

Revised Report
received 2/15/06

DRAINAGE REPORT
FOR
RIVER GLEN ESTATES SUBDIVISION
IN
CITY OF FRUITA, COLORADO

PREPARED FOR:

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PREPARED BY:

INDEPENDENT SURVEY
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DECEMBER 2005



2-03-06

I. GENERAL LOCATION:

The proposed project is located along the east side of 18 Road and south of the I-70 Frontage Road, and is a Replat of Lots 2 & 3 in Pheasant Hollow Subdivision North. River Glen Estates is intended to be a residential subdivision containing 20 lots and a community park. The area is 6.83 acres.

II. GENERAL DESCRIPTION AND EXISTING DRAINAGE:

The property has previously been cultivated for agricultural purposes and has been furrow irrigated from east to west. The land slopes from northeast to the southwest at approximately 0.7 to 1.0%. All surface drainage from the property currently flows into a 12 inch culvert under the driveway just south of the south property line of the project, then into a 12 inch culvert which apparently crosses under 18 road, however it cannot be determined where this culvert outlets to. These two culverts are partially plugged. There is another storm sewer manhole and a 12 inch storm sewer pipe under 18 road which flows into a large drainage ditch which flows west and into the Colorado River. This storm sewer picks up subsurface drainage from french drains which were apparently installed to dewater the fields during irrigation.

Off-site drainage consists of about 4 acres in Pheasant Hollow Subdivision North, Lot 1 which is located north of the proposed subdivision and south of I-70 Frontage Road. (The south roadway borrow ditch of the I-70 Frontage Road flows northwest under 18 road and does not contribute to this project.)

III. PROPOSED DRAINAGE:

Overlot grading on the subdivision will be done so that drainage from each lot will flow onto the proposed street and flow via curb and gutter to drop inlets located at the low point in the street. The drop inlets will be connected with storm sewer pipe which will flow to a new manhole which will be installed over the existing 12 inch pipe under 18 road which empties into the large drainage ditch.

Existing drainage which comes down an existing swale on the property south of the referenced project will continue to flow into the existing culverts mentioned above. Flow into these two culverts will be decreased significantly because of the diversion of surface runoff from this project into the existing 12 inch storm sewer. The capacity of this 12 inch storm sewer pipe has been checked and was found to be just capable of handling the 100-yr. event flow with 6.5 feet of head in manhole #1. A head of 6.5 feet will create a backwater to manhole # 2 but will not affect the hydraulics in Line "A", since the hydraulics is limited by Inlet Control at manhole # 3.

Line "A" was designed using Inlet Control and a head of 2.7 feet, which will cause water to reach a depth of about 3 inches above gutter elevation.

Outlots B & C which are designated as park and irrigation storage area are excluded from calculations because these areas will not contribute to this drainage system. It is intended that the park will be graded so that it will retain all precipitation which falls on it and will be allowed to seep into the soil. The irrigation storage pond likewise will not contribute any runoff.

IV. DRAINAGE FEE IN LIEU OF DETENTION:

Per the request of the City of Fruita, the developer is willing to pay a "fee in lieu of detention" in accordance with "VIII-3 of the STORMWATER MANAGEMENT MANUAL".

The formula for calculating this fee is $\$14,000(C_{pre} - C_{post}) \times Area^{0.7}$

Where C is the runoff coefficient for the before and after conditions of the development.

The runoff coefficient for the "pre or historic" condition C_{pre} is 0.24

A weighted runoff coefficient has been calculated for the "post or after" condition C_{post} and is stated as 0.55.

Based on these values the fee is calculated to be \$16,175.53.

Appendix A, attached hereto is the calculations used to determine this fee.

APPENDIX A

**CALCULATIONS FOR
FEE IN LIEU OF DETENTION
FOR
PROPOSED
RIVER GLEN ESTATES SUBDIVISION
CITY OF FRUITA**

DRAINAGE REPORT
RIVER GLENN ESTATES SUBDIVISION

11/02/05
KJB.

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PER CITY OF FRUITA, DETENTION WILL NOT BE REQUIRED BECAUSE OF PROXIMITY TO COLORADO RIVER. INSTEAD, A CASH-IN-LIEU OF DETENTION WILL BE REQUIRED. THEREFORE A FEE WILL BE DETERMINED USING THE FORMULA IN "STORM-WATER MANAGEMENT MANUAL", BASED ON RUNOFF COEF. FOR "PRE" AND "POST" DEVELOPMENT.

1. DETERMINE "PRE"-DEVELOPED C_{PRE} FOR 100-YR. EVENT.

AVERAGE S \approx 1%

SOIL TYPE GROUP B TO C - USE C ..

LAND SURFACE CHARACTERISTIC IS CULTIVATED/AGRICULTURAL.

THEREFORE $C_{PRE} = 0.24$ (TABLE B-1, SWMM)

2. DETERMINE "POST"-DEVELOPED C_{POST} FOR 100YR. EVENT.

COMPUTE WEIGHTED C_{POST}

ASSUME: ROOF AREA/LOT = 2800 SQ. FT. (COVENANTS CALL FOR 1,800' MIN. HOUSE SIZE)
DRIVEWAY/LOT 16x30 = 480 SQ. FT.

REMAINDER OF LOT 20% ROCK LANDSCAPE,
+ 80% GRASS

STREET + SIDEWALK	0.77 AC.
ROOFS 20x2800/43,560	1.29 AC.
DRIVEWAYS 20x480/43,560	0.22 AC.
GRASS 186,001 x .80/43,560	3.42 AC.
LANDSCAPE: 186,001 x .20/43,560	0.85 AC.
	<u>6.55 (O.L. B+C EXCLUDED)</u>

1	2	3	2x3
SURFACE	AREA (AC.)	C_{100}	
ASPHALT/SIDEWALK.	0.77	0.95	0.73
ROOFS	1.29	0.95	1.23
DRIVEWAYS	0.22	0.95	0.21
GRASS	3.42	0.30	1.03
LANDSCAPE	0.85	0.50	0.43
	<u>6.55</u>		<u>3.63</u>

WTO $C_{100} = 3.63 / 6.55 = 0.55$

FEE = \$14,000(0.55 - 0.24) x 6.55^{0.7} = \$16,175.53

3. DETERMINE STORM SEWER SIZE TO HANDLE 100 YR. RUNOFF

TIME OF CONCENTRATION:

CHANNELIZED (300')		26 MIN.
OVERLAND (960'-300')	$\frac{660}{1.6 \times 60}$	7 MIN.
		33 MIN.

$I_{100} = 2.03 \text{ in./hr.}$ AREA OFFSITE = 3.99 AC.
 ONSITE = 6.55
10.54

$Q_{100} = 0.55 \times 2.03 \times 10.54 = 11.76 \text{ cfs}$ GUTTER 4504.89
 F.L. PIPE - 4501.89

STORM LINE "A"

WITH SUBMERGED INLET - USE INLET CONTROL
 TRY 15" Ø PIPE; THEN $H_w/D = 40.5" \div 15" = 2.7$
 USE CHART 1, PAGE L-19 15" PIPE CARRIES 11.0 cfs
 WITHIN 6% OK.
 DIA. X-PIPE = 12" CARRIES 7.0 cfs; 15" CARRIES 10.0 cfs
 USE 15" TO INLET #1 + 12" TO INLET #2
 INLETS: INLET #1 INTERCEPTS GREATEST AMOUNT; ABOUT
 $0.55 \times 2.03 \times (3.99 + 6.55/2) = 8.11 \text{ cfs}$

TABLE G-1 (SWMM) SINGLE INLET, 100 YR., URBAN
 RESIDENTIAL CARRIES 13 cfs.
 OK USE SINGLE COMBINATION INLET.

CHECK EXISTING 12" PIPE UNDER 18 RD.

A HEAD OF 6.5' CAN BE ALLOWED IN M.H. #1 w/o AFFECTING HYDRAULICS OF LINE "A" ABOVE.

$H_w/D = 6.5 \div \frac{12}{12} = 6.5$

CHART 1, PAGE L-19 EXISTING 12" PIPE CARRIES ABOUT 12 cfs ∴ OK.

GRATE # 3 PICKS UP JUST A SMALL AREA OF 18 ROAD OF ABOUT 0.06 ACRES ($Q = 0.95 \times 2.03 \times 0.06 = 0.12 \text{ cfs}$)