CITY OF
Albuquerque

November 19, 1996

Martin J. Chávez, Mayor

Larry Read
Larry Read & Associates
P.O. Box 90233
Albuquerque, NM 87199

RE: ST. JOSEPH'S MEDICAL OFFICES (E20-D11C). ENGINEER'S CERTIFICATION FOR CERTIFICATE OF OCCUPANCY APPROVAL. ENGINEER'S CERTIFICATION DATED NOVEMBER 16, 1996.

Dear Mr. Read:

Based on the information provided on your November 18, 1996 updated submittal, the above referenced project is approved for Certificate of Occupancy.

If I can be of further assistance or you have any questions, please feel free to contact me at 768-3622.

Sincerely,

Lisa Ann Manwill
Engineering Assoc./Hyd.

c: Andrew Garcia
File

ST JOE'S NORTH PARKING LOT
Worksheet for Triangular Channel

Project Description	
Project File	c:\fmw\project1.fm2
Worksheet	st. joe
Flow Element	Triangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.017	
Channel Slope	0.040000	ft/ft
Left Side Slope	0.00	H : V
Right Side Slope	16.00	H : V
Discharge	3.00	ft^3/s

Results		
Depth	0.29	ft
Flow Area	0.65	ft^2
Wetted Perimeter	4.87	ft
Top Width	4.58	ft
Critical Depth	0.39	ft
Critical Slope	0.007909	ft/ft
Velocity	4.59	ft/s
Velocity Head	0.33	ft
Specific Energy	0.61	ft
Froude Number	2.14	
Flow is supercritical.		

ST. JOE'S NORTH SIDE RUNDOWN
Worksheet for Rectangular Channel

Project Description	
Project File	c:\fmw\project1.fm2
Worksheet	ST. JOE'S NORTH RUNDOWN
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.020000	ft/ft
Depth	0.50	ft
Bottom Width	1.50	ft

Results		
Discharge	5.43	ft^3/s
Flow Area	0.75	ft^2
Wetted Perimeter	2.50	ft
Top Width	1.50	ft
Critical Depth	0.74	ft
Critical Slope	0.006804	ft/ft
Velocity	7.24	ft/s
Velocity Head	0.82	ft
Specific Energy	1.32	ft
Froude Number	1.81	
Flow is supercritical.		

City of Albuquerque

P.O. BOX 1293 ALBUQUERQUE, NEW MEXICO 87103

December 26, 1995

Larry Read
Larry Read & Associates
P.O. Box 90233
Albuquerque, NM 87199

RE: ST. JOSEPH'S MEDICAL OFFICES (E20-D11C) DRAINAGE REPORT FOR SITE DEVELOPMENT PLAN, FINAL PLAT, BUILDING PERMIT AND SO #19 PERMIT APPROVAL. ENGINEER'S STAMP DATED 12-18-95.

Dear Mr. Read:

Based on the information provided on your December 26, 1995 submittal, the above referenced project is approved for Site Development Plan, Final Plat, Building Permit, and SO #19 Permit.

Prior to Certificate of Occupancy approval, an Engineer's Certification will be required.

If I can be of further assistance or you have any questions, please feel free to contact me at 768-3622.

Sincerely,

Lisa Ann Manwill
Engineering Assoc./Hyd.

c: Arlene Portillo
Andrew Garcia
File

DRAINAGE REPORT

for

ST. JOSEPH'S MEDICAL OFFICES

Tract 2A-1-A,

LAND OF WILLIAM O. & MARY L. EDWARD

ALBUQUERQUE, NEW MEXICO

December 18, 1995

Prepared by
Larry D. Read, P.E.
P. O. Box 90233
Albuquerque, New Mexico 87199
(505) 858-3165

DRAINAGE REPORT

for

ST. JOSEPH'S MEDICAL OFFICES

Tract 2A-1-A,

LAND OF WILLIAM O. & MARY L. EDWARD

ALBUQUERQUE, NEW MEXICO

December 18, 1995

LOCATION & DESCRIPTION

The proposed site is a 1.37 acre tract located at the southwest corner of Academy Road N.E. and Moon Street N.E. within the City of Albuquerque, New Mexico.

The site has been recently graded and has scarce vegetation. The graded terrain slopes about 3.5% to the west toward the existing Sycamore Plaza.

HISTORICAL DRAINAGE

Prior to the development of the Sycamore Plaza Shopping Center, this site consisted of two drainage basins. This condition can be seen in Figure 1, the 1973 Floodway Map. The northern basin discharged about 0.42 cfs to Academy Road NE while to southern basin discharged about 0.59 cfs to a natural arroyo that crossed the shopping center site toward to west. The development of Sycamore Plaza eliminated the natural arroyo that conveyed the runoff from the southern basin. In order to minimize sediment transported from this site onto the shopping center site, this site was regraded to form a retention and sediment pond adjacent to the west property line. Provisions were made such that if the retention/sediment pond overtopped, the excess will flow parallel to the existing retaining wall south and onto the shopping center parking lot where it could be discharged along with the shopping center runoff. This is the condition of the site at the present time so there is no discharge under normal conditions from the site.

PROPOSED CONDITIONS

St Joseph's Hospitals, the owner and developer of this site, proposes to construct a Medical Office Building enclosing approximately 12,000 square feet with additional paved parking and driveways. The proposed grading divides the site into two drainage basins as shown on the Grading and Drainage Plan in the pocket at the rear of this report. Basin A-1 drains to the south across Tract 2A-1-B within a temporary riprap channel. This channel is within a 20' wide drainage easement created when this parcel was subdivided into the two existing tracts. The channel discharges 3.1 cfs (100 year - 6 hour) to an existing 40' wide drainage easement on Tract 2A-2 (The La Paloma Apartments). This drainage easement conveys the runoff to the Bear Arroyo and planed for an ultimate discharge from Tract 2A-1-A and 2A-1-B of 10 cfs. Basin A-2 discharges 3.5 cfs (100 year - 6 hour) into Academy Road through a concrete trough and sidewalk culvert. The downstream capacity of Academy Road and Wyoming Boulevard is discussed below.

This project, as shown on FEMA Floodway Map 3500032-0017 is not within any 100-year flood plains.

OFFSITE DRAINAGE

This property bounded by Academy Road to the north, Moon Street to the east, Sycamore Plaza to the west, and vacant Tract 2A-1-B to the south. All properties slope away from this site therefore no offsite drainage will impact this project. To insure no offsite drainage enters the site, the proposed grading plan has set the property line 0.87' or higher above the gutter flowline in Academy Rd. and Moon St. All drainage from this site is into public streets or platted, recorded drainage easements.

To ensure the runoff this site contributes to Academy Rd. does not adversely impact any property downstream, this report has completed a limited scope drainage study of Academy Rd and Wyoming Blvd. to the Pino Arroyo. The study made the following assumptions based on field observations and as-built drawings as available:

- All runoff from the east in Academy Rd. is diverted south at Layton Rd. due to cross slopes within the intersection and the longitudinal slope of Academy Rd. west of the intersection.

- All runoff within Academy Rd. and Wyoming Blvd. is distributed evenly between the two gutter flowlines.

- All runoff within Academy Rd. is diverted to the north in Wyoming Blvd. due to the cross slopes within the intersection and the longitudinal grade of Academy Rd. west of the intersection.

- Although Academy Rd. is presently only a four lane section, for the purposes of this report it is assumed to be a six lane section due to the very wide median having sufficient distance for the expansion.

- Wyoming Blvd. is a six lane section. It is assumed that Wyoming is already built to it's ultimate width since all land adjacent to it is privately owned and mostly developed.

- Once the runoff reaches the Pino Arroyo, there is sufficient capacity within the arroyo.

- All drainage from the basins on the property of Albuquerque Academy that contribute runoff to Wyoming have been ponded to reduce the peak. The pond discharge rates from the drainage study (Z-19-011) were input into this computer model.

The results of this study are included in the Appendix of this report for reference. The computer model shows a routed flow of 65 cfs within Wyoming Blvd. at the Pino Arroyo prior to adding the runoff from this project and a routed flow of 67 cfs at the same point with runoff from this project. In both cases the depth of flow within Wyoming is 0.58' deep (assuming the flow is evenly split between the gutters). The flows are supercritical therefore, the energy grade has been calculated ($E_g = d + v^2/2g$). I the first case the energy grade is 0.82' without the runoff from this site and 0.83' with the runoff from this site added. In both cases it is less than the 0.87' allowable per the DPM. Also in both cases the product V x D is 2.3, significantly less than that allowed by the DPM.

PEAK RUNOFF QUANTITIES

The AHYMO printouts, summary sheets, and miscellaneous calculations to support these analyses are included in the Appendix of this report for reference. The values by Drainage Basin are summarized as follows:

Basin A-1	Total Area	= 0.000974 sq mi
	Developed Peak Runoff Q_{100}	=3.07 cfs
	Developed Volume V_{100}	=0.1181 ac-ft
	Developed Peak Runoff Q_{10}	=2.05 cfs
	Developed Volume V_{10}	=0.0788 ac-ft
Basin A-2	Total Area	= 0.001171 sq mi
	Developed Peak Runoff Q_{100}	=3.54 cfs
	Developed Volume V_{100}	=0.1344 ac-ft

Developed Peak Runoff Q_{10} =2.36 cfs
Developed Volume V_{10} =0.0896 ac-ft

METHODOLOGY

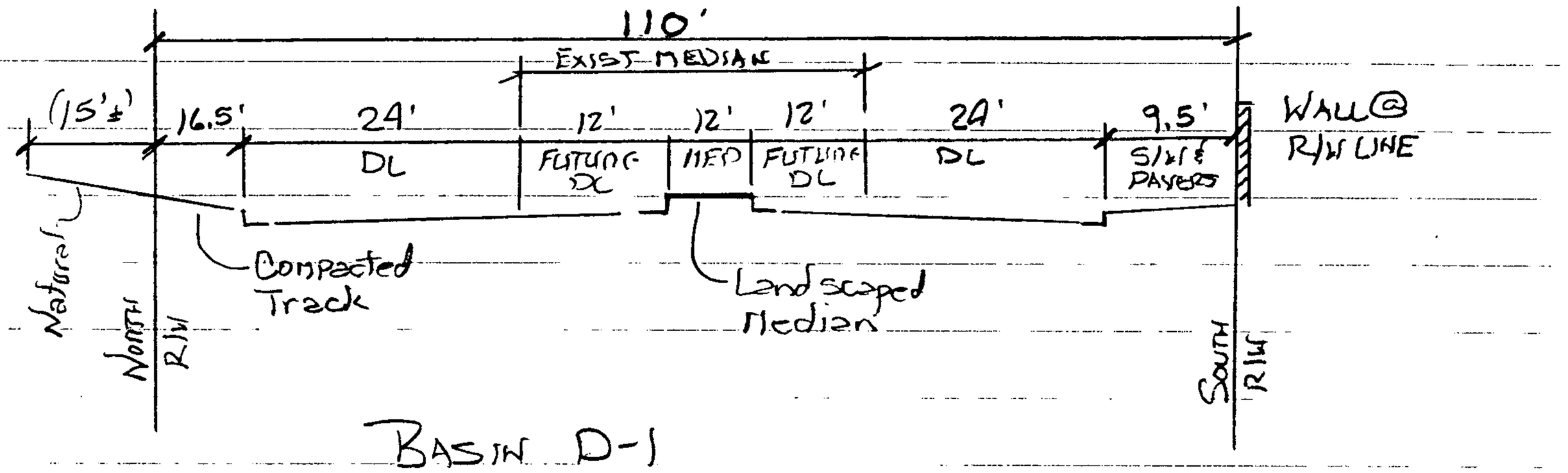
The hydrology for this project was analyzed using the January 1994 release of the AHYMO computer modeling program as developed by AMAFCA. All procedures are in accordance with those shown in the January 1993 release of the City of Albuquerque Development Process Manual, Section 22.2.

The specific values used for this analysis are as follows:

-Precipitation Zone 3

-Design Storm 100-year, 6-hour duration
i = 2.60 inches (t_c = 0.2 hours)

ACADEMY BLVD (BASINS D-1 & D-2)



BASIN D-1

L = 2450' A = 7.2 acres (0.01125 sm) Savg = 2%

TYPE D: $\frac{9.5+24+12+12+24 * 81.5 * 2450'}{43560} = 4.6$ ac

4.6/7.2 = 65%

TYPE C: $\frac{16.5' + 2450}{43560} = 0.9$ ac

0.9/7.2 = 13%

TYPE B = $\frac{12' * 2450}{43560} = 0.7$ ac

0.7/7.2 = 10%

TYPE A = $\frac{15 * 2450}{43560} = 0.84$ ac

0.84/7.2 = 12%

BASIN D-2

L= 2080' A= 7.6 ac (0.01188sq mi) S_{avg} = 2.3%

TYPE D - $\frac{81.5 * 2080}{43560}$ = 3.89 ac / 7.6 = 51%

TYPE C - $\frac{16.5 * 2080}{43560}$ = 0.8 ac / 7.6 = 10.5%

TYPE B - $\frac{12 * 2080}{43560}$ = 0.57 ac / 7.6 = 7.5%

TYPE A - 100 - 51 - 10.5 - 7.5 = 31%

WYOMING BLVD BASINS (D-3 & D-8)
D-4, D-5, & D-6 PART)

Use the same section as Academy except:
- the two driving lanes marked future exist
- the "15' Natural" Strip on the north does not exist
- the west parkway is 6' sidewalk & 10.5' landscaped

BASIN D-3

L= 780' A= 2.2 ac (0.0034 sq mi) S_{avg} = 0.9%

TYPE D $\frac{81.5 + 6 * 780}{43560}$ = 1.6 ac / 2.2 ac = 71%

TYPE C Compacted landscape 11%

TYPE B $\frac{12 + 10.5 * 780}{43560}$ = 0.40ac / 2.2 = 18%

TYPE A NONE 0%

BASIN D-4

- Assume Academy Property will remain Natural or, if Developed, will be ponded to reduce runoff to historical

- Wyoming L = 640' S = 1.1% TOTAL BASIN 20.5ac (0.03203sm)

TYPE D = $\frac{87.5 * 640}{43560}$ = 1.29ac / 20.5 = 6.3%

TYPE C = 0.7%

TYPE B = $\frac{22.5 * 640}{43560}$ = 0.33ac / 20.5 = 1.6%

TYPE A = (Measured) 18.9ac / 20.5 = 91.4%

BASINS D-5, D-6, & D-7 - the Academy Property has constructed detention ponds to reduce flows on the Wyoming Blvd. For the purpose of this study - they will be assumed as 100% TYPE A SOIL (REFERENCE DRAINAGE FILE E-19-11)

Total Discharge to Wyoming is (per E-19-11)
BASIN 1 - 1.75cfs (BASIN D-6)
BASIN 2 - 1.3cfs (BASIN D-6)
BASIN 3 - 0.9cfs (BASIN D-5)
- BASIN D-7 directed to Arroyo -

BASIN D-5

WYOMING L= 1080' S= 2.1% A= 1080 * 110 = 2.3ac (0.004219)

TYPE D= $\frac{87.5 * 1080}{43560}$ = 2.2ac / 2.7 = 80.3%

TYPE C: 0

TYPE B= $\frac{22.5 * 1080}{43560}$ = 0.56ac / 2.7 = 20.7%

TYPE A - 0 - SEE NOTE ABOVE

BASIN D-6

WYOMING $L = 1240'$ $S = 1.1\%$ $A = 1240' * 110 = 3.13 ac$ (0.00489 sm)

TYPE D $\frac{87.5 * 1240}{43560} = 2.5 ac / 3.13 = 80\%$

TYPE C 6

TYPE B $\frac{22.5 * 1240}{43560} = 0.64 ac / 3.13 = 20\%$

TYPE A 0 - SEE NOTE ABOVE

BASIN D-7

Runoff diverted to arroyo per drainage report E-19-11.

BASIN D-8

$L = 1720'$ $S = 1.1\%$ $A = 5.4 ac$ (0.00844 sm) $Serv = 1.1\%$

TYPE D = $\frac{87.5 * 1720'}{43560} = 3.5 ac / 5.4 = 64\%$

TYPE C - Misc Compacted Soils = 20%

TYPE B = $\frac{22.5 * 1720}{43560} = 0.9 ac / 5.4 = 16\%$

Inlet Interception @ Moon

Q_{100} = 30 cfs

- Assume flow split evenly on north & south side of Academy

∴ Q ½ street = 15cfs S = 2% Sx = 2%

d = 0.96' v = 4 fps (Plate 22.3 D-2

North Side

1. A inlet
2. D inlets

Q_i (A) = 7 cfs (Plate 22.3 D-5)

Q_b = 15 - 7 = 8 cfs

d = 0.38 cfs v = 3.4 fps

Q_i (D) = 4.4 cfs (Plate 22.3 D-5)

Q_b = 8 - 4.4 = 3.6 cfs

d = 0.3' v = 2.9 fps

Q_i (D) = 3 cfs

Q_b = 3.6 - 3 = 0.6 cfs

South Side

Q_{100} = 15 cfs d = 0.46'

1 - A inlet
2 - Double 'C' inlets

Q_i (A) = 7 cfs

Q_b = 15 - 7 = 8 cfs
d = 0.38'

Q_i (Double C) = 5.2 cfs
Q_b = 8 - 5.2 = 2.8 cfs
d = 0.28'

Q_i (Double C) = 3.1 cfs < 2.8 full interception

Q to Basin D-2 = 0.6 cfs

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
START										TIME= .00
*S COMPUTE 100 YR. 6 HR. HYDROGRAPHS.										
*S										
*S ----------										
*S --- DEVELOPED CONDITIONS ---										
*S -- USING - 6 HOUR STORM --										
*S --- PER COA DPM SECTION 22.2 ---										
*S ---RAINFALL IS ZONE 3 (FIG. A-1)---										
*S ----------										
*S FILE NAME STJOESAC.DAT										
*S										
RAINFALL TYPE= 1										RAIN6= 2.600
*S										
*S										
*S										
*S ON-SITE BASINS										
*S										
*S										
*S BASIN A-1										
*S										
COMPUTE NM HYD	161.10	-	61	.00097	3.07	.118	2.27365	1.500	4.925	PER IMP= 93.55
*S										
*S BASIN A-2										
*S										
COMPUTE NM HYD	162.10	-	62	.00117	3.54	.134	2.15163	1.500	4.725	PER IMP= 83.90
*S										
*S										
*S OFF-SITE BASINS										
*S										
*S										
*S BASIN D-1										
*S										
COMPUTE NM HYD	101.10	-	1	.01125	30.13	1.114	1.85635	1.500	4.185	PER IMP= 65.00
*S										
*S BASIN D-2										
*S										
COMPUTE NM HYD	102.10	-	2	.01188	27.98	1.010	1.59337	1.500	3.680	PER IMP= 51.00
*S										
*S BASIN D-3										
*S										
COMPUTE NM HYD	103.10	-	3	.00340	9.62	.358	1.97579	1.500	4.419	PER IMP= 71.00
*S										
*S BASIN D-4										
*S										
COMPUTE NM HYD	104.10	-	4	.03203	42.64	1.314	.76921	1.500	2.080	PER IMP= 6.30
*S										
*S BASIN D-5 STREET										
*S										
COMPUTE NM HYD	105.10	-	5	.00422	12.29	.466	2.07269	1.500	4.552	PER IMP= 80.30
*S										
*S BASIN D-6 STREET										
*S										
COMPUTE NM HYD	106.10	-	6	.00489	14.22	.539	2.06838	1.500	4.544	PER IMP= 80.00
*S										
*S BASIN D-8										
*S										
COMPUTE NM HYD	108.10	-	8	.00084	2.35	.086	1.90746	1.500	4.354	PER IMP= 64.00
*S ALL OF THE RUNOFF FROM BASIN D-1 IS INTERCEPTED AT MOON EXCEPT										
*S 0.6 CFS. SEE HAND CALCULATIONS										
DIVIDE HYD	101.20	1	10	.01123	29.40	1.112	1.85633	1.500	4.091	
	101.30	AND	11	.00002	.73	.002	1.85635	1.500	56.155	
*S										
*S ADD RUNOFF FROM ONSITE BASIN A-2										
ADD HYD	111.10	62&11	11	.00119	4.27	.136	2.14637	1.500	5.605	
*S										
*S ROUTE BASIN THROUGH BASIN D-2 AND COMBINE RESULTING										
*S										

ROUTE	112.00	11	12	.00119	2.21	.136	2.14676	1.600	2.903

COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	113.00	2&12	13	.01307	29.55	1.146	1.64373	1.500	3.532	
*S										
*S										
*S	RUNOFF IS DIVERTED TO THE NORTH IN THE WYOMING/ACADEMY INTERSECTION									
*S	BY THE ADVERSE GRADES ON THE WEST APPROACH OF ACADEMY TO THE INTERSECTION									
*S										
*S	ADD RUNOFF FROM WYOMING SOUTH AND ROUTE NORTH ON WYOMING									
ADD HYD	114.00	3&13	14	.01647	39.16	1.504	1.71226	1.500	3.715	
*S										
*S										
*S	ROUTE RUNOFF TO THE NORTH END OF BASIN D-4 AND COMBINE WITH THE RUNOFF									
*S	FROM BASIN D-4. DIVIDE FLOWS IN HALF FOR EACH SIDE OF WYOMING AND ROUTE									
*S	SEPARATELY THEN RECOMBINE									
*S										
DIVIDE HYD	115.00	14	15	.00824	19.58	.752	1.71226	1.500	3.715	
	116.00	AND	16	.00824	19.58	.752	1.71226	1.500	3.715	
ROUTE	117.00	15	17	.00824	18.00	.752	1.71227	1.533	3.415	
ROUTE	118.00	16	18	.00824	12.76	.752	1.71227	1.600	2.420	
ADD HYD	114.10	17&18	14	.01647	30.20	1.504	1.71219	1.567	2.864	
*S										
ADD HYD	119.00	14& 4	19	.04850	71.47	2.818	1.08945	1.533	2.303	
*S										
*S										
*S	STORE HYDROGRAPHS OF DISCHARGE RATE FROM THE ACADEMY'S PROPERTY									
*S	SINCE THEY ARE FROM A DETENTION POND, ASSUME CONSTANT DISCHARGE									
*S	RATE THROUGHOUT STORM. DISCHARGE RATES FROM DRAINAGE FILE E-19-011									
*S	BY BOHANAN HUSTOM 1985.									
*S										
*S	HYD 90 IS FROM BH BASIN 3 AND WILL COMBINE WITH THE WYOMING RUNOFF									
*S	BASIN D-5									
*S										
STORE HYD	190.00	-	90	.10670	.90	.193	.03398	.200	.013	
ADD HYD	105.10	5&90	5	.11092	13.19	.654	.11048	1.500	.186	
*S										
*S										
*S	ROUTE FLOWS THROUGH BASIN D-5. ASSUME FLOW EVENLY DIVIDED IN									
*S	EAST AND WEST SIDE OF ACADEMY. ROUTE FLOWS SEPARATLEY AND									
*S	COMBINE AT NORTH END OF BASIN D-5									
*S										
DIVIDE HYD	120.00	19	20	.02425	35.74	1.409	1.08945	1.533	2.303	
	121.00	AND	21	.02425	35.74	1.409	1.08945	1.533	2.303	
*S										
ROUTE	122.00	20	22	.02425	32.75	1.409	1.08945	1.600	2.110	
ROUTE	123.00	21	23	.02425	32.75	1.409	1.08945	1.600	2.110	
ADD HYD	124.10	22&23	24	.04850	65.51	2.818	1.08942	1.600	2.110	
*S										
*S	ADD ROUTED FLOW TO BASE FLOW FROM BASIN D-5									
*S										
ADD HYD	125.00	24& 5	25	.15942	75.79	3.472	.40831	1.567	.743	
*S										
*S										
*S	HYD 91 AND 92 ARE FROM BH BASINS 1 AND 2 RESPECTIVELY. THEY WILL									
*S	COMBINED WITH BASIN D-6									
*S										
STORE HYD	191.00	-	91	.04280	1.30	.301	.13179	.200	.047	
*S										
ADD HYD	106.10	6&91	6	.04769	15.52	.831	.32683	1.500	.509	
*S										
*S										
STORE HYD	192.00	-	92	.04280	1.75	.376	.16473	.200	.064	
ADD HYD	106.20	6&92	6	.09049	17.27	1.195	.24767	1.500	.298	
DIVIDE HYD	120.00	25	27	.07971	37.90	1.736	.40831	1.567	.743	
	121.00	AND	28	.07971	37.90	1.736	.40831	1.567	.743	
*S										
*S	ROUTE FLOWS THROUGH BASIN D-6. SPLIT FOR ROUTING AS DOCUMENTED									
*S	ABOVE.									
*S										
ROUTE	129.00	27	29	.07971	33.40	1.736	.40831	1.633	.655	
ROUTE	130.00	28	30	.07971	33.40	1.736	.40831	1.633	.655	
*S										
*S										

```
ADD HYD              125.10 29&30  25        .15942        66.79        3.472        .40831     1.633      .655
*S
*S  ADD ROUTED FLOW TO BASE FLOW FROM BASIN D-6
*S
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COMMAND	HYDROGRAPH IDENTIFICATION	FROM ID NO.	TO ID NO.	AREA (SQ MI)	PEAK DISCHARGE (CFS)	RUNOFF VOLUME (AC-FT)	RUNOFF (INCHES)	TIME TO PEAK (HOURS)	CFS PER ACRE	NOTATION
ADD HYD	131.00	6&25	31	.24991	78.23	4.667	.35014	1.633	.489	
*S										
*S ROUTE FLOWS TO NORTH END OF BASIN D-8 AND COMBINE WITH RUNOFF										
*S FROM BASIN D-8										
*S										
DIVIDE HYD	133.00	31	33	.12496	39.12	2.333	.35014	1.633	.489	
	134.00	AND	34	.12496	39.12	2.333	.35014	1.633	.489	
*S										
ROUTE	135.00	33	35	.12496	33.09	2.333	.35014	1.733	.414	
ROUTE	136.00	34	36	.12496	33.09	2.333	.35014	1.733	.414	
ADD HYD	137.00	35&36	37	.24991	66.19	4.667	.35014	1.733	.414	
*S										
ADD HYD	138.00	8&37	38	.25075	67.15	4.753	.35538	1.733	.418	
*S										
FINISH										

FLOW DEPTH IN WYOMING W/O ST. JOE RUNOFF
Worksheet for Irregular Channel

Project Description	
Project File	a:\project1.fm2
Worksheet	wyoming
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.011000 ft/ft

Elevation range: 0.00 ft to 0.87 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
100.00	0.87	100.00	146.20	0.017
110.00	0.67			
110.10	0.00			
146.10	0.72			
146.20	0.87			

Discharge 33.00 ft³/s

Results

Wtd. Mannings Coefficient	0.017	
Water Surface Elevation	0.58	ft
Flow Area	8.34	ft²
Wetted Perimeter	29.43	ft
Top Width	28.93	ft
Depth	0.58	ft
Critical Water Elev.	0.64	ft
Critical Slope	0.006299	ft/ft
Velocity	3.96	ft/s
Velocity Head	0.24	ft
Specific Energy	0.82	ft
Froude Number	1.30	
Full Flow Capacity	98.96	ft³/s

Flow is supercritical.

FLOW DEPTH IN WYOMING AT THE ARROYO
Worksheet for Irregular Channel

Project Description	
Project File	a:\project1.fm2
Worksheet	wyoming
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Water Elevation

Input Data

Channel Slope 0.011000 ft/ft

Elevation range: 0.00 ft to 0.87 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
100.00	0.87	100.00	146.20	0.017
110.00	0.67			
110.10	0.00			
146.10	0.72			
146.20	0.87			

Discharge 34.00 ft³/s

Results

Wtd. Mannings Coefficient	0.017	
Water Surface Elevation	0.58	ft
Flow Area	8.53	ft²
Wetted Perimeter	29.76	ft
Top Width	29.25	ft
Depth	0.58	ft
Critical Water Elev.	0.65	ft
Critical Slope	0.006274	ft/ft
Velocity	3.99	ft/s
Velocity Head	0.25	ft
Specific Energy	0.83	ft
Froude Number	1.30	
Full Flow Capacity	98.96	ft³/s

Flow is supercritical.

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name:

Comment: RUNDOWN TO EXISTING DRAINAGE EASEMENT

Solve For Depth

Given Input Data:

Left Side Slope..	6.00:1 (H:V)
Right Side Slope.	6.00:1 (H:V)
Manning's n.....	0.025
Channel Slope....	0.0150 ft/ft
Discharge.....	10.00 cfs

Computed Results:

Depth.....	0.69 ft
Velocity.....	3.54 fps
Flow Area.....	2.83 sf
Flow Top Width...	8.24 ft
Wetted Perimeter.	8.35 ft
Critical Depth...	0.70 ft
Critical Slope...	0.01 ft/ft
Froude Number....	1.06 (flow is Supercritical)

Triangular Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name:

Comment: RUNDOWN TO EXISTING DRAINAGE EASEMENT

Solve For Depth

Given Input Data:

Left Side Slope..	6.00:1 (H:V)
Right Side Slope.	6.00:1 (H:V)
Manning's n.....	0.025
Channel Slope....	0.0150 ft/ft
Discharge.....	10.00 cfs

Computed Results:

Depth.....	0.69 ft
Velocity.....	3.54 fps
Flow Area.....	2.83 sf
Flow Top Width...	8.24 ft
Wetted Perimeter.	8.35 ft
Critical Depth...	0.70 ft
Critical Slope...	0.01 ft/ft
Froude Number....	1.06 (flow is Supercritical)