FINAL DRAINAGE REPORT

FOR

LITTLE RED CLIFF SUBDIVISION
FRUITA, COLORADO

SUBMITTED TO:

CITY OF FRUITA
PLANNING - ENGINEERING
325 EAST ASPEN, SUITE 155
FRUITA, COLORADO 81521

PREPARED FOR:

Mike McGinnis
Promark Realty Inc.
359 Main Street, Suite #2
Grand Junction, Colorado 81501

PREPARED BY:

Rhino Engineering, Inc.
1334 Ute Avenue
Grand Junction, Colorado 81501

August 1, 2000

RE Project No. 00033.01

"I hereby certify that this report for the final drainage report for the Little Red Cliff Subdivision located at the northeast corner of the intersection of State Highway 340 and Red Cliffs Drive, within the corporate limits of the City of Fruita, was prepared by me or under my direct supervision."

_____

John Emil Kornfeld, P.E.
Registered Professional Engineer,
State of Colorado No. 33064

ONE X

17 ROAD

(340)

17¼ ROAD
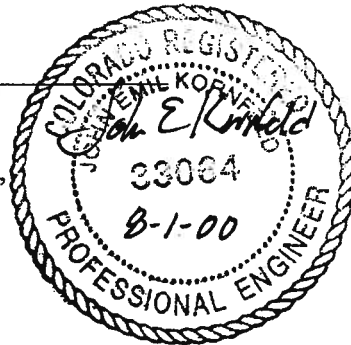
17½ ROAD

HONEYSUCKLE CIRCLE

CLIFFS DRIVE

COLORADO RIVER

ZONE X
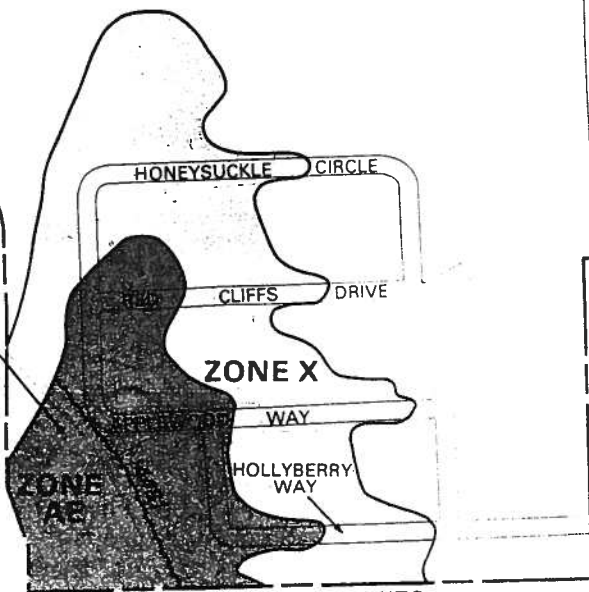
WAY

HOLLYBERRY WAY

ZONE AE

CORPORATE LIMITS

According to the Stormwater Management Master Plan (SWMMP) for the City of Fruita, June 1998, "the Redcliff Mobile Home Park surface drains south to an open field. All of the systems function marginally well, but a better outfall system is desirable, and even necessary when future development occurs" (page II-4). A copy of the drainage exhibit from the above report is attached.

This site is not generally subject to offsite drainage, as the irrigation/drainage ditch to the north of the property intercepts sheet flow from the north.

III.   PROPOSED DRAINAGE CONDITIONS

A. Changes in Drainage Conditions

Development of this parcel into six residential lots will increase stormwater runoff. Conversion of sparse grass areas to "hard surfaces", such as roofs, driveways, sidewalks, and patios, will show an increase in runoff.

Refer to Exhibit 2 – Developed Drainage Plan. The lots will sheet drain to the east street, Honeysuckle Circle, and then drain southerly in the curb and gutter section to the park area on the south side of Red Cliffs Drive.

Future development of the park (Filing 2) will provide detention for the increase of runoff with development of the parcel. However, the development will not create any significant change in the overall site drainage.

B. Maintenance Issues

Based on the size of the development, no maintenance issues with stormwater are anticipated.

IV.   DESIGN CRITERIA AND APPROACH

A. General Considerations

There are not any drainage constraints imposed on this site with future development.

B. Hydrology

The hydrologic analysis presented in this drainage report used procedures per SWMM guidelines.

TR55 was used to calculate the times of concentrations. The Rational Method was used to determine peak runoff rates. Analysis for this development includes peak discharges for the 2-year and 100-year frequency precipitation events.
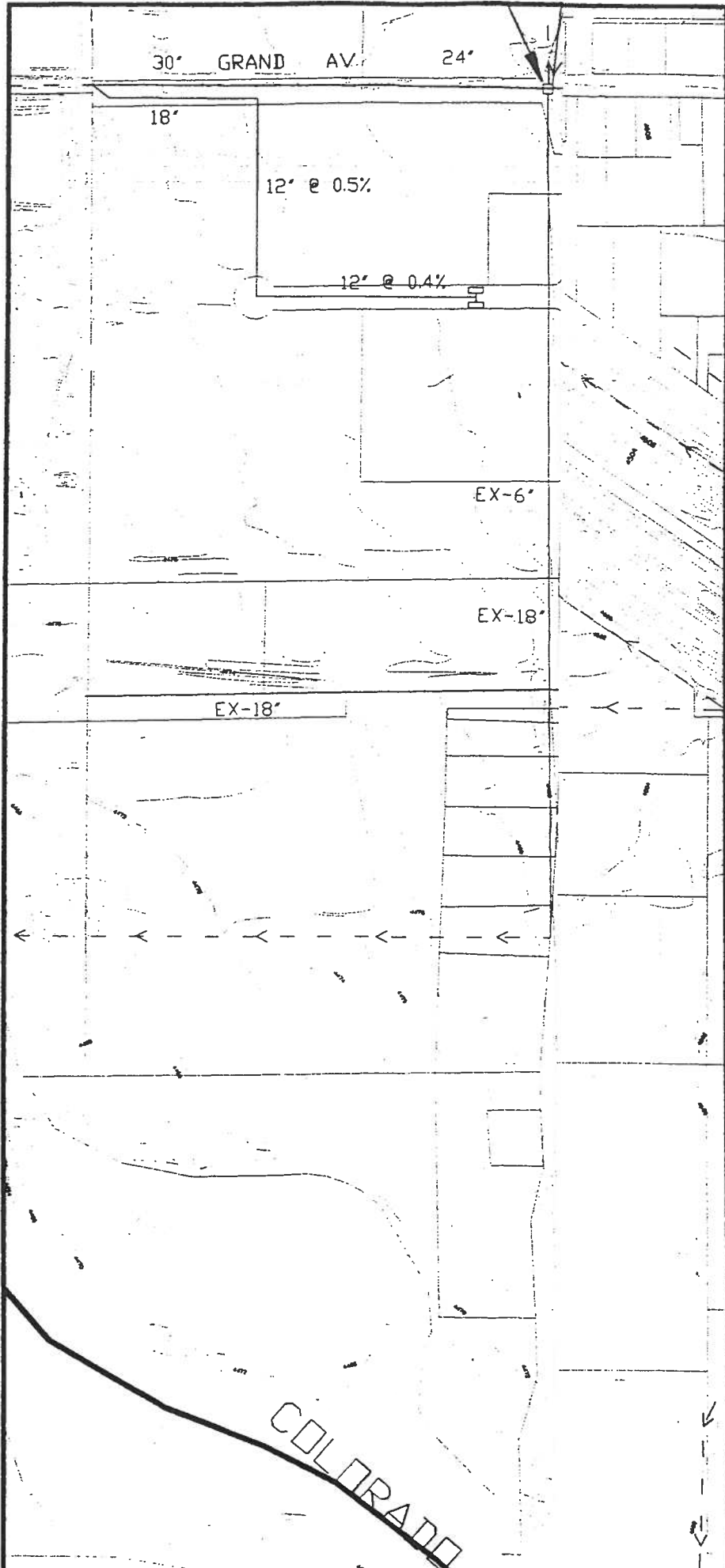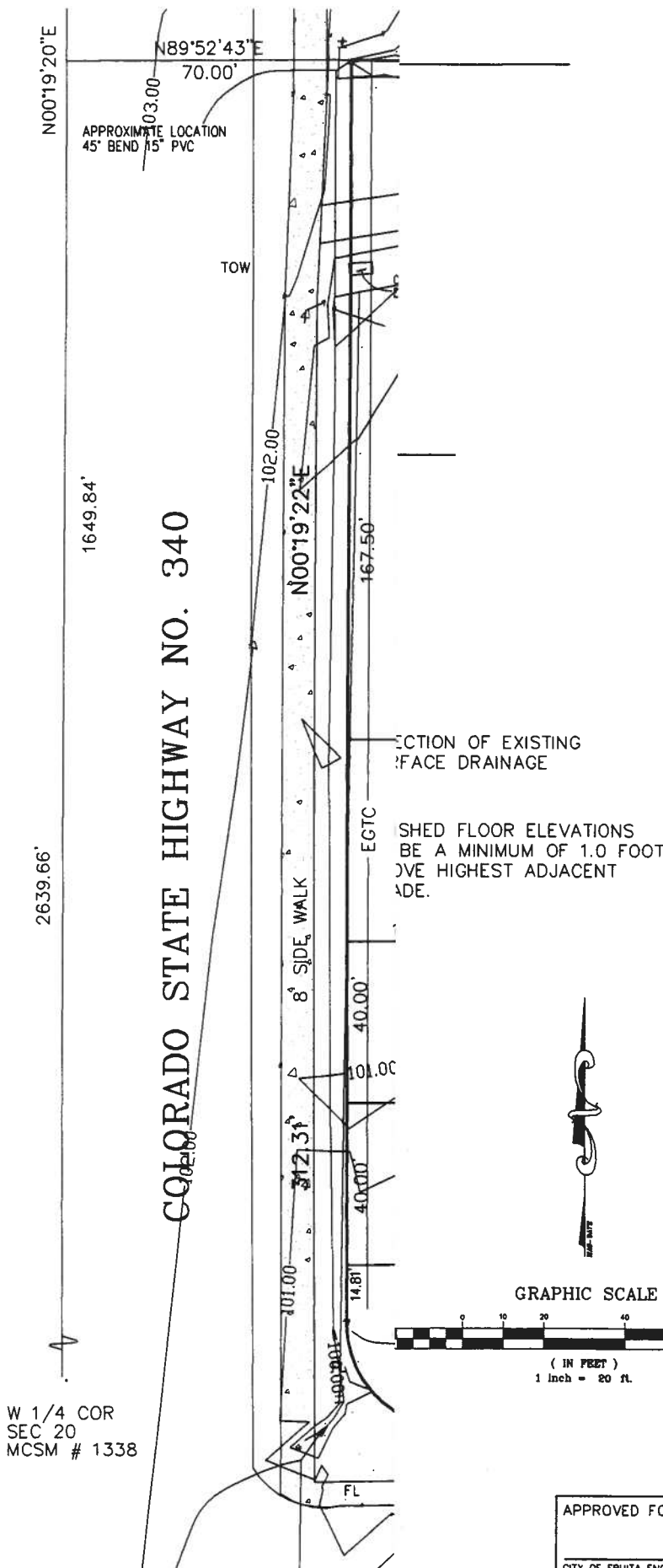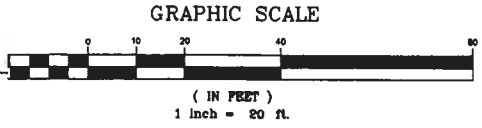
30' GRAND AV. 24'

18'

12' @ 0.5%

12' @ 0.4%

EX-6'

EX-18'

EX-18'

COLORADO

EXHIBIT "2C"
Key Drainage Components &
Southwest Area Deficiencies

LEGEND

FACILITY	EXISTING	PROPOSED	REMOVE & REPLACE
BORE & CASING		▭	
CONTOURS	(BOR 1975)		
CULVERT	· · · · · ·	— —	
GJDD DRAIN CHANNEL	– – ⟶ – –	– · ▸ –	⟹
GJDD DRAIN PIPE	⟶	⟶	⟹
IRRIGATION CANAL/ DITCH	– – ⟶ – –	– · ▹ –	
IRRIGATION PIPE	⟶	⟶	
STORM DETENTION FACILITY			
STORM DRAIN CHANNEL	– ⟶ –	– · ▸ –	⟹
STORM DRAIN PIPE	⟶	⟶	⟹
STORM DRAIN INLET	▭	▬	⬛
STORM GUTTER FLOW	⟶	⟶	
STORM OVERLAND FLOW	⟶	⟶	
STREAM, CREEK, RIVER, OR WASH	⟶		

WILLIAMS ENGINEERING
1231 19 ROAD, FRUITA, COLORADO 81521-9689
(970) 858-1014 PHONE   (970) 858-1007 FAX

N00°19'20"E

N89°52'43"E
70.00'
03.00

APPROXIMATE LOCATION
45° BEND 15" PVC

TOW

102.00

1649.84'

N00°19'22"E

167.50'

COLORADO STATE HIGHWAY NO. 340

2639.66'

EGTC

ECTION OF EXISTING
RFACE DRAINAGE

SHED FLOOR ELEVATIONS
BE A MINIMUM OF 1.0 FOOT
OVE HIGHEST ADJACENT
ADE.

8' SIDE WALK

40.00'

101.00

312.31'

40.00'

101.00

14.81

101.00

W 1/4 COR
SEC 20
MCSM # 1338

FL

GRAPHIC SCALE

0   10   20   40   80

(IN FEET)
1 inch = 20 ft.

GRADING AND DRAINAGE PLAN
HONEYSUCKLE CIRCLE SUBDIVISION
PROMARK REALTY INC.
GRAND JUNCTION, COLORADO

RHINO ENGINEERING, INC.
1334 UTE AVENUE
GRAND JUNCTION, CO 81501
970.241.6027   fax 970.256.7992

APPROVED FOR CONSTRUCTION		DATE 7/25/00
		SCALE 1" = 20'
CITY OF FRUITA ENGINEERING	DATE	
FINAL ACCEPTANCE		PROJECT NO 00033.02
CITY OF FRUITA ENGINEERING	DATE	SHEET NO 1

V.   RESULTS AND CONCLUSIONS

A. Runoff Rates for the 2-Year and the 100-Year Storm

Existing Hydrologic Conditions

According to TR55 procedures, the curve number that best matches the existing hydrologic is 79. A curve number of 79 represents "open space, fair condition with grass cover 50 to 75 percent" with "C" hydrologic soils.

The time of concentration was calculated to be 46 minutes (2-year) and 27 minutes (100-year).

According to hydrologic analysis, the historic (existing) peak runoff rates for this site include:

Site	2-Year Peak Runoff Rate (cfs)	100-Year Peak Runoff Rate (cfs)
1.1-Acre	0.18	1.16

The Rational Method calculations and TR55 data summary summary for existing conditions for the 2-year and 100-year design storms are included in Appendix I.

Developed Hydrologic Conditions

According to hydrologic/hydraulic analysis, the developed peak runoff rates include:

Site	2-Year Peak Runoff Rate (cfs)	100-Year Peak Runoff Rate (cfs)
1.1-Acre	0.29	1.67

The Rational Method calculations and TR55 data summary for developed conditions for the 2-year and the 100-year design storms are located in Appendix II.

B. Detention/Retention

No detention is proposed onsite. The increase in stormwater runoff from development will be provided in the park area, south of Red Cliffs Drive, when the park area develops.

Actual detention volumes will be determined when the park detention basin is designed, based on the difference between the existing and developed peak runoff rates. However, to approximate actual volumes, determine the difference between the stormwater runoff between existing and developed conditions.

The difference in stormwater volume (based on the difference in runoff coefficients) for the 2-year storm is:

(1.1 acres)(43560 square feet/1 acre)(0.70 inches)(1 feet/12inches)(0.48-0.40) = 224 cubic feet

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APPENDIX I

EXISTING HYDROLOGIC CONDITIONS
RATIONAL METHOD CALCULATIONS AND TR55 SUMMARIES

EXISTING PEAK RUNOFF

Based calculations on SWMM manual.

Area of parcel = 1.1 acres

Existing ground cover consists of sparse grass and annuals, ~ 50% ground cover.

Use TR55 to estimate Time of Concentrations.

$$T_C \text{ (existing) for } 2yr = 0.77 \text{ hours}$$
$$100yr = 0.46 \text{ hours}$$

See attached computer printouts

Use precipitation data per page A-2

$$i_2 \text{ for } TC = 46 \text{ minutes} = 0.41$$

$$i_{100} \text{ for } TC = 27 \text{ minutes} = 2.29$$

Use runoff coefficients for non-green landscaping (low end) since area is not irrigated

$$C_2 = 0.40 \text{ per page } B-3$$
$$C_{100} = 0.46$$

$$Q_2 = (0.40)(0.41)(1.1) = \underline{0.18 \text{ cfs}}$$

$$Q_{100} = (0.46)(2.29)(1.1) = \underline{1.16 \text{ cfs}}$$

DEVELOPED PEAK RUNOFF

Existing ground cover consists of the following hard surfaces per lot:

Structures,	1500 ft²	(30×50)
Patios & Sidewalks	440 ft²	(10×20 and 4×60)
Driveway	900 ft²	(18×50)
	2840 ft² / lot	

@ 6 lots = 17,040 ft²

use $c = 0.93$ for hard surfaces (2YR) and 0.95 (100 YR)

assume remaining areas are open space, i.e, grass, landscaping

$C_2 = 0.24$
$C_{100} = 0.30$

$$wt\ C_2 = \frac{(0.93)(17,040) + (0.24)(32,776)}{49,816} = 0.48$$

$$wt\ C_{100} = \frac{(0.95)(17,040) + (0.30)(32,776)}{49,816} = 0.53$$

T_c for 2 yr = 0.49 HR $i_2 = 0.54$
T_c for 100 yr = 0.30 HR $i_{100} = 2.85$

$Q_2 = (0.48)(0.54)(1.1) = \underline{0.29\ cfs}$

$Q_{100} = (0.53)(2.85)(1.1) = \underline{1.67\ cfs}$