

FINAL DRAINAGE REPORT

ELMWOOD HEIGHTS SUBDIVISION

FRUITA, COLORADO

PREPARED FOR:

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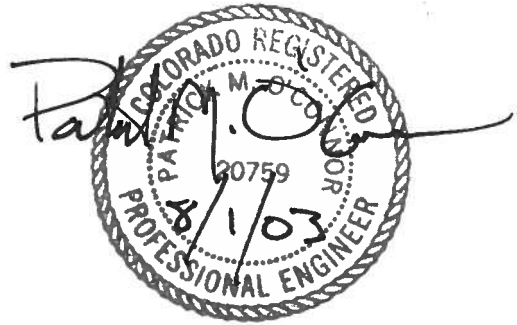
PREPARED BY:

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August 1, 2003
VEC # 4145.01-01

CERTIFICATION

I hereby certify that this Final Drainage Report for Elmwood Heights Subdivision was prepared under my direct supervision.



Patrick M. O'Connor, P.E.
Registered Professional Engineer
State of Colorado, # 20759

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FINAL DRAINAGE REPORT

ELMWOOD HEIGHTS SUBDIVISION

I. LOCATION AND DESCRIPTION OF PROJECT

Elmwood Heights Subdivision (*previously called "Advantage Village"*) is located approximately 1/8 mile south of K 3/4 Road along the east side of 17 1/4 Road. The Sketch-Plan was approved earlier this year and the project was recently annexed into the Fruita City limits and zoned "Community Residential" (from County AFT) in accordance with the Fruita Community Plan 2020. The project is comprised of one Mesa County Tax parcel (number 2697-082-00-071) containing 8.003 acres. This is a request for Preliminary-Final Plan approval.

The proposed project will ultimately consist of 25 single-family residential lots on 8.003 acres for an overall density of 3.12 units per acre. Included are 0.927 acres of open-space (11.6% of total area) containing a private park to be owned and maintained by the Homeowners Association.

Elimination of flood-irrigation practices and creation of a stormwater management facility will reduce peak flows exiting the property and improve runoff conditions downstream.

Existing streets in the vicinity include 17 1/4 Road adjacent immediately to the west, K 3/4 Road to the north, and Ponderosa Drive to the south which exists in the Orchard Valley subdivision immediately adjacent to the south, but is not stubbed north into this proposed development. Urban residential streets are proposed to extend into the adjacent parcels to the east and west to provide neighborhood connectivity. All streets and utilities will be constructed in conformance with current City of Fruita Standards and Specifications. The project will be designed to comply with the standards listed in the current City of Fruita Development Code for "Community Residential" zoning.

The site is currently vacant and being utilized as flood-irrigated pasture. Two small independently owned parcels, including Stonehaven Bed and Breakfast, exist along 17 1/4 Road on the south side of the access to the project. Other similar undeveloped parcels surround the site. Elmwood Cemetery is adjacent to the west, across 17 1/4 Road with Orchard Valley West Subdivision south of that. Access to the project will occur initially from the 17 1/4 Road entrance, but can also be accomplished from the east stub streets once the adjacent parcel is developed.

Landscaping of the open space tract will consist mainly of a low-maintenance native grass with irrigation and shall be installed by the developer. Surface maintenance of this open space tract will ultimately become the responsibility of the Homeowners Association. The landscaping, and maintenance, of all single family lots will be the responsibility of individual lot owners.

The soils at the site have been evaluated by a geotechnical analysis included within Final Plan submittal and are typical for the Fruita area. The surface soils generally consist of Fruita Very Fine Sandy Loam. These soils are categorized as hydrologic soils group "B" which have moderate infiltration capability and moderate to low runoff potential. This should not pose an adverse impact to development of the site. There are no known geological hazards at this location.

II. EXISTING DRAINAGE CONDITIONS

MAJOR BASIN

Elmwood Heights Subdivision is located in north Fruita within the Little Salt Wash major basin. Contours on topographic maps of the site included in the appendix show that a small drain ditch exists along the east boundary of the project which drains south through the Orchard Valley Subdivision before entering the Denton Drain, being carried to the Little Salt Wash, and ultimately draining directly into the Colorado River.

Elmwood Heights Subdivision does not exist within the 100 year floodplain of the Little Salt Wash, Colorado River Basin, or any other basin as delineated by the July 15, 1992 Flood Insurance Rate Maps produced by FEMA.

SITE

Topography of the property is relatively "flat" in nature, sloping generally south at an average rate of one to two percent. Pasture grasses cover most of the site with surface ditches providing irrigation delivery and tail-water collection around the perimeter. Irrigation is delivered to the property by a Grand Valley Irrigation Company pipeline existing in the northwest corner of the site. Runoff from the site has historically flowed south to be collected by a tailwater ditch along the southern boundary. This ditch flows east to the existing drain ditch and 12" drain pipe in the southeast corner which delivers stormwater runoff and irrigation return flows to the Orchard Valley storm sewer. The drain ditch and 12" pipe carry storm runoff and irrigation return flows from several parcels to the north and east.

OFF-SITE IMPACTS TO THE SITE

Offsite surface runoff in the vicinity is collected and diverted away from the site by the existing ditches surrounding the project. Existing topography of the area can be seen from maps in the appendix to drain generally south and west, toward Little Salt Wash and the river. A large subdivision (Orchard Valley) exists immediately south of the site which contains and discharges runoff to the Denton Drain through its own system of streets and stormwater management.

IV. DRAINAGE DESIGN CRITERIA AND APPROACH

REGULATIONS

The City of Fruita Stormwater Management Master Plan (SWMMP - June, 1998) and Mesa County Stormwater Management Manual (SWMM - May, 1996) were used as the basis for analysis and facility design criteria. No other master drainage plan has been completed for the area, to our knowledge. This development was designed within the guidelines of the SWMMP and the SWMM to assure minimal impacts to downstream properties.

HYDROLOGICAL CRITERIA

Because the project is a residential development containing sub-basins less than 25 acres, the "Rational Method" was used to calculate the historic and developed flow rates. As required, a minor storm is considered to be a 2-year frequency and a major storm is considered to be a 100-year frequency event.

Runoff Coefficients and intensity-duration-frequency data used in the computations were based on the most recent SWMM criteria defined above. Coefficients were assigned based on land use and hydrologic soils group. Haestad Methods software ("Pondpack") was used to perform the calculations.

HYDRAULIC CRITERIA

All site facilities and conveyance elements were designed in accordance with the City of Fruita SWMMP and the City of Fruita Design Standards and Construction Specifications.

Open channels and pipelines were analyzed using Manning's Equation and roughness coefficients found in the SWMM Manual. Haestad Flowmaster Software was used to perform the calculations. Copies of these calculations are included in the appendix.

RETENTION

A conservative calculation of retention follows. It includes the 2 acre offsite tract (Keenan) and assumes a conservative 100-year developed runoff coefficient of 0.50 (0.42 was used in the pond-routing calculations included in the appendix).

Retention Volume = (Precipitation) X (Area) X (Runoff Coefficient)

Therefore, 100-year Retention = (2.01") X (10 Acres) X (0.50) = **36,482 cubic-feet**

V. RESULTS AND CONCLUSION

AREAS

Site (Total) 8.00 Acres

RUNOFF COEFFICIENTS - "C"

Pasture	- 0.22 (2 yr.)	0.27 (100 yr.)
Developed (1/4 ac./unit)	- 0.33 (2 yr.)	0.42 (100 yr.)

TIMES OF CONCENTRATION

Historic Site	-	30 minutes
Developed Site	-	19 minutes

RUNOFF (All Flows are C.F.S.)

	<u>Historic Site (Undeveloped)</u>	<u>Total Site (Developed)</u>	<u>Pumped Flows From Detention</u>
2 Year	1.19	2.31	0.10
100 Year	5.81	11.63	0.10

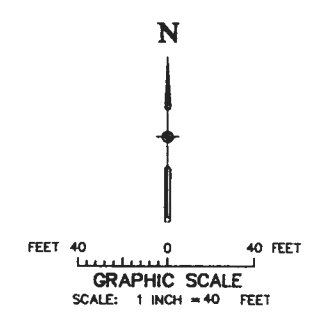
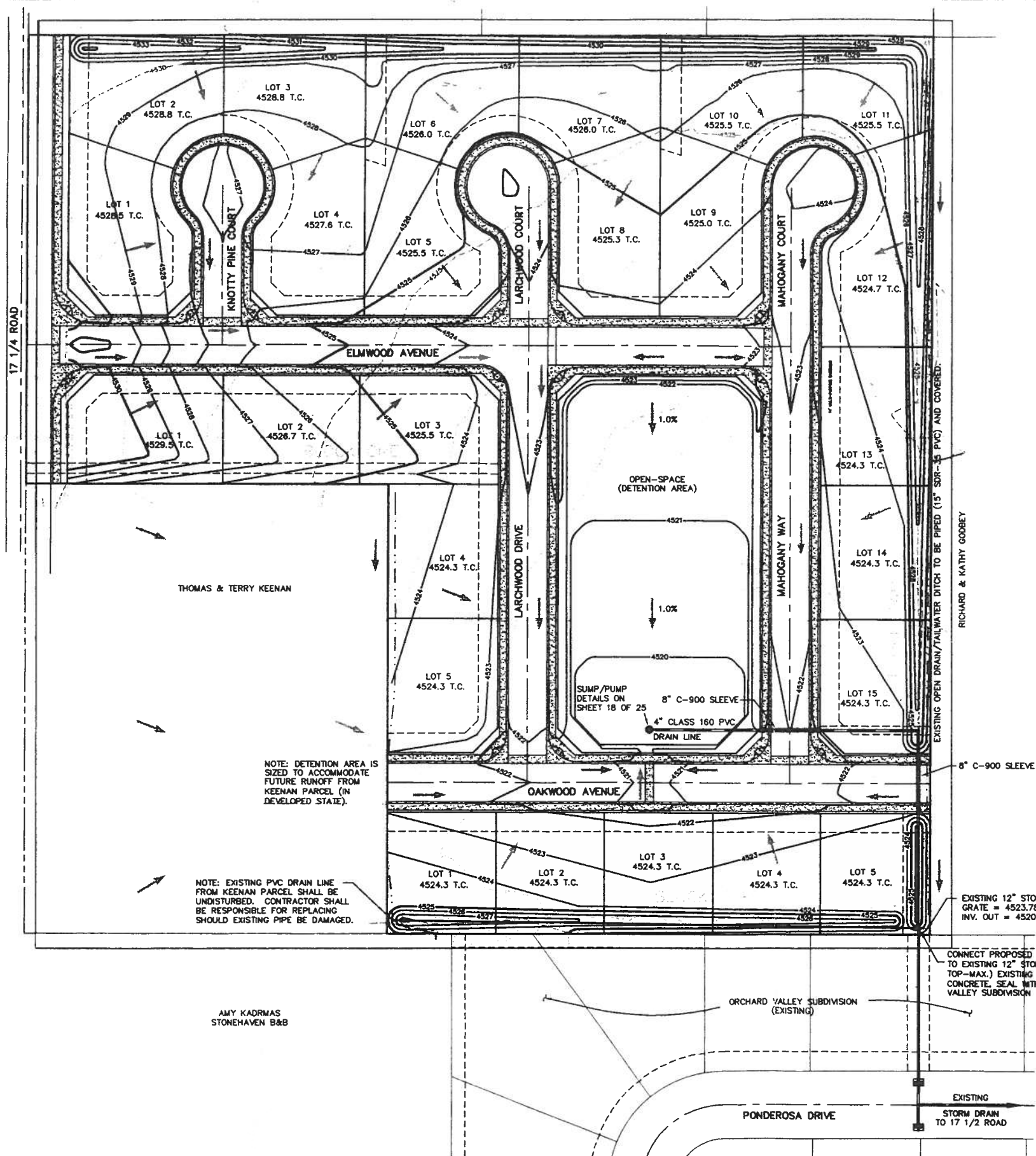
DETENTION INFORMATION -

Elmwood Hts. Detention Pond - Top of Pond: 4522.0 (including ponding in street)

<u>Storm</u>	-----Pumped Release-----		
	<u>Vol. (ft³.)</u>	<u>Pond Elev.</u>	<u>Released Q</u>
2 Yr.	3,676	4520.17	0.10
100 Yr.	19,963	4521.11	0.10

CONCLUSION

The developed site will detain and discharge runoff at rates much below the historic rates. The detention area is capable of retaining 100-year developed runoff from this site and a 2 acre offsite tract. Irrigation return flows from offsite parcels to the north and east draining into the existing drain ditch along the eastern boundary should be controlled (limited) by the offsite users to avoid capacity problems with the existing 12" drain pipe draining through Orchard Valley Subdivision.



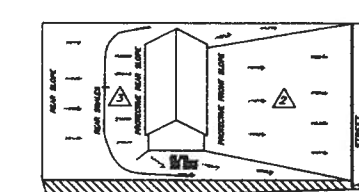
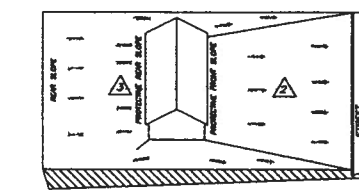
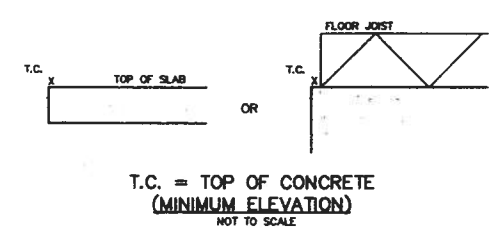
- LEGEND**
- ← FLOW DIRECTION
 - - - EXISTING CONTOUR
 - PROPOSED CONTOUR
 - 4677.6 T.C. PROPOSED TOP-OF-CONCRETE ELEVATION (MINIMUM)

- NOTES:**
- ELEVATION CONTOURS ARE BASED UPON A FIELD SURVEY PERFORMED BY VISTA ENGINEERING CORP.
 - MAXIMUM TOP-OF-CONCRETE ELEVATIONS SHALL NOT EXCEED LEVELS CREATING DRIVEWAY SLOPES GREATER THAN MAXIMUM ALLOWED BY CODE.

ELMWOOD HEIGHTS
TOP-OF-CONCRETE ELEVATION TABULATION
7/30/03

LOT	BLOCK	ADDRESS	(MINIMUM) T.C. ELEV.
1	1	ELMWOOD AVENUE	4528.5
2	1	ELMWOOD AVENUE	4528.7
3	1	ELMWOOD AVENUE	4525.5
4	1	LARCHWOOD DRIVE	4525.5
5	1	LARCHWOOD DRIVE	4524.3
5	1	OAKWOOD AVENUE	4524.3
1	2	ELMWOOD AVENUE	4528.5
1	2	KNOTTY PINE COURT	4528.5
2	2	KNOTTY PINE COURT	4528.8
3	2	KNOTTY PINE COURT	4528.8
4	2	KNOTTY PINE COURT	4527.8
4	2	ELMWOOD AVENUE	4527.6
5	2	ELMWOOD AVENUE	4525.5
5	2	LARCHWOOD COURT	4525.5
6	2	LARCHWOOD COURT	4528.0
7	2	LARCHWOOD COURT	4528.0
8	2	LARCHWOOD COURT	4525.3
8	2	ELMWOOD AVENUE	4525.3
9	2	ELMWOOD AVENUE	4525.0
9	2	MAHOGANY COURT	4525.0
10	2	MAHOGANY COURT	4525.5
11	2	MAHOGANY COURT	4525.5
12	2	MAHOGANY COURT	4527.7
13	2	MAHOGANY WAY	4524.3
14	2	MAHOGANY WAY	4524.3
15	2	MAHOGANY WAY	4524.3
15	2	OAKWOOD AVENUE	4524.3
1	3	OAKWOOD AVENUE	4524.3
2	3	OAKWOOD AVENUE	4524.3
3	3	OAKWOOD AVENUE	4524.3
4	3	OAKWOOD AVENUE	4524.3
5	3	OAKWOOD AVENUE	4524.3

NOTE: MINIMUM T.C. = 4524.3



- NOTES:**
- △ ALL LOTS ARE TYPE 'A' UNLESS MARKED OTHERWISE ON PLAN.
 - △ MINIMUM ELEVATION OF TC (TOP OF SLAB OR FOUNDATION) SHALL BE 1.0 FT. ± 2% OF STACK (25') MEASURED FROM FLOWLINE OF GUTTER.
 - △ MINIMUM SIDE AND REAR SLOPES SHALL BE 6" DROP FROM FOUNDATION IN FIRST 10'.
- NOTE:
TC = MINIMUM FINISHED FLOOR ELEVATION

PROJECT BENCHMARK/CONTROL

- ◆ C-W 1/16 CORNER SECTION 8, T1N, R2W, UM MCSM NO. 1377
NORTHING 73832.94
EASTING 43299.71
ELEVATION 4524.66 (NAVD '88)
- ◆ NW 1/16 CORNER SECTION 8, T1N, R2W, UM MCSM NO. 1378
NORTHING 6551.1147
EASTING 7839.8915



APPROVED FOR CONSTRUCTION:

CITY DEVELOPMENT ENGINEER DATE

ACCEPTED AS CONSTRUCTED:

CITY DEVELOPMENT ENGINEER DATE

DRAWN BY: S.G.S.	REVIEWED _____ DATE: _____ FOR _____
DESIGNED BY: P.M.O.	REVIEWED _____ DATE: _____ FOR VISTA ENGINEERING CORP.
CHECKED BY: P.M.O.	

VISTA ENGINEERING CORP.
CONSULTING ENGINEERS AND LAND SURVEYORS
2777 CROSSROADS BOULEVARD • GRAND JUNCTION, CO 81608 • (970) 243-2242

REVISION	DATE	DESCRIPTION	BY	QTY	ROD THONEN

GRADING AND DRAINAGE PLAN
ELMWOOD HEIGHTS

FRUITA, COLORADO	SCALE: 1" = 40'	JOB NO: 445.0-01	DATE: 7-30-03
SHEET NO:		16 of 25	