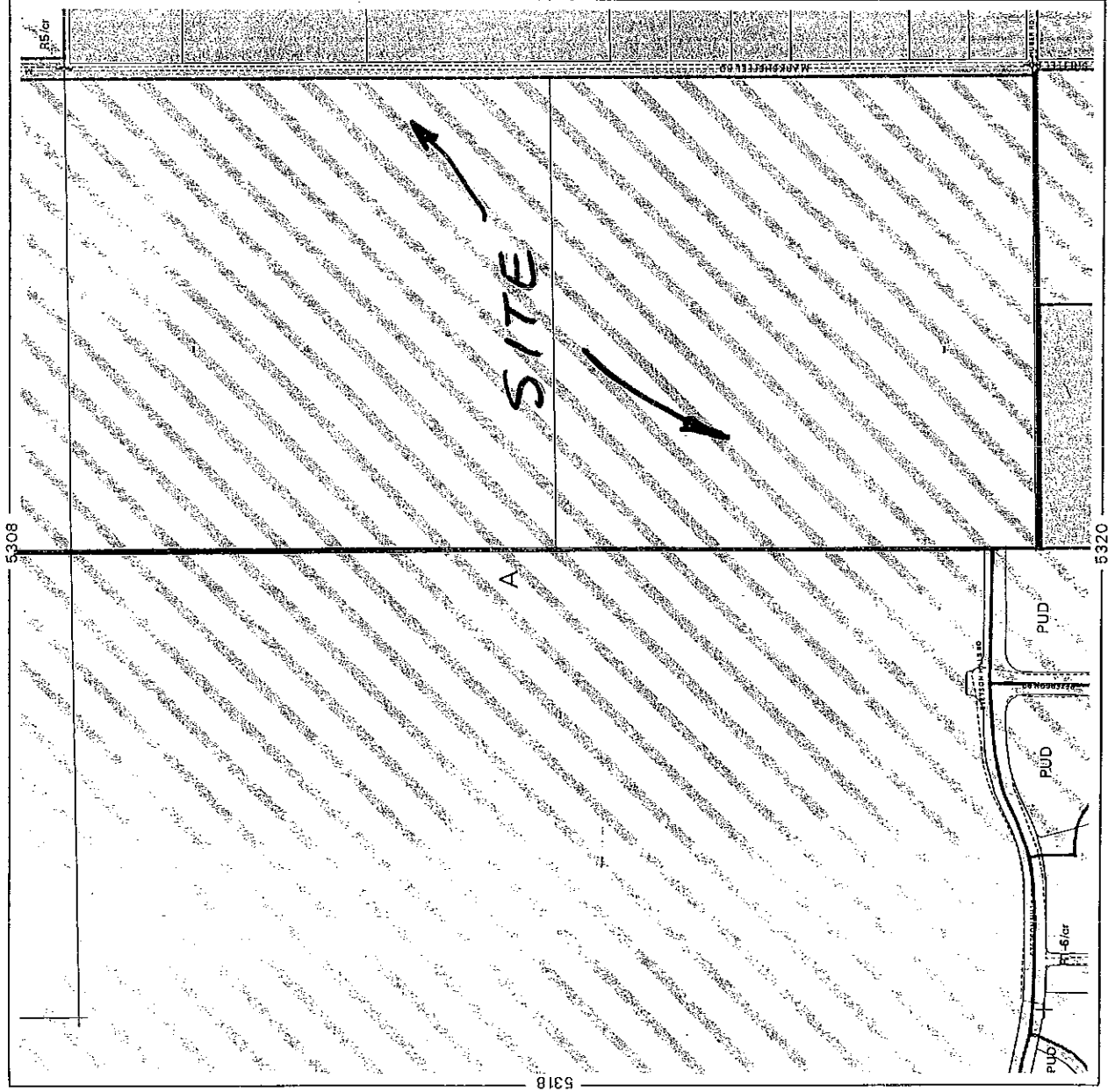
A Agricultural	RT-9 Single-Family Residential - 9,000 sq. ft.
APD Airport Planned Development	R2 Two-Family Residential
C5 Intermediate Business	R4 Eight-Family Residential
C6 General Business	R5 Multi-Family Residential
M1 Light Industrial	SU Special Use
M2 Heavy Industrial	UND Zoning Undetermined at time of publication
OC Office Complex	/or Zone Subject to Conditions of Record
OR Office Residential	— Zoning Boundary
PBC Planned Business Center	Conditional Use
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PUD Planned Unit Development	Navigation Preservation Overlay
R Single-Family Residential	Planned Provisional Overlay
R - Estate	
RT-6 Single-Family Residential - 6,000 sq. ft.	Not in City



1" = 500'
0 500 1000 Feet

Zoning Information is current through December 31, 1996.
The Official Zoning Map of the City of Colorado Springs is the Department of Planning, Development and Finance's official record of the City's zoning regulations. It is subject to change by resolution of the City Council. The Zoning Map is not to be used as a basis for determining the legal status of a property. For that purpose, the official zoning map of the City of Colorado Springs should be consulted.

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EXISTING CONDITIONS

RUNOFF COMPUTATIONS
RATIONAL METHOD

STETSON RIDGE M.D.D.P.
STETSON HILLS BLVD. & MARKSHEFFEL RD.
COLORADO SPRINGS, COLORADO

LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

TABLE A:
CURRENT CONDITIONS

LWA # 98079.61

24-Feb-99

SHEET 1 OF 2

BASIN	AREA	SOIL TYPE	C 5 C 100	GEOMETRY		Tt 5 Tt 100	V Tt	tc 5 tc 100	I 5 I 100	Q5	Q100	COMMENTS
				LENGTH	HEIGHT							
				SLOPE								
A	81.91	B	0.15	1000.0	64.0	30.45	1.26	48.25	1.72	21.2	50.4	
		97	0.20	6.40		28.84	17.80	46.64	3.08			
B1	9.62	B	0.15	1000.0	42.0	34.99	1.60	38.63	1.99	2.9	6.9	
		97	0.20	4.20		33.14	3.64	36.78	3.58			
OS - B2	18.06	B	0.15	1000.0	38.0	36.16	0.44	54.98	1.58	4.3	10.2	
		97	0.20	3.80		34.26	18.82	53.08	2.83			
B	27.68	B	0.15	1000.0	38.0	36.16	0.44	54.98	1.58	6.6	15.6	
		97	0.20	3.80		34.26	18.82	53.08	2.83			
C1	7.06	B	0.15	700.0	16.0	35.78		35.78	2.08	2.2	5.3	
		97	0.20	2.29		33.90		33.90	3.76			
C2	67.17	B	0.15	780.0	35.0	30.23	2.51	47.48	1.74	17.5	41.8	
		97	0.20	4.49		28.64	17.25	45.89	3.11			
C3	4.39	B	0.15	350.0	17.0	19.73	VARIES	23.18	2.69	1.8	4.2	
		97	0.20	4.86		18.69	3.45	22.14	4.82			
OS - C4	27.67	B	0.15	1000.0	18.0	46.27	VARIES	57.67	1.53	6.4	15.2	
		97	0.20	1.80		43.84	11.40	55.24	2.75			
C	106.29	B	0.15	780.0	35.0	30.23	VARIES	56.17	1.56	24.8	59.0	HEC - 1 FLOWS Q5=17 cfs ; Q100=91 cfs
		97	0.20	4.49		28.64	25.94	54.58	2.77			
D	17.67	B	0.15	470.0	26.0	21.90	3.12	28.04	2.41	6.4	15.3	
		97	0.20	5.53		20.75	6.14	26.89	4.32			
E	54.50	A / B	0.15	1000.0	59.0	31.27	VARIES	58.12	1.52	12.4	29.6	
		8 / 97	0.20	5.90		29.63	26.85	56.48	2.71			
F	0.41	B	0.15	250.0	10.0	17.78		17.78	3.10	0.2	0.5	
		97	0.20	4.00		16.84		16.84	5.56			
G1	77.81	B	0.15	1000.0	53.0	32.40	VARIES	49.30	1.70	19.8	47.3	
		97	0.20	5.30		30.70	16.90	47.60	3.04			
G2	101.24	A / B	0.15	1000.0	48.0	33.48	VARIES	61.32	1.47	22.3	53.0	HEC - 1 FLOWS Q5=16 cfs ; Q100=82 cfs
		8 / 97	0.20	4.80		31.72	27.84	59.56	2.62			

RUNOFF COMPUTATIONS

RATIONAL METHOD

STETSON RIDGE M.D.D.P.
STETSON HILLS BLVD. & MARKSHEFFEL RD.
COLORADO SPRINGS, COLORADO

LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

TABLE A:
CURRENT CONDITIONS

LWA # 98079.61

24-Feb-99

SHEET 2 OF 2

[illegible]

RUNOFF COMPUTATIONS
TRAVEL TIME CALCULATIONS (TR-55)

STETSON RIDGE M.D.D.P.
STETSON HILLS BLVD. & MARKSHEFFEL RD.
COLORADO SPRINGS, COLORADO

TABLE A:
CURRENT CONDITIONS

LWA # 98079.61

LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

98079EX.WK4

24-Feb-99

SHT. 1 of 3

BASIN	"n"	"p" In Inches	"K"	HIGH ELEV.	LOW ELEV.	LENGTH	HEIGHT	SLOPE	"V"	"TT"	COMMENTS
A			0.7	6742.0	6698.0	1350	44.0	3.26%	1.26	17.80	
B1			1.5	6720.0	6716.0	350	4.0	1.14%	1.60	3.64	
OS - B2			0.7	6714.0	6712.0	500	2.0	0.40%	0.44	18.82	
B			0.7	6714.0	6712.0	500	2.0	0.40%	0.44	18.82	
C2			2.0	6776.0	6735.0	2600	41.0	1.58%	2.51	17.25	
C3			2.0	6766.0	6750.0	300	16.0	5.33%	4.62	1.08	
			0.7	6750.0	6736.0	240	14.0	5.83%	1.69	2.37	
						540				3.45	
OS - C4			0.7	6734.0	6720.0	520	14.0	2.69%	1.15	7.55	
			*	6720.0	6717.0	310	3.0	0.97%	1.34	3.86	STREAM CALC.'s
						830				11.40	
C	0.24	2.20		6811.0	6792.0	300	19.0	6.33%	0.19	26.14	
			0.7	6792.0	6776.0	480	16.0	3.33%	1.28	6.26	
			2.0	6776.0	6720.0	3400	56.0	1.65%	2.57	22.08	
			*	6720.0	6717.0	310	3.0	0.97%	1.34	3.86	STREAM CALC.'s
						4490.00				58.33	
D			2.0	6800.0	6772.0	1150	28.0	2.43%	3.12	6.14	
E			0.7	6860.0	6850.0	320	10.0	3.13%	1.24	4.31	
			2.0	6850.0	6822.0	930	28.0	3.01%	3.47	4.47	
			0.9	6822.0	6790.0	1450	32.0	2.21%	1.34	18.08	
						2700.00				26.85	
				* = $TT = (11.9 * L^{.3})^{.0.385} * 60$							
				H							

TABLE A:
CURRENT CONDITIONS

LWA # 98079.61

LEIGH WHITEHEAD & ASSOCIATES, INC.
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COLORADO SPRINGS, COLORADO
(719) 636-5179

98079EX.WK4

24-Feb-99

SHT. 2 of 3

BASIN	"n"	"P" In Inches	"K "	HIGH ELEV.	LOW ELEV.	LENGTH	HEIGHT	SLOPE	"V "	"TT "	COMMENTS
G1			0.7	6773.0	6752.0	770	21.0	2.73%	1.16	11.10	
			*	6752.0	6740.0	700	12.0	1.71%	2.01	5.80	STREAM CALC.'s
						1470				16.90	
G2	0.24	2.20		6890.0	6871.0	300	19.0	6.33%	0.19	26.14	
			0.7	6871.0	6842.0	700	29.0	4.14%	1.42	8.19	
			0.7	6842.0	6826.0	880	16.0	1.82%	0.94	15.54	
			2.0	6826.0	6802.0	800	24.0	3.00%	3.46	3.85	
			*	6802.0	6753.0	1550	49.0	3.16%	3.06	8.45	STREAM CALC.'s
						4230				62.16	
OS - G4			2.0	6760.0	6734.0	1100	26.0	2.36%	3.07	5.96	
			*	6734.0	6728.0	320	6.0	1.88%	1.74	3.07	STREAM CALC.'s
						1420				9.03	
G	0.24	2.20		6890.0	6871.0	300	19.0	6.33%	0.19	26.14	
			0.7	6871.0	6842.0	700	29.0	4.14%	1.42	8.19	
			0.7	6842.0	6826.0	880	16.0	1.82%	0.94	15.54	
			2.0	6826.0	6802.0	800	24.0	3.00%	3.46	3.85	
			*	6802.0	6753.0	1550	49.0	3.16%	3.06	8.45	STREAM CALC.'s
			2.0	6753.0	6734.0	1120	19.0	1.70%	2.60	7.17	
			*	6734.0	6728.0	320	6.0	1.88%	1.74	3.07	STREAM CALC.'s
						5670.00				72.39	
H4			*	6800.0	6792.0	740	8.0	1.08%	1.71	7.23	STREAM CALC.'s
H6			*	6844.0	6782.0	3750	62.0	1.65%	2.92	21.41	STREAM CALC.'s
H			*	6844.0	6782.0	3750	62.0	1.65%	2.92	21.41	STREAM CALC.'s
				* = TT = (11.9 * L^3) ^ 0.385 * 60							
				H							

RUNOFF COMPUTATIONS
TRAVEL TIME CALCULATIONS (TR-55)

STETSON RIDGE M.D.D.P.
STETSON HILLS BLVD. & MARKSHEFFEL RD.
COLORADO SPRINGS, COLORADO

LEIGH WHITEHEAD & ASSOCIATES, INC.
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2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 638-5179

98079EX.WK4

TABLE A:
CURRENT CONDITIONS

LWA # 98079.61

24-Feb-99

SHT. 3 of 3

BASIN	"n"	"P" In Inches	"K"	HIGH ELEV.	LOW ELEV.	LENGTH	HEIGHT	SLOPE	"V"	"TT"	COMMENTS
G1	0.24	2.20		6826.0	6810.0	300	16.0	5.33%	0.18	28.00	
			0.7	6810.0	6773.0	700	37.0	5.29%	1.61	7.25	
			0.7	6773.0	6752.0	770	21.0	2.73%	1.16	11.10	
			*	6752.0	6740.0	700	12.0	1.71%	2.01	5.80	STREAM CALC.'s
						2470				52.14	
G2	0.24	2.20		6880.0	6871.0	300	19.0	6.33%	0.19	26.14	
			0.7	6871.0	6842.0	700	29.0	4.14%	1.42	8.19	
			0.7	6842.0	6826.0	880	16.0	1.82%	0.94	15.54	
			2.0	6826.0	6802.0	800	24.0	3.00%	3.46	3.85	
			*	6802.0	6753.0	1550	49.0	3.16%	3.06	8.45	STREAM CALC.'s
						4230				62.16	
G3	0.24	2.20		6826.0	6808.0	300	18.0	6.00%	0.19	26.71	
			0.7	6808.0	6776.0	680	32.0	4.71%	1.52	7.46	
						980				34.17	
OS - G4	0.24	2.20		6800.0	6784.0	300	16.0	5.33%	0.18	28.00	
			0.7	6784.0	6760.0	1100	24.0	2.18%	1.03	17.73	
			2.0	6760.0	6734.0	1100	26.0	2.36%	3.07	5.96	
			*	6734.0	6728.0	320	6.0	1.88%	1.74	3.07	STREAM CALC.'s
						2820				54.76	
G	0.24	2.20		6890.0	6871.0	300	19.0	6.33%	0.19	26.14	
			0.7	6871.0	6842.0	700	29.0	4.14%	1.42	8.19	
			0.7	6842.0	6826.0	880	16.0	1.82%	0.94	15.54	
			2.0	6826.0	6802.0	800	24.0	3.00%	3.46	3.85	
			*	6802.0	6753.0	1550	49.0	3.16%	3.06	8.45	STREAM CALC.'s
			2.0	6753.0	6734.0	1120	19.0	1.70%	2.60	7.17	
			*	6734.0	6728.0	320	6.0	1.88%	1.74	3.07	STREAM CALC.'s
						5670.00				72.39	
				* = TT = (11.9 * L^3) ^ 0.385 * 60							
				H							



C:\HAESTAD\GHEC1\SAMPLE\98079EXC.OUT
GHEC1 S/N: 1343001909 HMVersion: 6.33 Data File: C:\WINDOWS\TEMP\~vbh020C.TMP

```
*****  
*  
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *  
* MAY 1991 *  
* VERSION 4.0.1E *  
*  
* RUN DATE 02/24/1999 TIME 12:10:27 *  
*  
*****
```

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

```
      X      X XXXXXXXX XXXXX      X  
      X      X X      X      X      XX  
      X      X X      X      X      X  
      XXXXXXXX XXXX      X      XXXXX      X  
      X      X X      X      X      X  
      X      X X      X      X      X  
      X      X XXXXXXXX XXXXX      XXX
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:::::::::::::::::::::::::::::::::::::  
:::::::::::::::::::::::::::::::::::::  
:::  
::: Full Microcomputer Implementation :::  
::: by :::  
::: Haestad Methods, Inc. :::  
:::  
:::::::::::::::::::::::::::::::::::::  
:::::::::::::::::::::::::::::::::::::
```

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

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

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

HEC-1 INPUT

PAGE 1

```
LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10  
1          ID STETSON RIDGE M.D.D.P., BASIN C, 5 Yr. & 100 Yr. (EXIST)  
2          IT      5
```


3	IO	5	0	
4	JR	PREC	1.0	1.6923

[illegible]

```
*****
*
*   FLOOD HYDROGRAPH PACKAGE   (HEC-1)
*           MAY   1991
*           VERSION 4.0.1E
*
*   RUN DATE  02/24/1999  TIME  12:10:27
*
*****
```

```

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

```

```

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

IT        HYDROGRAPH TIME DATA
          NMIN       5   MINUTES IN COMPUTATION INTERVAL
          IDATE      1 0   STARTING DATE
          ITIME      0000  STARTING TIME
          NQ         101  NUMBER OF HYDROGRAPH ORDINATES
          NDDATE     1 0   ENDING DATE
          NDDTIME    0820  ENDING TIME
          ICENT      19   CENTURY MARK

          COMPUTATION INTERVAL      0.08 HOURS
          TOTAL TIME BASE          8.33 HOURS

```

Page 2

DRAINAGE AREA	SQUARE MILES
PRECIPITATION DEPTH	INCHES
LENGTH, ELEVATION	FEET
FLOW	CUBIC FEET PER SECOND
STORAGE VOLUME	ACRE-FeET
SURFACE AREA	ACRES
TEMPERATURE	DEGREES FAHRENHEIT

```

JP      MULTI-PLAN OPTION
        NPLAN          1  NUMBER OF PLANS

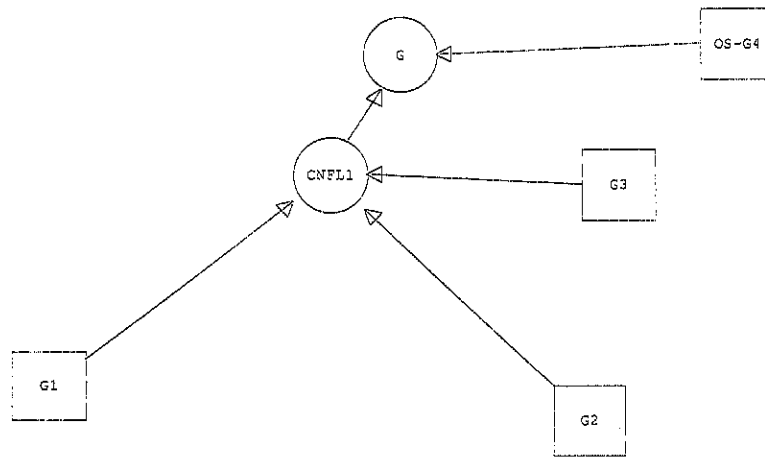
JR      MULTI-RATIO OPTION
        RATIOS OF PRECIPITATION
        1.00    1.69

```

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
 FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
 TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
				1.00	1.69
HYDROGRAPH AT					
C	0.17	1	FLOW	17.	91.
			TIME	6.58	6.50

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



HEC1 S/N: 1343001909 HMVersion: 6.33 Data File: C:\WINDOWS\TEMP\~vbhlA14.TMP

*
* FLOOD HYDROGRAPH PACKAGE (HEC-1) *
* MAY 1991 *
* VERSION 4.0.1E *
*
* RUN DATE 02/24/1999 TIME 12:03:27 *
*

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

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

::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::
:::
::: Full Microcomputer Implementation :::
::: by :::
::: Haestad Methods, Inc. :::
:::
::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::

37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

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

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
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NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

HEC-1 INPUT

PAGE 1

LINE ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1 ID STETSON RIDGE M.D.D.P., BASIN G, 5 Yr. & 100 Yr. (EXIST)
2 IT 5

3	IO	5	0								
4	JR	PREC	1	1.6923							
5	KK	G2									
6	KM	SUB BASIN G2									
7	KO				22						
8	BA	0.1582									
9	PB	2.6									
10	IN	15									
11	PC	0.0	0.0005	0.0015	0.003	0.0045	0.006	0.008	0.01	0.012	0.0143
12	PC	0.0165	0.0188	0.021	0.0233	0.0255	0.0278	0.032	0.039	0.046	0.053
13	PC	0.06	0.075	0.1	0.4	0.7	0.725	0.75	0.765	0.78	0.79
14	PC	0.8	0.81	0.82	0.825	0.83	0.835	0.84	0.845	0.85	0.855
15	PC	0.86	0.8638	0.8675	0.8713	0.875	0.8788	0.8825	0.8863	0.89	0.8938
16	PC	0.8975	0.9013	0.905	0.9083	0.9115	0.9148	0.918	0.921	0.924	0.927
17	PC	0.93	0.9325	0.935	0.9375	0.94	0.9425	0.945	0.9475	0.95	0.9525
18	PC	0.955	0.9575	0.96	0.9625	0.965	0.9675	0.97	0.9725	0.975	0.9775
19	PC	0.98	0.9813	0.9825	0.9838	0.985	0.9863	0.9875	0.9888	0.99	0.9913
20	PC	0.9925	0.9938	0.995	0.9963	0.9975	0.9988	1.0	1.0	1.0	1.0
21	LS		61								
22	UD	0.6216									
23	KK	G1									
24	KM	SUB BASIN G1									
25	KO				22						
26	BA	0.1216									
27	LS		61								
28	UD	0.5214									
29	KK	G3									
30	KM	SUB BASIN G3									
31	KO				22						
32	BA	0.0065									
33	LS		61								
34	UD	0.3417									
35	KK	CNFL1									
36	KM	CONFLUENCE 1 (AT BOUNDARY									
37	KO				22						
38	HC	3									
39	KK	OS-G4									
40	KM	SUB BASIN OS-G3									
41	KO				22						
42	BA	0.0361									
43	LS		61								
44	UD	0.5476									

HEC-1 INPUT

PAGE 2

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

45	KK	G			
46	KM	BASIN G			
47	KO			22	
48	HC	2			
49	ZZ				

C:\HAESTAD\GHEC1\SAMPLE\98079EXG.OUT

```
*****
*
* FLOOD HYDROGRAPH PACKAGE (HEC-1)
* MAY 1991
* VERSION 4.0.1E
*
* RUN DATE 02/24/1999 TIME 12:03:27
*
*****
```

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

STETSON RIDGE M.D.D.P., BASIN G, 5 Yr. & 100 Yr. (EXIST)

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

IT        HYDROGRAPH TIME DATA
          NMIN      5 MINUTES IN COMPUTATION INTERVAL
          IDATE      1 0 STARTING DATE
          ITIME      0000 STARTING TIME
          NQ        101 NUMBER OF HYDROGRAPH ORDINATES
          NDDATE     1 0 ENDING DATE
          NDTIME     0820 ENDING TIME
          ICENT      19 CENTURY MARK

          COMPUTATION INTERVAL 0.08 HOURS
          TOTAL TIME BASE 8.33 HOURS

ENGLISH UNITS
DRAINAGE AREA      SQUARE MILES
PRECIPITATION DEPTH INCHES
LENGTH, ELEVATION FEET
FLOW               CUBIC FEET PER SECOND
STORAGE VOLUME     ACRE-FEET
SURFACE AREA       ACRES
TEMPERATURE        DEGREES FAHRENHEIT

JP        MULTI-PLAN OPTION
          NPLAN      1 NUMBER OF PLANS

JR        MULTI-RATIO OPTION
          RATIOS OF PRECIPITATION
          1.00      1.69
```

*** **

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

C:\HAESTAD\GHEC1\SAMPLE\98079EXG.OUT
 RATIOS APPLIED TO PRECIPITATION

OPERATION	STATION	AREA	PLAN		RATIO 1	RATIO 2
					1.00	1.69
HYDROGRAPH AT G2	0.16	1	FLOW	16.	82.	
			TIME		6.67	6.50
HYDROGRAPH AT G1	0.12	1	FLOW	14.	72.	
			TIME		6.50	6.42
HYDROGRAPH AT G3	0.01	1	FLOW	1.	5.	
			TIME		6.25	6.25
3 COMBINED AT CNFL1	0.29	1	FLOW	30.	156.	
			TIME		6.58	6.50
HYDROGRAPH AT OS-G4	0.04	1	FLOW	4.	21.	
			TIME		6.50	6.42
2 COMBINED AT G	0.32	1	FLOW	34.	176.	
			TIME		6.58	6.50

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

PROPOSED CONDITIONS

RUNOFF COMPUTATIONS
RATIONAL METHOD

STETSON RIDGE M.D.D.P.
STETSON HILLS BLVD. & MARKSHEFFEL RD.
COLORADO SPRINGS, COLORADO

98079PR.WK4

LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

TABLE A:
PROPOSED CONDITIONS

LWA # 98079.61

26-Oct-2000

SHEET 1 OF 4

BASIN	AREA	SOIL TYPE	C 5 C 100	GEOMETRY		Tt 5 Tt 100	V Tt	tc 5 tc 100	i 5 i 100	Q5	Q100	COMMENTS
				LENGTH	HEIGHT SLOPE							
A1	12.25	B	0.69	300.0	5.0	11.22	Varies	18.30	3.05	25.8	53.7	Residential & Public Assembly
		97	0.77		1.67	9.03	7.06	16.11	5.69			
A2	16.45	B	0.60	300.0	15.0	9.52	Varies	15.62	3.31	32.6	70.8	Residential
		97	0.70		5.00	7.62	6.10	13.72	6.15			
A3	6.32	B	0.60	300.0	20.0	8.66	5.24	10.89	3.91	14.8	32.4	Residential
		97	0.70		6.67	6.93	2.23	9.16	7.33			
DP-1	35.02	B	0.63	300.0	5.0	12.86	Varies	23.52	2.67	58.8	127.5	A1 thru A3
		97	0.73		1.67	10.12	10.66	20.78	4.99			
A4	22.83	B	0.50	300.0	5.0	16.42	Varies	30.15	2.31	26.4	58.5	Residential
		97	0.60		1.67	13.68	13.73	27.41	4.27			
A5	13.64	B	0.50	300.0	7.0	14.69	Varies	22.46	2.74	18.7	41.6	Residential
		97	0.60		2.33	12.24	7.77	20.01	5.09			
A	71.49	B	0.57	300.0	5.0	14.50	Varies	29.91	2.32	94.6	205.6	
		97	0.67		1.67	11.77	15.41	27.18	4.29			
B1	7.52	B	0.50	300.0	5.0	16.42	Varies	21.50	2.80	10.5	23.7	Residential
		97	0.60		1.67	13.68	5.08	18.76	5.26			
B2	15.60	B	0.50	300.0	6.0	15.46	Varies	20.82	2.85	22.2	50.0	Residential
		97	0.60		2.00	12.88	5.36	18.24	5.34			
B	23.12	B	0.50	300.0	5.0	16.42	Varies	22.95	2.70	31.3	70.2	Residential
		97	0.60		1.67	13.68	6.53	20.21	5.06			
C1	18.42	B	0.90	300.0	11.0	4.22	Varies	14.56	3.42	56.7	108.4	Public Assembly
		97	0.95		3.67	3.16	10.34	13.50	6.19			
C2	15.17	B	0.53	300.0	4.0	16.79	Varies	23.97	2.64	21.2	53.1	School, Park & Residential
		97	0.68		1.33	12.37	7.18	19.55	5.15			
C3	14.62	B	0.50	300.0	7.0	14.69	2.46	23.63	2.66	19.4	43.3	Residential
		97	0.60		2.33	12.24	8.94	21.18	4.93			
C4	20.72	B	0.50	300.0	9.0	13.52	Varies	26.05	2.52	26.1	57.5	Residential
		97	0.60		3.00	11.27	12.53	23.80	4.63			
DP - 2	39.14	B	0.69	300.0	9.0	9.24	2.36	21.77	2.78	75.2	150.6	C1 & C4
		97	0.76		3.00	7.66	12.53	20.19	5.06			

RUNOFF COMPUTATIONS
RATIONAL METHOD

98079PR.WK4

STETSON RIDGE M.D.D.P.
STETSON HILLS BLVD. & MARKSHEFFEL RD.
COLORADO SPRINGS, COLORADO

LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

TABLE A:
PROPOSED CONDITIONS

LWA # 98079.61

26-Oct-2000

SHEET 2 OF 4

BASIN	AREA	SOIL TYPE	C 5 C 100	GEOMETRY		Tt 5 Tt 100	V Tt	tc 5 tc 100	i 5 i 100	Q5 Q100	COMMENTS
				LENGTH	HEIGHT SLOPE						
C5	13.66	B	0.50	180.0	3.0	12.72	Varies	19.07	2.99	20.4	Residential
		97	0.60		1.67	10.60	6.35	16.95	5.55	45.5	
DP-3	67.97	B	0.62	300.0	9.0	10.82	2.53	30.10	2.31	97.5	C1, C2, C4 & C5
		97	0.71		3.00	8.79	19.28	28.07	4.21	203.2	
C6	14.36	B	0.50	300.0	14.0	11.69	Varies	17.68	3.11	22.3	Residential
		97	0.60		4.67	9.74	5.99	15.73	5.76	49.6	
C	96.95	B	0.58	300.0	14.0	10.13	Varies	33.98	2.15	121.0	
		97	0.68		4.67	8.18	23.85	32.03	3.89	256.7	
D	6.20	B	0.90	50.0	1.0	2.10	2.52	10.87	3.91	21.8	Street Flow (Marksheffel Road)
		97	0.95		2.00	1.58	8.77	10.35	6.97	41.1	
E1	6.74	B	0.90	50.0	1.0	2.10	3.62	14.15	3.47	21.0	Street Flow (Marksheffel Road)
		8 / 97	0.95		2.00	1.58	12.05	13.63	6.17	39.5	
E2	4.09	B	0.90	50.0	1.0	2.10	2.54	7.82	4.46	16.4	Street Flow (Marksheffel Road)
		97	0.95		2.00	1.58	5.72	7.30	8.00	31.1	
E	10.83	B	0.90	50.0	1.0	2.10	Varies	19.96	2.92	28.4	Street Flow (Marksheffel Road)
		8 / 97	0.95		2.00	1.58	17.86	19.44	5.17	53.2	
F	3.51	B	0.50	300.0	6.0	15.46	2.94	18.86	3.01	5.3	Residential
		97	0.60		2.00	12.88	3.40	16.28	5.66	11.9	
G1	13.88	B	0.75	200.0	2.0	9.26	Varies	21.38	2.81	29.3	Neighborhood Commercial
		8	0.80		1.00	7.93	12.12	20.05	5.08	56.4	
G2	3.88	B	0.75	150.0	3.0	6.38	2.73	10.95	3.90	11.3	Office, Medium
		8	0.80		2.00	5.47	4.57	10.04	7.06	21.9	
G3	19.67	B	0.55	300.0	3.0	17.81	Varies	32.23	2.22	24.0	Residential
		8	0.65		1.00	14.58	14.42	29.00	4.13	52.8	
DP-4	33.55	B	0.63	200.0	2.0	12.43	Varies	35.42	2.10	44.3	G1 & G3
		8	0.71		1.00	10.31	22.99	33.30	3.80	90.6	
G4	10.23	B	0.38	300.0	2.0	26.66	Varies	37.48	2.03	7.9	Park & Residential
		8 / 97	0.57		0.67	19.62	10.82	30.44	4.01	23.4	
G5	10.87	B	0.53	300.0	6.0	14.69	Varies	21.57	2.80	16.1	Residential
		8	0.63		2.00	12.11	6.88	18.99	5.23	35.8	

RUNOFF COMPUTATIONS
RATIONAL METHOD

98079PR.WK4

STETSON RIDGE M.D.D.P.
STETSON HILLS BLVD. & MARKSHEFFEL RD.
COLORADO SPRINGS, COLORADO

LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

TABLE A:
PROPOSED CONDITIONS

LWA # 98079.61

14-Sep-2000

SHEET 3 OF 4

BASIN	AREA	SOIL TYPE	C 5 C 100	GEOMETRY		Tt 5 Tt 100	V Tt	tc 5 tc 100	i 5 i 100	Q5	Q100	COMMENTS
				LENGTH	HEIGHT							
				SLOPE								
G6	5.31	B	0.50	300.0	13.0	11.98	4.00	13.96	3.49	9.3	20.9	Residential
		8 / 97	0.60	4.33		9.98	1.98	11.96	6.55			
DP - 5	63.84	B	0.57	200.0	2.0	14.02	Varies	37.01	2.04	74.3	159.6	G1 through G6
		97	0.67	1.00		11.37	22.99	34.36	3.73			
G7	8.70	B	0.50	300.0	15.0	11.43	Varies	17.14	3.16	13.7	30.5	Residential
		97	0.60	5.00		9.52	5.71	15.23	5.85			
DP-6	14.01	B	0.50	300.0	13.0	11.98	Varies	18.84	3.01	21.1	46.8	G6 & G7
		8	0.60	4.33		9.98	6.86	16.84	5.56			
G8	9.42	B	0.50	300.0	13.0	11.98	Varies	22.58	2.73	12.9	28.3	Residential
		97	0.60	4.33		9.98	10.60	20.58	5.01			
DP-7	81.96	B	0.56	300.0	2.0	19.99	Varies	47.86	1.73	79.5	172.5	G1 thru G8
		97	0.66	0.67		16.29	27.87	44.16	3.19			
G9	10.19	B	0.50	300.0	20.0	10.39	2.91	15.55	3.31	16.9	37.5	Residential
		97	0.60	6.67		8.66	5.16	13.82	6.13			
G10	4.77	B	0.50	300.0	17.0	10.96	Varies	15.23	3.35	8.0	17.8	Residential
		97	0.60	5.67		9.14	4.27	13.41	6.22			
G11	8.84	B	0.50	300.0	16.0	11.19	Varies	21.30	2.82	12.5	27.4	Residential
		8	0.60	5.33		9.32	10.11	19.43	5.17			
G12	32.02	B	0.65	300.0	8.0	10.54	Varies	23.15	2.69	56.0	115.1	Neighborhood Commercial, Office & Residential
		8	0.73	2.67		8.67	12.61	21.28	4.92			
G13	19.50	B	0.50	300.0	15.0	11.43	Varies	18.45	3.04	29.6	65.7	Residential
		8 / 97	0.60	5.00		9.52	7.02	16.54	5.61			
G14	20.97	B	0.66	300.0	5.0	12.04	Varies	23.15	2.69	37.2	77.0	Office & Residential
		8 / 97	0.74	1.67		9.85	11.11	20.96	4.96			
G15	8.91	B	0.30	300.0	8.0	18.75	3.28	26.12	2.51	6.7	24.8	Park
		8 / 97	0.55	2.67		12.89	7.37	20.26	5.05			

RUNOFF COMPUTATIONS
RATIONAL METHOD

STETSON RIDGE M.D.D.P.
STETSON HILLS BLVD. & MARKSHEFFEL RD.
COLORADO SPRINGS, COLORADO

LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

TABLE A:
PROPOSED CONDITIONS

LWA # 98079.61

26-Oct-2000

SHEET 4 OF 4

BASIN	AREA	SOIL TYPE	C 5 C 100	GEOMETRY		Tt 5 Tt 100	V Tt	tc 5 tc 100	i 5 i 100	Q5	Q100	COMMENTS
				LENGTH	HEIGHT							
				SLOPE								
DP-8	81.40	B	0.58	300.0	8.0	12.19	Varies	34.94	2.12	99.9		G12 through G15
		8 / 97	0.68	2.67		9.84	22.75	32.59	3.85		213.3	
G16	26.12	B	0.73	150.0	3.0	6.74	Varies	22.29	2.75	52.4		School, Office & Park
		8 / 97	0.79	2.00		5.65	15.55	21.20	4.93		101.8	
DP-9	0.165 sm	B	82.2 (CN)					53.27 min.		77		G1 through G11 (HEC-1 Flows)
		8	82.2 (CN)					0.89 hrs.			190	
G17	16.94	B	0.50	300.0	7.0	14.69	Varies	19.56	2.95	25.0		Residential
		8 / 97	0.60	2.33		12.24	4.87	17.11	5.52		56.1	
DP-10	25.78	B	0.50	300.0	7.0	14.69	Varies	29.05	2.36	30.5		G16 & G17
		97	0.60	2.33		12.24	14.36	26.60	4.34		67.2	
DP-11	0.311 sm	B	83.8 (CN)					68.6 min.		139		G1 - G9, & G12 - G16 (HEC-1 Flows)
		8	83.8 (CN)					1.07 hrs.			350	
G	0.359 sm	B	83.3 (CN)					70.8 min.		157		Basin G (HEC-1 Flows)
		8	83.3 (CN)					1.2 hrs.			399	
H1	28.76	B	0.75	300.0	22.0	5.87	Varies	17.82	3.09	66.8		Office (Low Density)
		8	0.80	7.33		5.03	11.95	16.98	5.54		127.5	
H2	11.51	B	0.50	300.0	20.0	10.39	Varies	16.34	3.23	18.6		Residential
		8	0.60	6.67		8.66	5.95	14.61	5.97		41.2	
OS - H3	2.52	B	0.30	160.0	10.0	10.34	1.81	14.93	3.38	2.6		
		8	0.55	6.25		7.11	4.59	11.70	6.61		9.2	
H4	13.84	B	0.30	300.0	14.0	15.59	Varies	27.02	2.47	10.2		Park
		8	0.55	4.67		10.72	11.43	22.15	4.82		36.7	
H5	8.02	B	0.30	300.0	19.0	14.09	Varies	18.99	2.99	7.2		Park
		8	0.55	6.33		9.69	4.90	14.59	5.97		26.3	
H	64.65	B	0.54	300.0	22.0	9.40	Varies	41.25	1.91	66.6		
		8 / 97	0.67	7.33		7.22	31.85	39.07	3.45		149.3	
I	7.44	B	0.50	300.0	12.0	12.30	4.38	15.15	3.36	12.5		
		8 / 97	0.60	4.00		10.25	2.85	13.10	6.28		28.0	

LWA # 98079.61

LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

98079PR.WK4

14-Sep-2000

SHT. 1 of 4

TABLE A:
PROPOSED CONDITIONS

BASIN	"K"	HIGH ELEV.	LOW ELEV.	LENGTH	HEIGHT	SLOPE	"V"	"TT"	COMMENTS
A1	2.0	6800.0	6771.0	880	29.0	3.30%	3.63	4.04	
	2.0	6771.0	6734.0	790	37.0	4.68%	4.33	3.04	
				1670				7.08	
A2	2.0	6790.0	6734.0	800	56.0	7.00%	5.29	2.52	
	2.0	6734.0	6712.0	740	22.0	2.97%	3.45	3.58	
				1540				6.10	
A3	2.0	6760.0	6712.0	700	48.0	6.86%	5.24	2.23	
DP - 1	2.0	6800.0	6771.0	880	29.0	3.30%	3.63	4.04	
	2.0	6771.0	6734.0	790	37.0	4.68%	4.33	3.04	
	2.0	6734.0	6712.0	740	22.0	2.97%	3.45	3.58	
				2410				10.65	
A4	2.0	6764.0	6760.0	250	4.0	1.60%	2.53	1.65	
	2.0	6760.0	6712.0	1550	48.0	3.10%	3.52	7.34	
	2.0	6712.0	6699.0	750	13.0	1.73%	2.63	4.75	
				2550				13.73	
A5	2.0	6762.0	6726.0	1150	36.0	3.13%	3.54	5.42	
	2.0	6726.0	6699.0	600	27.0	4.50%	4.24	2.36	
				1750				7.77	
A	2.0	6800.0	6771.0	880	29.0	3.30%	3.63	4.04	
	2.0	6771.0	6734.0	790	37.0	4.68%	4.33	3.04	
	2.0	6734.0	6712.0	740	22.0	2.97%	3.45	3.58	
	2.0	6712.0	6699.0	750	13.0	1.73%	2.63	4.75	
				3160				15.41	
B1	2.0	6751.0	6727.0	790	24.0	3.04%	3.49	3.78	
	2.0	6727.0	6718.0	280	9.0	3.21%	3.59	1.30	
				1070				5.08	
B2	2.0	6746.0	6718.0	850	28.0	3.29%	3.63	3.90	
	2.0	6718.0	6714.0	230	4.0	1.74%	2.64	1.45	
				1080				5.36	
B	2.0	6751.0	6727.0	790	24.0	3.04%	3.49	3.78	
	2.0	6727.0	6718.0	280	9.0	3.21%	3.59	1.30	
	2.0	6718.0	6714.0	230	4.0	1.74%	2.64	1.45	
				1300				6.53	
C1	2.0	6794.0	6778.0	630	16.0	2.54%	3.19	3.29	
	2.0	6778.0	6764.0	1000	14.0	1.40%	2.37	7.04	
				1630				10.34	
C2	2.0	6784.0	6754.0	650	10.0	1.54%	2.48	4.37	
	2.0	6754.0	6743.0	500	11.0	2.20%	2.97	2.81	
				1150				7.18	
C3	2.0	6754.0	6734.0	1320	20.0	1.52%	2.46	6.94	
C4	2.0	6802.0	6777.0	1100	25.0	2.27%	3.02	6.08	
	2.0	6777.0	6764.0	920	13.0	1.41%	2.38	6.45	
				2020				12.53	
		* = TT = (11.9 * L^3) ^ 0.385 * 60							
		H							

BASIN	" K "	HIGH ELEV.	LOW ELEV.	LENGTH	HEIGHT	SLOPE	" V "	" TT "	COMMENTS
DP - 2	2.0	6802.0	6777.0	1100	25.0	2.27%	3.02	6.08	
	2.0	6777.0	6764.0	920	13.0	1.41%	2.38	6.45	
				2020				12.53	
C5	2.0	6790.0	6768.0	310	22.0	7.10%	5.33	0.97	
	2.0	6768.0	6744.0	1000	24.0	2.40%	3.10	5.38	
				1310				6.35	
DP - 3	2.0	6802.0	6777.0	1100	25.0	2.27%	3.02	6.08	
	2.0	6777.0	6764.0	1000	13.0	1.30%	2.28	7.31	
	2.0	6764.0	6744.0	1000	20.0	2.00%	2.83	5.89	
				3100				19.28	
C5	2.0	6766.0	6744.0	400	22.0	5.50%	4.69	1.42	
	2.0	6744.0	6734.0	670	10.0	1.49%	2.44	4.57	
				1070				5.99	
C	2.0	6802.0	6777.0	1100	25.0	2.27%	3.02	6.08	
	2.0	6777.0	6764.0	1000	13.0	1.30%	2.28	7.31	
	2.0	6764.0	6744.0	1000	20.0	2.00%	2.83	5.89	
	2.0	6744.0	6734.0	670	10.0	1.49%	2.44	4.57	
				3770				23.85	
D	2.0	6801.0	6780.0	1325	21.0	1.58%	2.52	8.77	
E1	2.0	6894.0	6808.0	2620	86.0	3.28%	3.62	12.05	
E2	2.0	6807.0	6793.0	870	14.0	1.61%	2.54	5.72	
E	2.0	6894.0	6808.0	2620	86.0	3.28%	3.62	12.05	
	2.0	6808.0	6793.0	900	15.0	1.67%	2.58	5.81	
				3520				17.86	
F	2.0	6711.0	6698.0	600	13.0	2.17%	2.94	3.40	
G1	2.0	6810.0	6807.0	600	3.0	0.50%	1.41	7.07	
	2.0	6807.0	6792.0	820	15.0	1.83%	2.71	5.05	
				1420				12.12	
G2	2.0	6806.0	6792.0	750	14.0	1.87%	2.73	4.57	
G3	2.0	6797.0	6792.0	450	5.0	1.11%	2.11	3.56	
	2.0	6792.0	6761.0	1740	31.0	1.78%	2.67	10.86	
				2190				14.42	
DP - 4	2.0	6810.0	6807.0	600	3.0	0.50%	1.41	7.07	
	2.0	6807.0	6761.0	2560	46.0	1.80%	2.68	15.91	
				3160				22.99	
G4	2.0	6793.0	6791.0	70	2.0	2.86%	3.38	0.35	
	2.0	6791.0	6761.0	1680	30.0	1.79%	2.67	10.46	
				1750				10.82	
G5	2.0	6818.0	6793.0	750	25.0	3.33%	3.65	3.42	
	2.0	6793.0	6761.0	820	32.0	3.90%	3.95	3.46	
				1570				6.88	
G6	2.0	6780.0	6761.0	475	19.0	4.00%	4.00	1.98	

RUNOFF COMPUTATIONS
TRAVEL TIME CALCULATIONS (TR-55)

STETSON RIDGE M.D.D.P.
STETSON HILLS BLVD. & MARKSHEFFEL RD.
COLORADO SPRINGS, COLORADO

TABLE A:
PROPOSED CONDITIONS

LWA # 98079.61

LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 638-5179

98079PR.WK4

14-Sep-2009

SHT. 3 of 4

BASIN	"n"	"p" In Inches	"K"	HIGH ELEV.	LOW ELEV.	LENGTH	HEIGHT	SLOPE	"V"	"TT"	COMMENTS
DP - 6			2.0	6780.0	6761.0	475	19.0	4.00%	4.00	1.98	
			2.0	6761.0	6751.0	700	10.0	1.43%	2.39	4.88	
						1175				6.86	
G7			2.0	6762.0	6761.0	100	1.0	1.00%	2.00	0.83	
			2.0	6761.0	6751.0	700	10.0	1.43%	2.39	4.88	
						800				5.71	
G8			2.0	6781.0	6761.0	980	20.0	2.04%	2.86	5.72	
			2.0	6761.0	6751.0	700	10.0	1.43%	2.39	4.88	
						1680				10.60	
G9			2.0	6780.0	6761.0	900	19.0	2.11%	2.91	5.16	
G10			2.0	6765.0	6751.0	230	14.0	6.09%	4.93	0.78	
			2.0	6751.0	6743.0	520	8.0	1.54%	2.48	3.49	
						750				4.27	
G11			2.0	6752.0	6747.0	150	5.0	3.33%	3.65	0.68	
			2.0	6747.0	6743.0	800	4.0	0.50%	1.41	8.43	
						950				10.11	
DP - 7			2.0	6810.0	6807.0	600	3.0	0.50%	1.41	7.07	
			2.0	6807.0	6761.0	2560	46.0	1.80%	2.68	15.91	
			2.0	6761.0	6751.0	700	10.0	1.43%	2.39	4.88	
						3860				27.87	
DP-7	0.24	2.20		6827.0	6810.0	300	17.0	5.67%	0.18	27.33	
			2.0	6810.0	6807.0	600	3.0	0.50%	1.41	7.07	
			2.0	6807.0	6751.0	2560	46.0	1.80%	2.68	15.91	
			2.0	6761.0	6751.0	700	10.0	1.43%	2.39	4.88	
			2.0	6751.0	6743.0	520	8.0	1.54%	2.48	3.49	
						4080				58.69	HEC-1 Travel Time
G12			2.0	6889.0	6888.0	450	11.0	2.44%	3.13	2.40	
			2.0	6888.0	6807.0	2300	81.0	3.52%	3.75	10.21	
						2750				12.61	
G13			2.0	6867.0	6824.0	1450	43.0	2.97%	3.44	7.02	
G14			2.0	6826.0	6801.0	830	25.0	3.01%	3.47	3.99	
			2.0	6801.0	6790.0	930	11.0	1.18%	2.18	7.13	
						1760				11.11	
G15			2.0	6829.0	6790.0	1450	39.0	2.69%	3.28	7.37	
DP-8			2.0	6889.0	6888.0	450	11.0	2.44%	3.13	2.40	
			2.0	6888.0	6807.0	2300	81.0	3.52%	3.75	10.21	
			2.0	6807.0	6790.0	1360	17.0	1.25%	2.24	10.14	
						4110				22.75	
G16			2.0	6807.0	6790.0	1330	17.0	1.26%	2.26	9.80	
			2.0	6790.0	6772.0	950	18.0	1.89%	2.75	5.75	
						2280				15.55	

$$* TT = (11.8 * L^{.3}) * 0.385 * 60$$

H

RUNOFF COMPUTATIONS
TRAVEL TIME CALCULATIONS (TR-55)

STETSON RIDGE M.D.D.P.
STETSON HILLS BLVD. & MARKSHEFFEL RD.
COLORADO SPRINGS, COLORADO

LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

98079PR.WK4

TABLE A:
PROPOSED CONDITIONS

LWA # 98079.61

14-Sep-2009

SHT. 4 of 4

BASIN	"n"	"P" In Inches	"K"	HIGH ELEV.	LOW ELEV.	LENGTH	HEIGHT	SLOPE	"V"	"TT"	COMMENTS
DP-9			2.0	6899.0	6888.0	450	11.0	2.44%	3.13	2.40	
			2.0	6888.0	6807.0	2300	81.0	3.52%	3.75	10.21	
			2.0	6807.0	6790.0	1360	17.0	1.25%	2.24	10.14	
			2.0	6790.0	6772.0	950	18.0	1.89%	2.75	5.75	
						5060				28.50	
DP-9	0.24	2.20		6907.0	6899.0	300	8.0	2.67%	0.14	36.94	
			2.0	6899.0	6888.0	450	11.0	2.44%	3.13	2.40	
			2.0	6888.0	6807.0	2300	81.0	3.52%	3.75	10.21	
			2.0	6807.0	6790.0	1360	17.0	1.25%	2.24	10.14	
			2.0	6790.0	6772.0	950	18.0	1.89%	2.75	5.75	
						5360				65.44	
G17			2.0	6783.0	6778.0	200	5.0	2.50%	3.16	1.05	
			2.0	6778.0	6760.0	425	18.0	4.24%	4.12	1.72	
			2.0	6760.0	6747.0	435	13.0	2.99%	3.46	2.10	
						1060				4.87	
DP-10			2.0	6783.0	6778.0	200	5.0	2.50%	3.16	1.05	
			2.0	6778.0	6760.0	425	18.0	4.24%	4.12	1.72	
			2.0	6760.0	6747.0	435	13.0	2.99%	3.46	2.10	
			2.0	6747.0	6743.0	800	4.0	0.50%	1.41	9.43	
						1660				14.30	
DP-10	0.24	2.20		6790.0	6783.0	300	7.0	2.33%	0.13	38.97	
			2.0	6783.0	6778.0	200	5.0	2.50%	3.16	1.05	
			2.0	6778.0	6760.0	425	18.0	4.24%	4.12	1.72	
			2.0	6760.0	6747.0	435	13.0	2.99%	3.46	2.10	
			2.0	6747.0	6743.0	800	4.0	0.50%	1.41	9.43	
						2160				53.27	
H1			2.0	6887.0	6848.0	580	39.0	6.72%	5.19	1.86	
			*	6848.0	6826.0	1500	28.0	0.02	2.46	10.09	STREAM CALC.'s
						2080				11.95	
H2			2.0	6862.0	6818.0	500	44.0	8.80%	5.93	1.40	
			*	6818.0	6812.0	450	6.0	1.33%	1.85	4.54	STREAM CALC.'s
						950				5.95	
OS - H3			*	6810.0	6802.0	500	8.0	1.60%	1.81	4.59	STREAM CALC.'s
H4			2.0	6826.0	6802.0	580	24.0	4.14%	4.07	2.38	
			*	6802.0	6790.0	1030	12.0	1.17%	1.90	9.06	STREAM CALC.'s
						1610				11.43	
H5			2.0	6814.0	6788.0	250	26.0	10.40%	6.45	0.65	
			*	6788.0	6782.0	425	6.0	1.41%	1.67	4.25	STREAM CALC.'s
						675				4.90	
H			2.0	6889.0	6842.0	660	47.0	7.12%	5.34	2.06	
			*	6842.0	6812.0	1540	30.0	1.95%	2.53	10.13	STREAM CALC.'s
			*	6812.0	6802.0	650	10.0	1.54%	1.90	5.71	STREAM CALC.'s
			*	6802.0	6790.0	980	12.0	1.22%	1.91	8.55	STREAM CALC.'s
			*	6790.0	6782.0	575	8.0	1.39%	1.77	5.40	STREAM CALC.'s
						4405				31.65	
I			2.0	6818.0	6782.0	750	36.0	4.80%	4.38	2.85	

RUNOFF COMPUTATIONS

98079PR.WK4

WEIGHTED RUNOFF COEFFICIENT ("C")

LEIGH WHITEHEAD & ASSOCIATES, INC.
Engineers, Surveyors & Planners
2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, COLORADO
(719) 636-5179

STETSON RIDGE M.D.D.P.
STETSON HILLS BLVD. & MARKSHEFFEL RD.
COLORADO SPRINGS, COLORADO

14-Sep-2009

PROPOSED CONDITIONS

LWA #98079.61

SHT. 1 of 3

	AREA	TOTAL AREA	PERCENT COVER	"C5"	WEIGHTED "C5"	"C100"	WEIGHTED "C100"	TYPE OF COVER
A1	8.63	12.25	70.45%	0.60	0.42	0.70	0.49	Residential (12 to 25 DU / Ac.)
	3.62	12.25	29.55%	0.90	0.27	0.95	0.28	Public Assembly
	12.25		100.00%		0.69		0.77	
DP - 1	31.40	35.02	89.66%	0.60	0.54	0.70	0.63	Residential (12 to 25 DU / Ac.)
	3.62	35.02	10.34%	0.90	0.09	0.95	0.10	Public Assembly
	35.02		100.00%		0.63		0.73	
A	36.47	71.49	51.01%	0.60	0.31	0.70	0.36	Residential (12 to 25 DU / Ac.)
	31.40	71.49	43.92%	0.50	0.22	0.60	0.26	Residential (3.5 to 8 DU / Ac.)
	3.62	71.49	5.06%	0.90	0.05	0.95	0.05	Public Assembly
	71.49		100.00%		0.57		0.67	
C2	5.00	15.17	32.96%	0.30	0.10	0.55	0.18	Park
	2.86	15.17	18.85%	0.50	0.09	0.60	0.11	Residential (3.5 to 8 DU / Ac.)
	7.31	15.17	48.19%	0.70	0.34	0.80	0.39	School
	15.17		100.00%		0.53		0.68	
DP - 2	20.72	39.14	52.94%	0.50	0.26	0.60	0.32	Residential (3.5 to 8 DU / Ac.)
	18.42	39.14	47.06%	0.90	0.42	0.95	0.45	Public Assembly
	39.14		100.00%		0.69		0.76	
DP-3	5.00	67.97	7.36%	0.30	0.02	0.55	0.04	Park
	37.24	67.97	54.79%	0.50	0.27	0.60	0.33	Residential (3.5 to 8 DU / Ac.)
	7.31	67.97	10.75%	0.70	0.08	0.80	0.09	School
	18.42	67.97	27.10%	0.90	0.24	0.95	0.26	Public Assembly
	67.97		100.00%		0.62		0.71	
C	5.00	96.95	5.16%	0.30	0.02	0.55	0.03	Park
	66.22	96.95	68.30%	0.50	0.34	0.60	0.41	Residential (3.5 to 8 DU / Ac.)
	7.31	96.95	7.54%	0.70	0.05	0.80	0.06	School
	18.42	96.95	19.00%	0.90	0.17	0.95	0.18	Public Assembly
	96.95		100.00%		0.58		0.68	
D	4.96	9.01	55.05%	0.50	0.28	0.60	0.33	Residential (3.5 to 8 DU / Ac.)
	4.05	9.01	44.95%	0.90	0.40	0.95	0.43	Public Assembly
	9.01		100.00%		0.68		0.76	
DP - 4	19.67	33.55	58.63%	0.55	0.32	0.65	0.38	Residential (8 to 12 DU / Ac.)
	13.88	33.55	41.37%	0.75	0.31	0.80	0.33	Neighborhood Commercial
	33.55		100.00%		0.63		0.71	
G4	6.01	10.23	58.75%	0.30	0.18	0.55	0.32	Park
	4.22	10.23	41.25%	0.50	0.21	0.60	0.25	Residential (3.5 to 8 DU / Ac.)
	10.23		100.00%		0.38		0.57	

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COLORADO SPRINGS, COLORADO

14-Sep-2000

PROPOSED CONDITIONS

LWA #98079.61

SHT. 2 of 3

	AREA	TOTAL AREA	PERCENT COVER	"C5"	WEIGHTED "C5"	"C100"	WEIGHTED "C100"	TYPE OF COVER
G5	3.72	10.87	34.22%	0.50	0.17	0.60	0.21	Residential (3.5 to 8 DU / Ac.)
	7.15	10.87	65.78%	0.55	0.36	0.65	0.43	Residential (8 to 12 DU / Ac.)
	10.87		100.00%		0.53		0.63	
DP - 5	17.76	63.84	27.82%	0.75	0.21	0.80	0.22	Neighborhood Commercial / Office
	26.82	63.84	42.01%	0.55	0.23	0.65	0.27	Residential (8 to 12 DU / Ac.)
	13.25	63.84	20.76%	0.50	0.10	0.60	0.12	Residential (3.5 to 8 DU / Ac.)
	6.01	63.84	9.41%	0.30	0.03	0.55	0.05	Park
	63.84		100.00%		0.57		0.67	
DP - 7	17.76	81.96	21.67%	0.75	0.16	0.80	0.17	Neighborhood Commercial / Office
	26.82	81.96	32.72%	0.55	0.18	0.65	0.21	Residential (8 to 12 DU / Ac.)
	31.37	81.96	38.27%	0.50	0.19	0.60	0.23	Residential (3.5 to 8 DU / Ac.)
	6.01	81.96	7.33%	0.30	0.02	0.55	0.04	Park
	81.96		100.00%		0.56		0.66	
DP-7 (CN)	17.76	81.96	21.67%	92	19.94	92	19.94	Neighborhood Commercial / Office
	26.82	81.96	32.72%	85	27.81	85	27.81	Residential (8 to 12 DU / Ac.)
	31.37	81.96	38.27%	80	30.62	80	30.62	Residential (3.5 to 8 DU / Ac.)
	6.01	81.96	7.33%	61	4.47	61	4.47	Park
	81.96		100.00%		82.84		82.84	
G12	16.01	32.02	50.00%	0.75	0.38	0.80	0.40	Neighborhood Commercial / Office
	16.01	32.02	50.00%	0.55	0.28	0.65	0.33	Residential (8 to 12 DU / Ac.)
	32.02		100.00%		0.65		0.73	
G14	8.21	20.97	39.15%	0.75	0.29	0.80	0.31	Office (Medium)
	12.76	20.97	60.85%	0.60	0.37	0.70	0.43	Residential (12 to 25 DU / Ac.)
	20.97		100.00%		0.66		0.74	
G15	20.52	26.12	78.56%	0.75	0.59	0.80	0.63	School
	4.86	26.12	18.61%	0.70	0.13	0.80	0.15	Office (Medium)
	0.74	26.12	2.83%	0.30	0.01	0.55	0.02	Park
	26.12		100.00%		0.73		0.79	
DP - 8	24.22	81.40	29.75%	0.75	0.22	0.80	0.24	Neighborhood Commercial / Office
	12.76	81.40	15.68%	0.60	0.09	0.70	0.11	Residential (12 to 25 DU / Ac.)
	16.01	81.40	19.67%	0.55	0.11	0.65	0.13	Residential (8 to 12 DU / Ac.)
	19.50	81.40	23.96%	0.50	0.12	0.60	0.14	Residential (3.5 to 8 DU / Ac.)
	8.91	81.40	10.95%	0.30	0.03	0.55	0.06	Park
	81.40		100.00%		0.58		0.68	

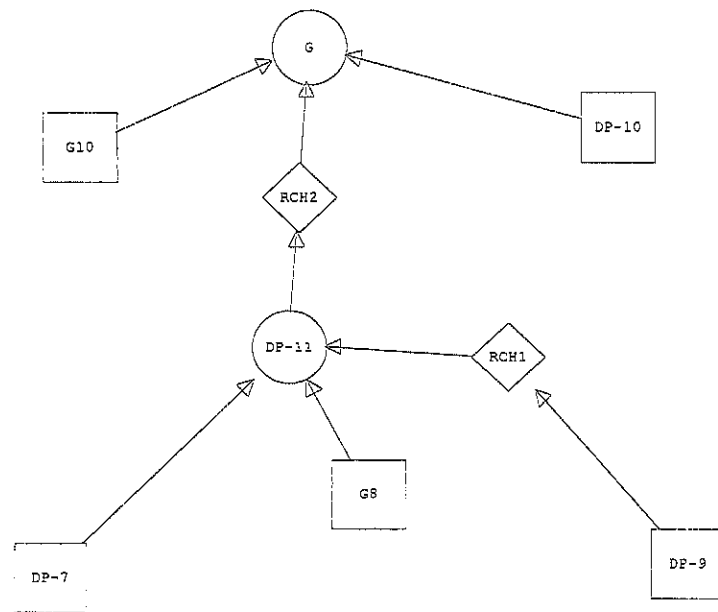
98079PR.WK4

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

14-Sep-2000

SHT. 3 of 3

[illegible]



□HEC1 S/N: 1343001909

HMVersion: 6.33

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*   FLOOD HYDROGRAPH PACKAGE   (HEC-1)
*           MAY   1991
*           VERSION 4.0.1E
*
*   RUN DATE  09/14/2000   TIME  11:29:48
*
*****
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*
* U.S. ARMY CORPS OF ENGINEERS *
* HYDROLOGIC ENGINEERING CENTER *
* 609 SECOND STREET *
* DAVIS, CALIFORNIA 95616 *
* (916) 756-1104 *
*

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X	X	XXXXXXXX	XXXXXX		XXX

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::: Full Microcomputer Implementation :::
::: by :::
::: Haestad Methods, Inc. :::
:::
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37 Brookside Road * Waterbury, Connecticut 06708 * (203) 755-1666

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

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

HEC-1 INPUT

```

LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
1         ID  STETSON RIDGE M.D.D.P., BASIN, 5 Yr. & 100 Yr. (Proposed Conditions)
2         IT   10

```

3	IO	5	0								
4	JR	PREC	1	1.6923							
5	KK	DP-9									
6	KM	SUB BASIN G16									
7	KO				22						
8	BA	0.1680									
9	PB	2.6									
10	IN	10									
11	PC	0.0	0.0005	0.0015	0.003	0.0045	0.006	0.008	0.01	0.012	0.0143
12	PC	0.0165	0.0188	0.021	0.0233	0.0255	0.0278	0.032	0.039	0.046	0.053
13	PC	0.06	0.075	0.1	0.4	0.7	0.725	0.75	0.765	0.78	0.79
14	PC	0.8	0.81	0.82	0.825	0.83	0.835	0.84	0.845	0.85	0.855
15	PC	0.86	0.8638	0.8675	0.8713	0.875	0.8788	0.8825	0.8863	0.89	0.8938
16	PC	0.8975	0.9013	0.905	0.9083	0.9115	0.9148	0.918	0.921	0.924	0.927
17	PC	0.93	0.9325	0.935	0.9375	0.94	0.9425	0.945	0.9475	0.95	0.9525
18	PC	0.955	0.9575	0.96	0.9625	0.965	0.9675	0.97	0.9725	0.975	0.9775
19	PC	0.98	0.9813	0.9825	0.9838	0.985	0.9863	0.9875	0.9888	0.99	0.9913
20	PC	0.9925	0.9938	0.995	0.9963	0.9975	0.9988	1.0	1.0	1.0	1.0
21	LS		84.78								
22	UD	0.6544									
23	KK	RCH1									
24	KM	Reach 1									
25	KO					22					
26	RD	770	0.0223	0.013		CIRC	3.5				
27	KK	DP-7									
28	KM	DESIGN POINT 7, SUB BASINS G1 - G11									
29	KO					22					
30	BA	0.1281									
31	LS		82.84								
32	UD	0.5869									
33	KK	G8									
34	KM	Sub-Basin G8									
35	KO					22					
36	BA	0.0147									
37	LS		80								
38	UD	0.4102									
39	KK	DP-11									
40	KM	Sub- Basins G1-G7 & G12-G16									
41	KO					22					
42	HC	3									
43	KK	RCH2									
44	KM	Reach 2									
45	KO					22					
46	RD	520	0.0154	0.013		TRAP	4.0				
47	KK	G10									
48	KM	SUB BASIN G10									
49	KO					22					
50	BA	0.0075									
51	LS		80								
52	UD	0.3469									
53	KK	DP-10									
54	KM	Sub-Basins G11 & G17									
55	KO					22					
56	BA	0.0403									
57	LS		80								
58	UD	0.5327									
59	KK	G									
60	KM	Basin G									

61 KO
62 HC 3
63 ZZ

PEAK FLOW AND STAGE (END-OF-PERIOD) SUMMARY FOR MULTIPLE PLAN-RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND, AREA IN SQUARE MILES
TIME TO PEAK IN HOURS

OPERATION	STATION	AREA	PLAN	RATIOS APPLIED TO PRECIPITATION	
				RATIO 1	RATIO 2
				1.00	1.69
HYDROGRAPH AT	DP-9	0.17	1 FLOW	77.	190.
			TIME	4.67	4.50
ROUTED TO	RCH1	0.17	1 FLOW	77.	188.
			TIME	4.67	4.50
HYDROGRAPH AT	DP-7	0.13	1 FLOW	57.	146.
			TIME	4.50	4.50
HYDROGRAPH AT	G8	0.01	1 FLOW	7.	19.
			TIME	4.33	4.33
3 COMBINED AT	DP-11	0.31	1 FLOW	139.	350.
			TIME	4.50	4.50
ROUTED TO	RCH2	0.31	1 FLOW	139.	349.
			TIME	4.50	4.50
HYDROGRAPH AT	G10	0.01	1 FLOW	4.	10.
			TIME	4.33	4.17
HYDROGRAPH AT	DP-10	0.04	1 FLOW	16.	43.
			TIME	4.50	4.50
3 COMBINED AT	G	0.36	1 FLOW	157.	399.
			TIME	4.50	4.50

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL		
							PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
FOR PLAN = 1 RATIO= 0.00									
RCH1	MANE	0.71	77.38	271.22	1.24	10.00	77.35	280.00	1.24
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1111E+02 EXCESS=0.0000E+00 OUTFLOW=0.1111E+02 BASIN STORAGE=0.2681E-02 PERCENT ERROR= 0.0									
FOR PLAN = 1 RATIO= 0.00									
RCH1	MANE	0.59	189.89	270.89	2.79	10.00	188.38	270.00	2.79
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.2499E+02 EXCESS=0.0000E+00 OUTFLOW=0.2499E+02 BASIN STORAGE=0.4461E-02 PERCENT ERROR= 0.0									

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FOR PLAN = 1 RATIO= 0.00

RCH2	MANE	0.34	139.12	270.50	1.18	10.00	138.61	270.00	1.18
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.1951E+02 EXCESS=0.0000E+00 OUTFLOW=0.1950E+02 BASIN STORAGE=0.6063E-02 PERCENT ERROR= 0.0									

FOR PLAN = 1 RATIO= 0.00

RCH2	MANE	0.23	349.45	270.18	2.70	10.00	348.92	270.00	2.70
CONTINUITY SUMMARY (AC-FT) - INFLOW=0.4473E+02 EXCESS=0.0000E+00 OUTFLOW=0.4473E+02 BASIN STORAGE=0.8921E-02 PERCENT ERROR= 0.0									

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

HYDRAULIC CALCULATIONS

CURB OPENING INLET COMPUTATIONS
CONTINUOUS GRADE
5 & 100 Year Flows

25-Oct-2000

28079INL.WK4

Sheet 1 of 2

Q_i/Q^*L_1	ERR	ERR	$Q_i/Q^{*2,5}L_3$
L_i/L_1^*Q	ERR	ERR	$L_i/L_3^{*0,4}Q$

98079INL.WK4

CATCH BASIN SIZE CALCULATIONS

Curb Inlet (Sump Condition)

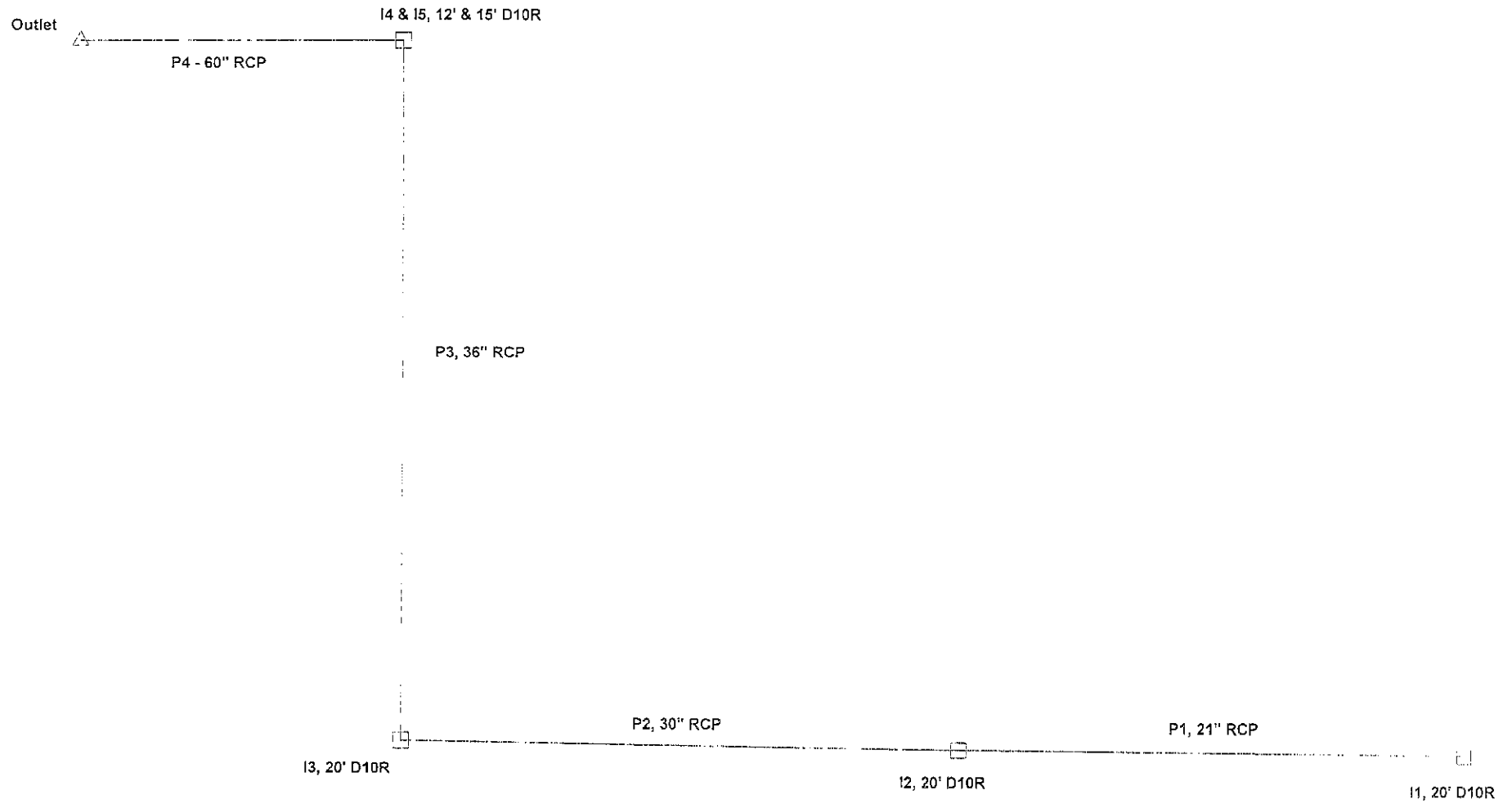
LWA # 98079.61

25-Oct-2000

Sheet 2 of 2

WEIR FLOW = $(1.7 \cdot Li + 6.12) (D_{max} + 0.25)^{1.85} / CLOG$, FOR DEPTHS $< 0.67'$
ORIFICE FLOW = $(3.60 \cdot Li) D^{-0.08} / CLOG$, FOR DEPTHS $> 0.94'$

5 Year Flow



```

----- Beginning Calculation Cycle -----
Discharge: 13.70 cfs at node I1, 20' D10R
Discharge: 26.20 cfs at node I2, 20' D10R
Discharge: 58.80 cfs at node I3, 20' D10R
Discharge: 94.60 cfs at node I4, 12' & 15' D10R
Discharge: 94.60 cfs at node Outlet
Beginning iteration 1
Discharge: 13.70 cfs at node I1, 20' D10R
Discharge: 26.20 cfs at node I2, 20' D10R
Discharge: 58.80 cfs at node I3, 20' D10R
Discharge: 94.60 cfs at node I4, 12' & 15' D10R
Discharge: 94.60 cfs at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error: 0.0
Warning: No Duration data exists in IDF Table
----- Calculations Complete -----

```

```

** Analysis Options **
Friction method: Manning's Formula
HGL Convergence Test: 0.001000
Maximum Network Traversals: 5
Number of Pipe Profile Steps: 5
Discharge Convergence Test: 0.001000
Maximum Design Passes: 3

```

```

----- Network Quick View -----

```

Label	Length	Size	Discharge	Hydraulic Grade	
				Upstream	Downstream
P1, 21"	350.00	21 inch	13.70	6,729.38	6,724.14
P2, 30"	500.00	30 inch	26.20	6,723.75	6,709.48
P3, 36"	800.00	36 inch	58.80	6,709.48	6,699.44
P4 - 60"	100.00	60 inch	94.60	6,698.77	6,695.90

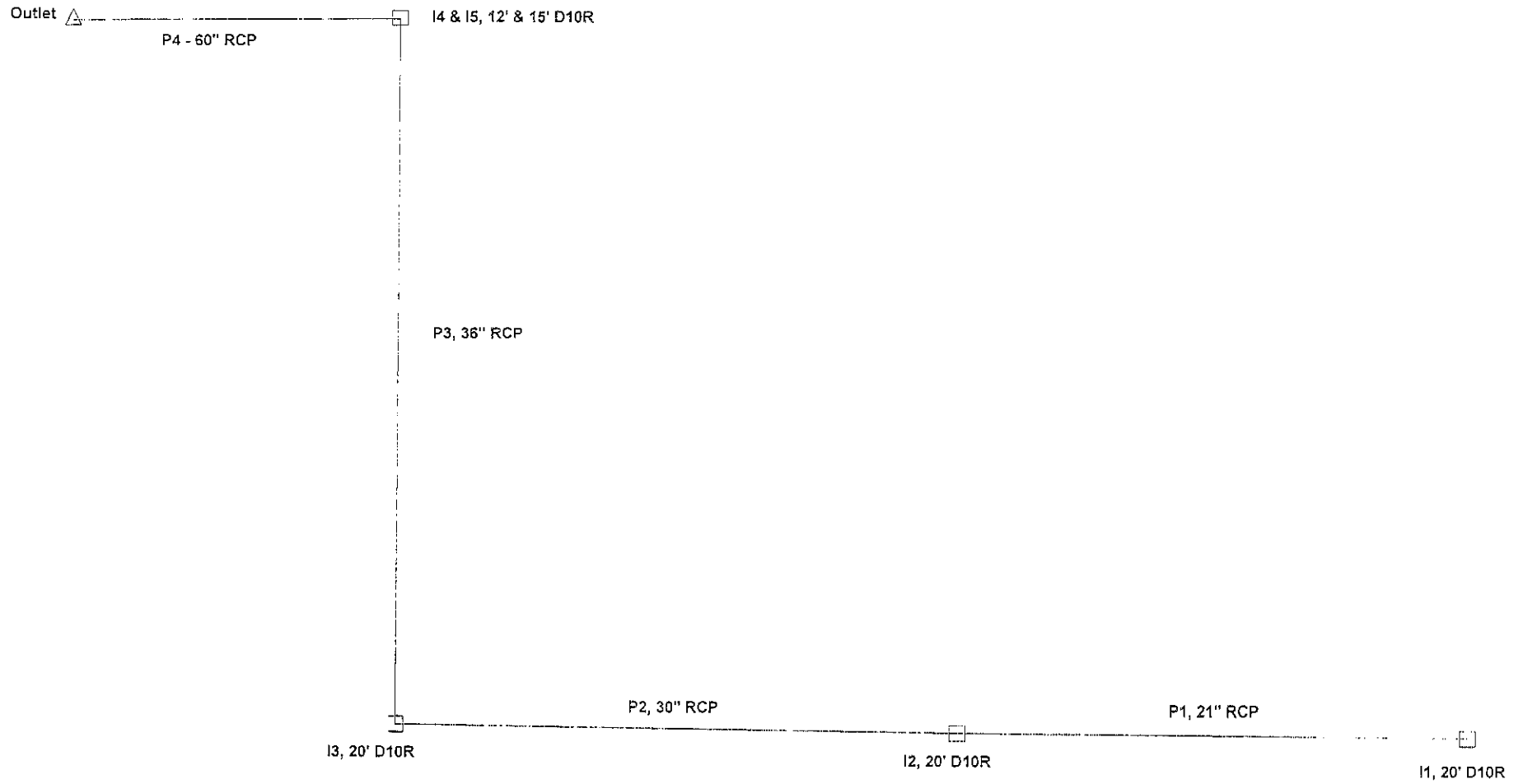
Label	Discharge	Ground	Elevations	
			Upstream HGL	Downstream HGL
I1, 20' D	13.70	6,733.00	6,729.38	6,729.38
I2, 20' D	26.20	6,727.00	6,724.14	6,723.75
I3, 20' D	58.80	6,714.00	6,709.48	6,709.48
I4, 12' &	94.60	6,705.00	6,699.44	6,698.77
Outlet	94.60	6,705.00	6,695.73	6,695.73

Elapsed: 0 minute(s) 1 second(s)

PIPE HYDRAULIC REPORT

Pipe	-Node- Up Dn	-Invert- Up Dn (ft)	Length (ft)	S (ft/ft)	-Section- Shape Size	Q (cfs)	Cap (cfs)	-Depth- Up Dn (ft)	-HGL- Up Dn (ft)	-EGL- Up Dn (ft)	-Ground- Up Dn (ft)
P1, 21" RCP	I1, 20' D10R	6,728.00	350.00	0.017143	Circular 21 inch	13.70	20.74	1.38	6,729.38	6,730.08	6,733.00
	I2, 20' D10R	6,722.00						2.14	6,724.14	6,724.65	6,727.00
P2, 30" RCP	I2, 20' D10R	6,722.00	500.00	0.030000	Circular 30 inch	26.20	71.04	1.75	6,723.75	6,724.54	6,727.00
	I3, 20' D10R	6,707.00						2.48	6,709.48	6,709.92	6,714.00
P3, 36" RCP	I3, 20' D10R	6,707.00	800.00	0.013750	Circular 36 inch	58.80	78.21	2.48	6,709.48	6,710.86	6,714.00
	I4, 12' & 15' D10	6,696.00						3.44	6,699.44	6,700.51	6,705.00
P4 - 60" RCP	I4, 12' & 15' D10	6,696.00	100.00	0.020000	Circular 60 inch	94.60	368.30	2.77	6,698.77	6,699.89	6,705.00
	Outlet	6,694.00						1.90	6,695.90	6,698.87	6,705.00

100 Year Flow



```

----- Beginning Calculation Cycle -----
Discharge: 20.60 cfs at node I-1
Discharge: 41.40 cfs at node I-2
Discharge: 82.00 cfs at node I-3
Discharge: 205.60 cfs at node I-4
Discharge: 205.60 cfs at node Outlet
Beginning iteration 1
Discharge: 20.60 cfs at node I-1
Discharge: 41.40 cfs at node I-2
Discharge: 82.00 cfs at node I-3
Discharge: 205.60 cfs at node I-4
Discharge: 205.60 cfs at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error: 0.0
Warning: No Duration data exists in IDF Table
Information: P-3 Surcharged condition
Information: P-1 Surcharged condition
----- Calculations Complete -----

```

```

** Analysis Options **
Friction method: Manning's Formula
HGL Convergence Test: 0.001000
Maximum Network Traversals: 5
Number of Pipe Profile Steps: 5
Discharge Convergence Test: 0.001000
Maximum Design Passes: 3

```

----- Network Quick View -----

Label	Length	Size	Discharge	Hydraulic Grade	
				Upstream	Downstream
P-1	350.00	21 inch	20.60	6,730.73	6,724.81
P-2	500.00	30 inch	41.40	6,724.16	6,713.52
P-3	800.00	36 inch	82.00	6,713.52	6,701.42
P-4	100.00	60 inch	205.60	6,700.09	6,697.04

Label	Discharge	Ground	Elevations	
			Upstream HGL	Downstream HGL
I-1	20.60	6,733.00	6,730.73	6,730.73
I-2	41.40	6,727.00	6,724.81	6,724.16
I-3	82.00	6,714.00	6,713.52	6,713.52
I-4	205.60	6,705.00	6,701.42	6,700.09
Outlet	205.60	6,705.00	6,696.67	6,696.67

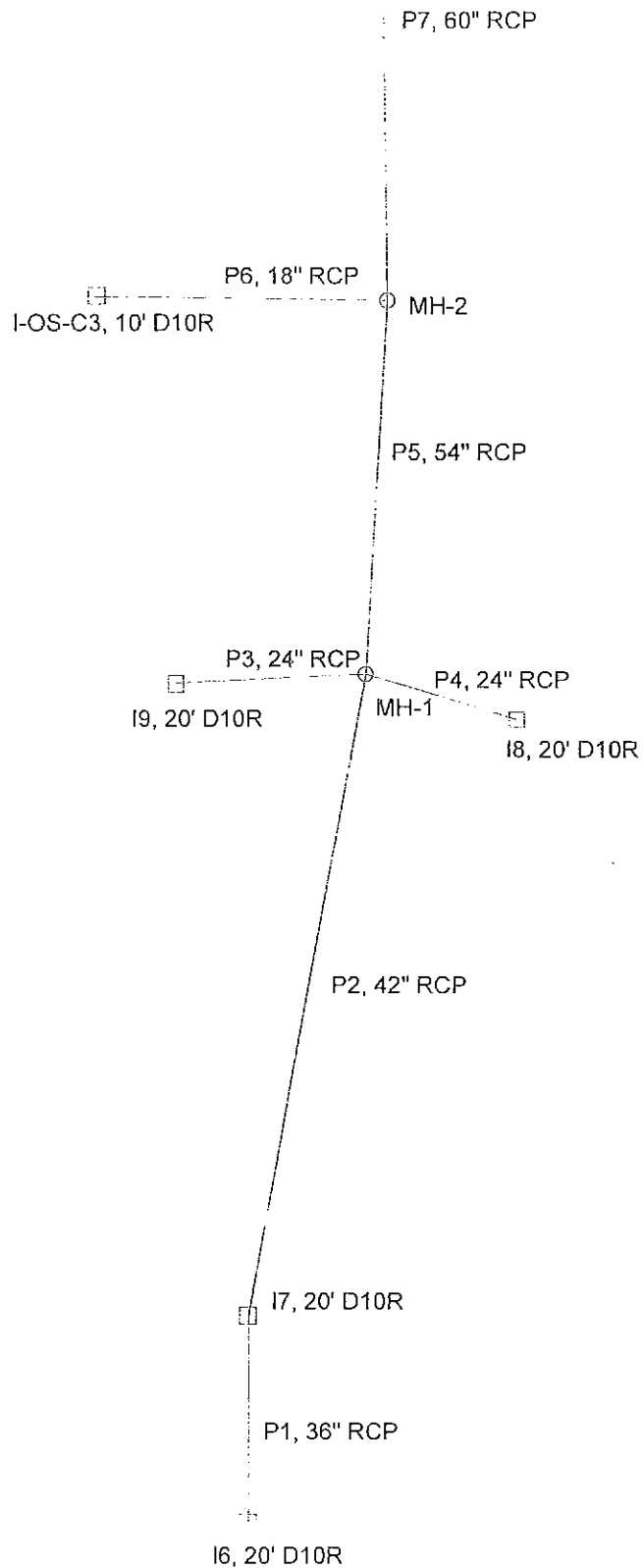
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PIPE HYDRAULIC REPORT

Pipe	-Node- Up Dn	-Invert- Up Dn (ft)	Length (ft)	S (ft/ft)	-Section- Shape Size	Q (cfs)	Cap (cfs)	-Depth- Up Dn (ft)	-HGL- Up Dn (ft)	-EGL- Up Dn (ft)	-Ground- Up Dn (ft)	V avg (ft/s)	Roughness
P-1	I-1	6,728.00	350.00	0.017143	Circular	20.60	20.74	2.73	6,730.73	6,731.87	6,733.00	8.56	0.013
	I-2	6,722.00			21 inch			2.81	6,724.81	6,725.95			
P-2	I-2	6,722.00	500.00	0.030000	Circular	41.40	71.04	2.16	6,724.16	6,725.47	6,727.00	8.81	0.013
	I-3	6,707.00			30 inch			6.52	6,713.52	6,714.62			
P-3	I-3	6,707.00	800.00	0.013750	Circular	82.00	78.21	6.52	6,713.52	6,715.61	6,714.00	11.60	0.013
	I-4	6,696.00			36 inch			5.42	6,701.42	6,703.51			
P-4	I-4	6,696.00	100.00	0.020000	Circular	205.60	368.30	4.09	6,700.09	6,702.31	6,705.00	14.21	0.013
	Outlet	6,694.00			60 inch			3.04	6,697.04	6,701.25			

5 Year Flow

△ Outlet



```

----- Beginning Calculation Cycle -----
Discharge: 37.60 cfs at node I6, 20' D10R
Discharge: 75.20 cfs at node I7, 20' D10R
Discharge: 20.80 cfs at node I9, 20' D10R
Discharge: 23.00 cfs at node I8, 20' D10R
Discharge: 119.00 cfs at node MH-1
Discharge: 2.20 cfs at node I-OS-C3, 10' D10R
Discharge: 121.20 cfs at node MH-2
Discharge: 121.20 cfs at node Outlet
Beginning iteration 1
Discharge: 37.60 cfs at node I6, 20' D10R
Discharge: 75.20 cfs at node I7, 20' D10R
Discharge: 20.80 cfs at node I9, 20' D10R
Discharge: 23.00 cfs at node I8, 20' D10R
Discharge: 119.00 cfs at node MH-1
Discharge: 2.20 cfs at node I-OS-C3, 10' D10R
Discharge: 121.20 cfs at node MH-2
Discharge: 121.20 cfs at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error: 0.0
Warning: No Duration data exists in IDF Table
Information: P3, 24" RCP Surcharged condition
Information: P4, 24" RCP Surcharged condition
----- Calculations Complete -----

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** Analysis Options **
Friction method: Manning's Formula
HGL Convergence Test: 0.001000
Maximum Network Traversals: 5
Number of Pipe Profile Steps: 5
Discharge Convergence Test: 0.001000
Maximum Design Passes: 3

```

----- Network Quick View -----

Label	Length	Size	Discharge	Hydraulic Grade	
				Upstream	Downstream
P1, 36"	175.00	36 inch	37.60	6,763.00	6,762.40
P2, 42"	1,350.00	42 inch	75.20	6,761.71	6,735.66
P5, 54"	250.00	54 inch	119.00	6,735.21	6,731.55
P6, 18"	200.00	18 inch	2.20	6,732.56	6,731.55
P3, 24"	50.00	24 inch	20.80	6,736.08	6,735.66
P4, 24"	50.00	24 inch	23.00	6,736.18	6,735.66
P7, 60"	200.00	60 inch	121.20	6,731.15	6,728.40

Label	Discharge	Elevations		
		Ground	Upstream HGL	Downstream HGL
I6, 20' D	37.60	6,769.00	6,763.00	6,763.00
I7, 20' D	75.20	6,770.00	6,762.40	6,761.71
MH-1	119.00	6,741.50	6,735.66	6,735.21
MH-2	121.20	6,736.00	6,731.55	6,731.15
Outlet	121.20	6,734.00	6,728.40	6,728.40
I-OS-C3,	2.20	6,744.00	6,732.56	6,732.56
I9, 20' D	20.80	6,742.50	6,736.08	6,736.08
I8, 20' D	23.00	6,742.50	6,736.18	6,736.18

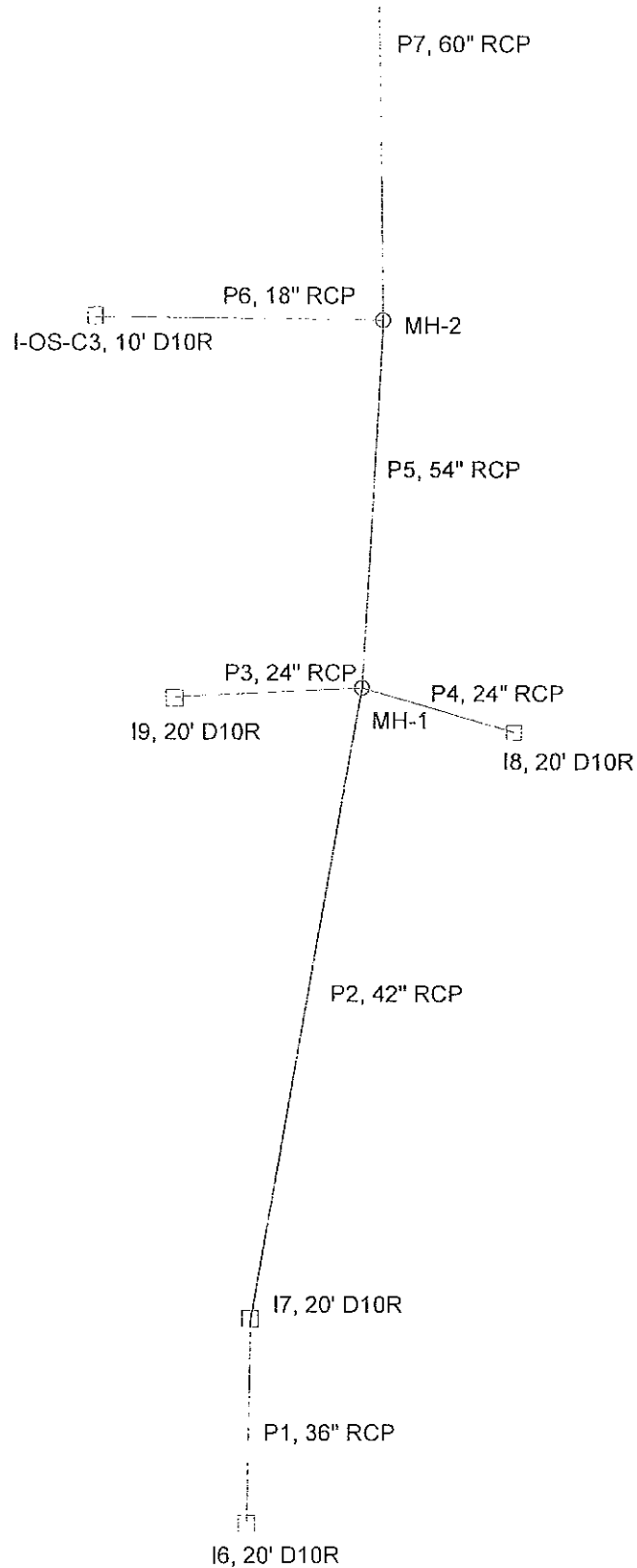
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PIPE HYDRAULIC REPORT

Pipe	-Node- Up Dn	-Invert- Up Dn (ft)	Length (ft)	S (ft/ft)	-Section- Shape Size	Q (cfs)	Cap (cfs)	-Depth- Up Dn (ft)	-HGL- Up Dn (ft)	-EGL- Up Dn (ft)	-Ground- Up Dn (ft)
P6, 18" RCP	I-OS-C3, 10' D10R MH-2	6,732.00	200.00	0.020000	Circular 18 inch	2.20	14.85	0.56	6,732.56	6,732.77	6,744.00
		6,728.00						3.55	6,731.55	6,731.58	6,736.00
P4, 24" RCP	I8, 20' D10R MH-1	6,733.00	50.00	0.020000	Circular 24 inch	23.00	31.99	3.18	6,736.18	6,737.01	6,742.50
		6,732.00						3.66	6,735.66	6,736.49	6,741.50
P3, 24" RCP	I9, 20' D10R MH-1	6,733.00	50.00	0.020000	Circular 24 inch	20.80	31.99	3.08	6,736.08	6,736.76	6,742.50
		6,732.00						3.66	6,735.66	6,736.34	6,741.50
P1, 36" RCP	I6, 20' D10R I7, 20' D10R	6,761.00	175.00	0.011429	Circular 36 inch	37.60	71.30	2.00	6,763.00	6,763.88	6,769.00
		6,759.00						3.40	6,762.40	6,762.84	6,770.00
P2, 42" RCP	I7, 20' D10R MH-1	6,759.00	1,350.00	0.020000	Circular 42 inch	75.20	142.28	2.71	6,761.71	6,763.09	6,770.00
		6,732.00						3.66	6,735.66	6,736.61	6,741.50
P5, 54" RCP	MH-1 MH-2	6,732.00	250.00	0.016000	Circular 54 inch	119.00	248.73	3.21	6,735.21	6,736.70	6,741.50
		6,728.00						3.55	6,731.55	6,732.77	6,736.00
P7, 60" RCP	MH-2 Outlet	6,728.00	200.00	0.010000	Circular 60 inch	121.20	260.43	3.15	6,731.15	6,732.49	6,736.00
		6,726.00						2.40	6,728.40	6,731.03	6,734.00

100 Year Flow

△ Outlet



----- Beginning Calculation Cycle -----

Discharge: 68.60 cfs at node I6, 20' D10R
 Discharge: 137.20 cfs at node I7, 20' D10R
 Discharge: 56.20 cfs at node I9, 20' D10R
 Discharge: 59.80 cfs at node I8, 20' D10R
 Discharge: 253.20 cfs at node MH-1
 Discharge: 3.50 cfs at node I-OS-C3, 10' D10R
 Discharge: 256.70 cfs at node MH-2
 Discharge: 256.70 cfs at node Outlet
 Beginning iteration 1
 Discharge: 68.60 cfs at node I6, 20' D10R
 Discharge: 137.20 cfs at node I7, 20' D10R
 Discharge: 56.20 cfs at node I9, 20' D10R
 Discharge: 59.80 cfs at node I8, 20' D10R
 Discharge: 253.20 cfs at node MH-1
 Discharge: 3.50 cfs at node I-OS-C3, 10' D10R
 Discharge: 256.70 cfs at node MH-2
 Discharge: 256.70 cfs at node Outlet
 Discharge Convergence Achieved in 1 iterations: relative error: 0.0
 Warning: No Duration data exists in IDF Table
 Information: P5, 54" RCP Surcharged condition
 Information: P6, 18" RCP Surcharged condition
 Information: P2, 42" RCP Surcharged condition
 Information: P3, 24" RCP Surcharged condition
 Information: P4, 24" RCP Surcharged condition
 Information: P1, 36" RCP Surcharged condition
 ----- Calculations Complete -----

** Analysis Options **

Friction method: Manning's Formula
 HGL Convergence Test: 0.001000
 Maximum Network Traversals: 5
 Number of Pipe Profile Steps: 5
 Discharge Convergence Test: 0.001000
 Maximum Design Passes: 3

----- Network Quick View -----

Label	Length	Size	Discharge	Hydraulic Grade	
				Upstream	Downstream
P1, 36"	175.00	36 inch	68.60	6,767.23	6,765.38
P2, 42"	1,350.00	42 inch	137.20	6,763.80	6,738.69
P5, 54"	250.00	54 inch	253.20	6,737.51	6,733.36
P6, 18"	200.00	18 inch	3.50	6,733.58	6,733.36
P3, 24"	50.00	24 inch	56.20	6,741.77	6,738.69
P4, 24"	50.00	24 inch	59.80	6,742.18	6,738.69
P7, 60"	200.00	60 inch	256.70	6,732.46	6,730.03

Label	Discharge	Ground	Elevations	
			Upstream HGL	Downstream HGL
I6, 20' D	68.60	6,769.00	6,767.23	6,767.23
I7, 20' D	137.20	6,770.00	6,765.38	6,763.80
MH-1	253.20	6,741.50	6,738.69	6,737.51
MH-2	256.70	6,736.00	6,733.36	6,732.46
Outlet	256.70	6,734.00	6,730.03	6,730.03
I-OS-C3,	3.50	6,744.00	6,733.58	6,733.58
I9, 20' D	56.20	6,742.50	6,741.77	6,741.77
I8, 20' D	59.80	6,742.50	6,742.18	6,742.18

Elapsed: 0 minute(s) 1 second(s)

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Ou le ----- Beginning Calculation Cycle -----
I- Discharge: 14.10 cfs at node I-15, 20' D10R
I- Discharge: 33.80 cfs at node I-16 & 17, 20' & 10' D10R
MH 2 Discharge: 15.70 cfs at node I-18, 20' D10R
I- 1. Discharge: 66.10 cfs at node I-19 & 20, 20' D10R's
I- Discharge: 99.90 cfs at node MH-2
I- 9 Discharge: 122.70 cfs at node I-21, 20' D10R
I- 3 Discharge: 146.70 cfs at node I-13 & 14, 2- 15' D10R's
I- Discharge: 19.00 cfs at node I-10, 20' D10R
El Discharge: 44.00 cfs at node I-11, 20' D10R
Discharge: 65.30 cfs at node I-12, 20' D10R
Discharge: 212.00 cfs at node MH-1
Discharge: 212.00 cfs at node Outlet
Beginning iteration 1
Discharge: 14.10 cfs at node I-15, 20' D10R
Discharge: 33.80 cfs at node I-16 & 17, 20' & 10' D10R
Discharge: 15.70 cfs at node I-18, 20' D10R
Discharge: 66.10 cfs at node I-19 & 20, 20' D10R's
Discharge: 99.90 cfs at node MH-2
Discharge: 122.70 cfs at node I-21, 20' D10R
Discharge: 146.70 cfs at node I-13 & 14, 2- 15' D10R's
Discharge: 19.00 cfs at node I-10, 20' D10R
Discharge: 44.00 cfs at node I-11, 20' D10R
Discharge: 65.30 cfs at node I-12, 20' D10R
Discharge: 212.00 cfs at node MH-1
Discharge: 212.00 cfs at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error: 0.0
Warning: No Duration data exists in IDF Table
----- Calculations Complete -----

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**** Analysis Options ****

Friction method: Manning's Formula
HGL Convergence Test: 0.001000
Maximum Network Traversals: 5
Number of Pipe Profile Steps: 5
Discharge Convergence Test: 0.001000
Maximum Design Passes: 3

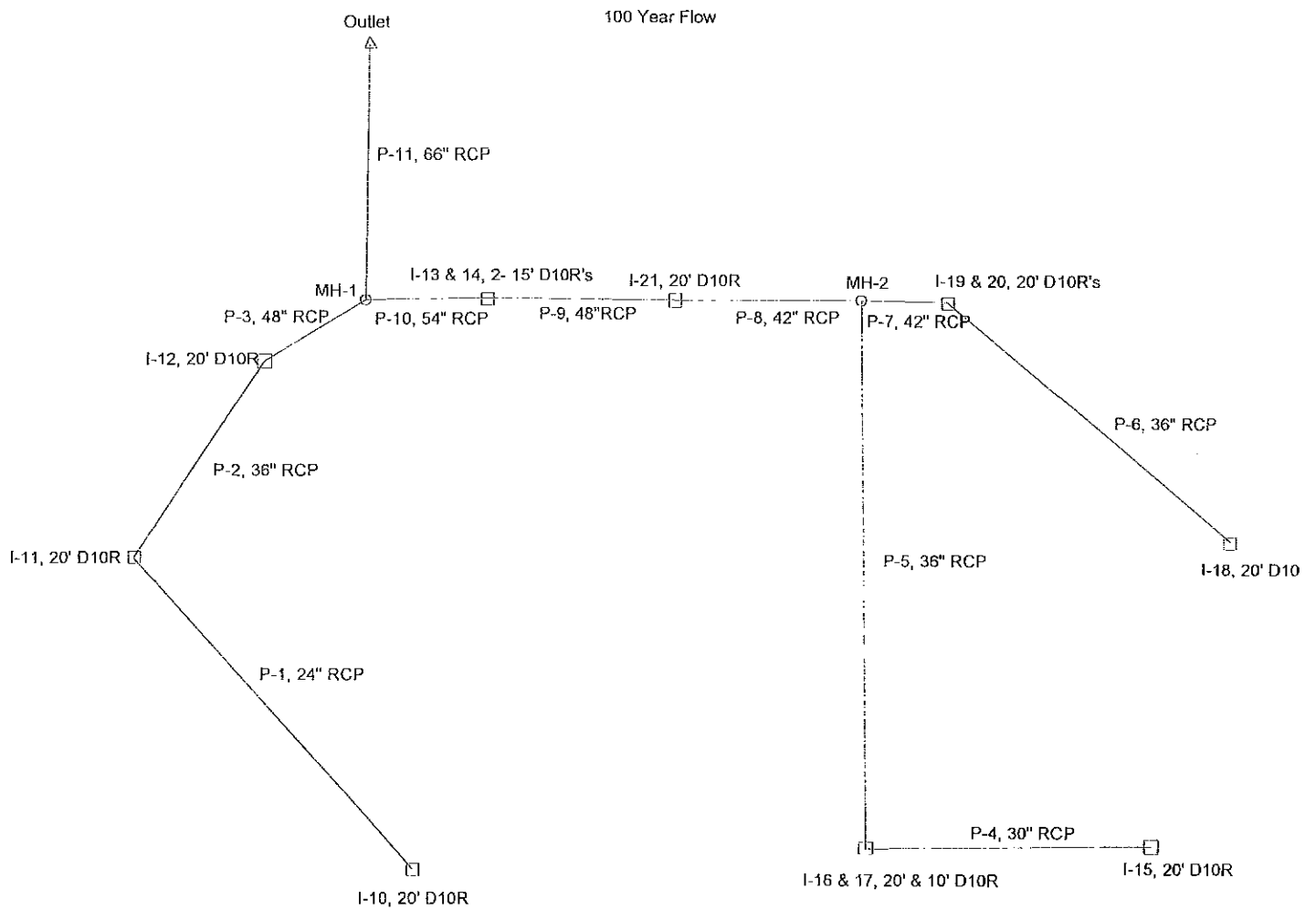
----- Network Quick View -----

Label	Length	Size	Discharge	Hydraulic Grade	
				Upstream	Downstream
P-11, 66	600.00	66 inch	212.00	6,747.08	6,739.02
P-4, 30"	600.00	30 inch	14.10	6,828.26	6,814.13
P-5, 36"	1,425.00	36 inch	33.80	6,813.89	6,786.84
P-8, 42"	850.00	42 inch	99.90	6,786.07	6,773.70
P-6, 36"	850.00	36 inch	15.70	6,819.26	6,787.57
P-7, 42"	125.00	42 inch	66.10	6,787.35	6,786.84
P-1, 24"	1,500.00	24 inch	19.00	6,798.57	6,759.46
P-9, 48"	800.00	48 inch	122.70	6,773.33	6,749.92
P-10, 54	150.00	54 inch	146.70	6,749.56	6,747.86
P-2, 36"	525.00	36 inch	44.00	6,759.16	6,751.65
P-3, 48"	250.00	48 inch	65.30	6,751.44	6,747.86

Label	Discharge	Elevations		
		Ground	Upstream HGL	Downstream HGL
I-10, 20'	19.00	6,802.00	6,798.57	6,798.57
I-11, 20'	44.00	6,762.00	6,759.46	6,759.16
MH-1	212.00	6,753.00	6,747.86	6,747.08

PIPE HYDRAULIC REPORT

Pipe	-Node- Up Dn	-Invert- Up Dn (ft)	Length (ft)	S (ft/ft)	-Section- Shape Size	Q (cfs)	Cap (cfs)	-Depth- Up Dn (ft)	-HGL- Up Dn (ft)	-EGL- Up Dn (ft)
P-1, 24" RCP	I-10, 20' D10R	6,797.00	1,500.00	0.026000	Circular	19.00	36.48	1.57	6,798.57	6,799.37
	I-11, 20' D10R	6,758.00			24 inch			1.46	6,759.46	6,760.39
P-2, 36" RCP	I-11, 20' D10R	6,757.00	525.00	0.013333	Circular	44.00	77.01	2.16	6,759.16	6,760.17
	I-12, 20' D10R	6,750.00			36 inch			1.65	6,751.65	6,753.55
P-3, 48" RCP	I-12, 20' D10R	6,749.00	250.00	0.018000	Circular	65.30	192.71	2.44	6,751.44	6,752.47
	MH-1	6,744.50			48 inch			3.36	6,747.86	6,748.38
P-6, 36" RCP	I-18, 20' D10R	6,818.00	850.00	0.039412	Circular	15.70	132.41	1.26	6,819.26	6,819.74
	I-19 & 20, 20' D10R	6,784.50			36 inch			3.07	6,787.57	6,787.65
P-7, 42" RCP	I-19 & 20, 20' D10R	6,784.00	125.00	0.008000	Circular	66.10	89.98	3.35	6,787.35	6,788.10
	MH-2	6,783.00			42 inch			3.84	6,786.84	6,787.58
P-4, 30" RCP	I-15, 20' D10R	6,827.00	600.00	0.024167	Circular	14.10	63.76	1.26	6,828.26	6,828.76
	I-16 & 17, 20' & 10'	6,812.50			30 inch			1.63	6,814.13	6,814.40
P-5, 36" RCP	I-16 & 17, 20' & 10'	6,812.00	1,425.00	0.020000	Circular	33.80	94.32	1.89	6,813.89	6,814.70
	MH-2	6,783.50			36 inch			3.34	6,786.84	6,787.20
P-8, 42" RCP	MH-2	6,783.00	850.00	0.014706	Circular	99.90	122.00	3.07	6,786.07	6,788.01
	I-21, 20' D10R	6,770.50			42 inch			3.20	6,773.70	6,775.52
P-9, 48" RCP	I-21, 20' D10R	6,770.00	800.00	0.028750	Circular	122.70	243.55	3.33	6,773.33	6,775.20
	I-13 & 14, 2- 15' D1	6,747.00			48 inch			2.92	6,749.92	6,752.34
P-10, 54" RC	I-13 & 14, 2- 15' D1	6,746.00	150.00	0.013333	Circular	146.70	227.06	3.56	6,749.56	6,751.40
	MH-1	6,744.00			54 inch			3.86	6,747.86	6,749.45
P-11, 66" RC	MH-1	6,743.00	600.00	0.011667	Circular	212.00	362.70	4.08	6,747.08	6,749.04
	Outlet	6,736.00			66 inch			3.02	6,739.02	6,742.93



```

----- Beginning Calculation Cycle -----
Discharge: 21.10 cfs at node I-15, 20' D10R
Discharge: 51.90 cfs at node I-16 & 17, 20' & 10' D10R
Discharge: 24.50 cfs at node I-18, 20' D10R
Discharge: 76.40 cfs at node I-19 & 20, 20' D10R's
Discharge: 128.30 cfs at node MH-2
Discharge: 161.40 cfs at node I-21, 20' D10R
Discharge: 244.00 cfs at node I-13 & 14, 2- 15' D10R's
Discharge: 26.50 cfs at node I-10, 20' D10R
Discharge: 67.40 cfs at node I-11, 20' D10R
Discharge: 106.00 cfs at node I-12, 20' D10R
Discharge: 350.00 cfs at node MH-1
Discharge: 350.00 cfs at node Outlet
Beginning iteration 1
Discharge: 21.10 cfs at node I-15, 20' D10R
Discharge: 51.90 cfs at node I-16 & 17, 20' & 10' D10R
Discharge: 24.50 cfs at node I-18, 20' D10R
Discharge: 76.40 cfs at node I-19 & 20, 20' D10R's
Discharge: 128.30 cfs at node MH-2
Discharge: 161.40 cfs at node I-21, 20' D10R
Discharge: 244.00 cfs at node I-13 & 14, 2- 15' D10R's
Discharge: 26.50 cfs at node I-10, 20' D10R
Discharge: 67.40 cfs at node I-11, 20' D10R
Discharge: 106.00 cfs at node I-12, 20' D10R
Discharge: 350.00 cfs at node MH-1
Discharge: 350.00 cfs at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error: 0.0
Warning: No Duration data exists in IDF Table
Information: P-10, 54" RCP Surcharged condition
Information: P-8, 42" RCP Surcharged condition
Information: P-7, 42" RCP Surcharged condition
----- Calculations Complete -----

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**** Analysis Options ****

```

Friction method: Manning's Formula
HGL Convergence Test: 0.001000
Maximum Network Traversals: 5
Number of Pipe Profile Steps: 5
Discharge Convergence Test: 0.001000
Maximum Design Passes: 3

```

----- Network Quick View -----

Label	Length	Size	Discharge	Hydraulic Grade	
				Upstream	Downstream
P-11, 66	600.00	66 inch	350.00	6,748.02	6,740.34
P-4, 30"	600.00	30 inch	21.10	6,828.56	6,814.70
P-5, 36"	1,425.00	36 inch	51.90	6,814.34	6,789.16
P-8, 42"	850.00	42 inch	128.30	6,788.05	6,774.23
P-6, 36"	850.00	36 inch	24.50	6,819.60	6,790.18
P-7, 42"	125.00	42 inch	76.40	6,789.88	6,789.16
P-1, 24"	1,500.00	24 inch	26.50	6,798.80	6,760.11
P-9, 48"	800.00	48 inch	161.40	6,773.68	6,752.53
P-10, 54	150.00	54 inch	244.00	6,751.80	6,749.49
P-2, 36"	525.00	36 inch	67.40	6,759.62	6,752.43
P-3, 48"	250.00	48 inch	106.00	6,752.12	6,749.49

Label	Discharge	Elevations		
		Ground	Upstream HGL	Downstream HGL

I-10, 20'	26.50	6,802.00	6,798.80	6,798.80
I-11, 20'	67.40	6,762.00	6,760.11	6,759.62
MH-1	350.00	6,753.00	6,749.49	6,748.02
Outlet	350.00	6,744.00	6,740.34	6,740.34
I-15, 20'	21.10	6,832.00	6,828.56	6,828.56
I-16 & 17	51.90	6,818.00	6,814.70	6,814.34
MH-2	128.30	6,790.00	6,789.16	6,788.05
I-21, 20'	161.40	6,776.00	6,774.23	6,773.68
I-18, 20'	24.50	6,823.00	6,819.60	6,819.60
I-19 & 20	76.40	6,789.00	6,790.18	6,789.88
I-13 & 14	244.00	6,752.00	6,752.53	6,751.80
I-12, 20'	106.00	6,756.00	6,752.43	6,752.12
Elapsed: 0 minute(s) 5 second(s)				

PIPE HYDRAULIC REPORT

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Pipe	-Node- Up Dn	-Invert- Up Dn (ft)	Length (ft)	S (ft/ft)	-Section- Shape Size	Q (cfs)	Cap (cfs)	-Depth- Up Dn (ft)	-HGL- Up Dn (ft)	-EGL- Up Dn (ft)
P-1, 24" RCP	I-10, 20' D10R	6,797.00	1,500.00	0.026000	Circular	26.50	36.48	1.80	6,798.80	6,800.03
	I-11, 20' D10R	6,758.00			24 inch			2.11	6,760.11	6,761.22
P-2, 36" RCP	I-11, 20' D10R	6,757.00	525.00	0.013333	Circular	67.40	77.01	2.62	6,759.62	6,761.27
	I-12, 20' D10R	6,750.00			36 inch			2.43	6,752.43	6,754.31
P-3, 48" RCP	I-12, 20' D10R	6,749.00	250.00	0.018000	Circular	106.00	192.71	3.12	6,752.12	6,753.70
	MH-1	6,744.50			48 inch			4.99	6,749.49	6,750.60
P-6, 36" RCP	I-18, 20' D10R	6,818.00	850.00	0.039412	Circular	24.50	132.41	1.60	6,819.60	6,820.23
	I-19 & 20, 20' D10R'	6,784.50			36 inch			5.68	6,790.18	6,790.36
P-7, 42" RCP	I-19 & 20, 20' D10R'	6,784.00	125.00	0.008000	Circular	76.40	89.98	5.88	6,789.88	6,790.86
	MH-2	6,783.00			42 inch			6.16	6,789.16	6,790.14
P-4, 30" RCP	I-15, 20' D10R	6,827.00	600.00	0.024167	Circular	21.10	63.76	1.56	6,828.56	6,829.23
	I-16 & 17, 20' & 10'	6,812.50			30 inch			2.20	6,814.70	6,815.03
P-5, 36" RCP	I-16 & 17, 20' & 10'	6,812.00	1,425.00	0.020000	Circular	51.90	94.32	2.34	6,814.34	6,815.54
	MH-2	6,783.50			36 inch			5.66	6,789.16	6,790.00
P-8, 42" RCP	MH-2	6,783.00	850.00	0.014706	Circular	128.30	122.00	5.05	6,788.05	6,790.82
	I-21, 20' D10R	6,770.50			42 inch			3.73	6,774.23	6,776.99
P-9, 48" RCP	I-21, 20' D10R	6,770.00	800.00	0.028750	Circular	161.40	243.55	3.68	6,773.68	6,776.45
	I-13 & 14, 2- 15' D1	6,747.00			48 inch			5.53	6,752.53	6,755.10
P-10, 54" RC	I-13 & 14, 2- 15' D1	6,746.00	150.00	0.013333	Circular	244.00	227.06	5.80	6,751.80	6,755.46
	MH-1	6,744.00			54 inch			5.49	6,749.49	6,753.15
P-11, 66" RC	MH-1	6,743.00	600.00	0.011667	Circular	350.00	362.70	5.02	6,748.02	6,751.70
	Outlet	6,736.00			66 inch			4.34	6,740.34	6,745.04

SECTION "B-B"
 Rip Rap Channel From DP-10 To G10 & G17
 Worksheet for Trapezoidal Channel
5 YR. FLOW

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98079a.fm2
Worksheet	G10 & G17 Channel
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.027	
Channel Slope	0.010000	ft/ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	10.00	ft
Discharge	82.00	cfs

Results		
Depth	1.17	ft
Flow Area	15.86	ft ²
Wetted Perimeter	17.42	ft
Top Width	17.04	ft
Critical Depth	1.13	ft
Critical Slope	0.011306	ft/ft
Velocity	5.17	ft/s
Velocity Head	0.42	ft
Specific Energy	1.59	ft
Froude Number	0.94	
Flow is subcritical.		

SECTION "B-B"
 Rip Rap Channel From DP-10 To G10 & G17
 Worksheet for Trapezoidal Channel
 100 YR. FLOW

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98079a.fm2
Worksheet	G10 & G17 Channel
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

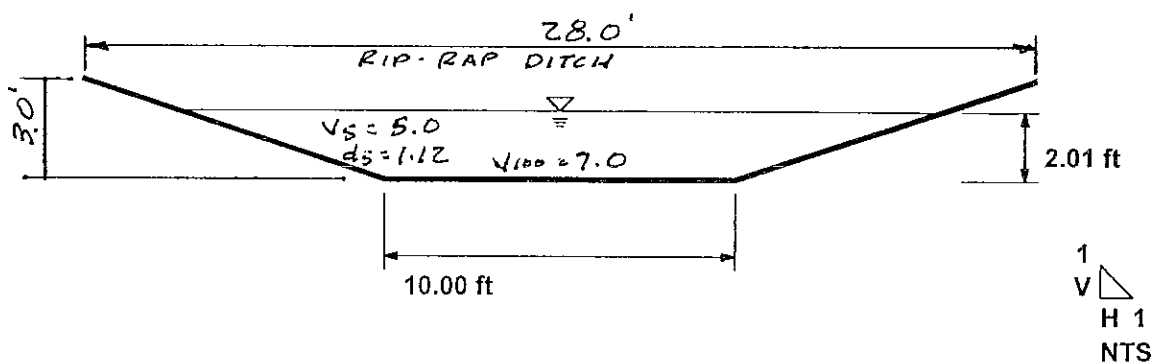
Input Data		
Mannings Coefficient	0.027	
Channel Slope	0.010000	ft/ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	10.00	ft
Discharge	224.00	cfs

Results		
Depth	2.01	ft
Flow Area	32.23	ft ²
Wetted Perimeter	22.72	ft
Top Width	22.06	ft
Critical Depth	2.03	ft
Critical Slope	0.009714	ft/ft
Velocity	6.95	ft/s
Velocity Head	0.75	ft
Specific Energy	2.76	ft
Froude Number	1.01	
Flow is supercritical.		

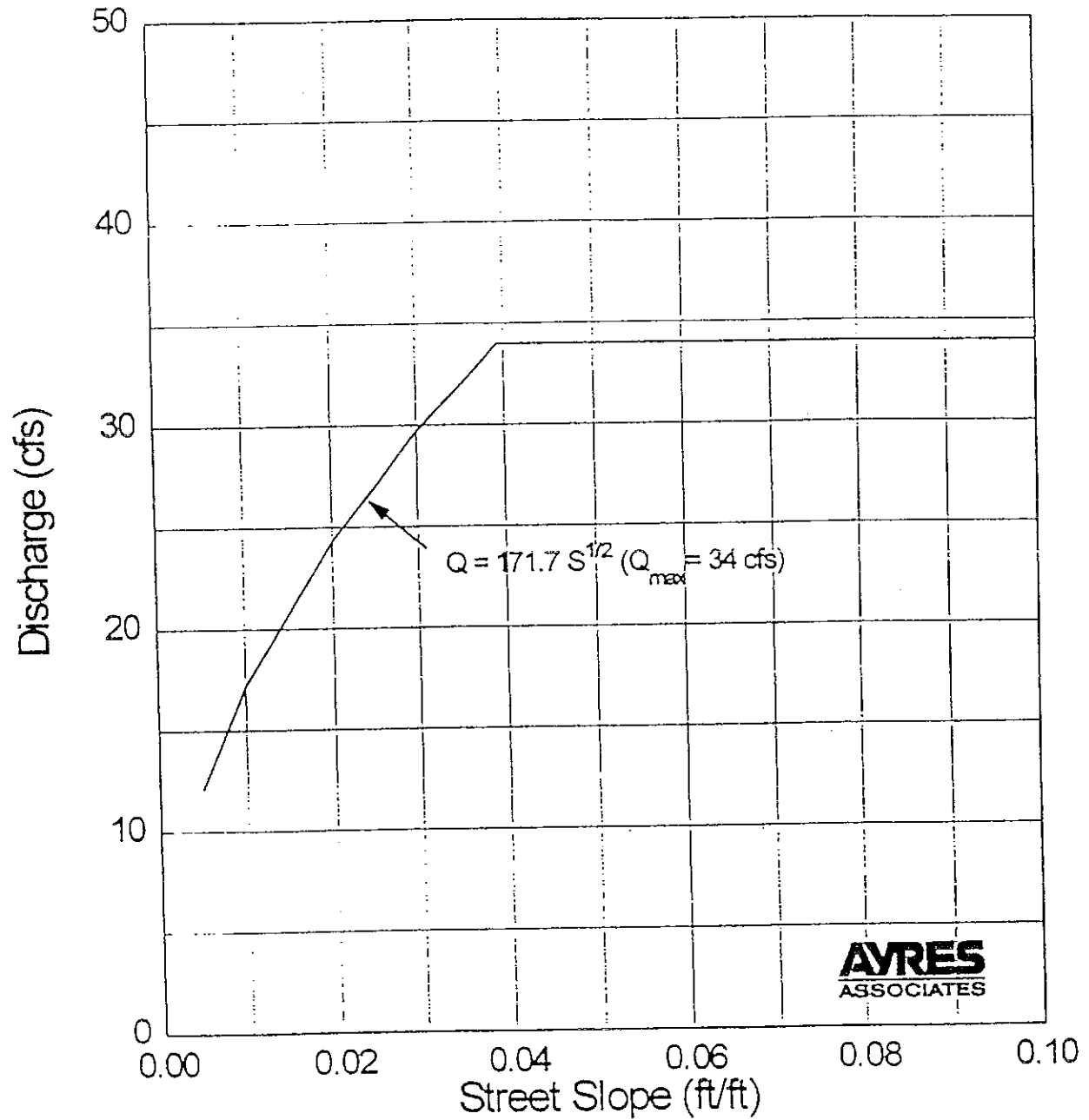
Section "B-B"
Cross Section for Trapezoidal Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98079a.fm2
Worksheet	G10 & G17 Channel
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.027
Channel Slope	0.010000 ft/ft
Depth	2.01 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	10.00 ft
Discharge	224.00 cfs



COLLECTOR STREETS (Major and Minor)



Interim Release October 12, 1994
City of Colorado Springs

Use this graph to determine the allowable street capacity per side, initial storm, for the typical street section using a 2% crown. No flow may cross the crown.