
**MASTER DEVELOPMENT
DRAINAGE PLAN
FOR
STETSON RIDGE EAST**

A.K.A. STETSON HILLS EAST

February, 2000

*Leigh
& Whitehead
Associates, Inc.*

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

LWA Project No. 98093.64

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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February, 2000

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

RE: Stetson Ridge East


Dear Representative:

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

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


Seven (7) complete copies of the master development drainage 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

2-24-00
Date

Reviewed by:

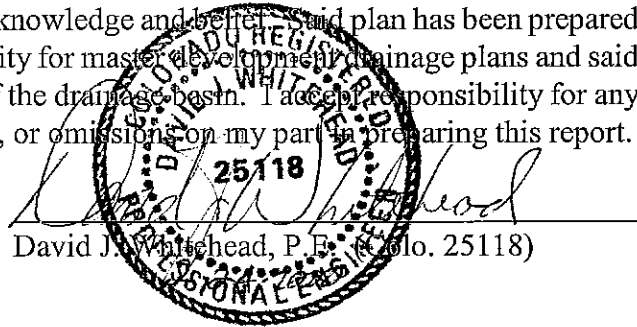

David J. Whitehead, P.E.

cc: L.J. Case

SIGNATURES AND STATEMENTS

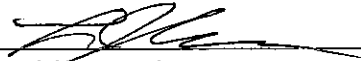
Engineer's Statement:

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 plan 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

3/23/00
Date

Conditions: _____

FLOODPLAIN STATEMENT

To the best of my knowledge and belief, Stetson Ridge East is not located in a F.E.M.A. designated 100-year floodplain, as shown on F.I.R.M. Panel No. 08041C0537 F, dated March 17, 1997.



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

MASTER DEVELOPMENT DRAINAGE PLAN

Introduction:

Stetson Ridge East is located in the northeast one-quarter of Section 20, Township 13 South, Range 65 West of the 6th P.M. The property is located approximately 1/4 mile south of Stetson Hills Boulevard (extended) and 1/4 mile west of Marksheffel Road. Stetson Hills Filing Nos. 28 and 29 are located adjacent to this site on the west and Stetson Hills Filing No. 9 is located adjacent to the southerly boundary line.

Stetson Ridge East contains approximately 40.3 acres and is County zoned RR-3. This is in the process of being annexed into the City of Colorado Springs which requires a Master Development Drainage Plan per City of Colorado Springs drainage criteria. The proposed use for this property is the development of single family residential with a density of 3.5 to 7.9 dwelling units per acres and to dedicate a park area on the southerly half of the site. The property is located within the Sand Creek Drainage Basin. Preliminary indications show that the property will be developed at one time. As currently known, this site will not be phased.

Soils:

The soils across the site are Truckton Sandy Loam, a deep, well-drained soil formed in alluvium and residuum, derived from arkosic sedimentary rock. The permeability of the Truckton soil is moderately rapid which gives it a Hydrologic Group B rating. The Group B rating will be used for current and developed conditions.

Adjacent to the site on the west is a proposed drainage channel that was part of the Master Development Drainage Plan for Stetson Hills Subdivision, Phase I, approved by the City of Colorado Springs on June 19, 1997. This proposed channel is to be constructed to intercept offsite flows and direct them northerly to an existing drainage channel flowing in a southwesterly direction to Sand Creek.

Current Conditions:

A majority of this site drains in a north-northwesterly and westerly direction. A small portion of the site drains northeasterly and a small portion along the east boundary line sheetflows in an easterly direction. Located to the southeasterly portion of the site, flow is directed southeasterly to an existing drainage swale adjacent to the Stetson Hills Filing No. 9 development. The Existing Conditions Plan shows that the site is divided into six major basins, six sub-basins, and three design points. The location of these basins and design points along with peak 5-year and 100-year flows are shown on the attached Existing Conditions Master Development Drainage Plan.

Basin A directs flow in a northwesterly direction and has a peak flow of 6.4 cfs for the 5-year event and 15.4 cfs for the 100-year event. The area contributing to this peak flow is 24.00 acres. This location for Basin A is shown on the attached Existing Conditions Drainage Plan as DP-1. Basin B-1 is a small area located in the northeast corner of the site and directs flow northeasterly as sheetflow. This area contains 1.65 acres and generates a peak flow of 0.7 cfs for the 5-year event and 1.8 cfs for the 100-year event. Basin C-1 is located along the easterly ridge of this property and runoff is directed easterly as sheetflow. Basin C-1 contains 1.21 acres and generates a peak flow of 0.5 cfs for the 5-year event and 1.2 cfs for the 100-year event. Sub-basins D-1 and OS-D2 are located on the southeasterly portion of the site. These two sub-basins contain a combined area of 2.76 acres and are delineated on the attached Existing Conditions Drainage Plan as DP-2. The peak flow generated at this point is 1.3 cfs for the 5-year event and 3.3 cfs for the 100-year event. Sub-basins E-1 and OS-E2 are located along the southerly portion of the site. Sub-basin OS-E2 currently directs runoff onto this property at the southwest corner. The peak flow at this location is 4.7 cfs for the 5-year event and 10.4 cfs for the 100-year event. Plans indicate that the Master Development Drainage Plan prepared by Merrick & Company directs these flows to a proposed channel that runs in a northerly direction adjacent to Stetson Ridge East. Currently, flows enter Stetson Ridge East and will be conveyed through the site and exit at a low point along the westerly boundary line. The location is shown on the attached drainage plan and is designated as DP-3. The total area at this location from Sub-basin E-1 and

OS-E2 are 8.63 acres which generates a peak flow of 5.3 cfs for the 5-year event and 11.8 cfs for the 100-year event. Basin F-1 contains 8.51 acres and generates a peak flow of 2.7 cfs for the 5-year event and 6.4 cfs for the 100-year event. Flows exiting Basin F-1 are directed westerly and northerly to an existing drainage channel located to the northwest of this property.

Developed Conditions:

Planned development for Stetson Ridge East is to construct single family residential on the northerly portion of the site and park land is planned for the southerly portion. The park area is approximately 18.5 acres. Surface runoff will be directed to the proposed interior road and storm drain system and to proposed and existing drainage swales and/or ditches located to the west and northwest of this property. This site was divided into six major basins delineated on the attached Proposed Conditions Master Development Drainage Plan as A-1 through F-1.

Sub-basin A-1, located within the proposed residential area, consists of 6.46 acres and generates a peak flow of 14.3 cfs for the 5-year event and 31.1 cfs for the 100-year event. Sub-basin OS-A2 is also located within a proposed residential area, consists of 2.82 acres, and generates a peak flow of 6.7 cfs for the 5-year event and 14.8 cfs for the 100-year event. Runoff from these basins will be directed to the proposed street system and conveyed to a low point in the street system. This low point is delineated on the attached Proposed Conditions Drainage Plan as DP-1, which is the combined area of sub-basins A1 and A2, containing 9.28 acres, and generating a peak flow of 20.5 cfs for the 5-year event and 44.7 cfs for the 100-year event. A 20' D-10R inlet will be required on the southeast side of the street and a 5' D-10 R inlet will be required on the northwest side of the street. These inlets will be constructed in a sump condition. Runoff from these inlets will be conveyed underground via 24" and 30" R.C.P.s, and outlet into a proposed drainage swale. The size of this swale is shown on the attached Proposed Conditions Drainage Plan as Sections A-A and B-B. Basin B-1 contains 2.22 acres and generates a peak flow of 4.8 cfs for the 5-year event and 10.6 cfs for the 100-year event. Basins C-1, D-1, and E-3 are located within the proposed park area. Basin C-1 contains 1.21 acres and directs runoff in a southeasterly direction. Peak flow generated from this basin is 1.2 cfs for the 5-year event and 4.4 cfs for the

100-year event.

Sub-basin D-1 contains 2.11 acres. Sub-basin OS-D2 is located within the Stetson Hills Filing No. 9 development. Flows are directed from these two basins to an existing drainage swale running in an easterly and southeasterly direction. The area contained within these two sub-basins is 2.76 acres and generates a peak flow of 2.3 cfs for the 5-year event and 8.0 cfs for the 100-year event. The location for the area and peak flow is shown on the attached Proposed Conditions Drainage Plan as DP-2. Runoff from DP-2 disperses from the aforementioned drainage swale and continues in a southeasterly direction as sheetflow to an existing 6'x8' R.C.B. located at Barnes Road.

Sub-basin E-3 is located within the park area. OS-E4 is part of the Stetson Hills Filing No. 9 development and OS-E5 is part of Stetson Hills Filing No. 28 and the proposed drainage channel. Runoff from these sub-basins is directed to the proposed road system and proposed drainage channel. This proposed channel flows in a northerly direction to the existing drainage channel at the northwest edge of this property.

Sub-basin E-1 and E-2 are located within the proposed residential area. These basins contain 7.20 acres. These sub-basins (combined) are shown on the attached Proposed Conditions Drainage Plan as DP-3 and generate a peak flow of 13.2 cfs for the 5-year event and 28.9 cfs for the 100-year event. These flows are less than the maximum allowable street flows, therefore, inlets are not required. Sub-basins E-1, E-2, E-3, OS-E4 and OS-E5 contain a total area of 27.57 acres and generate a peak flow of 29.0 cfs for the 5-year event and 83.5 cfs for the 100-year event. The location of these five drainage sub-basins is shown on the attached Proposed Conditions Drainage Plan and is delineated as DP-5. Runoff from this area is directed to the previously mentioned proposed and existing drainage channels located adjacent to this site.

DP-6 includes Sub-basins A1, OS-A2, F1 and OS-F2. It contains a total area of 13.74 acres and generates a peak flow of 27.7 cfs for the 5-year event and 60.3 cfs for the 100-year event. The

runoff is directed to the previously mentioned north-south drainage channel.

DP-7 includes Sub-basins A1, OS-A2, E1, E2, E3, OS-E4, OS-E5, F1, F2 and OS-F3, which contains 43.9 acres, and generates a peak flow of 47.7 cfs for the 5-year event and 125.5 cfs for the 100-year event. These flows will confluence at the existing drainage channel that flows in a westerly direction between Stetson Hills Filing No. 28 and Stetson Hills Filing No. 29.

The approved Master Development Drainage Plan for Stetson Hills Subdivision Phase I prepared by Merrick & Co. and approved on March 19, 1997, recommends construction of a rip-rap lined drainage ditch between Stetson Hills Filing No. 28 and Stetson Ridge East that will drain in a northerly direction to the previously mentioned existing drainage channel that flows in a westerly direction. The recommended size of this ditch from T10 to T12 is based on Section D-D from the approved MDDP by Merrick & Company which consists of a 6.0 foot depth and a width of 63 feet, and includes a 15' maintenance road. This ditch was sized on peak 100-year flow of 1072 cfs. The Stetson Ridge East MDDP shows a peak 100-year flow of 125.5 cfs. A recommended alternative to the rip-rap channel based on revised flows is delineated as Sections C-C, D-D and E-E and is shown on the attached Proposed Conditions Drainage Plan. A more detailed analysis will be completed when the final drainage report is prepared. The calculations for the channels and storm drain system along with the allowable street capacities are in the back of this report.

Proposed Improvements:

The planned development for this site is to construct single family residential lots and a park area. This area is compatible for this type of development. The surface runoff will be directed to the proposed street and storm drain system and conveyed to existing and proposed drainage channels. Overlot grading within the single family residential area should be anticipated to direct flow away from all proposed structures through various side lot and rear lot drainage swales and conveyed to the street and storm drain system. Areas with grade or topographic restrictions will direct runoff to the proposed offsite and existing offsite drainage system. This property may not

be phased. If it is phased, most likely, the single family residential area will be developed first. The park area will be dedicated to the City of Colorado Springs Parks Department and timing of development is unknown at this time.

Facilities:

Stetson Ridge East is located in Sub-basins 28 and 38 of the Upper Basin Sand Creek and Sub-basin 37 of the West Tributary Sand Creek. The drainage basin planning study for Sand Creek shows that there are no planned major drainage facilities for this area. Preliminary evaluation of this site indicates that an underground storm system is necessary for this property. The requirements for additional storm drain facilities will be evaluated at the preliminary/final drainage report and plan stage.

Drainage Fees:

Stetson Ridge East is located in the Sand Creek Drainage Basin. Currently, this is a drainage, bridge, pond and pond surcharge fee basin. The fees along with the public facilities will be determined at the preliminary and final drainage report and plan stage.

2000 Drainage, Bridge and Pond Fees Per Acre:

Drainage	\$6,394.00
Bridge	381.00
Pond (Land)	414.00
Pond (Facility)	1,426.00
Pond Surcharge	<u>941.00</u>
Total Fee Per Acre	\$9,556.00

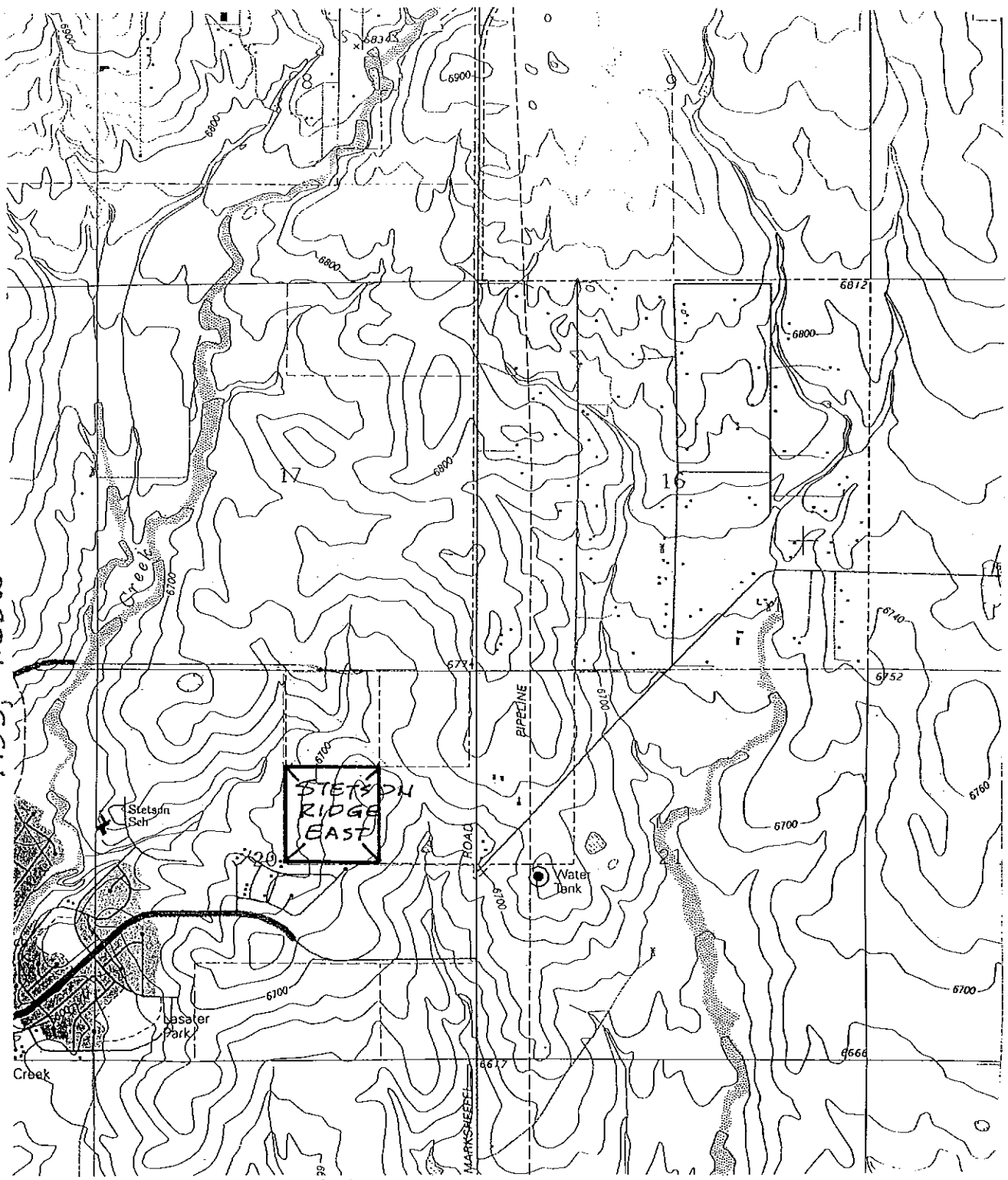
Summary:

This master development drainage plan is part of the submittal requirements of the annexation of this area and is being submitted to the City of Colorado Springs Engineering Unit and Planning Group. Construction of this development will not adversely affect the surrounding developments. With the proper design and construction of drainage facilities, it should safely convey storm runoff to the appropriate outlet points.

MAPS AND CALCULATIONS

NORTH

T13S, R65W

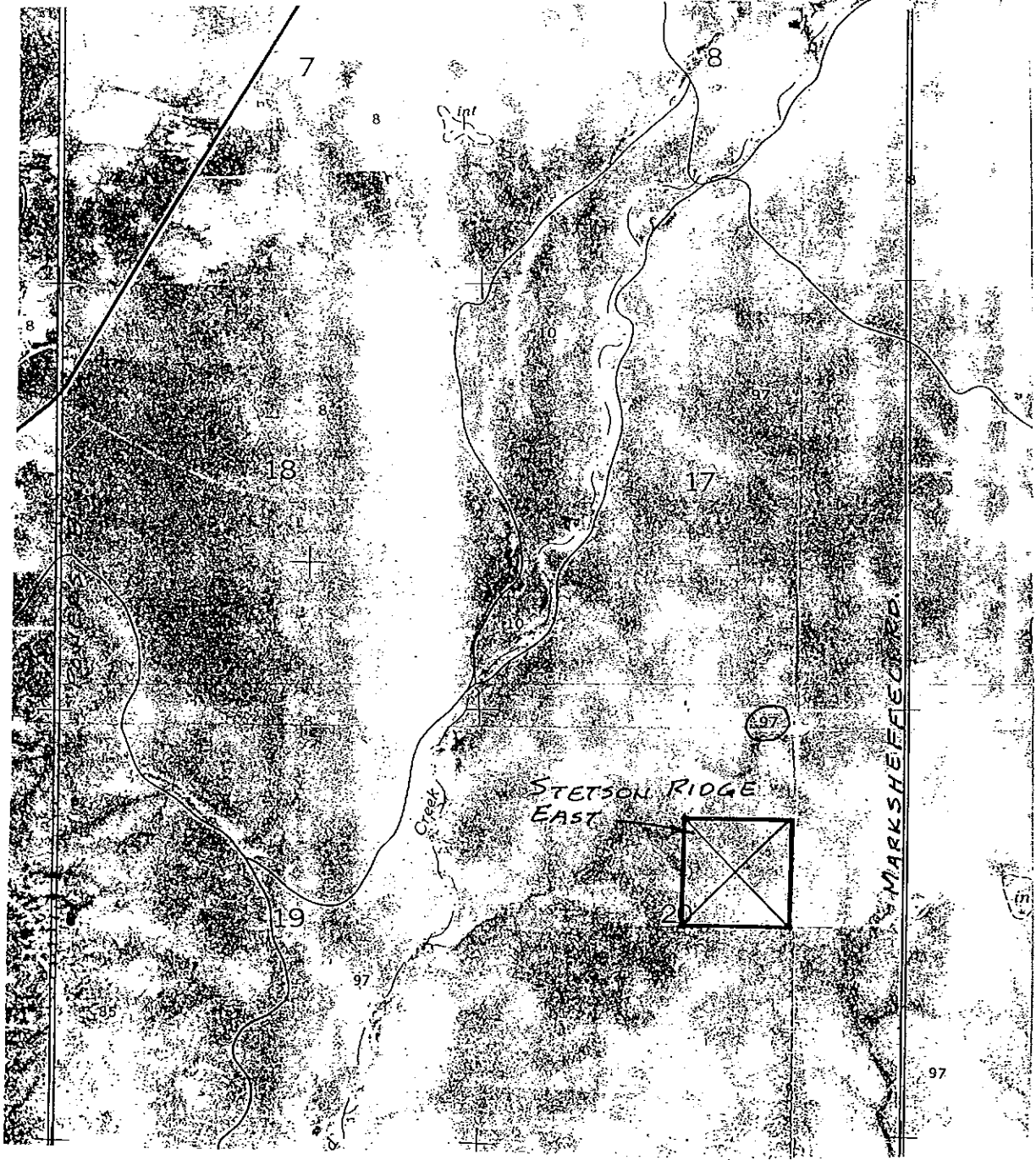


T13S, R65W

REF: FALCON NW "QUAD"
**LOCATION
MAP**

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

NORTH



REF: SCS SHEET 9 OF 37

SOILS MAP

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& Whitehead
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2720 EAST YAMPA STREET, SUITE 1
COLORADO SPRINGS, CO 80909-5061

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

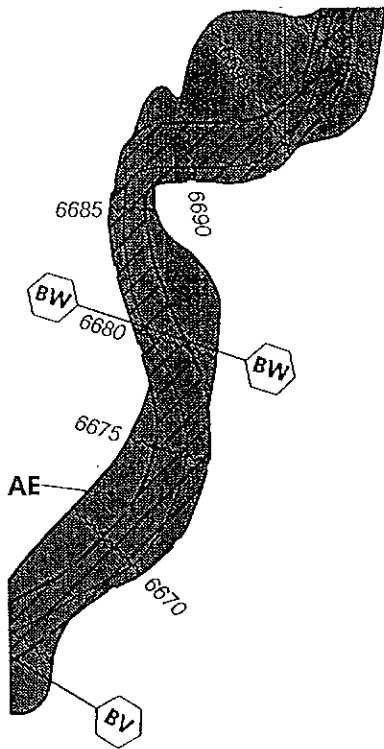
Soil name and map symbol	Hydro-logic group	Flooding			Bedrock		Potential frost action
		Frequency	Duration	Months	Depth	Hardness	
Omaha: 192, 193: Tomah part-----	B	None-----	---	---	In	---	Moderate.
Crowfoot part--	B	None-----	---	---	>60	---	Moderate.
Travessilla: 194: Travessilla part-----	D	None-----	---	---	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.
Istic Torrifluvents: 101-----	B	Occasional-----	Very brief-----	Mar-Aug	>60	---	Moderate.
Valent: 102, 103-----	A	None-----	---	---	>60	---	Low.
Vona: 104, 105-----	B	None-----	---	---	>60	---	Moderate.
Wigton: 106-----	A	None-----	---	---	>60	---	Low.
Wiley: 107, 108-----	B	None-----	---	---	>60	---	Low.
Yoder: 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.

*Leigh
& Whitehead
& Associates, Inc.*

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

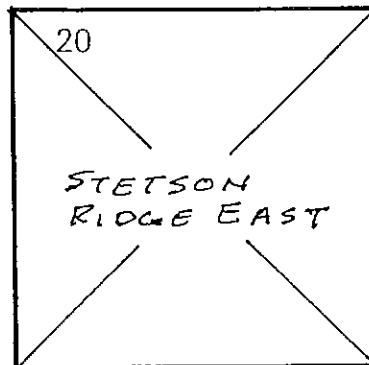
NORTH



CITY OF COLORADO SPRINGS
080060

EL PASO COUNTY
UNINCORPORATED AREAS
080059

ZONE X



CITY OF COLORADO SPRINGS
EL PASO COUNTY
CORPORATE LIMITS

104°

FEMA MAP

DATE: MARCH 17, 1997

PLATE NO. 08041C0537 F

*Leigh
& Whitehead
Associates, Inc.*

CONSULTING CIVIL ENGINEERS & SURVEYORS
2720 EAST YAMPA STREET, SUITE 1
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.



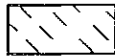
OTHER AREAS

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

UNDEVELOPED COASTAL BARRIERS



Identified
1983

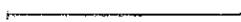


Identified
1990



Otherwise
Protected Areas

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



Flood Boundary



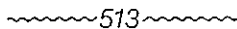
Floodway Boundary



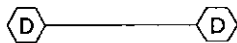
Zone D Boundary



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.



Cross Section Line

(EL 987)

RM7 X

• M2

Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.

Elevation Reference Mark

River Mile

97°07'30", 32°22'30"

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

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

*Leigh
& Whitehead
& Associates, Inc.*

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

ZONING MAP

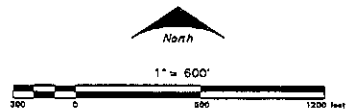
DEPARTMENT OF PLANNING, DEVELOPMENT AND FINANCE



DEVELOPMENT SERVICES AND
COMPREHENSIVE PLANNING DIVISION
Post Office Box 1575 Colorado Springs, CO 80901

ZONING LEGEND

A Agricultural	R1-9 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	for Zone Subject to Conditions of Record
OR Office Residential	— Zoning Boundary
PBC Planned Business Center	[Symbol] Conditional Use
PCR Planned Cultural Resort	[Symbol] Use Variance
PF Public Facilities	[Symbol] Design Flexibility Overlay
PIP1 Planned Industrial Park No. 1	[Symbol] Highrise Overlay
PIP2 Planned Industrial Park No. 2	[Symbol] Hillside Overlay
PK Public Park	[Symbol] Historic Preservation Overlay
PUD Planned Unit Development	[Symbol] Navigation Preservation Overlay
R Single-Family Residential - Estate	[Symbol] Planned Provisional Overlay
R1-6 Single-Family Residential - 6,000 sq. ft.	[Symbol] Not in City

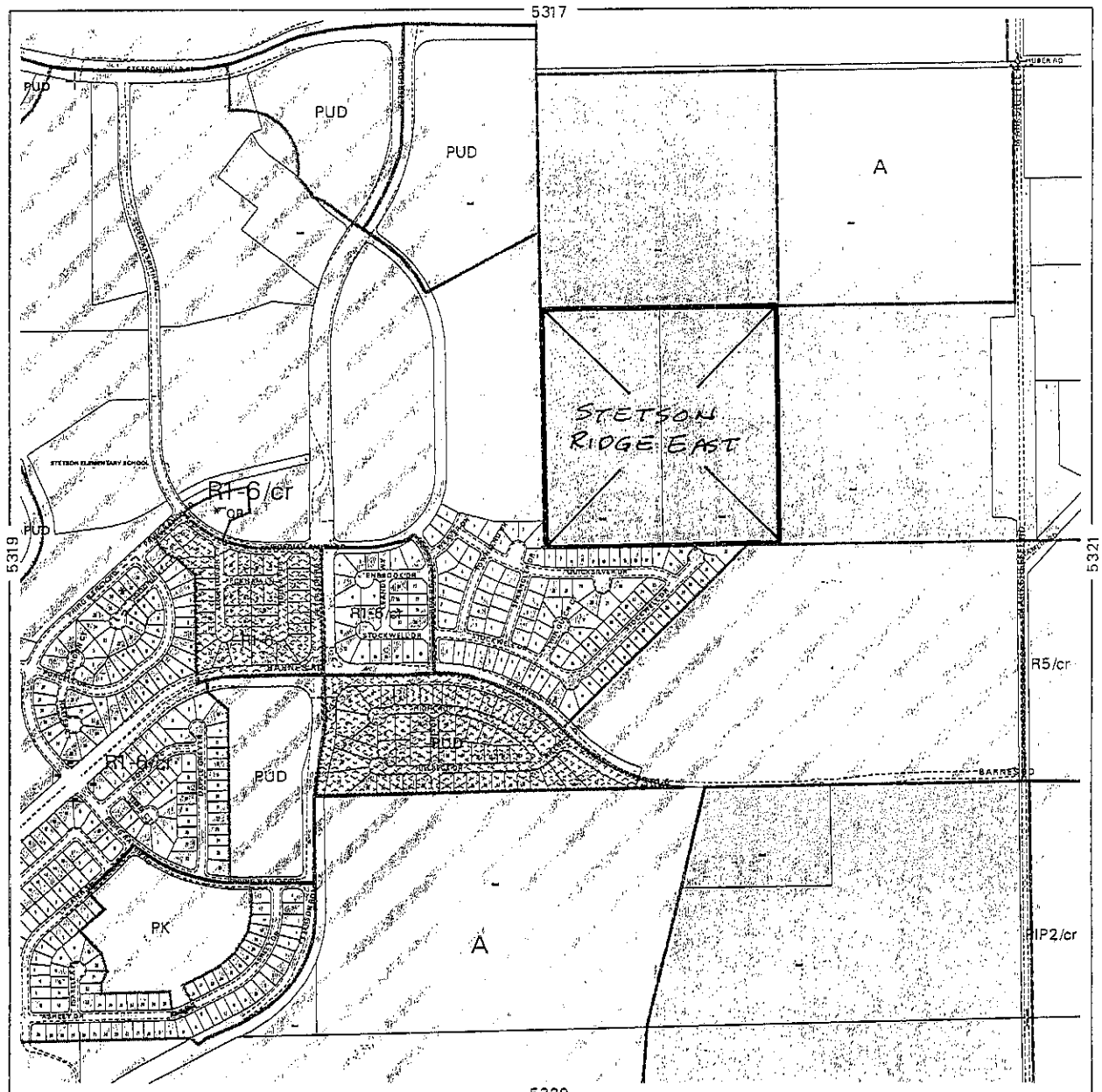
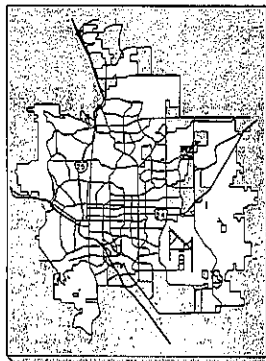


Zoning information is current through December 31, 1995.

The Official Zoning Map of the City is maintained in the Development Services Division and is available for inspection during regular business hours. Please be advised that all copies of the Official Zoning Map are hereby deemed unofficial, should not be relied upon, and may not accurately reflect approved zoning districts due to zone changes after the effective date of the Official Zoning Map.

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CURRENT CONDITIONS

PROPOSED CONDITIONS

RUNOFF COMPUTATIONS
RATIONAL METHOD

98093PR.WK4

STETSON RIDGE EAST M.D.D.P.
EAST OF STETSON HILLS BLVD. & WEST OF 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 # 98093.64

03-Feb-2000

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								
A1	6.46	B	0.60	300.0	19.0	8.81	Varies	12.45	3.68	14.3	31.1	
		97	0.70		6.33		7.05	3.64	10.69			
OS - A2	2.82	B	0.60	300.0	18.0	8.97	Varies	10.44	3.98	6.7	14.8	
		97	0.70		6.00		7.17	1.47	8.64			
DP - 1	9.28	B	0.60	300.0	19.0	8.81	Varies	12.45	3.68	20.5	44.7	A1 & OS - A2
		97	0.70		6.33		7.05	3.64	10.69			
B1	2.22	B	0.60	250.0	5.0	11.76	3.41	13.28	3.57	4.8	10.6	
		97	0.70		2.00		9.41	1.52	10.93			
C1	1.21	B	0.30	300.0	12.0	16.40	4.78	17.01	3.17	1.2	4.4	
		97	0.55		4.00		11.27	0.61	11.88			
D1	2.11	B	0.30	300.0	8.0	18.75	4.69	19.46	2.96	1.9	7.2	
		97	0.55		2.67		12.89	0.71	13.60			
OS-D2	0.65	B	0.25	300.0	9.0	19.16	4.22	19.87	2.92	0.5	1.2	
		97	0.35		3.00		16.90	0.71	17.61			
DP-2	2.76	B	0.29	300.0	8.0	18.98	Varies	20.40	2.88	2.3	8.0	D1 & OS - D2
		97	0.50		2.67		14.06	1.42	15.48			
E1	1.74	B	0.60	250.0	5.0	11.76	2.24	13.55	3.54	3.7	8.2	
		97	0.70		2.00		9.41	1.79	11.20			
E2	5.46	B	0.60	300.0	18.0	8.97	Varies	14.17	3.47	11.4	24.6	
		97	0.70		6.00		7.17	5.20	12.37			
DP-3	7.20	B	0.60	250.0	5.0	11.76	Varies	18.24	3.06	13.2	28.9	E1 & E2
		97	0.70		2.00		9.41	6.48	15.89			
E3	17.08	B	0.30	300.0	6.0	20.61	3.96	25.98	2.52	12.9	48.4	
		97	0.55		2.00		14.17	5.37	19.54			
OS - E4	2.11	B	0.60	300.0	12.0	10.25	4.68	12.14	3.72	4.7	10.4	
		97	0.70		4.00		8.20	1.89	10.09			
OS - E5	1.18	B	0.41	300.0	13.0	13.78	2.53	14.60	3.42	1.7	5.0	
		97	0.61		4.33		9.78	0.82	10.60			

RUNOFF COMPUTATIONS
WEIGHTED RUNOFF COEFFICIENTS "C"

98093PR.WK4

STETSON RIDGE EAST M.D.D.P.
EAST OF STETSON HILLS BLVD. & WEST OF 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 # 98093.64

03-Feb-2000

SHEET 1 OF 1

BASIN	AREA	TOTAL AREA	PERCENT COVER	C5"	WEIGHTED C5"	C100"	WEIGHTED C100"	TYPE OF COVER
DP - 2	2.11	2.76	76.4%	0.30	0.23	0.55	0.42	PARK
	0.65	2.76	23.6%	0.25	0.06	0.35	0.08	GRASS
	2.76				0.29		0.50	
OS - E5	0.44	1.18	37.3%	0.60	0.22	0.70	0.26	RESIDENTIAL
	0.74	1.18	62.7%	0.30	0.19	0.55	0.34	PARK / GRASS SWALE
	1.18				0.41		0.61	
DP - 4	2.55	20.37	12.5%	0.60	0.08	0.70	0.09	RESIDENTIAL
	17.82	20.37	87.5%	0.30	0.26	0.55	0.48	PARK / GRASS SWALE
	20.37				0.34		0.57	
DP - 5	9.75	27.57	35.4%	0.60	0.21	0.70	0.25	RESIDENTIAL
	17.82	27.57	64.6%	0.30	0.19	0.55	0.36	PARK / GRASS SWALE
	27.57				0.41		0.60	
OS - F3	0.53	2.59	20.5%	0.60	0.12	0.70	0.14	RESIDENTIAL
	2.06	2.59	79.5%	0.30	0.24	0.55	0.44	PARK / GRASS SWALE
	2.59				0.36		0.58	
DP - 7	24.02	43.90	54.7%	0.60	0.33	0.70	0.38	RESIDENTIAL
	19.88	43.90	45.3%	0.30	0.14	0.55	0.25	PARK / GRASS SWALE
	43.90				0.46		0.63	

RUNOFF COMPUTATIONS
TRAVEL TIME CALCULATIONS (TR-55)

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

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

98093PR.WK4

TABLE A:
PROPOSED CONDITIONS

LWA # 98093.64

03-Feb-2000

SHT. 1 of 2

BASIN	"K" PIPE SIZE	HIGH ELEV.	LOW ELEV.	LENGTH	HEIGHT	SLOPE	"V"	"TT"	COMMENTS
A1	2.0	6711.0	6690.0	410	21.0	5.12%	4.53	1.51	
	2.0	6690.0	6687.0	270	3.0	1.11%	2.11	2.13	
				680				3.64	
OS - A2	2.0	6701.0	6693.0	100	8.0	8.00%	5.66	0.29	
	2.0	6693.0	6686.0	240	7.0	2.92%	3.42	1.17	
				340				1.47	
DP - 1	2.0	6711.0	6690.0	410	21.0	5.12%	4.53	1.51	
	2.0	6690.0	6687.0	270	3.0	1.11%	2.11	2.13	
				680				3.64	
B1	2.0	6730.0	6721.0	310	9.0	2.90%	3.41	1.52	
C1	2.0	6726.0	6716.0	175	10.0	5.71%	4.78	0.61	
D1	2.0	6730.0	6719.0	200	11.0	5.50%	4.69	0.71	
OS - D2	2.0	6719.0	6711.0	180	8.0	4.44%	4.22	0.71	
DP - 2	2.0	6730.0	6719.0	200	11.0	5.50%	4.69	0.71	
	2.0	6719.0	6711.0	180	8.0	4.44%	4.22	0.71	
				380				1.42	
E1	2.0	6730.0	6727.0	240	3.0	1.25%	2.24	1.79	
E2	2.0	6712.0	6693.0	500	19.0	3.80%	3.90	2.14	
	2.0	6693.0	6691.0	300	2.0	0.67%	1.63	3.06	
				800				5.20	
DP - 3	2.0	6730.0	6727.0	240	3.0	1.25%	2.24	1.79	
	2.0	6727.0	6682.0	1125	45.0	4.00%	4.00	4.69	
				1365				6.48	

RUNOFF COMPUTATIONS
TRAVEL TIME CALCULATIONS (TR-55)

98093PR.WK4

STETSON RIDGE EAST M.D.D.P.
EAST OF STETSON HILLS BLVD. & WEST OF 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 # 98093.64

03-Feb-2000

SHT. 2 of 2

BASIN	"K" PIPE SIZE	HIGH ELEV.	LOW ELEV.	LENGTH	HEIGHT	SLOPE	"V"	"TT"	COMMENTS
E3	2.0	6732.0	6682.0	1275	50.0	3.92%	3.96	5.37	
OS - E4	2.0	6716.0	6687.0	530	29.0	5.47%	4.68	1.89	
OS - E5	2.0	6677.0	6675.0	125	2.0	1.60%	2.53	0.82	
DP - 4	2.0	6732.0	6682.0	1275	50.0	3.92%	3.96	5.37	
	2.0	6682.0	6677.0	200	5.0	2.50%	3.16	1.05	
	2.0	6677.0	6675.0	125	2.0	1.60%	2.53	0.82	
				1600				7.24	
DP - 5	2.0	6732.0	6682.0	1275	50.0	3.92%	3.96	5.37	
	2.0	6682.0	6677.0	200	5.0	2.50%	3.16	1.05	
	2.0	6677.0	6675.0	125	2.0	1.60%	2.53	0.82	
	3' Dia	6675.0	6674.0	100	1.0	1.00%	9.44	0.18	36" RCP
				1700				7.42	
F1	2.0	6680.0	6668.0	650	12.0	1.85%	2.72	3.99	
F2	2.0	6676.0	6668.0	195	8.0	4.10%	4.05	0.80	
DP - 6	2.0	6711.0	6690.0	410	21.0	5.12%	4.53	1.51	
	2.0	6690.0	6687.0	270	3.0	1.11%	2.11	2.13	
	2.0	6687.0	6668.0	440	19.0	4.32%	4.16	1.76	
				1120				5.41	
OS - F3	2.0	6674.0	6660.0	810	14.0	1.73%	2.63	5.13	
DP - 7	2.0	6732.0	6682.0	1275	50.0	3.92%	3.96	5.37	
	2.0	6682.0	6677.0	200	5.0	2.50%	3.16	1.05	
	2.0	6677.0	6675.0	125	2.0	1.60%	2.53	0.82	
	3' Dia	6675.0	6674.0	100	1.0	1.00%	9.44	0.18	36" RCP
	2.0	6674.0	6660.0	810	14.0	1.73%	2.63	5.13	
				2510				12.55	

Street Cross Section Cross Section for Irregular Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Street Section (1/2 Street)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data	
Wtd. Mannings Coefficient	0.016
Channel Slope	0.005000 ft/ft
Water Surface Elevation	100.00 ft
Discharge	5.53 cfs

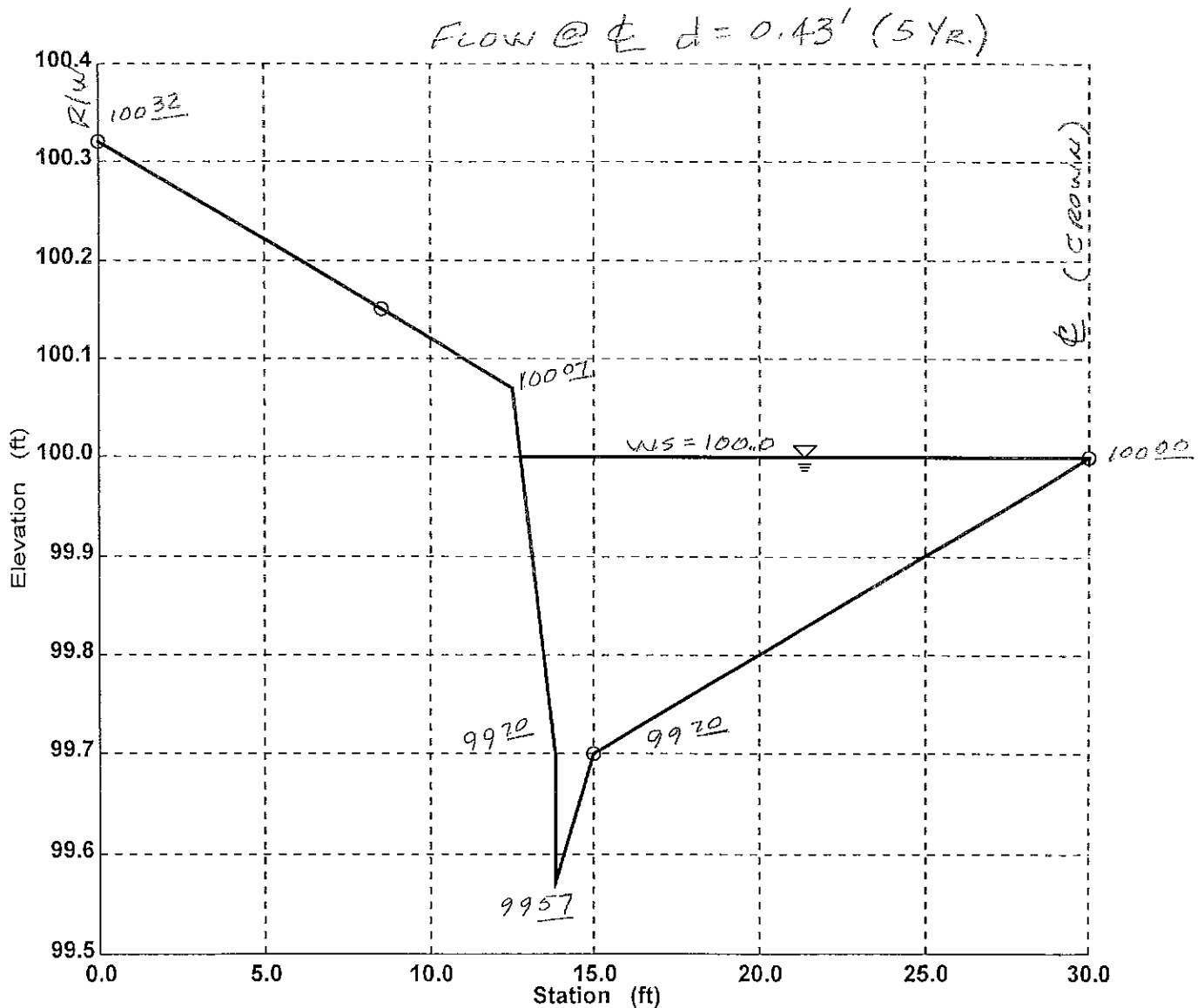


Table
Rating Table for Irregular Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Street Section (1/2 Street)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Constant Data	
Water Surface Elevation	100.00 ft

Input Data			
	Minimum	Maximum	Increment
Channel Slope	0.007000	0.049000	0.001000 ft/ft

Rating Table				
Channel Slope (ft/ft)	Wtd. Mannings Coefficient	Discharge (cfs)	Velocity (ft/s)	
0.007000	0.016	6.54	2.30	
0.008000	0.016	6.99	2.46	
0.009000	0.016	7.42	2.61	
0.010000	0.016	7.82	2.75	
0.011000	0.016	8.20	2.89	
0.012000	0.016	8.57	3.02	
0.013000	0.016	8.92	3.14	
0.014000	0.016	9.25	3.26	
0.015000	0.016	9.58	3.37	
0.016000	0.016	9.89	3.48	
0.017000	0.016	10.20	3.59	
0.018000	0.016	10.49	3.70	
0.019000	0.016	10.78	3.80	
0.020000	0.016	11.06	3.90	
0.021000	0.016	11.33	3.99	
0.022000	0.016	11.60	4.09	
0.023000	0.016	11.86	4.18	
0.024000	0.016	12.12	4.27	
0.025000	0.016	12.37	4.36	
0.026000	0.016	12.61	4.44	
0.027000	0.016	12.85	4.53	
0.028000	0.016	13.09	4.61	
0.029000	0.016	13.32	4.69	
0.030000	0.016	13.55	4.77	
0.031000	0.016	13.77	4.85	
0.032000	0.016	13.99	4.93	

Table
Rating Table for Irregular Channel

Rating Table				
Channel Slope (ft/ft)	Wtd. Mannings Coefficient	Discharge (cfs)	Velocity (ft/s)	
0.033000	0.016	14.21	5.00	
0.034000	0.016	14.42	5.08	
0.035000	0.016	14.63	5.15	
0.036000	0.016	14.84	5.23	
0.037000	0.016	15.04	5.30	
0.038000	0.016	15.25	5.37	
0.039000	0.016	15.44	5.44	
0.040000	0.016	15.64	5.51	
0.041000	0.016	15.84	5.58	
0.042000	0.016	16.03	5.65	
0.043000	0.016	16.22	5.71	
0.044000	0.016	16.40	5.78	
0.045000	0.016	16.59	5.84	
0.046000	0.016	16.77	5.91	
0.047000	0.016	16.95	5.97	
0.048000	0.016	17.13	6.04	
0.049000	0.016	17.31	6.10	

Curve Plotted Curves for Irregular Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Street Section (1/2 Street)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Constant Data	
Water Surface Elevation	100.00 ft

Input Data			
	Minimum	Maximum	Increment
Channel Slope	0.005000	0.050000	0.001000 ft/ft

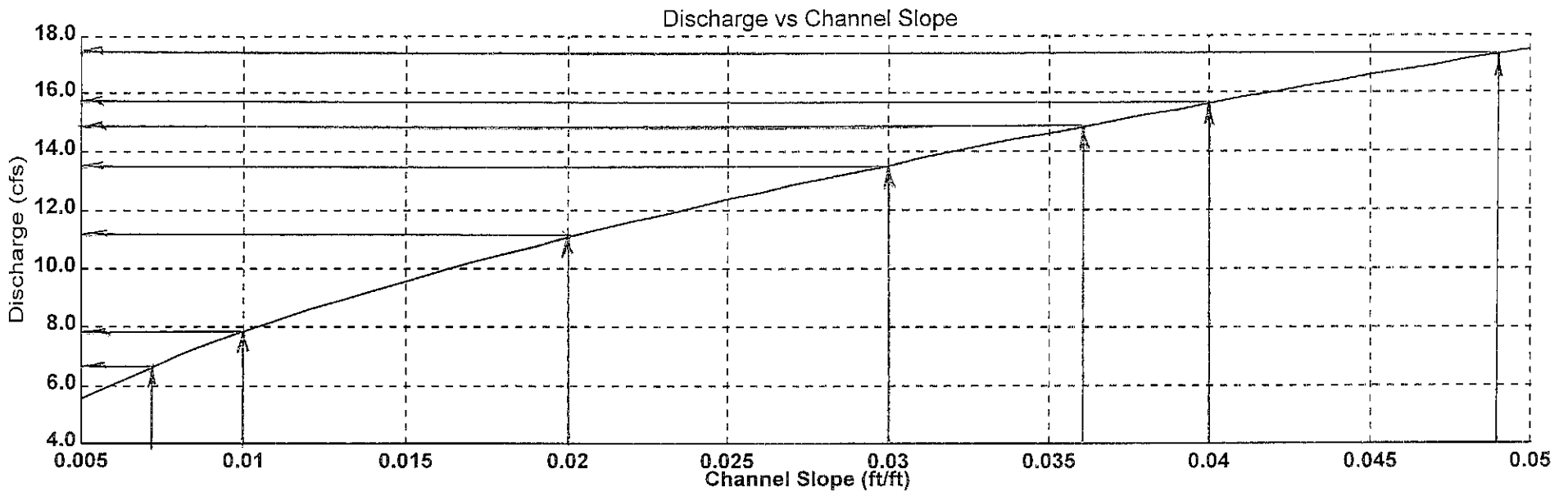


Table
Rating Table for Irregular Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Street Section (1/2 Street)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Constant Data	
Water Surface Elevation	100.32 ft

Input Data			
	Minimum	Maximum	Increment
Channel Slope	0.007000	0.049000	0.001000 ft/ft

Rating Table			
Channel Slope (ft/ft)	Wtd. Mannings Coefficient	Discharge (cfs)	Velocity (ft/s)
0.007000	0.016	35.83	3.59
0.008000	0.016	38.30	3.83
0.009000	0.016	40.63	4.07
0.010000	0.016	42.83	4.29
0.011000	0.016	44.92	4.49
0.012000	0.016	46.91	4.69
0.013000	0.016	48.83	4.89
0.014000	0.016	50.67	5.07
0.015000	0.016	52.45	5.25
0.016000	0.016	54.17	5.42
0.017000	0.016	55.84	5.59
0.018000	0.016	57.46	5.75
0.019000	0.016	59.03	5.91
0.020000	0.016	60.56	6.06
0.021000	0.016	62.06	6.21
0.022000	0.016	63.52	6.36
0.023000	0.016	64.95	6.50
0.024000	0.016	66.34	6.64
0.025000	0.016	67.71	6.78
0.026000	0.016	69.05	6.91
0.027000	0.016	70.37	7.04
0.028000	0.016	71.66	7.17
0.029000	0.016	72.93	7.30
0.030000	0.016	74.18	7.42
0.031000	0.016	75.40	7.55
0.032000	0.016	76.61	7.67

Table
Rating Table for Irregular Channel

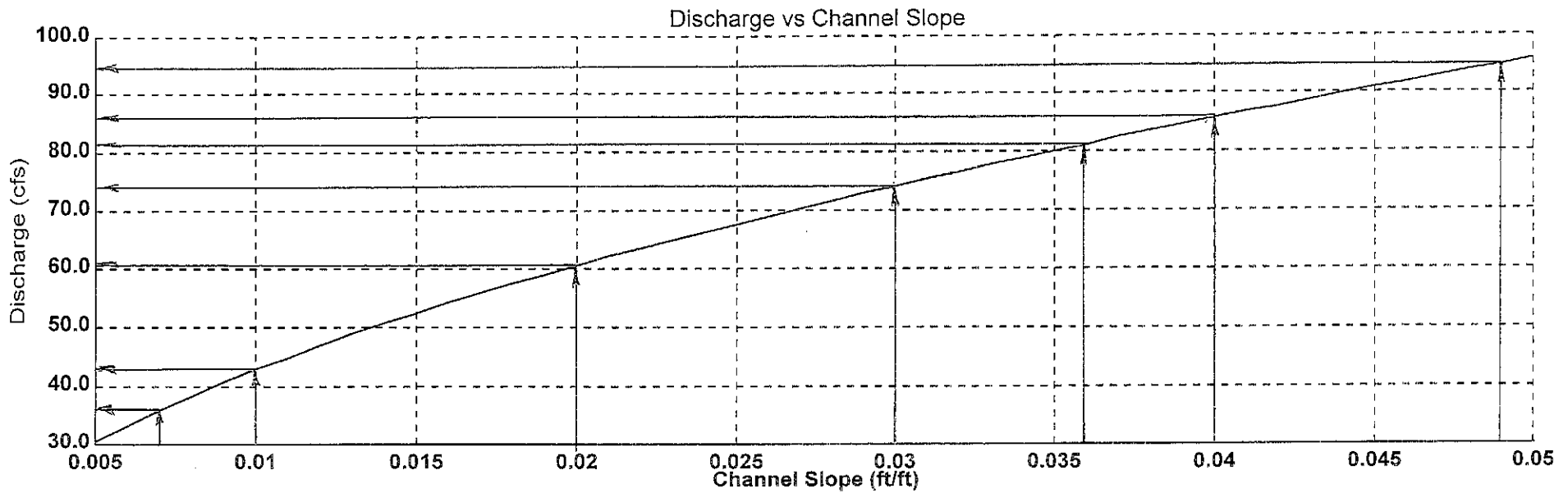
Rating Table				
Channel				
Slope (ft/ft)	Wtd. Mannings Coefficient	Discharge (cfs)	Velocity (ft/s)	
0.033000	0.016	77.80	7.79	
0.034000	0.016	78.97	7.90	
0.035000	0.016	80.12	8.02	
0.036000	0.016	81.26	8.13	
0.037000	0.016	82.38	8.24	
0.038000	0.016	83.48	8.35	
0.039000	0.016	84.57	8.46	
0.040000	0.016	85.65	8.57	
0.041000	0.016	86.72	8.68	
0.042000	0.016	87.77	8.78	
0.043000	0.016	88.80	8.89	
0.044000	0.016	89.83	8.99	
0.045000	0.016	90.85	9.09	
0.046000	0.016	91.85	9.19	
0.047000	0.016	92.84	9.29	
0.048000	0.016	93.83	9.39	
0.049000	0.016	94.80	9.49	

Curve Plotted Curves for Irregular Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Street Section (1/2 Street)
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Constant Data	
Water Surface Elevation	100.32 ft

Input Data			
	Minimum	Maximum	Increment
Channel Slope	0.005000	0.050000	0.001000 ft/ft



RUNOFF COMPUTATIONS
CATCH BASIN SIZE CALCULATIONS

98093PR.WK4

STETSON RIDGE EAST M.D.D.P.
EAST OF STETSON HILLS BLVD. & WEST OF 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
Curb Inlet (Sump Condition)

LWA # 98093.64

04-Feb-2000

SHT. 1 of 1

BASIN NO.	INLET SIZE	DEPTH	CLOG. FACTOR	INTERCEP. FLOW (WEIR)	INTERCEPT. FLOW (ORIFICE)	INTERCEPT. FLOW (CB OPEN.)	CONTROL FACTOR	5 Yr. FLOW cfs	100 Yr. FLOW cfs	FLOWBY	Discription
Inlet-1	20.0	0.38	1.25	17.0	31.5	17.0	WEIR	16.7		-0.3	SW Side
Inlet-1	20.0	0.77	1.25	38.3	47.8	38.3	WEIR		37.8	-0.5	SW Side
Inlet-2	5.0	0.22	1.25	3.9	5.4	3.9	WEIR	3.8		-0.1	NW Side
Inlet-2	5.0	0.42	1.25	6.9	8.4	6.9	WEIR		6.9	0.0	NW Side

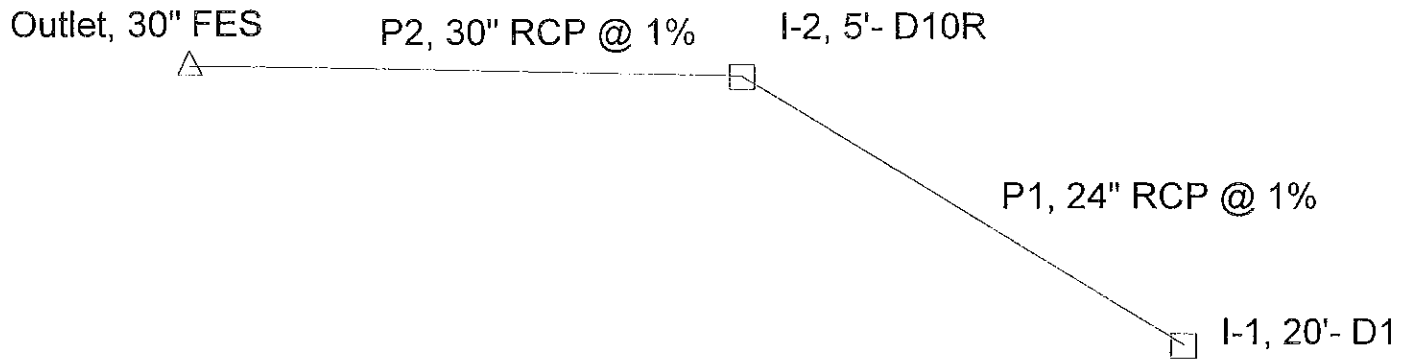
Peak Q5 @ DP - 1 =14.3 cfs; 16.7cfs SW Side & 3.8cfs NW Side

Peak Q100 @ DP - 1 =44.7 cfs; 37.8cfs SW Side & 6.9cfs NW Side

WEIR FLOW = $(1.7 * Li + 6.12) (D_{max} + 0.25)^{1.85 / CLOG}$, FOR DEPTHS < 0.67'

ORIFICE FLOW = $(3.60 * Li) D - 0.08)^{0.5 / CLOG}$, FOR DEPTHS > 0.94'

STETSON RIDGE EAST MDDP, 100 FLOWS



```

----- Beginning Calculation Cycle -----
Discharge: 37.80 cfs at node I-1
Discharge: 44.70 cfs at node I-2
Discharge: 44.70 cfs at node Outlet
Beginning iteration 1
Discharge: 37.80 cfs at node I-1
Discharge: 44.70 cfs at node I-2
Discharge: 44.70 cfs at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error: 0.0
Warning: No Duration data exists in IDF Table
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 -----

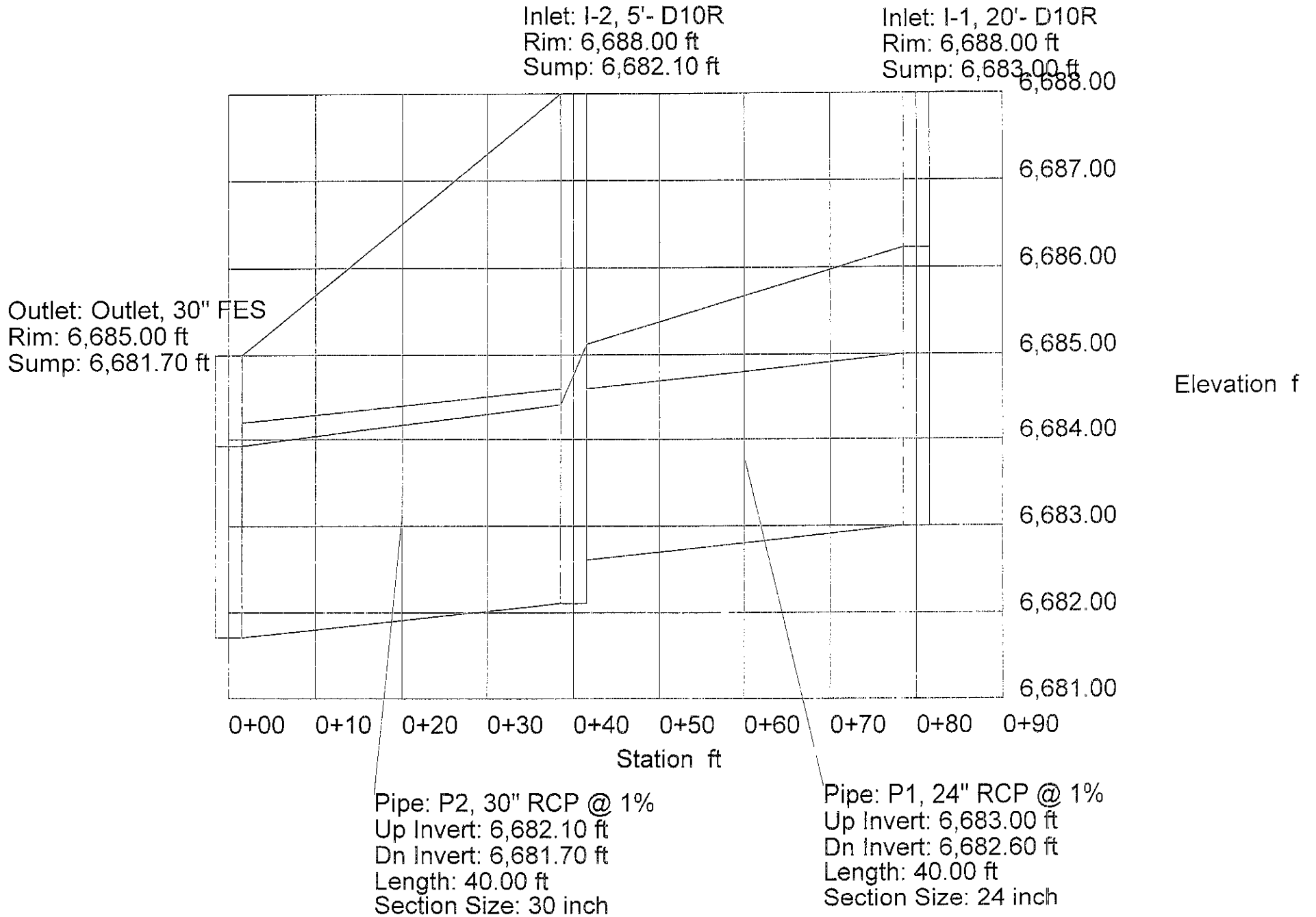
Label	Length	Size	Discharge	Hydraulic Grade	
				Upstream	Downstream
P-1	40.00	24 inch	37.80	6,686.23	6,685.11
P-2	40.00	30 inch	44.70	6,684.42	6,683.92

Label	Discharge	Ground	Elevations	
			Upstream HGL	Downstream HGL
I-1	37.80	6,688.00	6,686.23	6,686.23
I-2	44.70	6,688.00	6,685.11	6,684.42
Outlet	44.70	6,685.00	6,683.92	6,683.92

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

PIPE HYDRAULIC REPORT

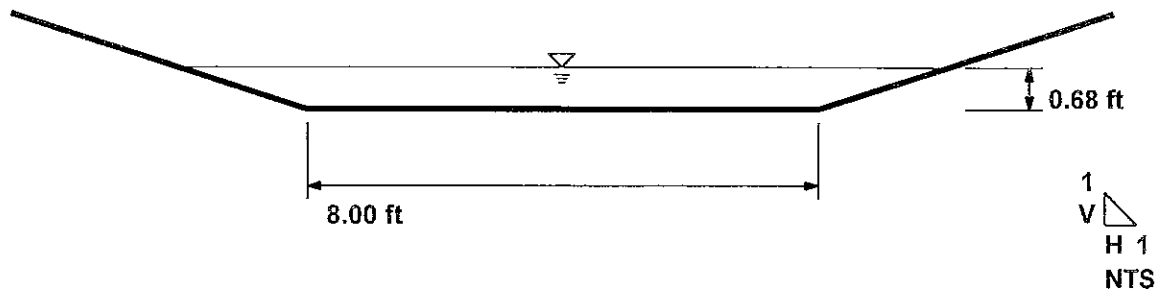
Pipe	-Node- Up Dn	-Invert- Up Dn (ft)	Length (ft)	S (ft/ft)	-Section- Shape Size	Q (cfs)	Cap (cfs)	-Depth- Up Dn (ft)	-HGL- Up Dn (ft)	-EGL- Up Dn (ft)	-Ground- Up Dn (ft)	V avg (ft/s)	Roughness
P-1	I-1	6,683.00	40.00	0.010000	Circular	37.80	22.62	3.23	6,686.23	6,688.48	6,688.00	12.03	0.013
	I-2	6,682.60			24 inch			2.51	6,685.11	6,687.36	6,688.00		
P-2	I-2	6,682.10	40.00	0.010000	Circular	44.70	41.01	2.32	6,684.42	6,685.80	6,688.00	9.55	0.013
	Outlet	6,681.70			30 inch			2.22	6,683.92	6,685.38	6,685.00		



Cross Section "A-A"
Cross Section for Trapezoidal Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Channel @ Sub-Basin F2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Channel Slope	0.039400 ft/ft
Depth	0.68 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	8.00 ft
Discharge	45.00 cfs



Cross Section "A-A"
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Channel @ Sub-Basin F2
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

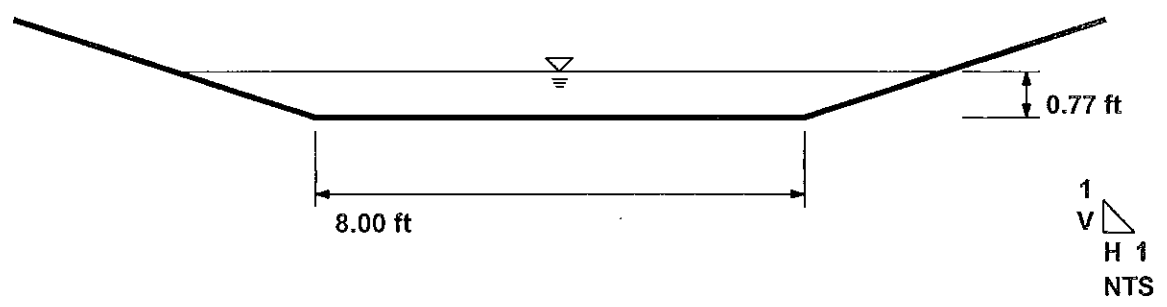
Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.039400	ft/ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	8.00	ft
Discharge	45.00	cfs

Results		
Depth	0.68	ft
Flow Area	6.79	ft ²
Wetted Perimeter	12.28	ft
Top Width	12.06	ft
Critical Depth	0.88	ft
Critical Slope	0.015137	ft/ft
Velocity	6.62	ft/s
Velocity Head	0.68	ft
Specific Energy	1.36	ft
Froude Number	1.56	
Flow is supercritical.		

Cross Section "B-B"
Cross Section for Trapezoidal Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Channel For DP-6
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Channel Slope	0.046200 ft/ft
Depth	0.77 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	8.00 ft
Discharge	61.00 cfs



Cross Section "B-B"
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Channel For DP-6
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

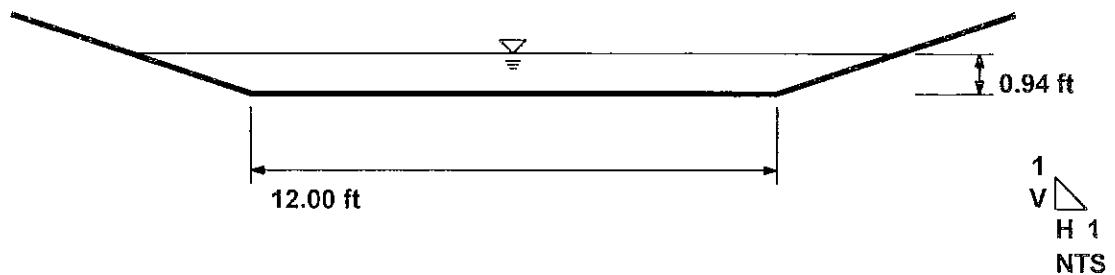
Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.046200	ft/ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	8.00	ft
Discharge	61.00	cfs

Results		
Depth	0.77	ft
Flow Area	7.92	ft ²
Wetted Perimeter	12.86	ft
Top Width	12.61	ft
Critical Depth	1.06	ft
Critical Slope	0.014432	ft/ft
Velocity	7.70	ft/s
Velocity Head	0.92	ft
Specific Energy	1.69	ft
Froude Number	1.71	
Flow is supercritical.		

Cross Section "C-C"
Cross Section for Trapezoidal Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Channel For @ Sub-Basin OS-E5
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Channel Slope	0.010000 ft/ft
Depth	0.94 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	12.00 ft
Discharge	58.00 cfs



Cross Section "C-C"
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Channel For @ Sub-Basin OS-E5
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

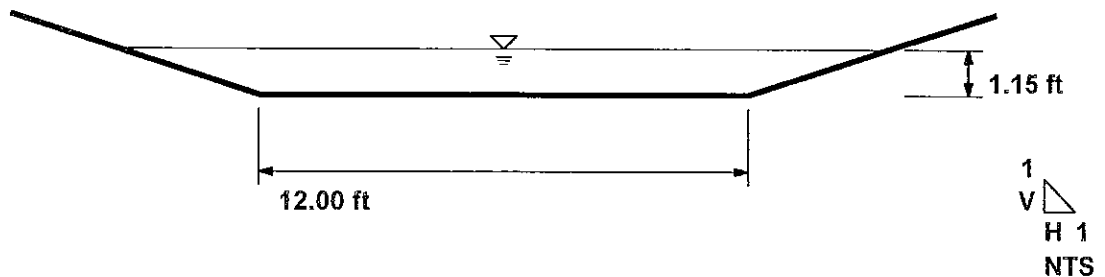
Input Data	
Mannings Coefficient	0.030
Channel Slope	0.010000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	12.00 ft
Discharge	58.00 cfs

Results	
Depth	0.94 ft
Flow Area	13.89 ft ²
Wetted Perimeter	17.93 ft
Top Width	17.62 ft
Critical Depth	0.84 ft
Critical Slope	0.014998 ft/ft
Velocity	4.18 ft/s
Velocity Head	0.27 ft
Specific Energy	1.21 ft
Froude Number	0.83
Flow is subcritical.	

Cross Section "D-D"
Cross Section for Trapezoidal Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Channel @ Sub-Basin OS-F3
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Channel Slope	0.010000 ft/ft
Depth	1.15 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	12.00 ft
Discharge	84.00 cfs



Cross Section "D-D"
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Channel @ Sub-Basin OS-F3
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

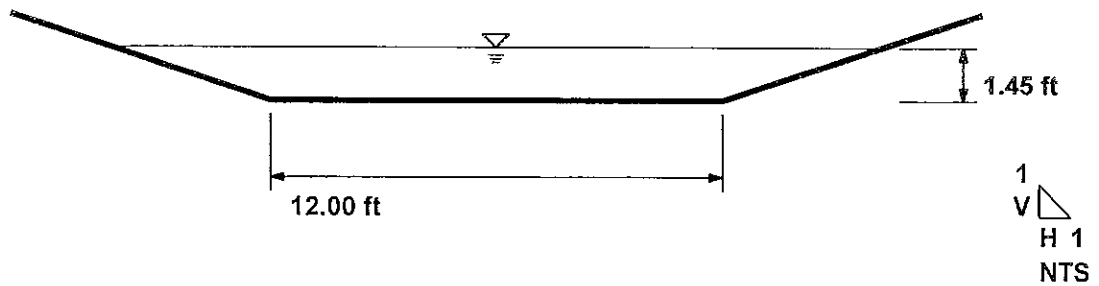
Input Data	
Mannings Coefficient	0.030
Channel Slope	0.010000 ft/ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	12.00 ft
Discharge	84.00 cfs

Results	
Depth	1.15 ft
Flow Area	17.86 ft ²
Wetted Perimeter	19.30 ft
Top Width	18.93 ft
Critical Depth	1.05 ft
Critical Slope	0.014087 ft/ft
Velocity	4.70 ft/s
Velocity Head	0.34 ft
Specific Energy	1.50 ft
Froude Number	0.85
Flow is subcritical.	

Cross Section "E-E"
Cross Section for Trapezoidal Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Channel For DP-7
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Section Data	
Mannings Coefficient	0.030
Channel Slope	0.010000 ft/ft
Depth	1.45 ft
Left Side Slope	3.000000 H : V
Right Side Slope	3.000000 H : V
Bottom Width	12.00 ft
Discharge	126.00 cfs



Cross Section "E-E"
Worksheet for Trapezoidal Channel

Project Description	
Project File	c:\engineering\haestad\academic\fmw\98093-64.fm2
Worksheet	Channel For DP-7
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.030	
Channel Slope	0.010000	ft/ft
Left Side Slope	3.000000	H : V
Right Side Slope	3.000000	H : V
Bottom Width	12.00	ft
Discharge	126.00	cfs

Results		
Depth	1.45	ft
Flow Area	23.63	ft ²
Wetted Perimeter	21.15	ft
Top Width	20.68	ft
Critical Depth	1.34	ft
Critical Slope	0.013190	ft/ft
Velocity	5.33	ft/s
Velocity Head	0.44	ft
Specific Energy	1.89	ft
Froude Number	0.88	
Flow is subcritical.		