

**MASTER DEVELOPMENT
DRAINAGE PLAN
FOR
FILLMORE HEIGHTS**

Prepared For
F N, LLC.
900 West Fillmore, Suite 200
Colorado Springs, Colorado 80907

Prepared By:
Associated Design Professionals, Inc.
1861 Austin Bluffs Parkway, Suite 101
Colorado Springs, Colorado 80918
(719) 266-5212

March 18, 1998
970704DR2



ENGINEERS STATEMENT:

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



Michael A. Bartusek, P.E., #23329



DEVELOPER'S STATEMENT:

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

F N, LLC

Business Name

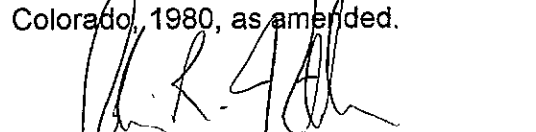
By: Darwin L. Fosberg

Title: Managing Member

Address: 900 West Fillmore, Suite 200

Colorado Springs, CO 80907

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



City Engineer

8/19/98

Date

Conditions:

MASTER DEVELOPMENT DRAINAGE PLAN FOR FILLMORE HEIGHTS

DESCRIPTION

The purpose of this Master Development Drainage Plan for Fillmore Heights is to identify major site drainage issues associated with the development. This Master Development Drainage Plan (MDDP) illustrates a conceptual plan for major storm drainage improvements such as channels, storm sewers, culverts and detention ponds. This will serve as a guide for planning and design for subsequent preliminary and final drainage reports. The MDDP follows the guidelines of the City-County Drainage Criteria Manual, as well as the Master Plan for Mesa Drainage Basin, approved on March 31, 1986.

This plan addresses the proposed improvements within the Mesa Drainage Basin. The Fillmore Heights property consists of land which drains mainly toward Chestnut Street, north of Fillmore Street.

The site consists of 22.56-acres of land located north of Fillmore Street and west of Chestnut Street. Figure 1 shows the area on a Vicinity Map. The zoning for most of the parcel is PIP-2, with a proposed use of light industrial. Two (2) additional parcels are currently being platted, Fillmore Subdivision and Fillmore Place. These lots, totaling 2.345 acres, are zoned C-6. Twenty-seven (27) other lots are proposed, ranging in size from approximately 0.4-acres to 1.4-acres. One lot in the southeastern portion of the property contains an existing house, which will be converted into an office. There is also a 0.21-acre ingress/egress tract east of Fillmore Subdivision.

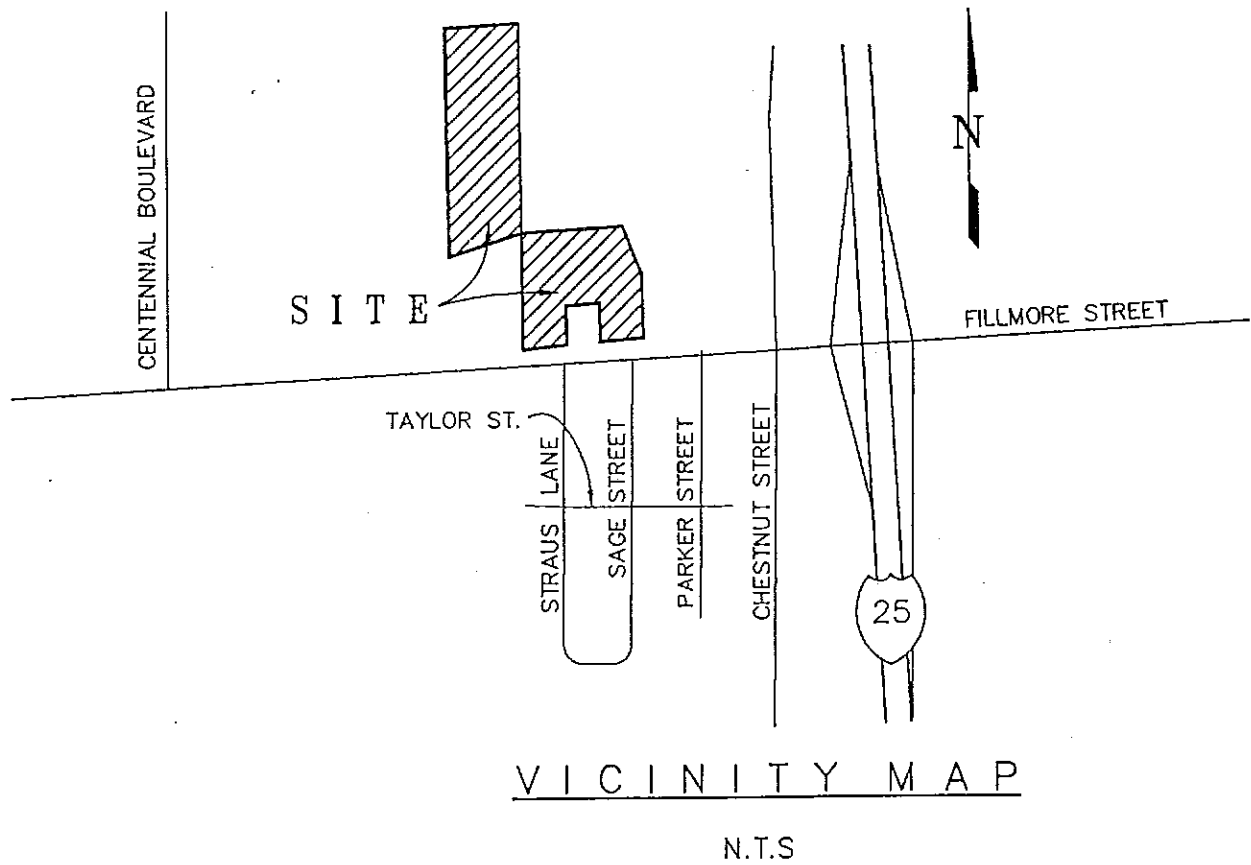


FIGURE 1

HYDROLOGIC INFORMATION:

Soils information was obtained from "Soil Survey of El Paso County, Colorado," dated June, 1981. According to the survey, most of the soil on site is a razor midway complex. This soil can be described as having a slow permeability with rapid surface runoff. It has a hydrologic soil classification of C/D. No portion of the site is located within a designated FEMA 100-year floodplain as designated on Map No. 080059-0163B, dated December 18, 1986.

METHOD OF COMPUTATIONS:

The Methodology utilized for this report is in accordance with the City/County Drainage Criteria Manual. The Rational Method was used for computation of runoff for drainage facility design:

$$Q = cia$$

Where Q = maximum rate of runoff in cubic feet per second
c = runoff coefficient representing drainage area characteristics
I = average rainfall intensity, in inches per hour, for the duration
required for the runoff to become established
a = drainage basin size in acres

The TR-20 computer program for Project Formulated Hydrology developed by the Soil Conservation Service, was utilized to evaluate detention requirements for the project.

EXISTING DRAINAGE CHARACTERISTICS:

The area delineated by this study is located north of Fillmore Street, east of Centennial Boulevard, west of Chestnut Street, and contains 22.56 acres.

The proposed development area is divided into two (2) areas. The southeastern area contains an existing house, and some additional buildings while the remaining area is vacant land. The terrain is somewhat varied, but generally slopes to the northeast at a slope of approximately 10%. Flow from this area travels overland to the eastern boundary, where a swale transports flows to the existing channel just south of the existing Colorado National Guard Building.

The northwestern area was utilized for agriculture purposes until recently. The land slopes generally to the east, with an average slope of approximately 8%. This area drains into natural swales and ravines located on the Champions Golf and Games property. Several of these swales and ravines combine near the site of the Colorado National Guard Building, near the site of a previously constructed shallow detention facility.

The offsite area tributary to the Fillmore Heights development is predominately undeveloped, and owned by two (2) entities:

- Western Mobile Southern, Inc.
- Hill Development Corporation

The property owned by Western Mobile Southern, Inc., is currently utilized as an asphalt processing area with some paved areas and numerous material piles, and sediment catchment areas. Flows from this area are transported via natural swales to a broad, 50FT wide channel. No change in use or further development of this tributary is expected in the near future.

The second portion of tributary area, currently owned by Lyda Hill, is undeveloped, with rangeland grasses and natural swales. The western portion of this land was overlot graded to an average slope of approximately 5%. This property then drops approximately 100 FT at a 15% slope. The storm flows from this undeveloped land are tributary to two (2) sump areas. Current development plans for the Hill Property indicate that all flows from the property will be directed to the existing southern sump area. This sump area will be enhanced as a temporary detention facility by the Hill Property (See attached letter). Based on the existing conditions of the site, the following storm flows will result:

<u>Subbasin</u>	<u>Acres</u>	<u>SUBBASIN FLOWS</u>	
		<u>5-Year(CFS)</u>	<u>100-Year(CFS)</u>
(57A)	5.5	7.7	16.9
(56)	19.39	20.7	45.2
(55)	46.74	50.8	111.0
(13A)	23.53	31.9	66.9
(57B)	4.5	5.3	12.0
(57C)	3.4	10.4	20.7

The total existing flows reaching the natural channel adjacent to the National Guard Building are 110.6 CFS for the 5-year flow and 237.7 CFS for the 100-year flow. (See existing conditions exhibit in Appendix A).

PROPOSED DEVELOPMENT CHARACTERISTICS:

The proposed site was recently re-zoned to a Planned Industrial Park No. 2 (PEP-2). The 22.56-acre parcel is being divided into twenty (20) lots varying in size from 59,300 SF to 16,800 SF, and two (2) additional lots along Fillmore Street. The proposed use is for light industrial facilities with a maximum lot coverage of 40%.

A private roadway, Fillmore Heights Grove, is proposed to traverse the site, intercepting flows from the developed lots west of the road, as well as flows from the off-site areas. The proposed roadway, Fillmore Heights Grove, is located approximately 400 FT west of the "New Chestnut Street" alignment delineated in the Mesa Drainage Basin Planning Study. A public storm sewer will be constructed to transport future developed flows through the site within a public drainage easement. The proposed storm trunk sewer will predominately convey flows from the Hill Property, which will be platted to include public streets and right-of-way. This proposed public storm trunk sewer will be privately maintained until such time as it conveys "public" storm flows from the Hill Property. This storm sewer will only carry flows at historic levels until adequate downstream facilities are constructed.

The development has been divided into several phases. Phase I is a single 19,104 SF lot adjacent to Fillmore Street, just west of Straus Lane. Flows from this lot will be divided with a portion directed to Fillmore Street, and the remainder transported north along the 32 FT roadway, Fillmore Heights Grove, toward the existing natural channel.

Phase II encompasses eight (8) lots, two (2) of which contain existing buildings. One of these, Lot 8, will not be developed further. These lots contain a total of 5.9 acres of land. Flows from these lots will all be directed to the existing channel which flows to Chestnut Street.

Stormwater from Lots 1 through 3 will be contained within the street section to a roadway sump and conveyed to the channel through 2 ten foot D-10R inlets connected to the 66" RCP culvert under the roadway. This culvert will also convey the offsite drainage from the Western Mobile Southern Property, as well as flows from the proposed storm sewer proposed for Phase III and IV. Flows from this culvert will be released onto the adjacent property, where it will be directed into a private detention facility. The owner of this property, Champions Golf and Games, has agreed to accept these developed flows. (See Statement of Understanding located in Appendix C.)

Phases III and IV, which extend northerly to the end of the project, encompass nineteen (19) lots and contain 12.5 acres of land. Due to the amount of off-site flows from the Hill Property, a large storm sewer will be required along the roadway. As per the MDDP for the Hill Properties dated October 1995, by Rockwell-Minchow Consultants, Inc., flows from the Hill Property are assumed to be at historic levels until downstream drainage facilities are upgraded. This will be accomplished by constructing a temporary detention facility adjacent to Lot 16 (See attached private maintenance agreement). Storm sewers will be constructed within the Hill Property to transport flows to this detention facility. Interceptor swales will be built along the westerly property line to transport all flows to this facility. A storm sewer will be constructed from the westerly property line to the trunk sewer in Fillmore Heights Grove to replace the riprap swales. Once the Hill property develops, storm sewers can be extended from the trunk sewer. Since the easterly lots will slope away from the roadway, an interceptor ditch will be built along the entire length of the property to transport flows toward the proposed culvert crossing and prevent them from flowing on to the Celebrity Golf and Game Property.

The proposed storm sewer in Fillmore Heights Grove will be sized to handle the developed 100-year storm from the adjacent Hill Property. This will require a 48" storm sewer. The storm sewer will intercept flows from the easterly interceptor ditch prior to connecting with the 66"

culvert. This culvert will traverse a portion of Lot 6 and extend beyond the proposed grading on the Champions Golf and Game Property where it will outlet into the existing natural channel. Riprap protection will be provided at the outlet of the culvert. Flows will then continue along the channel until they enter the proposed 1-acre, 7 acre-ft, temporary detention basin (See attached private maintenance agreement).

Based on the hydrologic calculations presented in the Mesa Drainage Basin Planning Study, the total developed 100-year flow expected at Chestnut Street is 604 CFS. Most of this flow was expected to be tributary to a proposed double 5'x6' box culvert under "New Chestnut Street." Based on our current calculations and street layout, only a portion of the original developed flow will enter the inlet of the proposed culvert at Fillmore Heights Grove. This amount is estimated at 126 CFS for the 100-year storm. An additional 286 CFS will enter the culvert via the 48" RCP storm sewer.

As a result of the new calculations, the required culvert under Fillmore Heights Grove can be downsized to a 66" RCP culvert. A riprap-lined channel will transport the upstream flows from the Western Mobile Southern property to the proposed 66" RCP culvert. The existing flow to this culvert is 82 CFS for the 100-year storm.

Phase V consists of a single 52,115 SF lot just south of the proposed detention facility. All developed flows from this site will be safely transported into the detention facility by a private storm sewer. The developed flows expected from the Fillmore Heights Development, with the Hill Property in existing condition, are as follows:

<u>Subbasin</u>	<u>SUBBASIN FLOWS</u>			<u>ACCUMULATED FLOWS</u>	
	<u>Acres</u>	<u>5-Year(CFS)</u>	<u>100-Year(CFS)</u>	<u>5-Year</u>	<u>100-year</u>
OS-1	0.24	0.4	1.0	--	--
OS-2	0.70	0.9	2.2	--	--
OS-3	9.15	13.7	30.0	--	--
OS-4	41.90	45.6	99.5	55.5	121.2
OS-5	23.53	39.0	81.6	112.7	239.2
OS-6	0.43	0.6	1.5	--	--
OS-7	0.78	0.8	2.2	--	--

<u>Subbasin</u>	<u>SUBBASIN FLOWS</u>			<u>ACCUMULATED FLOWS</u>	
	<u>Acres</u>	<u>5-Year(CFS)</u>	<u>100-Year(CFS)</u>	<u>5-Year</u>	<u>100-year</u>
OS-8	2.94	3.3	8.5	--	--
OS-9	1.29	4.1	8.2	--	--
OS-10	1.32	4.4	8.8	--	--
OS-11	3.42	4.3	10.4	129.9	276.0
A	1.81	5.4	10.8	5.6	11.7
B	1.97	5.5	10.9	10.3	21.0
C	1.30	3.7	7.5	13.3	27.1
D	2.00	6.1	12.2	67.5	145.1
E	1.99	5.4	10.8	5.7	11.5
F	1.66	4.7	9.3	9.6	19.4
G	1.09	3.5	7.0	12.0	24.2
H	0.61	2.0	4.0	13.3	26.6
I	0.21	0.8	1.5	--	--
J	1.66	5.2	10.4	5.8	12.3
K	2.29	6.6	13.2	--	--
L	3.08	9.5	19.0	14.8	29.6
M	0.21	0.8	1.5	--	--
N	1.91	7.5	13.8	--	--
O	0.21	1.0	1.8	--	--

The total developed flow to the lower detention basin site is 129.9 CFS for the 5-year flow and 276.0 CFS for the 100-year flow. The 100-year outflow from the 7 acre-foot detention facility is 100 CFS which is less than the existing 5-year flow.

Once the downstream facilities have been constructed from Monument Creek to Chestnut Street, developed flows can be released from the Fillmore Heights Property, as well as the Hill Property, and the land owned by Western Mobile Southern. The flows expected from the fully developed land tributary to main channel adjacent to National Guard Building, are as follows:

<u>Subbasin</u>	<u>SUBBASIN FLOWS</u>			<u>ACCUMULATED FLOWS</u>	
	<u>Acres</u>	<u>5-Year(CFS)</u>	<u>100-Year(CFS)</u>	<u>5-Year</u>	<u>100-year</u>
OS-1	0.24	0.4	1.0	--	--
OS-2	0.70	0.9	2.2	--	--
OS-3	9.15	19.3	40.4	--	--
OS-4	41.90	111.6	222.6	130.0	261.3
OS-5	23.53	63.1	126.0	203.5	409.1
OS-6	0.43	1.6	3.3	--	--
OS-7	0.78	2.6	5.2	--	--

<u>SUBBASIN FLOWS</u>		<u>ACCUMULATED FLOWS</u>			
<u>Subbasin</u>	<u>Acres</u>	<u>5-Year(CFS)</u>	<u>100-Year(CFS)</u>	<u>5-Year</u>	<u>100-year</u>
OS-8	2.94	3.3	8.5	--	--
OS-9	1.29	4.1	8.2	--	--
OS-10	1.32	4.4	8.8	--	--
OS-11	3.42	4.3	10.4	221.7	448.9
A	1.81	5.4	10.8	5.6	11.7
B	1.97	5.5	10.9	10.3	21.0
C	1.30	3.7	7.5	133.4	268.4
D	2.00	6.1	12.2	135.9	273.3
E	1.99	5.4	10.8	5.7	11.5
F	1.66	4.7	9.3	9.6	19.4
G	1.09	3.5	7.0	12.0	24.2
H	0.61	2.0	4.0	13.3	26.6
I	0.21	0.8	1.5	--	--
J	1.66	5.2	10.4	5.8	12.3
K	2.29	6.6	13.2	--	--
L	3.08	9.5	19.0	14.8	29.6
M	0.21	0.8	1.5	--	--
N	1.91	7.5	13.8	--	--
O	0.21	1.0	1.8	--	--

DRAINAGE FACILITIES

The drainage facilities proposed under this MDDP are in accordance with the recommendations stated in the Mesa Drainage Study. The proposed facilities have been separated into public and private facilities, based on the guidelines presented in the Basin Study. The estimated reimbursable public storm sewers required for this site are as follows:

<u>Description</u>	<u>Quantity</u>	<u>Cost</u>	<u>Amount</u>
66" RCP	229 LF	\$ 175.00	\$ 40,075.00
Headwalls	2 EA	2,000.00	4,000.00
Riprap Outlet	60 CY	30.00	1,800.00
48" RCP	565 LF	100.00	56,500.00
10' D10R Inlets	3 EA	3,000.00	9,000.00
66" Bend	2 EA	1,500.00	3,000.00
66" x 48" WYE	1 EA	1,500.00	1,500.00
48" Bend	1 EA	1,000.00	1,000.00
48" x 24" WYE & Bend	1 EA	1,300.00	1,300.00
66" x 48" Reducer	1 EA	1,600.00	1,600.00
	Subtotal		\$119,775.00
	Engineering & Contingency @ 15%		17,966.25
	TOTAL		\$137,741.25

The estimated non-reimbursable private drainage items are as follows:

<u>Description</u>	<u>Quantity</u>	<u>Cost</u>	<u>Amount</u>
1 AC Temporary Detention Facility w/ 36" Outlet	1 LS	\$10,000.00	\$10,000.00
5' D10R Inlet	2 EA	2,500.00	5,000.00
10" D10R Inlet	3 EA	3,000.00	9,000.00
24" RCP	375 LF	35.00	13,125.00
18" RCP	32 LF	25.00	800.00
12" Riprap	200 cy	30.00	<u>6,000.00</u>
	Subtotal		\$43,925.00
	Engineering & Contingency @ 15%		<u>6,588.75</u>
	TOTAL		\$50,513.75

DRAINAGE FEES

Since the land within this Project is currently unplatted, drainage fees will be assessed within the Mesa Drainage Basin. The estimated 1998 Drainage Fees for this site is as follows:

$$22.56 \text{ Acres} \times \$5,355 = \$120,808.80$$

The estimated cost of reimbursable drainage facilities is \$137,741.25. Therefore, no drainage fees are required to be posted at the time of platting. A reimbursement from the basin fee will be as follows:

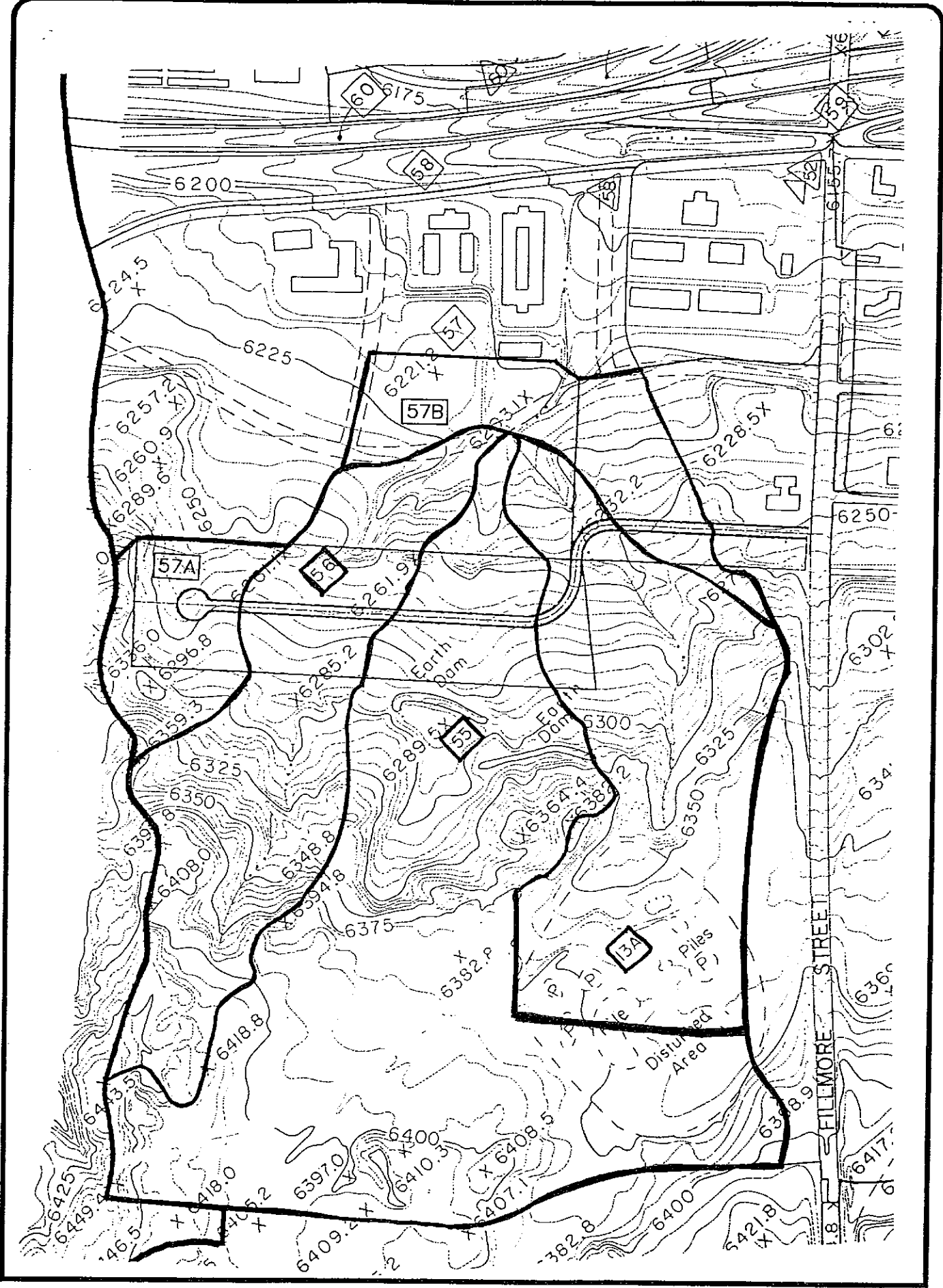
$$\$137,741.25 - \$120,808.80 = \$16,932.45$$

SUMMARY

The mostly undeveloped parcel will be developed for light industrial uses. The required public and private drainage facilities will be constructed to address storm flows off the property. These facilities will include a temporary private detention facility, which will reduce both on-site and off-site flows to a level below an existing 5-year storm. This detention basin will be privately maintained until such time as adequate downstream outlet facilities are constructed per the Master Plan for the Mesa Drainage Basin. A private maintenance agreement will be complete and submitted in the Final Drainage Report.

Appendix A

Design Calculations



SHEET 4 OF 4	FILLMORE HEIGHTS MASTER DEVELOPMENT DRAINAGE PLAN CITY OF COLORADO SPRINGS, COLORADO EXISTING CONDITIONS	NO.	DATE	REVISION	BY
PROJECT NO. 1574/47 SHEET NO. 4 OF 4 CITY OF COLORADO SPRINGS PROJECT MANAGER DATE DRAWN BY CHECKED BY					

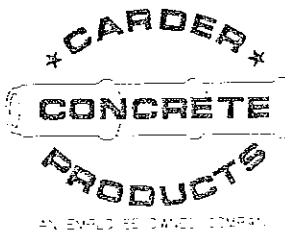
AREA DESIG.	AREA (acre)	C5 (5 yr)	C100 (100 yr)	C5 X A	C100 X A	L (ft)	Initial Tci			Travel Time						Q5 (cfs)	Q100 (cfs)	length L (feet)	vel. V (fps)	t (min)	AREA DESIG.
							Slope (%)	ti (min)	L (ft)	Slope (%)	V (fps)	Tt (min)	TC (min)	I5 (in/hr)	I100 (in/hr)						
DEVELOPED CONDITIONS (FILLMORE HEIGHTS SUB ONLY)																					
OS2	0.70	0.30	0.45	0.21	0.32	200	10.00	9.90	0	1.00	1.00	0.00	9.90	4.07	7.11	0.85	2.24	210	2.0	1.75	OS2
A	1.81	0.70	0.80	1.27	1.45	100	10.00	3.50	450	1.00	1.40	5.36	8.86	4.25	7.43	5.39	10.76				A
OS2-A				1.48	1.76								11.65	3.79	6.63	5.60	11.68	400	4.5	1.48	OS2-A
B	1.97	0.70	0.80	1.38	1.58	200	4.00	6.69	320	1.00	1.40	3.81	10.50	3.97	6.93	5.47	10.92				B
OS2-B				2.86	3.34								13.13	3.59	6.28	10.26	20.96	250	10.0	0.42	OS2-B
C	1.30	0.70	0.80	0.91	1.04	200	4.00	6.69	250	1.00	1.40	2.98	9.67	4.11	7.17	3.74	7.46				C
OS2-C				3.77	4.38								13.54	3.54	6.19	13.34	27.09				OS2-C
OS3	9.15	0.40	0.50	3.66	4.58	150	10.00	7.50	800	3.50	3.00	4.44	11.94	3.75	6.55	13.73	29.98				OS3
OS4	41.90	0.40	0.50	16.76	20.95	350	5.00	14.40	2000	5.00	4.00	8.33	22.73	2.72	4.75	45.56	99.47				OS4
OS3+OS4				20.42	25.53								22.73	2.72	4.75	55.51	121.19	200	4.5	0.74	OS3+OS4
OS2-C				24.19	29.90								23.47	2.67	4.66	64.59	139.48	320	10.0	0.53	OS2-C
D	2.00	0.70	0.80	1.40	1.60	200	4.00	6.69	400	6.00	4.00	1.67	8.36	4.35	7.60	6.09	12.16				D
OS2-D				25.59	31.50								24.01	2.64	4.61	67.47	145.11	60	10.0	0.10	OS2-D
OS1	0.24	0.30	0.45	0.07	0.11	50	10.00	4.95	0	12.00	9.00	0.00	4.95	5.20	9.09	0.37	0.98	450	4.5	1.67	OS1
E	1.99	0.70	0.80	1.39	1.59	250	4.00	7.49	300	1.00	1.40	3.57	11.06	3.88	6.78	5.41	10.79				E
OS1-E				1.47	1.70								11.06	3.88	6.78	5.69	11.52	400	4.5	1.48	OS1-E
F	1.66	0.70	0.80	1.16	1.33	200	4.00	6.69	300	1.00	1.40	3.57	10.27	4.01	7.00	4.65	9.29				F
OS1-F				2.63	3.03								12.54	3.67	6.41	9.64	19.41	250	4.5	0.93	OS1-F
G	1.09	0.70	0.80	0.76	0.87	200	4.00	6.69	130	6.00	4.00	0.54	7.24	4.59	8.02	3.50	6.99				G
OS2-G				3.39	3.90								13.46	3.55	6.20	12.04	24.19	170	4.5	0.63	OS2-G
H	0.61	0.70	0.80	0.43	0.49	180	4.00	6.35	100	6.00	4.00	0.42	6.77	4.70	8.21	2.01	4.01				H
OS2-H				3.82	4.39								14.09	3.48	6.07	13.27	26.64				OS2-H
OS1-H				29.40	35.89								24.11	2.63	4.60	77.36	164.93				OS1-H
OS5	23.53	0.50	0.60	11.77	14.12	200	2.00	12.62	1600	12.00	9.00	2.96	15.59	3.31	5.78	38.95	81.64				OS5
OS1-OS5				41.17	50.01								24.11	2.63	4.60	108.31	229.81				OS1-OS5
OS6	0.43	0.30	0.45	0.13	0.19	200	15.00	8.66	0	1.00	1.00	0.00	8.66	4.29	7.50	0.55	1.45	100	10.0	0.17	OS6
I	0.21	0.70	0.80	0.15	0.17	130	4.00	5.40	0	2.50	3.20	0.00	5.40	5.07	8.85	0.75	1.49				I
OS6-I				0.28	0.36								5.40	5.07	8.85	1.40	3.20	550	4.0	2.29	OS6-I
OS7	0.78	0.30	0.45	0.23	0.35	350	10.00	13.09	0	3.50	2.80	0.00	13.09	3.60	6.28	0.84	2.21	400	6.0	1.11	OS7
J	1.66	0.70	0.80	1.16	1.33	130	4.00	5.40	500	3.00	3.50	2.38	7.78	4.47	7.81	5.20	10.37				J
OS7-J				1.40	1.68								14.20	3.46	6.05	4.83	10.16				OS7-J
OS6-J				1.67	2.04								14.20	3.46	6.05	5.79	12.34				OS6-J
OS1-OS5				42.84	52.05								24.11	2.63	4.60	112.71	239.19	400	6.0	1.11	OS1-OS5
OS8	2.94	0.30	0.45	0.88	1.32	200	10.00	9.90	500	4.00	3.40	2.45	12.35	3.70	6.46	3.26	8.54				OS8
OS9	1.24	0.70	0.80	0.87	0.99	150	10.00	4.28	400	5.00	2.70	2.47	6.75	4.71	8.22	4.09	8.15				OS9
OS10	1.32	0.70	0.80	0.92	1.06	200	10.00	4.95	300	6.50	3.40	1.47	6.42	4.79	8.37	4.43	8.83				OS10
OS8-OS10				2.67	3.37								12.35	3.70	6.46	9.88	21.76				OS8-OS10
OS1-OS10				45.51	55.42								25.22	2.56	4.48	116.73	248.28				OS1-OS10
OS11	3.42	0.40	0.55	1.37	1.88	300	4.00	14.35	500	5.00	3.00	2.78	17.13	3.16	5.52	4.32	10.38				OS11
OS1-OS11				46.88	57.30								25.22	2.56	4.48	120.24	256.71				OS1-OS11
K	2.29	0.70	0.80	1.60	1.83	250	4.00	7.49	350	3.50	2.80	2.08	9.57	4.12	7.20	6.61	13.20	400	6.0	1.11	K
L	3.08	0.70	0.80	2.16	2.46	100	4.00	4.73	800	6.00	4.00	3.33	8.07	4.41	7.71	9.51	18.99				L

K+L				3.76	4.30									10.68	3.94	6.88	14.81	29.56				K+L
OS1-OS11				50.64	61.60									25.22	2.56	4.48	129.88	275.95				OS1-OS11
M	0.21	0.70	0.80	0.15	0.17	25	5.00	2.20	150	3.00	3.50	0.71	2.91	5.20	9.00	0.76	1.51					M
N	1.91	0.75	0.80	1.43	1.53	25	4.00	2.07	250	4.00	3.40	1.23	3.30	5.20	9.00	7.45	13.75					N
O	0.21	0.90	0.95	0.19	0.20	25	4.00	1.18	300	2.00	2.80	1.79	2.97	5.20	9.00	0.98	1.80					O

AREA	AREA	C5	C100	C5 X A	C100 X A		Initial Tci		Travel Time									length	vel.		AREA
DESIG.	(acre)	(5 yr)	(100 yr)			L (ft)	Slope (%)	ti (min)	L (ft)	Slope (%)	V (fps)	Tt (min)	TC (min)	I5 (in/hr)	I100 (in/hr)	Q5 (cfs)	Q100 (cfs)	L (feet)	V (fps)	tt (min)	DESIG.
DEVELOPED CONDITIONS (TOTALLY DEVELOPED)																					
OS2	0.70	0.30	0.45	0.21	0.32	200	10.00	9.90	0	1.00	1.00	0.00	9.90	4.07	7.11	0.85	2.24	210	2.0	1.75	OS2
A	1.81	0.70	0.80	1.27	1.45	100	10.00	3.50	450	1.00	1.40	5.36	8.86	4.25	7.43	5.39	10.76				A
OS2-A				1.48	1.76								11.65	3.79	6.63	5.60	11.68	400	4.5	1.48	OS2-A
B	1.97	0.70	0.80	1.38	1.58	200	4.00	6.69	320	1.00	1.40	3.81	10.50	3.97	6.93	5.47	10.92				B
OS2-B				2.86	3.34								13.13	3.59	6.28	10.26	20.96	250	10.0	0.42	OS2-B
C	1.30	0.70	0.80	0.91	1.04	200	4.00	6.69	250	1.00	1.40	2.98	9.67	4.11	7.17	3.74	7.46				C
OS2-C				3.77	4.38								13.54	3.54	6.19	15.51	27.09				OS2-C
OS3	9.15	0.50	0.60	4.58	5.49	150	10.00	6.43	800	6.00	5.00	2.67	9.09	4.21	7.35	19.26	40.37	200	4.5	0.74	OS3
OS4	41.90	0.70	0.80	29.33	33.52	300	5.00	7.62	1800	6.00	8.00	3.75	11.37	3.83	6.70	112.46	224.50				OS4
OS3+OS4				33.91	39.01								11.37	3.83	6.70	130.00	261.26	200	4.5	0.74	OS3+OS4
OS2-C				37.67	43.39								13.54	3.54	6.19	133.42	268.41	320	10.0	0.53	OS2-C
D	2.00	0.70	0.80	1.40	1.60	200	4.00	6.69	400	6.00	4.00	1.67	8.36	4.35	7.60	6.09	12.16				D
OS2-D				39.07	44.99								14.08	3.48	6.07	135.88	273.28	60	10.0	0.10	OS2-D
OS1	0.24	0.30	0.45	0.07	0.11	50	10.00	4.95	0	12.00	9.00	0.00	4.95	5.20	9.09	0.37	0.98	450	4.5	1.67	OS1
E	1.99	0.70	0.80	1.39	1.59	250	4.00	7.49	300	1.00	1.40	3.57	11.06	3.88	6.78	5.41	10.79				E
OS1-E				1.47	1.70								11.06	3.88	6.78	5.69	11.52	400	4.5	1.48	OS1-E
F	1.66	0.70	0.80	1.16	1.33	200	4.00	6.69	300	1.00	1.40	3.57	10.27	4.01	7.00	4.65	9.29				F
OS1-F				2.63	3.03								12.54	3.67	6.41	9.64	19.41	250	4.5	0.93	OS1-F
G	1.09	0.70	0.80	0.76	0.87	200	4.00	6.69	130	6.00	4.00	0.54	7.24	4.59	8.02	3.50	6.99				G
OS2-G				3.39	3.90								13.46	3.55	6.20	12.04	24.19	170	4.5	0.63	OS2-G
H	0.61	0.70	0.80	0.43	0.49	180	4.00	6.35	100	6.00	4.00	0.42	6.77	4.70	8.21	2.01	4.01				H
OS2-H				3.82	4.39								14.09	3.48	6.07	13.27	26.64				OS2-H
OS1-H				42.89	49.38								14.18	3.47	6.05	148.65	298.93				OS1-H
OS5	23.53	0.70	0.80	16.47	18.82	200	2.00	8.42	1600	12.00	9.00	2.96	11.38	3.83	6.69	63.13	126.02				OS5
OS1-OS5				59.36	68.20								14.18	3.47	6.05	205.74	412.89				OS1-OS5
OS6	0.43	0.30	0.45	0.13	0.19	200	15.00	8.66	0	1.00	1.00	0.00	8.66	4.29	7.50	0.55	1.45	100	10.0	0.17	OS6
I	0.21	0.70	0.80	0.15	0.17	130	4.00	5.40	0	2.50	3.20	0.00	5.40	5.07	8.85	0.75	1.49				I
OS6-I				0.28	0.36								5.40	5.07	8.85	1.40	3.20	550	4.0	2.29	OS6-I
OS7	0.78	0.30	0.45	0.23	0.35	350	10.00	13.09	0	3.50	2.80	0.00	13.09	3.60	6.28	0.84	2.21	400	6.0	1.11	OS7
J	1.66	0.70	0.80	1.16	1.33	130	4.00	5.40	500	3.00	3.50	2.38	7.78	4.47	7.81	5.20	10.37				J
OS7-J				1.40	1.68								14.20	3.46	6.05	4.83	10.16				OS7-J
OS6-J				1.67	2.04								14.20	3.46	6.05	5.79	12.34				OS6-J
OS1-OS5				61.03	70.24								14.18	3.47	6.05	211.54	425.25	400	6.0	1.11	OS1-OS5
OS8	2.94	0.30	0.45	0.88	1.32	200	10.00	9.90	500	4.00	3.40	2.45	12.35	3.70	6.46	3.26	8.54				OS8
OS9	1.24	0.70	0.80	0.87	0.99	150	10.00	4.28	400	5.00	2.70	2.47	6.75	4.71	8.22	4.09	8.15				OS9
OS10	1.32	0.70	0.80	0.92	1.06	200	10.00	4.95	300	6.50	3.40	1.47	6.42	4.79	8.37	4.43	8.83				OS10
OS8-OS10				2.67	3.37								12.35	3.70	6.46	9.88	21.76				OS8-OS10
OS1-OS10				63.71	73.61								15.29	3.34	5.84	212.92	429.73				OS1-OS10
OS11	3.42	0.40	0.55	1.37	1.88	300	4.00	14.35	500	5.00	3.00	2.78	17.13	3.16	5.52	4.32	10.38				OS11
OS1-OS11				65.07	75.49								15.29	3.34	5.84	217.49	440.71				OS1-OS11

K	2.29	0.70	0.80	1.60	1.83	250	4.00	7.49	350	3.50	2.80	2.08	9.57	4.12	7.20	6.61	13.20	400	6.0	1.11	K
L	3.08	0.70	0.80	2.16	2.46	100	4.00	4.73	800	6.00	4.00	3.33	8.07	4.41	7.71	9.51	18.99				L
K+L				3.76	4.30								10.68	3.94	6.88	14.81	29.56				K+L
OS1-OS11				68.83	79.79								15.29	3.34	5.84	230.05	465.79				OS1-OS11
M	0.21	0.70	0.80	0.15	0.17	25	5.00	2.20	150	3.00	3.50	0.71	2.91	5.20	9.00	0.76	1.51				M
N	1.91	0.75	0.80	1.43	1.53	25	4.00	2.07	250	4.00	3.40	1.23	3.30	5.20	9.00	7.45	13.75				N
O	0.21	0.90	0.95	0.19	0.20	25	4.00	1.18	300	2.00	2.80	1.79	2.97	5.20	9.00	0.98	1.80				O

FILLMORE HEIGHTS																				
HYDRAULIC GRADELINE CALCULATIONS																				
ULTIMATE CONDITIONS																				
Sta.	Inv.	D	W.S.	Section	A	K	V	Q	V ² /2g	E.G.	Sf	Avg. Sf	L	Hf	Hb	Hj	Hm	Ht	E.G.	Sta.
TRUNK SEWER																				
0+00	6218.00	66	6222.68	RCP-RND	23.76	0.00492	17.90	425.3	4.98	6227.65	0.01604	0.01604	50.00	0.80					6227.65	0+00
0+50	6221.50	66	6224.20	RCP-RND	23.76	0.00492	17.90	425.3	4.98	6229.18	0.01604	0.01604	0.00	0.00	1.00				6229.18	0+50
0+50	6221.80	66	6225.20	RCP-RND	23.76	0.00492	17.90	425.3	4.98	6230.17	0.01604	0.01604	110.00	1.76					6230.17	0+50
1+60	6226.20	66	6229.00	RCP-RND	23.76	0.00492	17.90	425.3	4.98	6233.98	0.01604	0.01604	0.00	0.00	1.00				6233.98	1+60
1+60	6226.50	66	6230.00	RCP-RND	23.76	0.00492	17.90	425.3	4.98	6234.97	0.01604	0.01604	35.00	0.56					6234.97	1+60
1+95	6227.90	66	6230.70	RCP-RND	23.76	0.00492	17.90	425.3	4.98	6235.68	0.01604	0.01584	0.00	0.00		1.49	0.25		6235.68	1+95
1+95	6228.20	66	6232.44	RCP-RND	23.76	0.00492	17.67	419.9	4.85	6237.29	0.01564	0.01564	30.00	0.47					6237.29	1+95
2+25	6229.40	66	6232.91	RCP-RND	23.76	0.00492	17.67	419.9	4.85	6237.76	0.01564	0.01166	0.00	0.00		0.94	0.24		6237.76	2+25
2+25	6229.70	66	6234.09	RCP-RND	23.76	0.00492	17.38	412.9	4.69	6238.78	0.01512	0.01141	8.00	0.09					6238.78	2+25
2+30	6230.02	66	6234.18	RCP-RND	23.76	0.00492	17.38	412.9	4.69	6238.87	0.01512	0.00756	8.00	0.06		3.02			6238.87	2+30
2+41	6231.92	48	6237.26	RCP-RND	12.57	0.00492	10.03	126.0	1.56	6238.82	0.00769	0.00769	4.00	0.03				1.47	6238.82	2+41
2+45	6232.12	48	6238.76	RCP-RND	12.57	0.00492	10.03	126.0	1.56	6240.33	0.00769	0.00384	0.00	0.00					6240.33	2+45
2+30	6230.02	66	6234.18	RCP-RND	23.76	0.00492	17.67	419.9	4.85	6239.03	0.01564	0.02945	0.00	0.00		3.69			6239.03	2+30
2+30	6231.52	48	6237.87	RCP-RND	12.57	0.00492	23.79	298.9	8.79	6246.66	0.04326	0.04326	60.00	2.60					6246.66	2+30
0+60	6234.52	48	6240.47	RCP-RND	12.57	0.00492	23.79	298.9	8.79	6249.25	0.04326	0.03972	0.00	0.00			0.44		6249.25	0+60
0+60	6234.82	48	6240.91	RCP-RND	12.57	0.00492	21.75	273.3	7.34	6248.25	0.03617	0.01809	321.00	5.81					6248.25	0+60
3+81	6254.08	48	6257.48	RCP-RND	12.57	0.00492	21.75	273.3	7.34	6264.82	0.03617	0.03617	0.00	0.00	1.47				6264.82	3+81
3+81	6254.58	48	6258.95	RCP-RND	12.57	0.00492	21.75	273.3	7.34	6266.29	0.03617	0.03617	8.00	0.29		2.10			6266.29	3+81
3+89	6255.06	48	6261.34	RCP-RND	12.57	0.00492	20.79	261.3	6.71	6268.05	0.03306	0.03306	180.00	5.95	1.34				6268.05	3+89
5+65	6264.06	48	6268.63	RCP-RND	12.57	0.00492	20.79	261.3	6.71	6275.35	0.03306	0.03306	0.00	0.00					6275.35	5+65



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FILLMORE HTS
 HYDRAULIC GRADE LINE

DATE 3/13/98 PAGE of

60" X 48" JUNCTION

$$(HJ + D_1 - D_2) \left(\frac{A_1 + A_2}{2} \right) = \frac{Q_2^2}{A_2 g} - \frac{Q_1^2}{A_1 g} - \frac{Q_3^2 \cos \theta}{A_3 g}$$

298.9 CFS
 (48") 3
 45°
 1 (48")
 126 CFS

$$(HJ + 4 - 5.5) \left(\frac{12.57 + 23.76}{2} \right) = \frac{(412.9)^2}{(23.76)(32.2)} - \frac{(126)^2}{(12.57)(32.2)} - \frac{(298.9)^2 \cos 45^\circ}{(12.57)(32.2)}$$

$$HJ - 1.5(18.17) = 222.84 - 39.22 - 156.08$$

$$18.17 HJ - 27.26 = 27.54$$

$$HJ = \frac{54.80}{18.17}$$

$$HJ = 3.02$$

48" X 24" JUNCTION

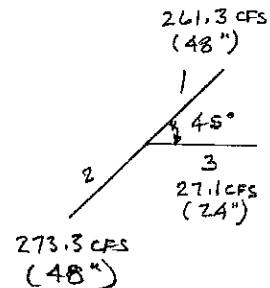
$$(HJ + 4 - 4) (12.56 + 12.56) = \frac{(273.3)^2}{(12.57)(32.2)} - \frac{(261.3)^2}{(12.57)(32.2)} - \frac{(27.1)^2 \cos 45^\circ}{(3.14)(32.2)}$$

$$12.56 HJ = 184.54 - 168.69 - 5.14$$

$$12.56 HJ = 10.71$$

$$HJ = \frac{26.41}{12.56}$$

$$HJ = 2.10$$



Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: FILLMORE HTS

Comment: STORM SEWER CAPACITY

Solve For Actual Depth

Given Input Data:

Diameter.....	4.00 ft
Slope.....	0.0400 ft/ft
Manning's n.....	0.013
Discharge.....	126.00 cfs

Computed Results:

Depth.....	1.85 ft
Velocity.....	22.11 fps
Flow Area.....	5.70 sf
Critical Depth....	3.37 ft
Critical Slope....	0.0074 ft/ft
Percent Full.....	46.34 %
Full Capacity.....	287.29 cfs
QMAX @.94D.....	309.04 cfs
Froude Number.....	3.26 (flow is Supercritical)

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: FILLMORE HTS

Comment: STORM SEWER CAPACITY

Solve For Actual Depth

Given Input Data:

Diameter.....	4.00 ft
Slope.....	0.0500 ft/ft
Manning's n.....	0.013
Discharge.....	261.30 cfs

Computed Results:

Depth.....	2.74 ft
Velocity.....	28.48 fps
Flow Area.....	9.17 sf
Critical Depth....	3.95 ft
Critical Slope....	0.0301 ft/ft
Percent Full.....	68.50 %
Full Capacity.....	321.20 cfs
QMAX @.94D.....	345.51 cfs
Froude Number.....	3.19 (flow is Supercritical)

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: FILLMORE HTS

Comment: STORM SEWER CAPACITY

Solve For Actual Depth

Given Input Data:

Diameter.....	4.00 ft
Slope.....	0.0600 ft/ft
Manning's n.....	0.013
Discharge.....	298.90 cfs

Computed Results:

Depth.....	2.83 ft
Velocity.....	31.43 fps
Flow Area.....	9.51 sf
Critical Depth....	3.97 ft
Critical Slope....	0.0402 ft/ft
Percent Full.....	70.79 %
Full Capacity.....	351.85 cfs
QMAX @.94D.....	378.49 cfs
Froude Number.....	3.43 (flow is Supercritical)

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: FILLMORE HTS

Comment: STORM SEWER CAPACITY

Solve For Actual Depth

Given Input Data:

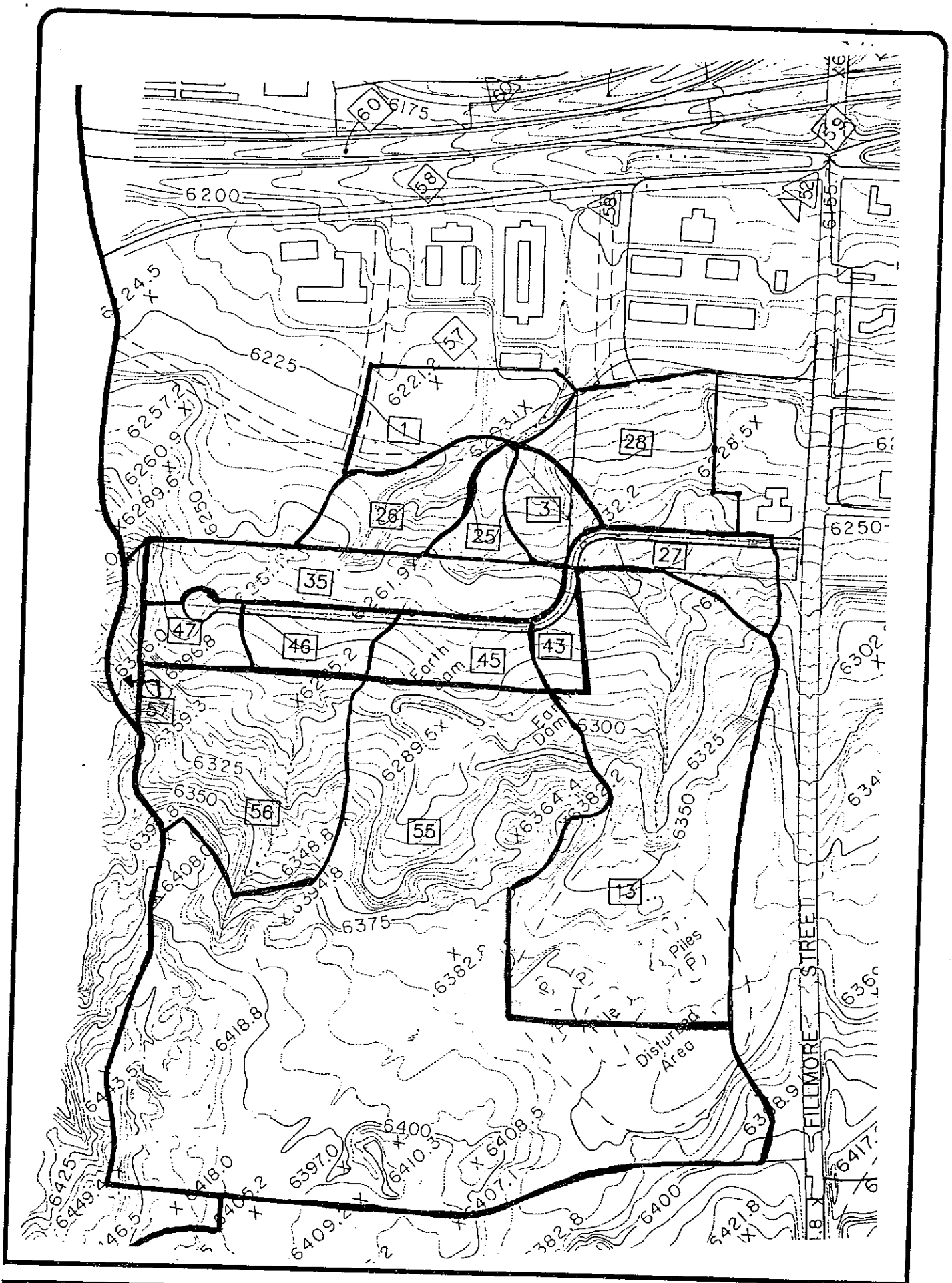
Diameter.....	5.50 ft
Slope.....	0.0400 ft/ft
Manning's n.....	0.013
Discharge.....	425.30 cfs


Computed Results:

Depth.....	3.18 ft
Velocity.....	29.92 fps
Flow Area.....	14.22 sf
Critical Depth....	5.25 ft
Critical Slope....	0.0139 ft/ft
Percent Full.....	57.76 %
Full Capacity.....	671.62 cfs
QMAX @.94D.....	722.46 cfs
Froude Number.....	3.26 (flow is Supercritical)

Appendix B

TR-20 Calculations



SHEET 1 of 1	FILLMORE HEIGHTS MASTER DEVELOPMENT DRAINAGE PLAN CITY OF COLORADO SPRINGS, COLORADO TR-20 DELINEATION	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>NO.</th> <th>DATE</th> <th>REVISION</th> <th>BY</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>	NO.	DATE	REVISION	BY														<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="font-size: small;"> DATE: 12/14/17 PROJECT NUMBER: 17000 CDD FILE NO.: 17-000000 DRAWN BY: [blank] </td> <td style="font-size: small;"> CHECKED BY: [blank] PROJECT MANAGER: [blank] SCALE: [blank] UNIT: [blank] </td> </tr> </table>	DATE: 12/14/17 PROJECT NUMBER: 17000 CDD FILE NO.: 17-000000 DRAWN BY: [blank]	CHECKED BY: [blank] PROJECT MANAGER: [blank] SCALE: [blank] UNIT: [blank]
	NO.	DATE	REVISION	BY																		
DATE: 12/14/17 PROJECT NUMBER: 17000 CDD FILE NO.: 17-000000 DRAWN BY: [blank]	CHECKED BY: [blank] PROJECT MANAGER: [blank] SCALE: [blank] UNIT: [blank]																					

*****80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY*****

DB TR-20 SUMMARY NOPLOTS
 TITLE 001 FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
 TITLE DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

5 RAINFL 7	0.5				
3	0.0000	0.0040	0.0080	0.0100	0.0140
8	0.0190	0.0220	0.0260	0.0300	0.0450
8	0.0600	0.1000	0.7100	0.7500	0.7750
8	0.8000	0.8200	0.8300	0.8400	0.8500
8	0.8600	0.8700	0.8750	0.8850	0.8900
8	0.9000	0.9050	0.9100	0.9200	0.9250
3	0.9300	0.9350	0.9400	0.9450	0.9500
8	0.9550	0.9600	0.9650	0.9700	0.9730
8	0.9750	0.9800	0.9830	0.9870	0.9900
3	0.9930	0.9960	0.9999	1.0000	1.0000

9 ENDTBL				
2 XSECTN	001	1.0		
8		6195.0	0.0	0.0
8		6195.5	10.0	3.68
8		6195.9	50.0	10.64
8		6196.3	100.0	17.14
8		6197.9	500.0	54.08
8		6200.6	2000.0	150.12

9 ENDTBL				
2 XSECTN	003	1.0		
8		6203.0	0.0	0.0
8		6203.5	10.0	3.68
8		6203.9	50.0	10.64
8		6204.3	100.0	17.14
8		6205.9	500.0	54.08
8		6208.6	2000.0	150.12

9 ENDTBL				
2 XSECTN	043	1.0		
8		6250.0	0.0	0.0
8		6250.1	10.0	4.18
8		6250.3	50.0	11.03
8		6250.5	100.0	16.78
8		6251.3	500.0	44.85

9 ENDTBL				
2 XSECTN	045	1.0		
8		6270.0	0.0	0.0
8		6270.1	10.0	4.18
8		6270.3	50.0	11.03
8		6270.5	100.0	16.78
8		6271.3	500.0	44.85

9 ENDTBL				
2 XSECTN	046	1.0		

1

*****80-80 LIST OF INPUT DATA (CONTINUED)*****

8	6275.0	0.0	0.0
8	6275.1	10.0	4.18

8		6275.3	50.0	11.03
8		6275.5	100.0	16.78
8		6276.3	500.0	44.85
9	ENDTBL			
2	XSECTN 047	1.0		
8		6277.0	0.0	0.0
8		6277.1	10.0	4.18
8		6277.3	50.0	11.03
8		6277.5	100.0	16.78
8		6278.3	500.0	44.85
9	ENDTBL			
2	XSECTN 055	1.0		
8		6300.0	0.0	0.0
8		6300.4	5.0	2.47
8		6300.6	10.0	3.98
8		6300.9	20.0	6.47
8		6301.1	30.0	8.64
8		6301.4	50.0	12.50
9	ENDTBL			
3	STRUCT 01			
8		6210.0	0.0	0.0
8		6212.0	20.0	0.459
8		6214.0	50.0	2.370
8		6216.0	72.0	4.395
8		6218.0	90.0	6.500
8		6220.0	100.0	8.680
8		6222.0	280.0	10.900
8		6224.0	600.0	13.200
9	ENDTBL			
3	STRUCT 02			
8		6195.0	0.0	0.0
8		6196.0	10.0	0.023
8		6197.0	20.0	0.253
8		6198.0	35.0	0.942
8		6199.0	50.0	1.860
8		6201.0	72.0	3.790
8		6203.0	90.0	5.815
8		6205.0	100.0	7.937
9	ENDTBL			
3	STRUCT 55			
8		6290.0	0.0	0.0
8		6292.0	0.0	0.172
8		6294.0	0.0	1.159
8		6295.0	0.0	1.750

1

*****80-80 LIST OF INPUT DATA (CONTINUED)*****

8		6296.0	60.0	2.600
8		6298.0	300.0	3.740
9	ENDTBL			
3	STRUCT 56			
8		6286.0	0.0	0.0
8		6288.0	0.0	0.068
8		6290.0	0.0	0.309
8		6290.5	11.0	0.430
8		6291.0	30.0	0.550
8		6292.5	200.0	0.700

```

) ENDTBL
6 RUNOFF 1 057      5      0.001      72.0      0.040      1
5 REACH 3 047      5 1      300.0
5 RUNOFF 1 047      7      0.0027      93.0      0.030      1
6 ADDHYD 4 047      7 1 6
5 REACH 3 047      6 4      400.0
5 RUNOFF 1 046      5      0.0036      93.0      0.030      1
6 ADDHYD 4 046      4 5 6
6 ADDHYD 4 046      6 4 5
5 REACH 3 045      5 3      450.0
5 RUNOFF 1 056      4      0.0143      74.0      0.200      1
6 REACH 3 055      4 7      250.0
5 RUNOFF 1 055      6      0.0730      76.0      0.379      1
5 ADDHYD 4 055      7 6 4
6 RESVOR 2 55 4 7      6290.0
5 RUNOFF 1 045      5      0.0047      93.0      0.030      1
5 ADDHYD 4 045      7 5 6
5 ADDHYD 4 045      6 3 4
6 REACH 3 043      4 7      250.0
5 RUNOFF 1 043      5      0.0020      93.0      0.030      1
5 ADDHYD 4 043      5 7 6
6 RUNOFF 1 035      5      0.0072      93.0      0.200      1
5 ADDHYD 4 035      5 6 7
5 RUNOFF 1 013      5      0.0368      80.0      0.190      1
6 ADDHYD 4 013      7 5 6
6 RUNOFF 1 027      4      0.0020      93.0      0.050      1
5 ADDHYD 4 027      6 4 5
5 REACH 3 003      5 7      400.0
6 RUNOFF 1 026      5      0.0041      80.0      0.065      1
5 ADDHYD 4 026      7 5 6
5 RUNOFF 1 025      4      0.0019      93.0      0.040      1
6 ADDHYD 4 025      6 4 3
5 RUNOFF 1 028      7      0.0072      93.0      0.140      1
5 ADDHYD 4 028      7 3 4
6 RUNOFF 1 003      5      0.0031      93.0      0.050      1
6 ADDHYD 4 001      4 5 6

```

*****80-80 LIST OF INPUT DATA (CONTINUED)*****

```

6 RUNOFF 1 001      5      0.0039      93.0      0.250      1
5 ADDHYD 4 001      6 5 3
5 RESVOR 2 02 3 7      6195.0
  ENDDATA
7 INCREM 6      0.10
7 COMPUT 7 057      02      0.0      4.50      1.0      7 2 01 01
  ENDCMP 1
  ENDJOB 2

```

*****END OF 80-80 LIST*****

(EXECUTIVE CONTROL OPERATION INCREM

RECORD ID

MAIN TIME INCREMENT = .10 HOURS

(EXECUTIVE CONTROL OPERATION COMPUT

RECORD ID

FROM XSECTION 57
TO STRUCTURE 2

STARTING TIME = .00 RAIN DEPTH = 4.50 RAIN DURATION= 1.00 RAIN TABLE NO.= 7 ANT. MOIST. COND= 2
 ALTERNATE NO.= 1 STORM NO.= 1 MAIN TIME INCREMENT = .10 HOURS

OPERATION RUNOFF CROSS SECTION 57

** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(2.27) AT XSECTION 57 EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 7 %.

TIME(HRS)	DISCHG	FIRST HYDROGRAPH POINT = .00 HOURS	PEAK DISCHARGE(CFS)	TIME INCREMENT = .10 HOURS	PEAK ELEVATION(FEET)	DRAINAGE AREA = .00 SQ.MI.
5.00	DISCHG	.00	2.27	.00	(RUNOFF)	1.82
6.00	DISCHG	2.11		.15		.09
7.00	DISCHG	.09		.10		.08
8.00	DISCHG	.08		.04		.04
9.00	DISCHG	.04		.04		.04
10.00	DISCHG	.04		.04		.02
11.00	DISCHG	.02		.04		.02
12.00	DISCHG	.02		.04		.02
13.00	DISCHG	.02		.02		.04
14.00	DISCHG	.04		.02		.02
15.00	DISCHG	.02		.02		.02
16.00	DISCHG	.02		.02		.02
17.00	DISCHG	.02		.02		.02
18.00	DISCHG	.02		.02		.02
19.00	DISCHG	.02		.01		.01
20.00	DISCHG	.01		.02		.01
21.00	DISCHG	.01		.02		.01
22.00	DISCHG	.01		.01		.01
23.00	DISCHG	.01		.02		.00

*** WARNING REACH 47 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

OPERATION REACH CROSS SECTION 47

** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(2.27) AT XSECTION 47 EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 7 %.

PEAK TIME(HRS) 5.96 PEAK DISCHARGE(CFS) 2.27 PEAK ELEVATION(FEET) 6277.02

0920 XEQ 01-26-98 09:10
 REV PC 09/83(.2)

FILLMORE HIGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
 DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 PASS 1
 PAGE 1

TIME(HRS)	DISCHG	FIRST HYDROGRAPH POINT = .00 HOURS	PEAK DISCHARGE(CFS)	TIME INCREMENT = .10 HOURS	PEAK ELEVATION(FEET)	DRAINAGE AREA = .00 SQ.MI.
5.00	DISCHG	.00	2.27	.00		1.82
6.00	DISCHG	2.11		.15		.09
7.00	DISCHG	.09		.10		.08
8.00	DISCHG	.08		.04		.04
9.00	DISCHG	.04		.04		.04

10.00	DISCHG	.04	.04	.04	.04	.04	.04	.02	.02	.02	.02
11.00	DISCHG	.02	.04	.04	.04	.04	.04	.02	.02	.02	.02
12.00	DISCHG	.02	.04	.04	.04	.04	.04	.02	.02	.02	.02
13.00	DISCHG	.02	.02	.02	.02	.02	.02	.04	.04	.04	.04
14.00	DISCHG	.04	.02	.02	.02	.02	.02	.02	.02	.02	.02
15.00	DISCHG	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
16.00	DISCHG	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
17.00	DISCHG	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
18.00	DISCHG	.02	.02	.02	.02	.02	.02	.02	.02	.02	.02
19.00	DISCHG	.02	.01	.01	.01	.01	.01	.01	.01	.01	.01
20.00	DISCHG	.01	.02	.02	.02	.02	.02	.01	.01	.01	.01
21.00	DISCHG	.01	.02	.02	.02	.02	.02	.01	.01	.01	.01
22.00	DISCHG	.01	.01	.01	.01	.01	.01	.01	.01	.01	.01
23.00	DISCHG	.01	.02	.02	.02	.02	.02	.00			

PERATION RUNOFF CROSS SECTION 47

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(10.16) AT XSECTION 47 EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 11 %.

TIME(HRS)	DISCHG	PEAK TIME(HRS) 5.95	PEAK DISCHARGE(CFS) 10.16	PEAK ELEVATION(FEET) (RUNOFF)	FIRST HYDROGRAPH POINT =	TIME INCREMENT =	DRAINAGE AREA =				
					.00 HOURS	.10 HOURS	.00 SQ.MI.				
4.00	DISCHG	.00	.00	.01	.01	.02	.03	.03	.04	.05	.05
5.00	DISCHG	.06	.19	.22	.25	.28	.30	7.03	8.22	8.73	9.00
6.00	DISCHG	9.15	.60	.60	.60	.60	.60	.38	.38	.38	.38
7.00	DISCHG	.38	.38	.38	.38	.38	.38	.30	.30	.30	.30
8.00	DISCHG	.30	.15	.15	.15	.15	.15	.15	.15	.15	.15
9.00	DISCHG	.15	.15	.15	.15	.15	.15	.15	.15	.15	.15
10.00	DISCHG	.15	.15	.15	.15	.15	.15	.08	.08	.08	.08
11.00	DISCHG	.08	.15	.15	.15	.15	.15	.08	.08	.08	.08
12.00	DISCHG	.08	.15	.15	.15	.15	.15	.08	.08	.08	.08
13.00	DISCHG	.08	.08	.08	.08	.08	.08	.15	.15	.15	.15
14.00	DISCHG	.15	.08	.08	.08	.08	.08	.08	.08	.08	.08
15.00	DISCHG	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
16.00	DISCHG	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
17.00	DISCHG	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
18.00	DISCHG	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
19.00	DISCHG	.08	.05	.05	.05	.05	.05	.03	.03	.03	.03
20.00	DISCHG	.03	.08	.08	.08	.08	.08	.05	.05	.05	.05

R20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 PASS 1
PAGE 2

21.00	DISCHG	.05	.06	.06	.06	.06	.06	.05	.05	.05	.05
22.00	DISCHG	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
23.00	DISCHG	.05	.06	.06	.06	.06	.06	.00			

PERATION ADDHYD CROSS SECTION 47

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(12.42) AT XSECTION 47 EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 10 %.

16.00	DISCHG	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
17.00	DISCHG	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
18.00	DISCHG	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
19.00	DISCHG	.10	.06	.06	.06	.06	.06	.04	.04	.04	.04
20.00	DISCHG	.04	.10	.10	.10	.10	.10	.06	.06	.06	.06
21.00	DISCHG	.06	.08	.08	.08	.08	.08	.06	.06	.06	.06
22.00	DISCHG	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
23.00	DISCHG	.06	.08	.08	.08	.08	.08	.00			

OPERATION RUNOFF CROSS SECTION 46

** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(13.55) AT XSECTION 46 EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 11 %.

+

PEAK TIME(HRS) 5.95
 PEAK DISCHARGE(CFS) 13.55
 PEAK ELEVATION(FEET) (RUNOFF)

TIME(HRS)	FIRST HYDROGRAPH POINT =	.00 HOURS	TIME INCREMENT =	.10 HOURS	DRAINAGE AREA =	.00 SQ.MI.
4.00	DISCHG	.00 .00 .01 .02 .03 .04 .05	.05	.06	.07	
5.00	DISCHG	.08 .25 .29 .33 .37 .40 9.38	10.97	11.65	12.00	
6.00	DISCHG	12.20 .80 .80 .80 .81 .81 .50	.50	.50	.50	
7.00	DISCHG	.50 .50 .50 .51 .51 .51 .40	.40	.40	.40	
8.00	DISCHG	.40 .20 .20 .20 .20 .20 .20	.20	.20	.20	
9.00	DISCHG	.20 .20 .20 .20 .20 .20 .20	.20	.20	.20	
10.00	DISCHG	.20 .20 .20 .20 .20 .20 .10	.10	.10	.10	
11.00	DISCHG	.10 .20 .20 .20 .20 .20 .10	.10	.10	.10	
12.00	DISCHG	.10 .20 .20 .20 .20 .20 .10	.10	.10	.10	
13.00	DISCHG	.10 .10 .10 .10 .10 .10 .20	.20	.20	.20	
14.00	DISCHG	.20 .10 .10 .10 .10 .10 .10	.10	.10	.10	
15.00	DISCHG	.10 .10 .10 .10 .10 .10 .10	.10	.10	.10	
16.00	DISCHG	.10 .10 .10 .10 .10 .10 .10	.10	.10	.10	
17.00	DISCHG	.10 .10 .10 .10 .10 .10 .10	.10	.10	.10	
18.00	DISCHG	.10 .10 .10 .10 .10 .10 .10	.10	.10	.10	
19.00	DISCHG	.10 .06 .06 .06 .06 .06 .04	.04	.04	.04	
20.00	DISCHG	.04 .10 .10 .10 .10 .10 .06	.06	.06	.06	
21.00	DISCHG	.06 .08 .08 .08 .08 .08 .06	.06	.06	.06	
22.00	DISCHG	.06 .06 .06 .06 .06 .06 .06	.06	.06	.06	
23.00	DISCHG	.06 .08 .08 .08 .08 .08 .00				

TR20 XEQ 01-26-98 09:10
 REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
 DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDDET

JOB 1 PASS 1
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OPERATION ADDHYD CROSS SECTION 46

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(25.97) AT XSECTION 46 EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 10 %.

PEAK TIME(HRS) 5.95
 PEAK DISCHARGE(CFS) 25.97
 PEAK ELEVATION(FEET) 6275.18

TIME(HRS)	FIRST HYDROGRAPH POINT =	.00 HOURS	TIME INCREMENT =	.10 HOURS	DRAINAGE AREA =	.01 SQ.MI.
-----------	--------------------------	-----------	------------------	-----------	-----------------	------------

4.00	DISCHG	.00	.00	.01	.03	.05	.06	.08	.10	.11	.12
5.00	DISCHG	.14	.44	.52	.58	.65	.71	16.53	20.06	21.81	22.82
6.00	DISCHG	23.46	1.56	1.55	1.55	1.56	1.56	.97	.98	.98	.98
7.00	DISCHG	.98	.98	.98	.98	.98	.98	.79	.79	.79	.79
8.00	DISCHG	.79	.39	.39	.39	.39	.39	.39	.39	.39	.39
9.00	DISCHG	.39	.39	.39	.39	.39	.39	.39	.39	.40	.40
10.00	DISCHG	.40	.40	.40	.40	.40	.40	.20	.20	.20	.20
11.00	DISCHG	.20	.40	.40	.40	.40	.40	.20	.20	.20	.20
12.00	DISCHG	.20	.40	.40	.40	.40	.40	.20	.20	.20	.20
13.00	DISCHG	.20	.20	.20	.20	.20	.20	.40	.40	.40	.40
14.00	DISCHG	.40	.20	.20	.20	.20	.20	.20	.20	.20	.20
15.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
16.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
17.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
18.00	DISCHG	.20	.20	.20	.20	.20	.20	.20	.20	.20	.20
19.00	DISCHG	.20	.12	.12	.12	.12	.12	.08	.08	.08	.08
20.00	DISCHG	.08	.20	.20	.20	.20	.20	.12	.12	.12	.12
21.00	DISCHG	.12	.16	.16	.16	.16	.16	.12	.12	.12	.12
22.00	DISCHG	.12	.12	.12	.12	.12	.12	.12	.12	.12	.12
23.00	DISCHG	.12	.16	.16	.16	.16	.16	.00			

OPERATION ADDHYD CROSS SECTION 46

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(38.38) AT XSECTION 46 EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 10 %.

	PEAK TIME(HRS)		PEAK DISCHARGE(CFS)		PEAK ELEVATION(FEET)						
	5.95		38.38		6275.24						
TIME(HRS)	FIRST HYDROGRAPH POINT =	.00 HOURS	TIME INCREMENT =	.10 HOURS	DRAINAGE AREA =	.01 SQ.MI.					
4.00	DISCHG	.00	.00	.02	.04	.07	.09	.12	.14	.16	.18
5.00	DISCHG	.20	.63	.74	.84	.92	1.01	23.68	29.16	31.96	33.64
6.00	DISCHG	34.72	2.32	2.30	2.30	2.31	2.31	1.45	1.45	1.45	1.45
7.00	DISCHG	1.45	1.45	1.45	1.45	1.46	1.46	1.17	1.17	1.17	1.17
8.00	DISCHG	1.17	.58	.58	.58	.58	.59	.59	.59	.59	.59
9.00	DISCHG	.59	.59	.59	.59	.59	.59	.59	.59	.59	.59
10.00	DISCHG	.59	.59	.59	.59	.59	.59	.29	.29	.29	.29

R20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 PASS 1
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11.00	DISCHG	.29	.59	.59	.59	.59	.59	.29	.29	.29	.29
12.00	DISCHG	.30	.59	.59	.59	.59	.59	.30	.30	.30	.30
13.00	DISCHG	.30	.30	.30	.30	.30	.30	.59	.59	.59	.59
14.00	DISCHG	.59	.30	.30	.30	.30	.30	.30	.30	.30	.30
15.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
16.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
17.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
18.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
19.00	DISCHG	.30	.18	.18	.18	.18	.18	.12	.12	.12	.12
20.00	DISCHG	.12	.30	.30	.30	.30	.30	.18	.18	.18	.18
21.00	DISCHG	.18	.24	.24	.24	.24	.24	.18	.18	.18	.18
22.00	DISCHG	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18
23.00	DISCHG	.18	.23	.23	.23	.23	.23	.00			

*** WARNING REACH 45 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

OPERATION REACH CROSS SECTION 45

** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(38.38) AT EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 10 %.

+ XSECTION 45

PEAK TIME(HRS) 5.95
 PEAK DISCHARGE(CFS) 38.38
 PEAK ELEVATION(FEET) 6270.24

TIME(HRS)	DISCHG	FIRST HYDROGRAPH POINT =	.00 HOURS	TIME INCREMENT =	.10 HOURS	DRAINAGE AREA =	.01 SQ.MI.				
4.00	DISCHG	.00	.00	.02	.04	.07	.09	.12	.14	.16	.18
5.00	DISCHG	.20	.63	.74	.84	.92	1.01	23.68	29.16	31.96	33.64
6.00	DISCHG	34.72	2.32	2.30	2.30	2.31	2.31	1.45	1.45	1.45	1.45
7.00	DISCHG	1.45	1.45	1.45	1.45	1.46	1.46	1.17	1.17	1.17	1.17
8.00	DISCHG	1.17	.58	.58	.58	.58	.59	.59	.59	.59	.59
9.00	DISCHG	.59	.59	.59	.59	.59	.59	.59	.59	.59	.59
10.00	DISCHG	.59	.59	.59	.59	.59	.59	.29	.29	.29	.29
11.00	DISCHG	.29	.59	.59	.59	.59	.59	.29	.29	.29	.29
12.00	DISCHG	.30	.59	.59	.59	.59	.59	.30	.30	.30	.30
13.00	DISCHG	.30	.30	.30	.30	.30	.30	.59	.59	.59	.59
14.00	DISCHG	.59	.30	.30	.30	.30	.30	.30	.30	.30	.30
15.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
16.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
17.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
18.00	DISCHG	.30	.30	.30	.30	.30	.30	.30	.30	.30	.30
19.00	DISCHG	.30	.18	.18	.18	.18	.18	.12	.12	.12	.12
20.00	DISCHG	.12	.30	.30	.30	.30	.30	.18	.18	.18	.18
21.00	DISCHG	.18	.24	.24	.24	.24	.24	.18	.18	.18	.18
22.00	DISCHG	.18	.18	.18	.18	.18	.18	.18	.18	.18	.18
23.00	DISCHG	.18	.23	.23	.23	.23	.23	.00			

OPERATION RUNOFF CROSS SECTION 56

TR20 XEQ 01-26-98 09:10
 REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
 DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDDET

JOB 1 PASS 1
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PEAK TIME(HRS) 6.01
 PEAK DISCHARGE(CFS) 26.26
 PEAK ELEVATION(FEET) (RUNOFF)

*** WARNING REACH 55 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

OPERATION REACH CROSS SECTION 55

PEAK TIME(HRS) 6.01
 PEAK DISCHARGE(CFS) 26.26
 PEAK ELEVATION(FEET) 6301.03

OPERATION RUNOFF CROSS SECTION 55

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.10	116.43	(RUNOFF)
10.42	3.21	(RUNOFF)
11.54	3.06	(RUNOFF)
12.54	3.08	(RUNOFF)
14.05	3.11	(RUNOFF)
23.48	1.28	(RUNOFF)

OPERATION ADDHYD CROSS SECTION 55

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.08	139.26	6302.74
7.45	9.19	6300.57
10.42	3.81	6300.30
11.51	3.65	6300.29
12.51	3.67	6300.29
14.02	3.71	6300.30
18.95	2.00	6300.16
23.47	1.54	6300.12

OPERATION RESVOR STRUCTURE 55

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.14	133.07	6296.61
10.46	3.81	6295.06
11.63	3.40	6295.06
12.63	3.43	6295.06
14.14	3.44	6295.06
18.95	1.99	6295.03
23.56	1.46	6295.02

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TR20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 PASS 1
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OPERATION RUNOFF CROSS SECTION 45

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(17.69) AT

EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 11 %.

XSECTION 45

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
5.95	17.69	(RUNOFF)

TIME(HRS)	FIRST HYDROGRAPH POINT =	.00 HOURS	TIME INCREMENT =	.10 HOURS	DRAINAGE AREA =	.00 SQ.MI.					
4.00	DISCHG	.00	.00	.01	.02	.04	.05	.06	.07	.08	.09
5.00	DISCHG	.10	.33	.38	.44	.48	.53	12.24	14.32	15.20	15.67
6.00	DISCHG	15.92	1.05	1.05	1.05	1.05	1.05	.66	.66	.66	.66
7.00	DISCHG	.66	.66	.66	.66	.66	.66	.53	.53	.53	.53
8.00	DISCHG	.53	.26	.26	.26	.26	.26	.26	.26	.26	.26
9.00	DISCHG	.26	.26	.26	.26	.26	.26	.26	.26	.26	.26
10.00	DISCHG	.26	.27	.27	.27	.27	.26	.13	.13	.13	.13
11.00	DISCHG	.13	.27	.27	.27	.27	.27	.13	.13	.13	.13

12.00	DISCHG	.13	.27	.27	.27	.27	.27	.13	.13	.13	.13
13.00	DISCHG	.13	.13	.13	.13	.13	.13	.27	.27	.27	.27
14.00	DISCHG	.27	.13	.13	.13	.13	.13	.13	.13	.13	.13
15.00	DISCHG	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13
16.00	DISCHG	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13
17.00	DISCHG	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13
18.00	DISCHG	.13	.13	.13	.13	.13	.13	.13	.13	.13	.13
19.00	DISCHG	.13	.08	.08	.08	.08	.08	.05	.05	.05	.05
20.00	DISCHG	.05	.13	.13	.13	.13	.13	.08	.08	.08	.08
21.00	DISCHG	.08	.11	.11	.11	.11	.11	.08	.08	.08	.08
22.00	DISCHG	.08	.08	.08	.08	.08	.08	.08	.08	.08	.08
23.00	DISCHG	.08	.10	.10	.10	.10	.10	.00			

OPERATION ADDHYD CROSS SECTION 45

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.14	132.29	6270.56
10.45	4.09	6270.04
12.60	3.55	6270.04
14.13	3.56	6270.04
18.95	2.13	6270.02
23.49	1.54	6270.02

OPERATION ADDHYD CROSS SECTION 45

TR20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 PASS 1
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PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.11	130.98	6270.56
10.45	4.71	6270.05
11.50	4.08	6270.04
12.50	4.10	6270.04
14.01	4.08	6270.04
18.95	2.44	6270.02
23.47	1.80	6270.02

*** WARNING REACH 43 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

OPERATION REACH CROSS SECTION 43

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.11	130.98	6250.56
10.45	4.71	6250.05
11.50	4.08	6250.04
12.50	4.10	6250.04
14.01	4.08	6250.04
18.95	2.44	6250.02
23.47	1.80	6250.02

OPERATION RUNOFF CROSS SECTION 43

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(7.53) AT XSECTION 43 EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 11 %.

TIME(HRS)	DISCHG	FIRST HYDROGRAPH POINT =	.00 HOURS	TIME INCREMENT =	.10 HOURS	PEAK DISCHARGE(CFS)	7.53	PEAK ELEVATION(FEET)	(RUNOFF)	DRAINAGE AREA =	.00 SQ.MI.
4.00	DISCHG	.00	.00	.00	.01	.02	.02	.03	.03	.03	.04
5.00	DISCHG	.04	.14	.16	.19	.21	.22	5.21	6.09	6.47	6.67
6.00	DISCHG	6.78	.45	.45	.45	.45	.45	.28	.28	.28	.28
7.00	DISCHG	.28	.28	.28	.28	.28	.28	.22	.22	.22	.22
8.00	DISCHG	.22	.11	.11	.11	.11	.11	.11	.11	.11	.11
9.00	DISCHG	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11
10.00	DISCHG	.11	.11	.11	.11	.11	.11	.06	.06	.06	.06
11.00	DISCHG	.06	.11	.11	.11	.11	.11	.06	.06	.06	.06
12.00	DISCHG	.06	.11	.11	.11	.11	.11	.06	.06	.06	.06
13.00	DISCHG	.06	.06	.06	.06	.06	.06	.11	.11	.11	.11
14.00	DISCHG	.11	.06	.06	.06	.06	.06	.06	.06	.06	.06
15.00	DISCHG	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
16.00	DISCHG	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
17.00	DISCHG	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
18.00	DISCHG	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06

TR20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 PASS 1
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19.00	DISCHG	.06	.03	.03	.03	.03	.03	.02	.02	.02	.02
20.00	DISCHG	.02	.06	.06	.06	.06	.06	.03	.03	.03	.03
21.00	DISCHG	.03	.05	.05	.05	.05	.05	.03	.03	.03	.03
22.00	DISCHG	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
23.00	DISCHG	.03	.04	.04	.04	.04	.04	.00			

OPERATION ADDEYD CROSS SECTION 43

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.05	136.66	6250.57
10.45	4.83	6250.05
11.50	4.19	6250.04
12.50	4.21	6250.04
14.00	4.19	6250.04
18.95	2.50	6250.02
23.46	1.85	6250.02

OPERATION RUNOFF CROSS SECTION 35

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
5.97	23.81	(RUNOFF)

OPERATION ADDHYD CROSS SECTION 35

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
----------------	---------------------	----------------------

6.04	158.67	(NULL)
10.45	5.25	(NULL)
11.49	4.60	(NULL)
12.49	4.62	(NULL)
14.00	4.60	(NULL)
18.93	2.68	(NULL)
23.46	2.01	(NULL)

OPERATION RUNOFF CROSS SECTION 13

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
5.99	85.62	(RUNOFF)
7.45	4.29	(RUNOFF)

OPERATION ADDHYD CROSS SECTION 13

TR20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDDET

JOB 1 PASS 1
PAGE 10

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.02	242.45	(NULL)
10.43	6.93	(NULL)
11.48	6.37	(NULL)
12.48	6.39	(NULL)
13.99	6.38	(NULL)
18.94	3.58	(NULL)
23.46	2.74	(NULL)

OPERATION RUNOFF CROSS SECTION 27

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(7.49) AT XSECTION 27 EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 10 %.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
5.95	7.49	(RUNOFF)

TIME(HRS)	FIRST HYDROGRAPH POINT =	.00 HOURS	TIME INCREMENT =	.10 HOURS	DRAINAGE AREA =	.00 SQ.MI.
4.00	DISCHG	.00 .00 .00	.01 .01 .02	.02 .03 .03	.04	
5.00	DISCHG	.04 .13 .16	.18 .20 .22	4.87 5.99 6.42	6.64	
6.00	DISCHG	6.76 .58 .45	.45 .45 .45	.28 .28 .28	.28	
7.00	DISCHG	.28 .28 .28	.28 .28 .28	.23 .22 .22	.22	
8.00	DISCHG	.22 .11 .11	.11 .11 .11	.11 .11 .11	.11	
9.00	DISCHG	.11 .11 .11	.11 .11 .11	.11 .11 .11	.11	
10.00	DISCHG	.11 .11 .11	.11 .11 .11	.06 .06 .06	.06	
11.00	DISCHG	.06 .11 .11	.11 .11 .11	.06 .06 .06	.06	
12.00	DISCHG	.06 .11 .11	.11 .11 .11	.06 .06 .06	.06	
13.00	DISCHG	.06 .06 .06	.06 .06 .06	.11 .11 .11	.11	
14.00	DISCHG	.11 .06 .06	.06 .06 .06	.06 .06 .06	.06	
15.00	DISCHG	.06 .06 .06	.06 .06 .06	.06 .06 .06	.06	
16.00	DISCHG	.06 .06 .06	.06 .06 .06	.06 .06 .06	.06	
17.00	DISCHG	.06 .06 .06	.06 .06 .06	.06 .06 .06	.06	

18.00	DISCHG	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
19.00	DISCHG	.06	.03	.03	.03	.03	.03	.02	.02	.02	.02
20.00	DISCHG	.02	.06	.06	.06	.06	.06	.03	.03	.03	.03
21.00	DISCHG	.03	.05	.05	.05	.05	.05	.03	.03	.03	.03
22.00	DISCHG	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
23.00	DISCHG	.03	.04	.04	.04	.04	.04	.00			

OPERATION ADDHYD CROSS SECTION 27

R20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 PASS 1
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PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.01	248.62	(NULL)
10.43	7.04	(NULL)
11.48	6.48	(NULL)
12.48	6.51	(NULL)
13.98	6.50	(NULL)
18.94	3.64	(NULL)
23.46	2.79	(NULL)

*** WARNING REACH 3 ATT-KIN COEFF.(C) GREATER THAN 0.667, CONSIDER REDUCING MAIN TIME INCREMENT ***

PERATION REACH CROSS SECTION 3

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.01	248.62	6204.89
10.43	7.04	6203.35
11.48	6.48	6203.32
12.48	6.51	6203.33
13.98	6.50	6203.32
18.94	3.64	6203.18
23.46	2.79	6203.14

OPERATION RUNOFF CROSS SECTION 26

** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(11.55) AT XSECTION 26 EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 7 %.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
5.96	11.55	(RUNOFF)

IME(HRS)	FIRST HYDROGRAPH POINT =	.00 HOURS	TIME INCREMENT =	.10 HOURS	DRAINAGE AREA =	.00 SQ.MI.
5.00	DISCHG	.00	.00	.00	2.25	9.73
6.00	DISCHG	10.71	1.42	.74	.49	.47
7.00	DISCHG	.47	.47	.47	.39	.38
8.00	DISCHG	.38	.20	.19	.19	.19
9.00	DISCHG	.19	.19	.19	.19	.19
10.00	DISCHG	.19	.19	.20	.10	.10
11.00	DISCHG	.10	.19	.20	.10	.10
12.00	DISCHG	.10	.19	.20	.11	.10

13.00	DISCHG	.10	.10	.10	.10	.10	.10	.19	.20	.20	.20
14.00	DISCHG	.20	.11	.10	.10	.10	.10	.10	.10	.10	.10
15.00	DISCHG	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
16.00	DISCHG	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
17.00	DISCHG	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
18.00	DISCHG	.10	.10	.10	.10	.10	.10	.10	.10	.10	.10
19.00	DISCHG	.10	.06	.06	.06	.06	.06	.04	.04	.04	.04

TR20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 PASS 1
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20.00	DISCHG	.04	.10	.10	.10	.10	.10	.06	.06	.06	.06
21.00	DISCHG	.06	.08	.08	.08	.08	.08	.06	.06	.06	.06
22.00	DISCHG	.06	.06	.06	.06	.06	.06	.06	.06	.06	.06
23.00	DISCHG	.06	.08	.08	.08	.08	.08	.01	.00		

OPERATION ADDHYD CROSS SECTION 26

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.01	258.80	(NULL)
10.43	7.23	(NULL)
11.48	6.69	(NULL)
12.48	6.71	(NULL)
13.98	6.70	(NULL)
18.93	3.74	(NULL)
23.46	2.88	(NULL)

OPERATION RUNOFF CROSS SECTION 25

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(7.14) AT EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 10 %.
XSECTION 25

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
5.95	7.14	(RUNOFF)

TIME(HRS)	FIRST HYDROGRAPH POINT =	.00 HOURS	TIME INCREMENT =	.10 HOURS	DRAINAGE AREA =	.00 SQ.MI.					
4.00	DISCHG	.00	.00	.00	.01	.01	.02	.02	.03	.03	.04
5.00	DISCHG	.04	.13	.15	.17	.19	.22	4.81	5.74	6.13	6.32
6.00	DISCHG	6.43	.46	.42	.42	.42	.42	.27	.27	.27	.27
7.00	DISCHG	.27	.27	.27	.27	.27	.27	.21	.21	.21	.21
8.00	DISCHG	.21	.11	.11	.11	.11	.11	.11	.11	.11	.11
9.00	DISCHG	.11	.11	.11	.11	.11	.11	.11	.11	.11	.11
10.00	DISCHG	.11	.11	.11	.11	.11	.11	.05	.05	.05	.05
11.00	DISCHG	.05	.11	.11	.11	.11	.11	.05	.05	.05	.05
12.00	DISCHG	.05	.11	.11	.11	.11	.11	.05	.05	.05	.05
13.00	DISCHG	.05	.05	.05	.05	.05	.05	.11	.11	.11	.11
14.00	DISCHG	.11	.05	.05	.05	.05	.05	.05	.05	.05	.05
15.00	DISCHG	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
16.00	DISCHG	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
17.00	DISCHG	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
18.00	DISCHG	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
19.00	DISCHG	.05	.03	.03	.03	.03	.03	.02	.02	.02	.02
20.00	DISCHG	.02	.05	.05	.05	.05	.05	.03	.03	.03	.03

21.00	DISCHG	.03	.04	.04	.04	.04	.04	.03	.03	.03	.03
22.00	DISCHG	.03	.03	.03	.03	.03	.03	.03	.03	.03	.03
23.00	DISCHG	.03	.04	.04	.04	.04	.04	.00			

TR20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 PASS 1
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OPERATION ADDHYD CROSS SECTION 25

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.00	265.02	(NULL)
10.43	7.34	(NULL)
11.48	6.80	(NULL)
12.48	6.83	(NULL)
13.98	6.81	(NULL)
18.93	3.79	(NULL)
23.46	2.93	(NULL)

OPERATION RUNOFF CROSS SECTION 28

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
5.96	25.05	(RUNOFF)

OPERATION ADDHYD CROSS SECTION 28

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.00	288.81	(NULL)
10.42	7.75	(NULL)
11.47	7.22	(NULL)
12.47	7.24	(NULL)
13.98	7.23	(NULL)
18.92	3.99	(NULL)
23.46	3.09	(NULL)

OPERATION RUNOFF CROSS SECTION 3

*** WARNING-MAIN TIME INCREMENT MAY BE TOO LARGE.

COMPUTED PEAK(11.61) AT XSECTION 3 EXCEEDS MAX. ADJACENT HYDROGRAPH COORDINATE BY 10 %.

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
5.95	11.61	(RUNOFF)

TIME(HRS)	FIRST HYDROGRAPH POINT =	.00 HOURS	TIME INCREMENT =	.10 HOURS	DRAINAGE AREA =	.00 SQ.MI.
4.00	DISCHG	.00	.01	.02	.03	.04
5.00	DISCHG	.07	.21	.25	.28	.31
6.00	DISCHG	10.48	.89	.69	.69	.69
7.00	DISCHG	.43	.43	.43	.43	.44
8.00	DISCHG	.35	.18	.17	.17	.17
9.00	DISCHG	.17	.17	.17	.17	.17
10.00	DISCHG	.17	.17	.17	.17	.17

11.00 DISCHG .09 .17 .17 .17 .18 .17 .09 .09 .09 .09

TR20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
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JOB 1 PASS 1
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12.00	DISCHG	.09	.17	.18	.18	.18	.18	.09	.09	.09	.09
13.00	DISCHG	.09	.09	.09	.09	.09	.09	.17	.18	.18	.18
14.00	DISCHG	.18	.09	.09	.09	.09	.09	.09	.09	.09	.09
15.00	DISCHG	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
16.00	DISCHG	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
17.00	DISCHG	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
18.00	DISCHG	.09	.09	.09	.09	.09	.09	.09	.09	.09	.09
19.00	DISCHG	.09	.05	.05	.05	.05	.05	.04	.04	.04	.04
20.00	DISCHG	.04	.09	.09	.09	.09	.09	.05	.05	.05	.05
21.00	DISCHG	.05	.07	.07	.07	.07	.07	.05	.05	.05	.05
22.00	DISCHG	.05	.05	.05	.05	.05	.05	.05	.05	.05	.05
23.00	DISCHG	.05	.07	.07	.07	.07	.07	.00			

OPERATION ADDHYD CROSS SECTION 1

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.00	299.39	6197.10
10.42	7.92	6195.40
11.47	7.40	6195.37
12.47	7.43	6195.37
13.98	7.41	6195.37
18.92	4.08	6195.20
23.46	3.17	6195.16

OPERATION RUNOFF CROSS SECTION 1

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
5.99	12.35	(RUNOFF)

OPERATION ADDHYD CROSS SECTION 1

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.00	311.74	6197.15
10.42	8.14	6195.41
11.47	7.62	6195.38
12.47	7.64	6195.38
13.98	7.63	6195.38
18.92	4.19	6195.21
20.49	3.80	6195.19
23.46	3.26	6195.16

TIME(HRS)	FIRST HYDROGRAPH POINT =	.00 HOURS	TIME INCREMENT =	.10 HOURS	DRAINAGE AREA =	.17 SQ.MI.
4.00	DISCHG	.00 .00 .03 .14 .25 .36 .46	.56 .66 .75			
5.00	DISCHG	.84 2.20 2.94 3.50 3.95 4.45 79.05	142.62 200.92 253.98			
6.00	DISCHG	311.64 243.95 173.12 118.90 79.51 66.99 52.17	41.34 33.91 28.81			
7.00	DISCHG	25.37 23.13 21.73 20.90 20.43 20.17 18.82	17.93 17.38 16.96			

8.00	DISCHG	16.63	13.96	12.15	10.99	10.08	9.39	8.91	8.59	8.38	8.26
9.00	DISCHG	8.18	8.14	8.12	8.10	8.10	8.10	8.10	8.11	8.11	8.12
10.00	DISCHG	8.12	8.13	8.13	8.14	8.14	8.14	6.91	6.07	5.52	5.09
11.00	DISCHG	4.76	5.76	6.45	6.90	7.27	7.57	6.55	5.84	5.39	5.02
12.00	DISCHG	4.73	5.75	6.46	6.92	7.30	7.60	6.57	5.88	5.42	5.04
13.00	DISCHG	4.74	4.52	4.38	4.28	4.22	4.19	5.41	6.25	6.81	7.25
14.00	DISCHG	7.59	6.59	5.90	5.45	5.07	4.77	4.55	4.40	4.30	4.24
15.00	DISCHG	4.21	4.18	4.17	4.16	4.16	4.16	4.16	4.16	4.16	4.16
16.00	DISCHG	4.16	4.16	4.16	4.16	4.17	4.17	4.17	4.17	4.17	4.17
17.00	DISCHG	4.17	4.17	4.17	4.18	4.18	4.18	4.18	4.18	4.18	4.18
18.00	DISCHG	4.18	4.18	4.19	4.19	4.19	4.19	4.19	4.19	4.19	4.19
19.00	DISCHG	4.19	3.69	3.35	3.12	2.94	2.79	2.44	2.20	2.05	1.93
20.00	DISCHG	1.85	2.54	3.02	3.34	3.60	3.80	3.44	3.19	3.03	2.88
21.00	DISCHG	2.77	2.94	3.05	3.13	3.20	3.25	3.04	2.89	2.80	2.72
22.00	DISCHG	2.66	2.61	2.58	2.56	2.55	2.54	2.54	2.54	2.53	2.53
23.00	DISCHG	2.53	2.76	2.92	3.02	3.10	3.16	2.24	1.61	1.19	.85
24.00	DISCHG	.58	.38	.24	.15	.10	.06	.03	.02	.01	.01
25.00	DISCHG	.00									

RUNOFF VOLUME ABOVE BASEFLOW = 2.56 WATERSHED INCHES, 283.23 CFS-HRS, 23.41 ACRE-FEET; BASEFLOW = .00 CFS

*** WARNING - STRUCTURE 2 DELTA T IS TOO LARGE. O / 2 > S / DELTA T OCCURED 1 TIMES STARTING WITH POINT252

OPERATION RESVOR STRUCTURE 2

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.35	100.42	6205.08
10.45	8.24	6195.82
11.49	7.50	6195.75
12.49	7.52	6195.75
13.99	7.50	6195.75
18.95	4.23	6195.42
23.46	3.20	6195.32

TIME(HRS)	FIRST HYDROGRAPH POINT =	.00 HOURS	TIME INCREMENT =	.10 HOURS	DRAINAGE AREA =	.17 SQ.MI.					
4.00	DISCHG	.00	.00	.02	.10	.22	.33	.43	.54	.63	.73
5.00	DISCHG	.82	1.72	2.82	3.34	3.84	4.30	20.03	35.01	51.65	67.46
6.00	DISCHG	83.69	94.01	98.39	100.21	100.17	99.14	97.63	95.68	93.47	91.09
7.00	DISCHG	87.49	83.01	78.72	74.65	70.51	65.99	61.81	57.90	54.28	50.94
8.00	DISCHG	47.00	42.99	39.21	35.71	31.77	28.13	25.00	22.32	20.03	16.49
9.00	DISCHG	13.97	12.20	10.96	10.09	7.83	8.18	8.08	8.11	8.11	8.12
10.00	DISCHG	8.12	8.12	8.13	8.14	8.14	8.14	7.35	6.24	5.67	5.20
11.00	DISCHG	4.84	5.38	6.31	6.78	7.17	7.49	6.93	5.98	5.51	5.12
12.00	DISCHG	4.80	5.37	6.32	6.79	7.20	7.52	6.96	6.02	5.54	5.14
13.00	DISCHG	4.82	4.58	4.41	4.30	4.23	4.19	4.97	6.08	6.66	7.13
14.00	DISCHG	7.50	6.97	6.04	5.57	5.17	4.85	4.60	4.44	4.33	4.26
15.00	DISCHG	4.21	4.19	4.17	4.17	4.16	4.16	4.16	4.16	4.16	4.16
16.00	DISCHG	4.16	4.16	4.16	4.16	4.17	4.17	4.17	4.17	4.17	4.17

1

17.00	DISCHG	4.17	4.17	4.17	4.18	4.18	4.18	4.18	4.18	4.18	4.18
18.00	DISCHG	4.18	4.18	4.18	4.19	4.19	4.19	4.19	4.19	4.19	4.19
19.00	DISCHG	4.19	3.87	3.42	3.18	2.98	2.83	2.56	2.26	2.09	1.96
20.00	DISCHG	1.87	2.29	2.92	3.25	3.53	3.74	3.58	3.24	3.07	2.92
21.00	DISCHG	2.80	2.87	3.03	3.11	3.18	3.24	3.12	2.92	2.83	2.74
22.00	DISCHG	2.68	2.62	2.59	2.57	2.55	2.54	2.54	2.54	2.53	2.53
23.00	DISCHG	2.53	2.68	2.89	2.99	3.08	3.15	2.57	1.74	1.30	.94
24.00	DISCHG	.65	.43	.28	.18	.11	.07	.04	.02	.01	.01
25.00	DISCHG	.00									

RUNOFF VOLUME ABOVE BASEFLOW = 2.58 WATERSHED INCHES, 284.52 CFS-HRS, 23.51 ACRE-FEET; BASEFLOW = .00 CFS

EXECUTIVE CONTROL OPERATION ENDCMP

RECORD ID

COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL OPERATION ENDJOB

RECORD ID

R20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 SUMMARY
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SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
(A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION			RUNOFF AMOUNT (IN)	PEAK DISCHARGE				
						BEGIN (HR)	AMOUNT (IN)	DURATION (HR)		ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSH)	
ALTERNATE	1	STORM	1											
SECTION	57	RUNOFF	.00	7	2	.10	.0	4.50	24.00	1.84	---	5.96	2.27	2268.5
SECTION	47	REACH	.00	7	2	.10	.0	4.50	24.00	1.84	6277.02	5.96	2.27	2268.5
XSECTION	47	RUNOFF	.00	7	2	.10	.0	4.50	24.00	3.64	---	5.95	10.16	3763.5
SECTION	47	ADDHYD	.00	7	2	.10	.0	4.50	24.00	3.15	6277.11	5.95	12.42	3356.4
SECTION	47	REACH	.00	7	2	.10	.0	4.50	24.00	3.15	6277.11	5.95	12.42	3356.4
VSECTION	46	RUNOFF	.00	7	2	.10	.0	4.50	24.00	3.64	---	5.95	13.55	3763.5
SECTION	46	ADDHYD	.01	7	2	.10	.0	4.50	24.00	3.39	6275.18	5.95	25.97	3557.0
ASECTION	46	ADDHYD	.01	7	2	.10	.0	4.50	24.00	3.31	6275.24	5.95	38.38	3489.4
XSECTION	45	REACH	.01	7	2	.10	.0	4.50	24.00	3.31	6270.24	5.95	38.38	3489.4
SECTION	56	RUNOFF	.01	7	2	.10	.0	4.50	24.00	1.97	---	6.01	26.26	1836.5
XSECTION	55	REACH	.01	7	2	.10	.0	4.50	24.00	1.97	6301.03	6.01	26.26	1836.5
SECTION	55	RUNOFF	.07	7	2	.10	.0	4.50	24.00	2.13	---	6.10	116.43	1594.9
SECTION	55	ADDHYD	.09	7	2	.10	.0	4.50	24.00	2.10	6302.74	6.08	139.26	1595.2
STRUCTURE	55	RESVOR	.09	7	2	.10	.0	4.50	24.00	2.11	6296.61	6.14	133.07	1524.3

XSECTION	45	RUNOFF	.00	7	2	.10	.0	4.50	24.00	3.64	---	5.95	17.69	3763.5
XSECTION	45	ADDHYD	.09	7	2	.10	.0	4.50	24.00	2.19	6270.56	6.14	132.29	1437.9
XSECTION	45	ADDHYD	.10	7	2	.10	.0	4.50	24.00	2.31	6270.56	6.11	130.98	1271.6
XSECTION	43	REACH	.10	7	2	.10	.0	4.50	24.00	2.31	6250.56	6.11	130.98	1271.6
XSECTION	43	RUNOFF	.00	7	2	.10	.0	4.50	24.00	3.64	---	5.95	7.53	3763.5
XSECTION	43	ADDHYD	.10	7	2	.10	.0	4.50	24.00	2.33	6250.57	6.05	136.66	1301.5
XSECTION	35	RUNOFF	.01	7	2	.10	.0	4.50	24.00	3.72	---	5.97	23.81	3307.3
XSECTION	35	ADDHYD	.11	7	2	.10	.0	4.50	24.00	2.42	---	6.04	158.67	1414.2
XSECTION	13	RUNOFF	.04	7	2	.10	.0	4.50	24.00	2.46	---	5.99	85.62	2326.7
XSECTION	13	ADDHYD	.15	7	2	.10	.0	4.50	24.00	2.43	---	6.02	242.45	1627.2
XSECTION	27	RUNOFF	.00	7	2	.10	.0	4.50	24.00	3.62	---	5.95	7.49	3746.4
XSECTION	27	ADDHYD	.15	7	2	.10	.0	4.50	24.00	2.45	---	6.01	248.62	1646.5
XSECTION	3	REACH	.15	7	2	.10	.0	4.50	24.00	2.45	6204.89	6.01	248.62	1646.5
XSECTION	26	RUNOFF	.00	7	2	.10	.0	4.50	24.00	2.43	---	5.96	11.55	2816.5
XSECTION	26	ADDHYD	.16	7	2	.10	.0	4.50	24.00	2.45	---	6.01	258.80	1668.6
XSECTION	25	RUNOFF	.00	7	2	.10	.0	4.50	24.00	3.63	---	5.95	7.14	3758.0
XSECTION	25	ADDHYD	.16	7	2	.10	.0	4.50	24.00	2.46	---	6.00	265.02	1688.0
XSECTION	28	RUNOFF	.01	7	2	.10	.0	4.50	24.00	3.69	---	5.96	25.05	3479.0

1

TR20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 SUMMARY
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SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
(A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION			RUNOFF AMOUNT (IN)	PEAK DISCHARGE				
						BEGIN (HR)	AMOUNT (IN)	DURATION (HR)		ELEVATION (FT)	TIME (HR)	RATE (CFS)	RATE (CSM)	
ALTERNATE	1	STORM	1											
XSECTION	28	ADDHYD	.16	7	2	.10	.0	4.50	24.00	2.52	---	6.00	288.81	1758.9
XSECTION	3	RUNOFF	7	2	.10	.0	4.50	24.00	3.62	---	5.95	11.61	3746.4	
XSECTION	1	ADDHYD	.17	7	2	.10	.0	4.50	24.00	2.54	6197.10	6.00	299.39	1789.5
XSECTION	1	RUNOFF	.00	7	2	.10	.0	4.50	24.00	3.71	---	5.99	12.35	3167.1
XSECTION	1	ADDHYD	.17	7	2	.10	.0	4.50	24.00	2.56	6197.15	6.00	311.74	1820.9
STRUCTURE	2	RESVOR	.17	7	2	.10	.0	4.50	24.00	2.58	6205.08	6.35	100.42	586.6

TR20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 SUMMARY
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SUMMARY TABLE 2 - SELECTED MODIFIED ATT-KIN REACH ROUTINGS IN ORDER OF STANDARD EXECUTIVE CONTROL INSTRUCTIONS

(A STAR(*) AFTER VOLUME ABOVE BASE(IN) INDICATES A HYDROGRAPH TRUNCATED AT A VALUE EXCEEDING BASE + 10% OF PEAK
 A QUESTION MARK(?) AFTER COEFF.(C) INDICATES PARAMETERS OUTSIDE ACCEPTABLE LIMITS, SEE PREVIOUS WARNINGS)

HYDROGRAPH INFORMATION

ROUTING PARAMETERS

PEAK

XSEC REACH + ID	INFLOW		OUTFLOW		INTERV.AREA		BASE- FLOW (CFS)	VOLUME ABOVE BASE (IN)	MAIN TIME (HR)	ITER- ATION #	Q AND A		PEAK RATIO (Q*)	S/Q @PEAK (K)	ATT- KIN COEFF (C)	TRAVEL TIME		
	LENGTH (FT)	PEAK TIME (HR)	PEAK TIME (HR)	PEAK TIME (HR)	PEAK TIME (HR)	PEAK TIME (HR)					COEFF (X)	POWER (M)				LENGTH (K*)	FACTO (Q*)	AGE (HR)
	ALTERNATE	1	STORM	1														
47	300	2	6.0	2	6.0		0	1.84	.10	0	.933	1.66	.028	1.000	140	1.00?	.00	.00
						11	6.0											
47	400	11	6.0	11	6.0		0	3.15	.10	0	.933	1.66	.011	1.000	96	1.00?	.00	.00
						---	---											
+ 45	450	35	6.0	35	6.0		0	3.31	.10	0	.933	1.66	.006	1.000	69	1.00?	.00	.00
						---	---											
+ 55	250	26	6.0	26	6.0		0	1.97	.10	0	1.37	1.43	.007	1.000	52	1.00?	.00	.00
						139	6.1											
+ 43	250	131	6.1	131	6.1		0	2.31	.10	0	.943	1.65	.000	1.000	23	1.00?	.00	.00
						132	6.0											
+ 3	400	248	6.0	248	6.0		0	2.45	.10	0	1.59	1.45	.002	1.000	37	1.00?	.00	.00
						---	---											

TR20 XEQ 01-26-98 09:10
 REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
 DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDDET

JOB 1 SUMMARY
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SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 1
0 STRUCTURE 55	.09	
ALTERNATE 1		133.07
0 STRUCTURE 2	.17	
ALTERNATE 1		100.42
0 XSECTION 1	.17	
ALTERNATE 1		311.74
0 XSECTION 3	.00	

	ALTERNATE	1		11.61
o	XSECTION	13	.15	
+	<hr/>			
	ALTERNATE	1		242.45
	XSECTION	25	.16	
+	<hr/>			
	ALTERNATE	1		265.02
	XSECTION	26	.16	
+	<hr/>			
	ALTERNATE	1		258.80
	XSECTION	27	.15	
	<hr/>			
	ALTERNATE	1		248.62
	XSECTION	28	.16	
	<hr/>			
	ALTERNATE	1		288.81
o	XSECTION	35	.11	
	<hr/>			
	ALTERNATE	1		158.67
o	XSECTION	43	.10	
	<hr/>			
	ALTERNATE	1		136.66
o	XSECTION	45	.10	
	<hr/>			
	ALTERNATE	1		130.98
o	XSECTION	46	.01	
+	<hr/>			
	ALTERNATE	1		38.38
o	XSECTION	47	.00	
+	<hr/>			
	ALTERNATE	1		12.42

TR20 XEQ 01-26-98 09:10
REV PC 09/83(.2)

FILLMORE HIEGHTS INDUSTRIAL PARK TR20 RUN 24 HR. 100 YR. STORM
DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : FHDET

JOB 1 SUMMARY
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SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID	DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 1
o XSECTION 55	.09	
<hr/>		
ALTERNATE 1		139.26
o XSECTION 56	.01	
<hr/>		
ALTERNATE 1		26.26
o XSECTION 57	.00	
+	<hr/>	
ALTERNATE 1		2.27

END OF 1 JOBS IN THIS RUN

Appendix C

Stormwater Acceptance Letter

March 19, 1998

To: F N, LLC
900 West Fillmore, Suite 200
Colorado Springs, CO 80907

City of Colorado Springs
Planning, Development, and Finance
Engineering Section
101 West Costilla
Colorado Springs, CO 80903

Re: Master Development Drainage Plan for Fillmore Heights

The Master Development Drainage Plan for Fillmore Heights prepared by ADP has been reviewed. We concur with the public storm sewer system as proposed in the report. The Hill Property will provide for temporary detention to the 121.2 cfs historic limit as shown on the plan until such time that the storm sewer outfall system is installed. With the signing and approval of the MDDP, the Hill Property can release the 121.2 cfs from the temporary detention pond at the location shown on the plan and the downstream owner accepts the future developed flows from the Hill Property when the outfall system is installed.

Sincerely,



Donald C. Hare
Agent for Lyda Hill

**AGREEMENT
PRIVATE MAINTENANCE OF DRAINAGE FACILITIES**

THIS AGREEMENT is made this _____ day of _____, 19____, by and between _____, a(n) _____ together with its successors and assigns, hereinafter called ("_____") and THE CITY OF COLORADO SPRINGS, a Colorado municipal corporation (the "City").

RECITALS:

1. _____ has had accepted by the City a drainage report for certain private drainage facilities at _____ (Drainage Facilities), as shown and described on the attached as Exhibit A (Drainage Report).

2. _____ is willing to agree, for itself, its successors and assigns, to maintain in perpetuity the Drainage Facilities as described herein.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is acknowledged, the parties agree as follows:

1. The Drainage Facilities are and shall remain the property of _____, it successors or assigns.

2. Flood Damage Repair Responsibilities

The City shall have the right to enter the property and make any necessary immediate repairs to damaged Drainage Facilities where such damaged sections threaten the strength and stability of existing adjacent Drainage Facilities which are maintained by the City, the costs of which are the responsibility of _____ as set forth in paragraph 3.

3. Routine Maintenance Responsibilities

_____ agrees to maintain in perpetuity the Drainage Facilities, with no obligation therefore by the City. By way of elaboration and not by limitation, _____ shall maintain the Drainage Facilities in conformity with the Drainage Report, including but not limited to maintaining the cross sections as shown in the Drainage Report; replacing construction materials as needed from time to time; removal of lodged materials in the Drainage Facilities from time to time; and general rendering the Drainage Facilities unencumbered by obstacles or blockages which might render the Drainage Facilities incapable to handle the water flow through them.

4. The City shall have the right to enter the property for inspection purposes. The City shall have a lien in perpetuity upon the property owned by _____ which is the subject of this Agreement and which is described as: _____

_____ Colorado Springs, El Paso County, Colorado, which lien shall be created upon the recording of this Agreement. In the event _____ shall fail to maintain the Drainage Facilities as required by this Agreement, the City shall give thirty (30) days written notice of such failure, during which time _____ does not cure or commence to cure as provided in this paragraph, or fails thereafter to complete curing the default within a reasonable period of time once a cure is commenced, the City may by virtue of the lien hereby created make any and all necessary repairs and initiate a special assessment against any or all of the above property pursuant to Chapter 7, Article I, Parts 1, 2, and 3 of the code of the city of Colorado springs as the same may be amended from time to time. The parties hereto and their successors and assigns hereby expressly waive any notice of hearing and objection to the initiation of the special assessment and the determination by the City of the cost of the assessment.

5. This Agreement shall be binding upon the parties, their successors and assigns, and shall be governed by and interpreted in accordance with the laws of the State of Colorado. This Agreement shall be recorded in El Paso County, Colorado. The benefits and burdens of this Agreement shall run with the land.

Signature of Developer/Owner
Name & Title _____
Company Name _____

CITY OF COLORADO SPRINGS, a Colorado municipal corporation

By: _____
Director of Public Works

ATTEST:

APPROVED AS TO FORM:

City Clerk

City Attorney

STATE OF COLORADO)
) SS.
COUNTY OF EL PASO)

The foregoing instrument was acknowledged before me this _____ day of _____, 19____, by _____ as Director of Public Works and by _____ as City Clerk of the City of Colorado Springs, a Colorado municipal corporation.

WITNESS MY HAND OFFICIAL SEAL.

Notary Public

My commission expires: _____ Address _____

STATE OF COLORADO)
) SS.
COUNTY OF EL PASO)

The foregoing instrument was acknowledged before me this _____ day of _____, 19____, by _____.

WITNESS MY HAND AND OFFICIAL SEAL.

Notary Public

My commission expires: _____ Address _____

Address of Parties:

City of Colorado Springs
c/o City Attorney
30 South Nevada Avenue
Colorado Springs, CO 80903



STATEMENT OF UNDERSTANDING
FOR
STORM WATER ACCEPTANCE
ONTO THE LANDS WITH
TAX SCHEDULE NO. 73361 00 040

Developed storm water runoff from Fillmore Heights Subdivision, as shown in the Drainage Plan and Report for Fillmore Heights Subdivision, will flow onto platted land with Tax Schedule No. 73361 00 040. The owner of said land will accept the storm water runoff flows which are greater than historic storm water runoff flows, and in accordance with said Drainage Plan and Report. The undersigned owner hereby accepts the responsibility for making this agreement binding on the heirs and assigns, and subsequent owners of said lands. This Statement of Understanding will be recorded with the County Clerk and will run with the land.

OWNER:

Celebrity Entertainment LLC
CELEBRITY DEVELOPMENT CORP.

Denise M Verdoorn
Denise Verdoorn, Manager

ATTEST:

Jay Lohr



INDEMNIFICATION

FN, LLC, a Colorado limited liability corporation, will contract to have work performed on its property at Fillmore Street in Colorado Springs, Colorado. The purpose of this work will be to construct a roadway, perform overlot grading, and construct a temporary detention facility.

Celebrity Development Corporation, dba Champions Golf & Games, owns the property adjacent to FN, LLC's property, commonly known as 777 Vondel Park Drive, Colorado Springs, CO 80906.

Champions Golf & Games hereby gives permission to FN, LLC to perform grading work on a section of the Champions Golf & Games property, as detailed on the attached Exhibit A. The work consists of placing dirt and sloping it more gradually than it sits presently, as well as constructing a temporary detention facility. This work shall be performed solely at FN, LLC's expense. FN, LLC shall perform all work and post all assurances for the work performed on this Project. Celebrity Development Corporation shall have the right to add developed flows to the temporary detention facility, as long as it is in place.

FN, LLC hereby agrees to protect, defend, indemnify and hold harmless Champions Golf & Games, and the directors, officers, partners, employees, agents, heirs, personal representatives, successors and assigns of each of the foregoing entities ("Indemnified Parties"), from any and all loss, damage, and claims of any sort or nature whatsoever, relating to the contemplated work or caused by the acts or negligence of FN, LLC or its contracted workers. FN, LLC also agrees to protect, defend, indemnify and hold harmless the Indemnified Parties from and against all claims of any type or nature for property damage, loss, personal injury and or any other injury sustained by third parties, including attorneys' fees and court costs caused by reason of the negligence of FN, LLC, or its contracted workers.

This indemnification is entered into as of 6/12/98.

Celebrity Entertainment LLC
CELEBRITY DEVELOPMENT
CORPORATION

FN, LLC, a Colorado limited liability
corporation

Denise M. Anderson

Darwin L. Faaborg

Darwin L. Faaborg, President



INDEMNIFICATION

FN, LLC, a Colorado limited liability corporation, will contract to have work performed on its Fillmore Heights property at Fillmore Street in Colorado Springs, Colorado. The purpose of this work will be to construct a roadway, perform overlot grading, and construct a temporary detention facility.

Western Mobile Southern, Inc., owns the property west of and adjacent to FN, LLC's property, commonly known as 1300 West Fillmore Street, Colorado Springs, CO 80906.

Western Mobile Southern, Inc., hereby gives permission to FN, LLC to perform grading work on a section of the property, as detailed on the attached exhibit A. The work consists of re-grading dirt slopes in a stabilized manner. All work will be in compliance with state, federal, and local regulations. The re-graded slopes will be re-seeded with a dry land seed mix. The bike path in the area of re-grading, and at the south-east corner of Western Mobiles Southern, Inc's., 1300 W. Fillmore property shall be restored to a condition acceptable To Western Mobile Southern, Inc. A certificate of Insurance must be received by Western Mobile Southern, Inc., before any work is started.

FN, LLC hereby agrees to protect, defend, indemnify and hold harmless Western Mobile and all subsidiaries, directors, officers, partners, employees, agents, heirs, personal representatives, successors, and assigns of each of the foregoing entities ("Indemnified Parties"), from any and all loss, damage, environmental injury, and claims of any sort of nature whatsoever relating from the work on Fillmore Heights or caused by the acts or negligence of FN, LLC or its contracting workers. FN, LLC also agrees to protect, defend, indemnify and hold harmless the Indemnified Parties from and against all claims of any type or nature for property damage, loss, personal injury and or any other injury sustained by third parties, including attorney's fees and court costs caused by reason of the negligence of FN, LLC, or its contracted workers.

This indemnification is entered into as of 6/1/98

WESTERN MOBILE SOUTHERN, INC.

FN, LLC, a Colorado limited liability corporation

Darwin L. Faaborg

Darwin L. Faaborg, President

Appendix D
Design Charts

TABLE 5-1

RECOMMENDED AVERAGE RUNOFF COEFFICIENTS AND PERCENT IMPERVIOUS

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

* Hydrologic Soil Group

9/30/90

TABLE 5-5
 RUNOFF CURVE NUMBERS
 FOR HYDROLOGIC SOIL-COVER COMPLEXES
 URBAN AND SUBURBAN CONDITIONS 1/
 (For Antecedent Moisture Condition II)
 (From: U.S. Department of Agriculture,
 Soil Conservation Service, 1977)

NOTE: THIS TABLE TO
 BE USED FOR 24-HOUR
 STORM ONLY.

<u>Land Use</u>	<u>Hydrologic Soil Group</u>			
	<u>A</u>	<u>B</u>	<u>C</u>	<u>D</u>
Open spaces, lawns, parks, golf courses, cemeteries, etc.				
Good condition: grass cover on 75% or more of the area	39*	61	74	80
Fair condition: grass cover on 50% to 75% of the area	49*	69	79	84
Commercial and business areas (85% impervious)	89*	92	94	95
Industrial districts (72% impervious)	81*	88	91	93
Residential: <u>2/</u>				
<u>Acres per Dwelling Unit</u>	<u>Average % impervious^{3/}</u>			
1/8 acre or less	65	77*	85	90
1/4 acre	38	61*	75	83
1/3 acre	30	57*	72	81
1/2 acre	25	54*	70	80
1 acre	20	51*	68	79
Paved parking lots, roofs, driveways, etc.	98	98	98	98
Streets and roads:				
paved with curbs and storm sewers	98	98	98	98
gravel	76*	85	89	91
dirt	72*	82	87	89

1/ For a more detailed description of agricultural land use curve numbers, refer to in the National Engineering Handbook (U.S. Dept. of Agriculture, Soil Conservation Service, 1972).

2/ Curve numbers are computed assuming the runoff from the house and driveway is directed towards the street with a minimum of roof water directed to lawns where additional infiltration could occur.

3/ The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.

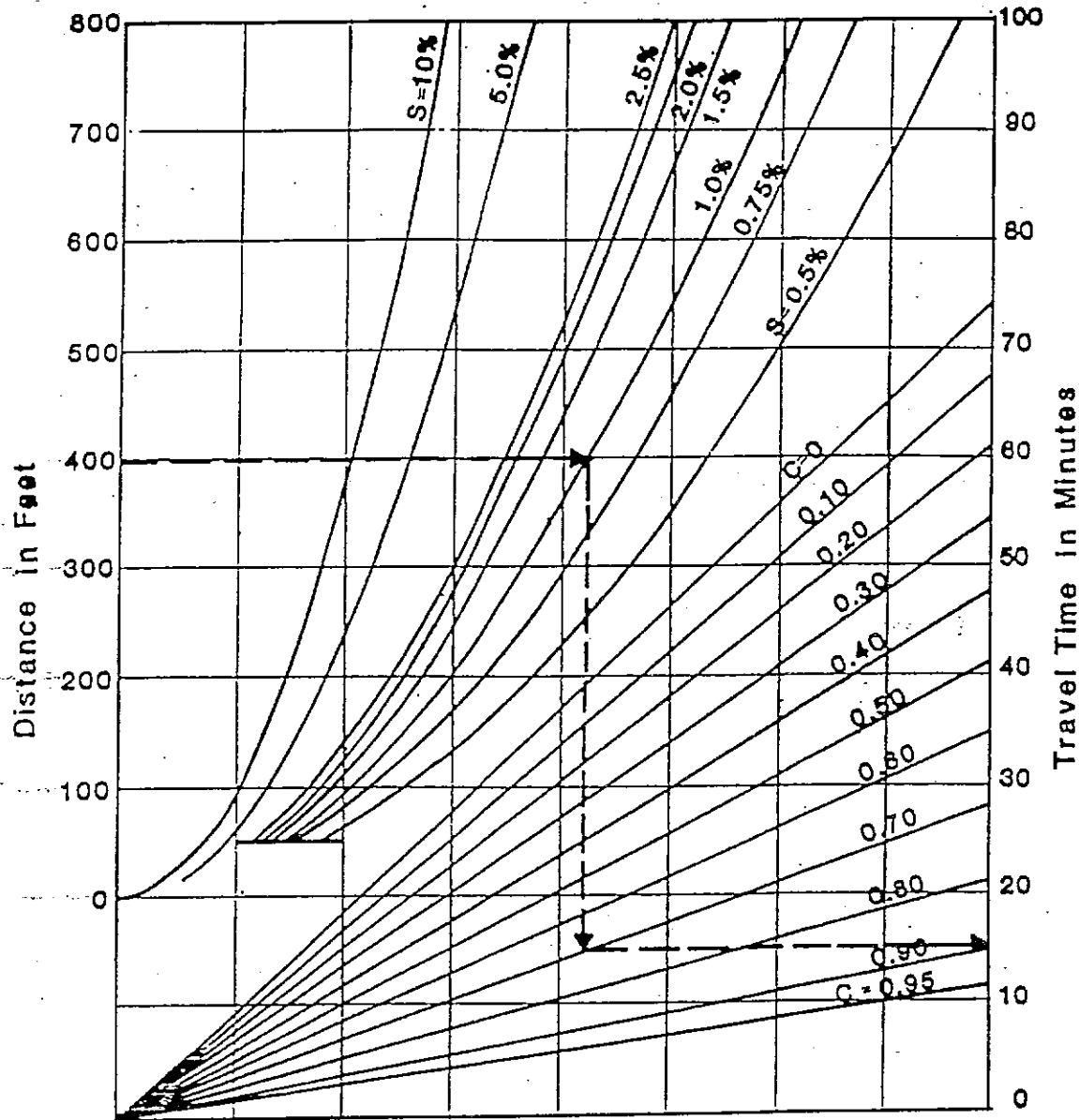
* Not to be used wherever overlot grading or filling is to occur.

TABLE 5-4
 RUNOFF CURVE NUMBERS FOR HYDROLOGIC
 SOIL-COVER COMPLEXES--RURAL CONDITIONS
 (Antecedent Moisture Condition II, and $I_a = 0.2 S$)
 (From: U.S. Dept. of Agriculture,
 Soil Conservation Service, 1977)

NOTE: THIS TABLE TO
 BE USED FOR 24-HOUR
 STORM ONLY.

Land Use	Cover Treatment or Practice	Hydrologic Condition	Runoff curve number by Hydrologic soil group			
			A	B	C	D
Fallow	Straight Row	----	77	86	91	94
Row crops	Straight Row	Poor	72	81	88	91
	Straight Row	Good	67	78	85	89
	Contoured	Poor	70	79	84	88
	Contoured	Good	65	75	82	86
	Cont. and terraced	Poor	66	74	80	82
	Cont. and terraced	Good	62	71	78	81
Small grain	Straight Row	Poor	65	76	84	88
		Good	63	75	83	87
	Contoured	Poor	63	74	82	85
		Good	61	73	81	84
	Cont. and terraced	Poor	61	72	79	82
		Good	59	70	78	81
Close-seeded legumes <u>1/</u> or rotation meadow	Straight Row	Poor	66	77	85	89
		Good	58	72	81	85
	Contoured	Poor	64	75	83	85
		Good	55	69	78	83
	Cont. and terraced	Poor	63	73	80	83
		Good	51	67	76	80
Pasture or range		Poor	68	79	86	89
		Fair	49	<u>69</u>	79	84
		Good	39	<u>61</u>	74	80
	Contoured	Poor	47	<u>67</u>	81	88
	Contoured	Fair	25	59	75	83
	Contoured	Good	6	35	70	79
		Good	30	58	71	78
Woods		Poor	45	66	77	83
		Fair	36	60	73	79
		Good	25	55	70	77
Farmsteads		----	59	74	82	86
Roads (dirt) <u>2/</u> (hard surface) <u>2/</u>		----	72	82	87	89
		----	74	84	90	92

1/ Close-drilled or broadcast
2/ Including right-of-way



REFERENCE : Wright - McLaughlin Engineers, Urban Storm Drainage Criteria Manual, Vol. 1.
 Denver Regional Council of Governments, Denver, Co. 1977



HDR Infrastructure, Inc.
 A Centerra Company

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

Overland Flow Curves

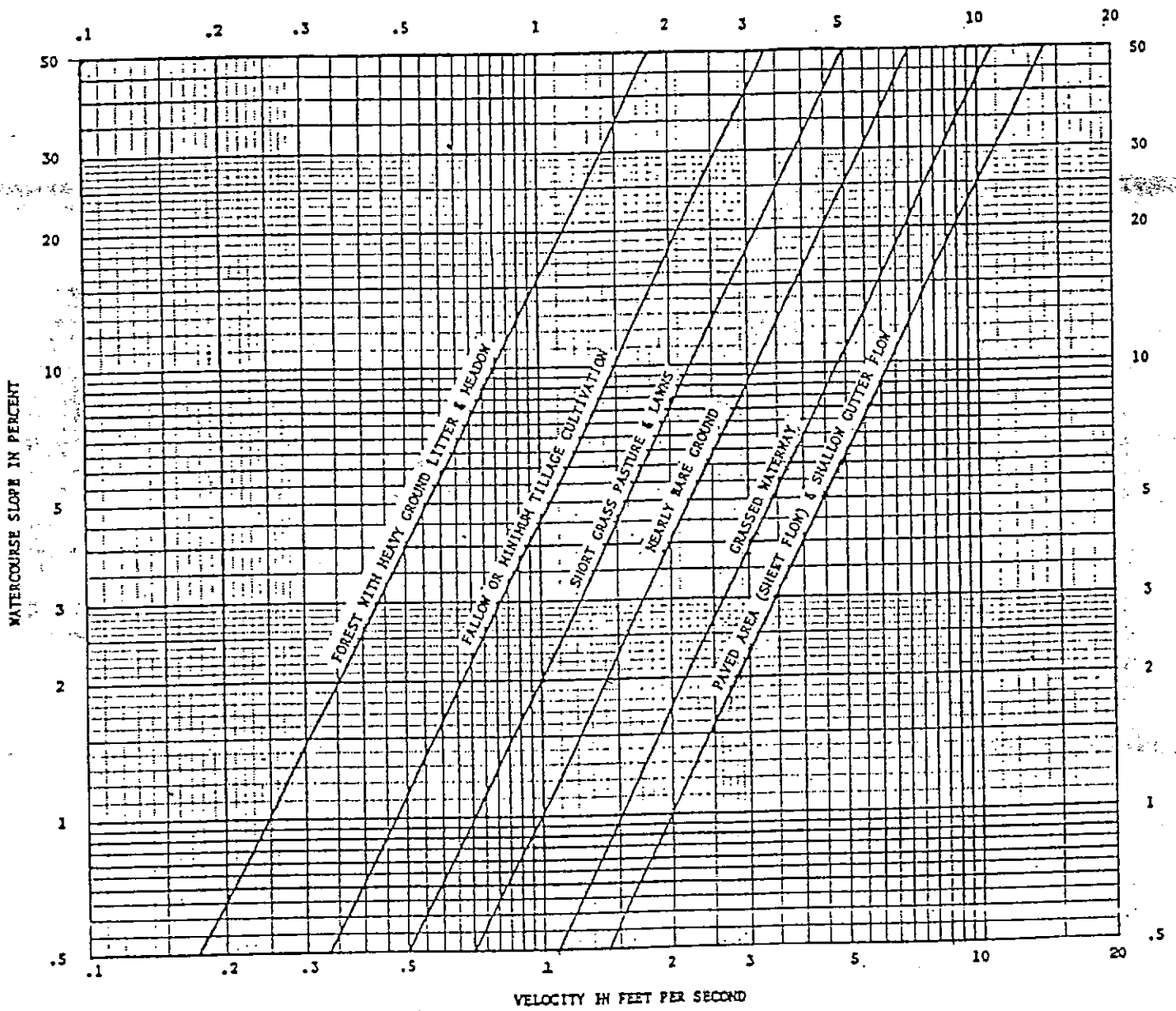
5-10

Date

OCT. 1987

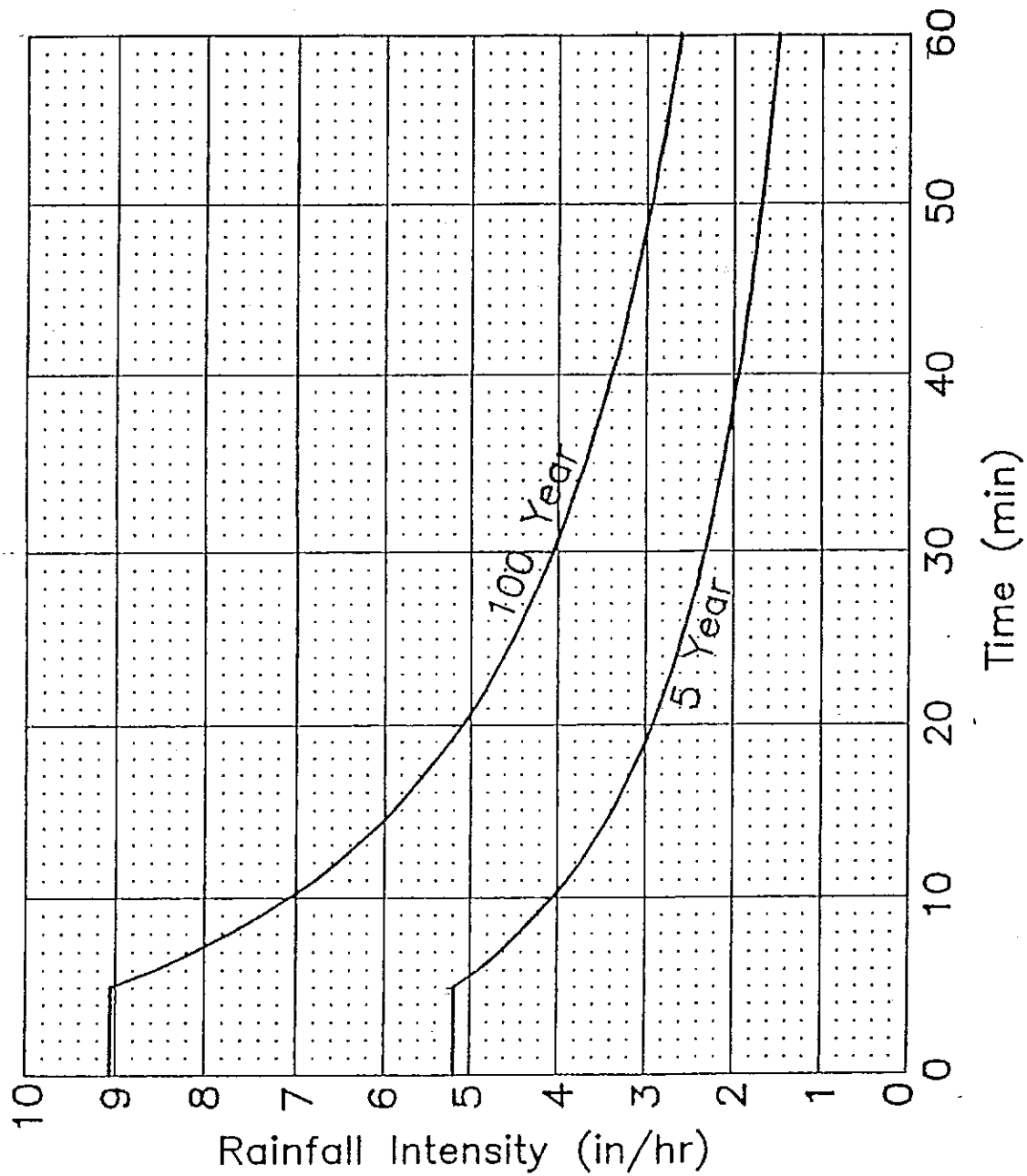
Figure

5-2



--Average velocities for estimating travel time for overland flow.

FIGURE 4



$$i_t = \frac{36.4 * i_{60}}{t_c^{0.83} + 6.72}$$

5 Year: $i_{60} = 1.50$
 100 Year: $i_{60} = 2.62$

RE: Based upon Pikes Peak Area Council of Governments
 Areawide Urban Runoff Control Manual.

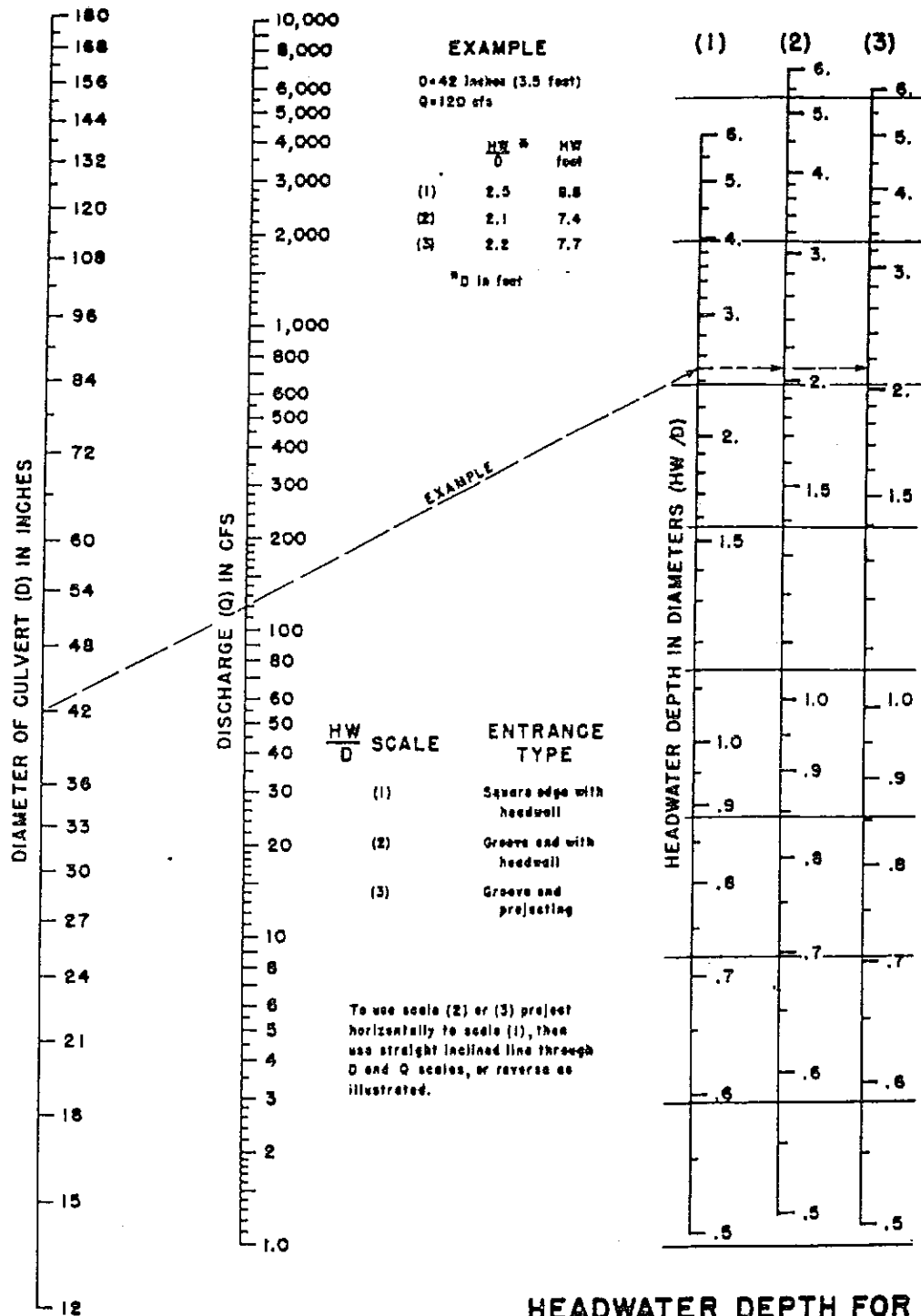
The City of Colorado Springs / El Paso County
 Drainage Criteria Manual

Storm Rainfall
 Time Intensity - Frequency Curves

5-9

Date:
 MAR. 1995

Figure:
 5 - 1



**HEADWATER DEPTH FOR
 CONCRETE PIPE CULVERTS
 WITH INLET CONTROL**

HEADWATER SCALES 2 & 3
 REVISED MAY 1964

BUREAU OF PUBLIC ROADS JAN. 1963

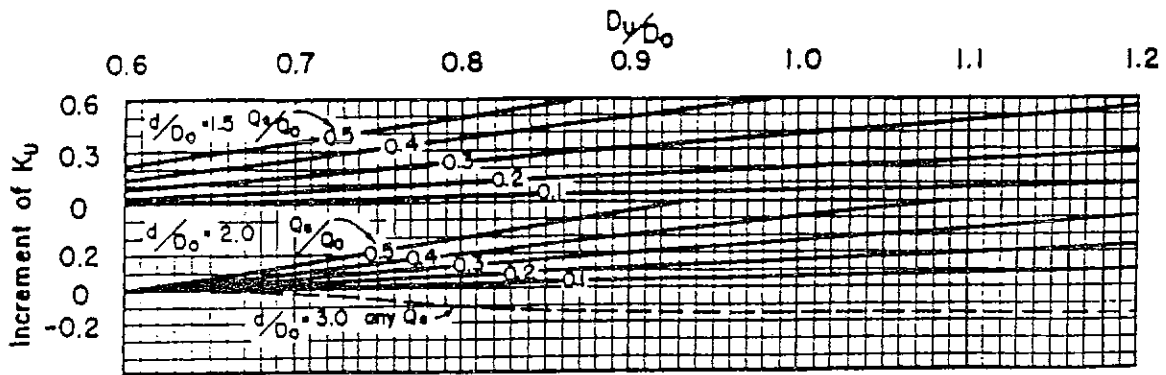


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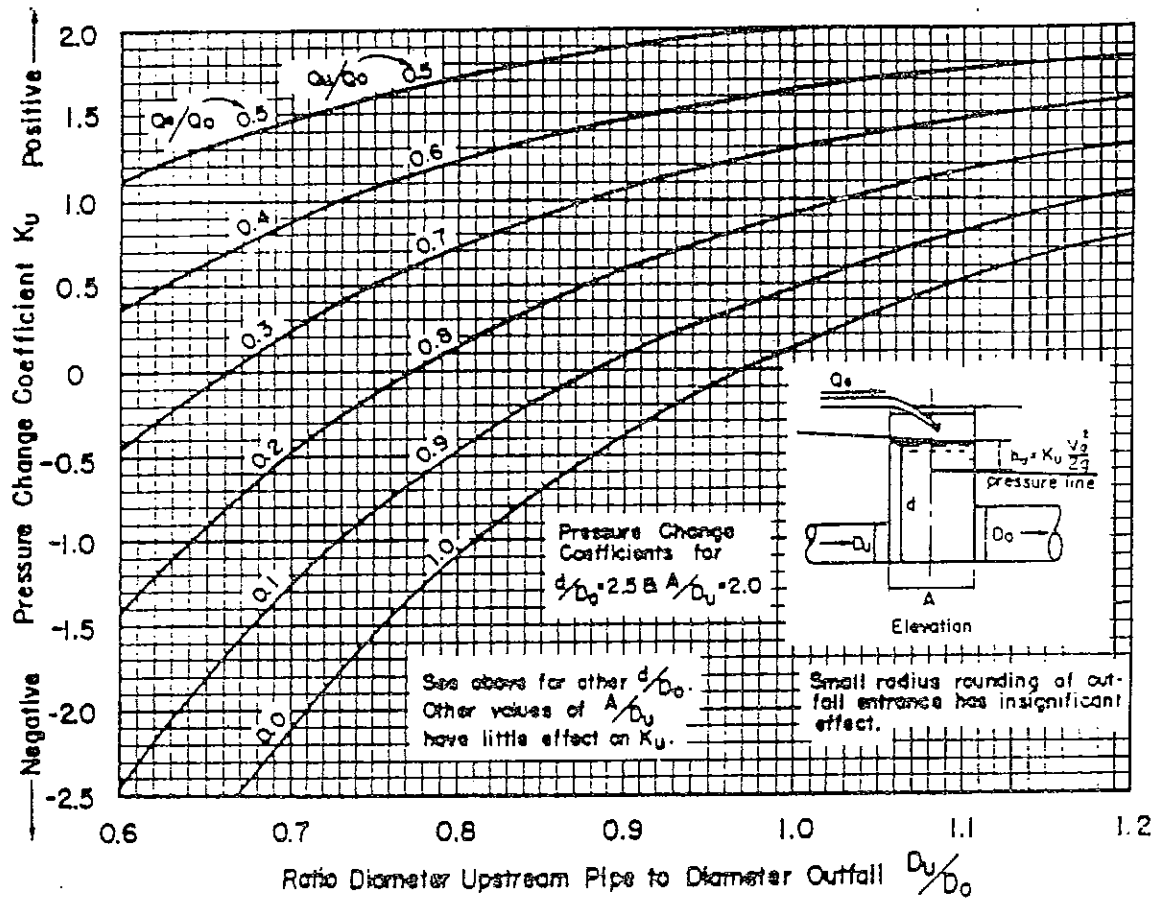
The City of Colorado Springs / El Paso County
 Drainage Criteria Manual

Date
 OCT. 1987

Figure
 9-34



Supplementary Chart for Modification of K_u
for Depth in Inlet other than $2.5 D_o$



RECTANGULAR MANHOLE WITH THROUGH PIPELINE AND INLET FLOW

1-15-69
Denver Regional Council of Governments



HDR Infrastructure, Inc.
A Centerra Company

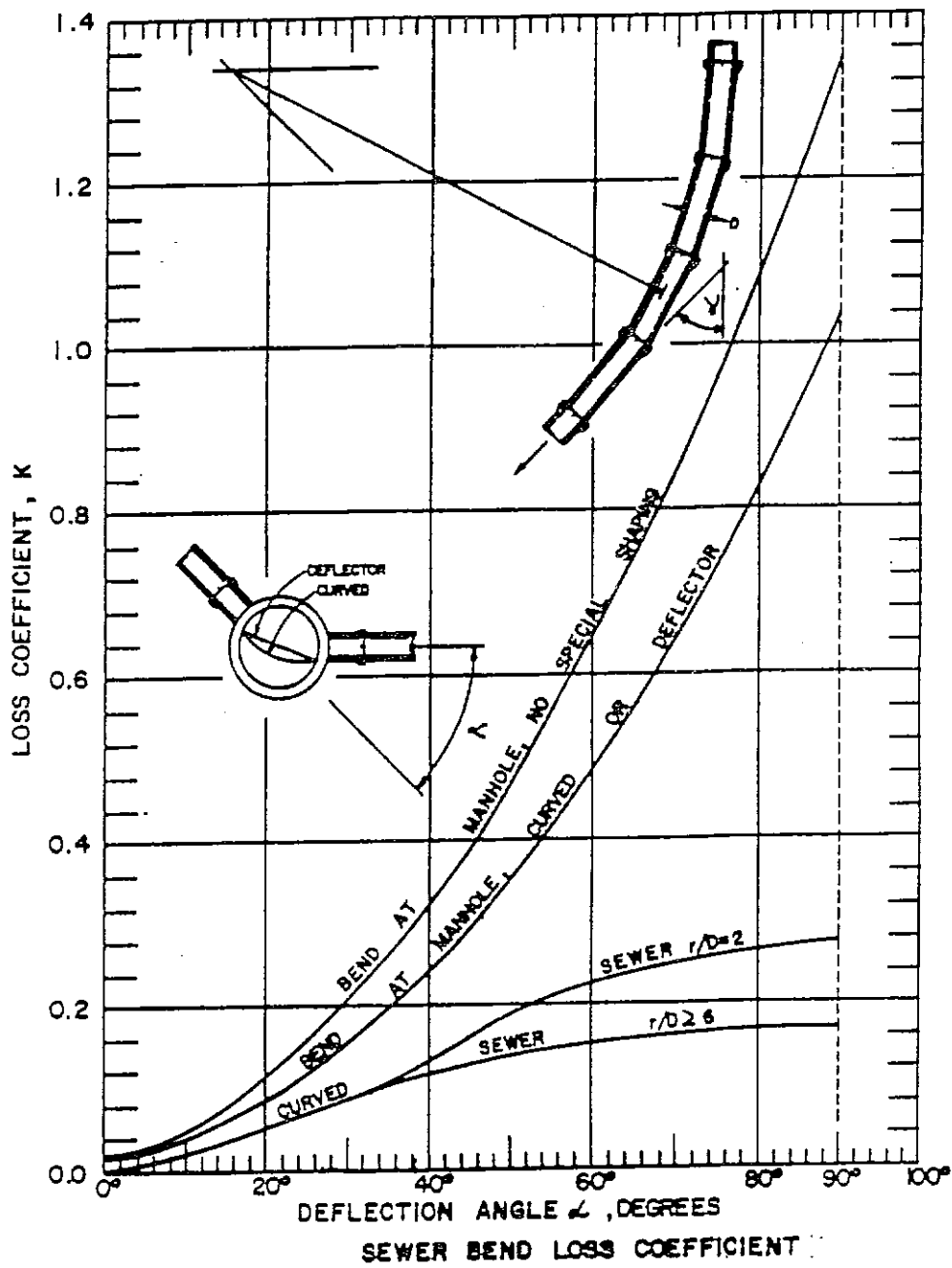
The City of Colorado Springs / El Paso County
Drainage Criteria Manual

Date

OCT. 1987

Figure

8 - 6



1-15-69
 Denver Regional Council of Governments



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 Drainage Criteria Manual

Date
 OCT. 1987

Figure
 8 - 13