

FINAL DRAINAGE REPORT
For
ELMWOOD ESTATES

Developer:
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Fruita, Colorado 81521
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Prepared By:
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Job Number 205096

January 13, 2006
Revised April 17, 2006, June 5, 2006 & June 26, 2006

I hereby certify that this report was prepared by myself.



William S. Merrell, P.E.
Colorado P.E. #39263

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I. General Location and Description

A. Site and Major Basin Location

The site of the proposed Elmwood Estates Subdivision is located on 17 ½ Road west and south of K 6/10 Road. The property is currently a single family residence. There are several similar residential subdivisions adjacent to the property. Elmwood Heights Subdivision is located to the west, Orchard Valley Subdivision is located to the south, across 17 ½ Road to the east is a proposed subdivision, Venter's Creek Subdivision, and to the north is Grace Community Church and a single family residence with a pasture. There is a church cemetery located immediately to the east and south of the project.

Exhibit 1 shows the general location of the proposed project, Exhibit 2 shows the general topography of the site and Exhibit 3 shows the topography of the surrounding area.

The major basin in which the project is located is commonly known as Little Salt Wash according to Mesa County. Little Salt Wash encompasses approximately 36.48 square miles. Exhibits 4 and 5 show the drainage basin map provided on the Mesa County interactive map internet web page, and the drainage plan for the site.

B. Site and Major Basin Description

The site is approximately 7.98 acres in size and is currently has a single family residence on it. The property does not appear to have a recent crop-oriented agricultural past and the site is covered with what appears to be untended pasture grass. Exhibit 6 shows the utility composite plan for the site.

The soils located on the site are described on the Mesa County web page as Fruitlands fine sandy loam, 0-2% slopes (F_p), hydro-group 'A' (Runoff class: Very low) and Turley clay loam, 0 to 2 percent slopes (T_r), which is best described as hydro-group 'C' (Runoff class: Medium). Exhibit 7 shows the soils map for the area and Exhibit 8 displays the soil's characteristics.

Little Salt Wash is a large basin that drains about 36.48 square miles. The basin starts near the base of the Bookcliffs. The basin is largely undeveloped. The main channel of the basin drains under 17 1/2 Road approximately ½ mile south of the property.

The basin then drains south to the Colorado River approximately two miles downstream.

II. Existing Drainage Conditions

A. Major Basin

The general topography of Little Salt Wash varies from moderately sloping to rolling and hilly. In general, the basin drains to the south passing from the base of the Bookcliffs, through undeveloped area, through agricultural ground, through developed areas, crossing underneath Highway I-70 and continuing to the Colorado River.

B. Site

Approximately 2/3 of the subject property generally drains to the southwest at less than a two percent slope. The remaining 1/3 of the property drains to the southeast at less than a two percent slope.

The on-site stormwater runoff on the western 2/3 of the property flows southwest to an area inlet at the southwest corner of the property. From this location, a 12-inch culvert drains to the south. This 12-inch culvert conveys runoff for a fairly significant area, and in the opinion of John Ballagh of the Grand Junction Drainage District is probably overloaded. Thus, in order to not place any additional load on this pipe we are constructing detention with this project.

The eastern 1/3 of the property drains to the road ditch adjacent to 17 1/2 Road and then south from there.

The subject property is not located within any established floodplain according to the Mesa County floodplain maps.

III. Proposed Drainage Conditions

A. Changes in Drainage Patterns

There are no changes to the historical drainage patterns planned for the project.

However, since we can only provide detention on one side of the project, that side provides as much detention as possible for both

sides. The detention for the west side is restricted enough to provide volume and peak flows for both sides. This also corresponds with what the Grand Junction Drainage District would like to see.

B. Maintenance Issues

The maintenance of drainage infrastructure outside of the public right-of-way will be the responsibility of the Homeowner's Association. The City of Fruita will maintain any surface or storm sewer facilities located within the public right-of-way.

IV. Design Criteria & Approach

A. General Considerations

There have been several drainage studies that were made for this drainage basin, but there is nothing that would directly relate to the runoff from this property. The lack of offsite drainage going through this property would also indicate this. However, the "Final Drainage Report" for Elmwood Heights Subdivision (Prepared by Vista Engineering Corp. on August 1, 2003) is relevant since their release from their detention basin flows into the same inlet that we release to.

The release from the Elmwood Heights Subdivision is only 0.10 cfs, as the release is pumped from the detention basin. Since Undeveloped flows are given as 5.81 cfs for the 100 year storm, this is quite a significant decrease.

This project will propose to discharge stormwater to the area inlet at the southwest corner of the property. The eastern portion of the project will discharge to existing drainage facilities adjacent to 17 ½ Road.

Constraints that will affect the drainage design are the offsite flow entering the property and the capacity of the existing 12-inch pipe leaving the existing area inlet. Since the existing pipe has a limited capacity, detention is being provided for this development. The detention on the western drainage shed, which flows to the existing 12-inch pipe, is designed to restrict as much volume and flow as possible for both sides of the project.

Road improvements for 17 ½ Road are planned for the near future, but have not been designed yet. We have designed storm sewers

there that will essentially surface drain, and will be capable of being connected to a storm sewer system on 17 ½ Road.

There is an existing storm sewer on the opposite side of 17 ½ Road that runs across the front of the proposed Venter's Creek Subdivision. This storm sewer apparently is private and is at its design capacity. The Grand Junction Drainage District has a system that runs along the south edge of the proposed Venter's Creek Subdivision and south then along the east side of 17 ½ Road.

B. Hydrology

The Stormwater Management Manual (SWMM) for Mesa County (1996) has been used for the preparation of this Final Drainage Report. The design storms are defined in the SWMM as the 2-year and 100-year events. The Grand Junction area precipitation information is used which are outlined within the SWMM.

The rational method is used for the hydrological analysis and conforms to the Mesa County SWMM Chapter VIII.

Exhibit 9 gives a "Composite C" determination for the entire subdivision.

C. Hydraulics

All hydraulic calculations for conveyance elements have been designed according to the SWMM. There are two storm sewer system planned for this project. Please see the construction plans for details of these storm sewer line in the subdivision.

Exhibits 30 through 41 give the flow calculations for the storm sewer design and include the storm water flow going directly into the detention basin. Exhibits 42 & 43 show the StormCad calculations for the project.

V. Results and Conclusion

A. Runoff Rates for 2 and 100 Year Storms

Runoff rates.

Basin A-1: 2-Year = 1.64 cfs
100-Year = 7.06 cfs
(Pre-development rates are 0.69 cfs and 3.11 cfs.)

Exhibits 22 through 25 show these calculations.
Exhibit 21 shows the drainage map for these designs.

Basin A-2: 2-Year = 0.67 cfs
100-Year = 2.87 cfs
(Pre-development rates are 0.33 cfs and 1.46 cfs.)

Exhibits 26 through 29 show these calculations.

[Note that there are no Exhibits 10 through 15 as these related to the offsite flow that was erroneously thought to be draining through this site.]

B. Detention

Due to the minimal pipe size of the outlet pipe out of the existing area inlet that we are tying into on the western side of our subdivision, we are detaining with this subdivision. Exhibits 16 through 18 are the detention basin calculations – which include a weir and orifice inside the outlet structure to control flow for the 100 Year Flow..

Exhibits 19 and 20 are the Historic and Post-development drainage maps.

Exhibit 44 gives a calculation showing the prorated drainage fee.

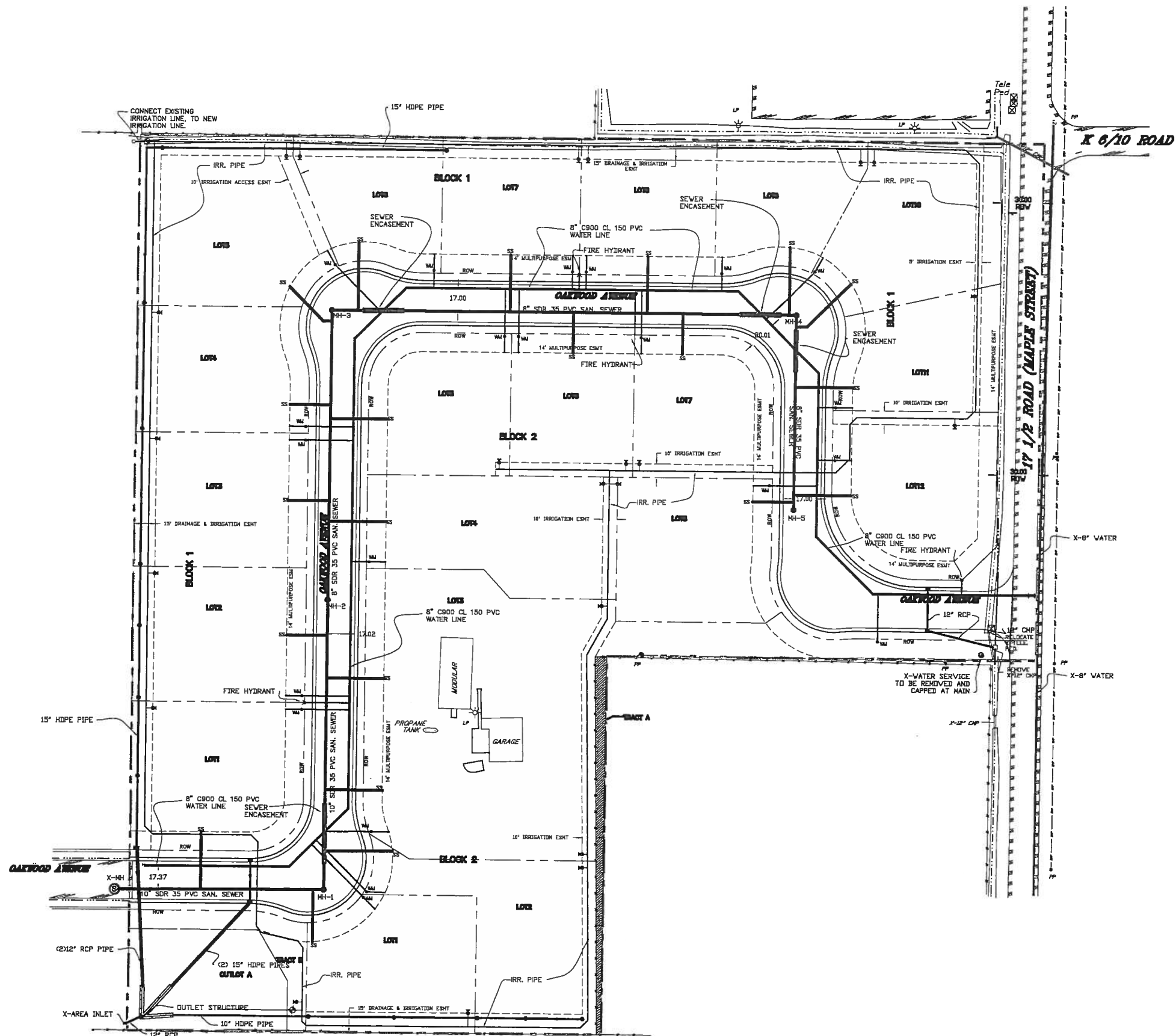
C. Compliance

This drainage report followed the Stormwater Management Manual (SWMM). This manual is the standard for drainage design, policy and criteria for the City of Fruita.

D. Report Limits

This report was prepared to analyze the developed conditions of the proposed site, the existing conditions of the limited off-site property and the design of the hydraulic elements on the site. Any changes or revisions to the project would necessitate a revised drainage study and design.

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CALL BEFORE YOU DIG 1-800-922-1987
 NOTICE: FIELD VERIFY THE LOCATION OF ALL EXISTING UTILITIES
 A MINIMUM OF 48 HOURS PRIOR TO CONSTRUCTION.

REFERENCED MESA COUNTY
 BENCHMARK: C1/4 CORNER OF SEC. 8
 MCSM #888
 ELEVATION: 4524.66 (NAVD 1988)
 SITE BENCHMARK: LS 20877
 NORTHWEST CORNER ON LTS BLK1
 ELEVATION: 4529.08 (NAVD 1988)
 N: 74491.40
 E: 43961.85

EXHIBIT 6

UTE WATER DISTRICT	
ACCEPTED FOR CONSTRUCTION FOR ONE YEAR FROM THIS DATE.	
BY: _____	DATE: _____
ACCEPTED AS CONSTRUCTED	
BY: _____	DATE: _____
CITY OF FRUITA	
ACCEPTED FOR CONSTRUCTION FOR ONE YEAR FROM THIS DATE.	
BY: _____	DATE: _____
ACCEPTED AS CONSTRUCTED	
BY: _____	DATE: _____

REVISION	DATE	NO.	BY
PER REVIEW COMMENTS	3/10/06	1	CJG
PER CITY REVIEW	5/16/06	2	CJG

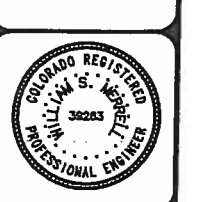
UTILITY COMPOSITE

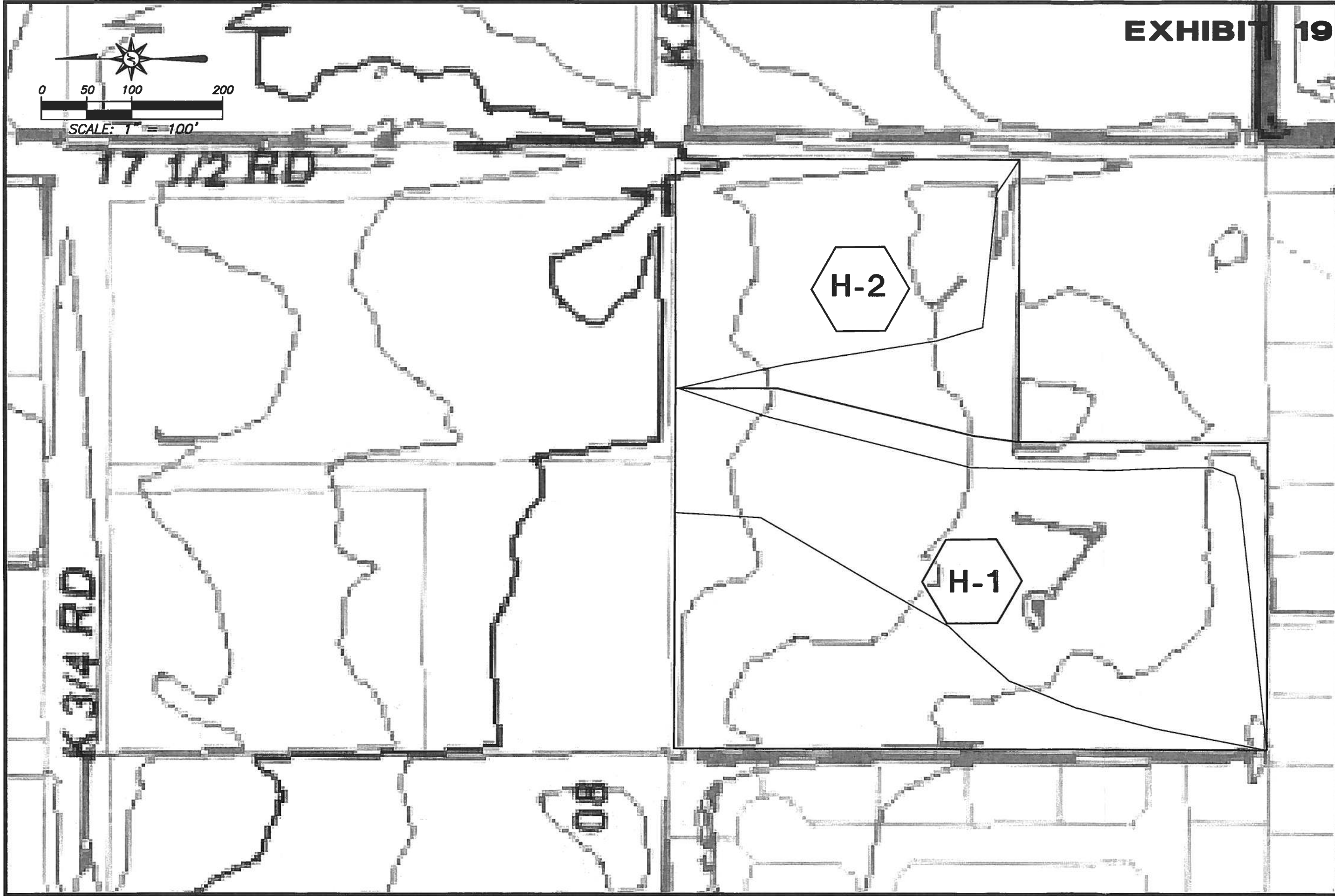
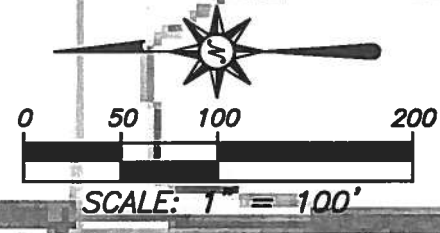
DATE: 12/20/05
 DRAWING: CJG
 CHK'D: WSM

ELMWOOD ESTATES

PROJECT NO.: 205096-401E NAME: ELMWOOD ESTATES

LANDesign
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 308 MAIN STREET SUITE 100
 GRAND JUNCTION, COLORADO 81501 (970) 245-4089





DRAINAGE MAP
HISTORIC

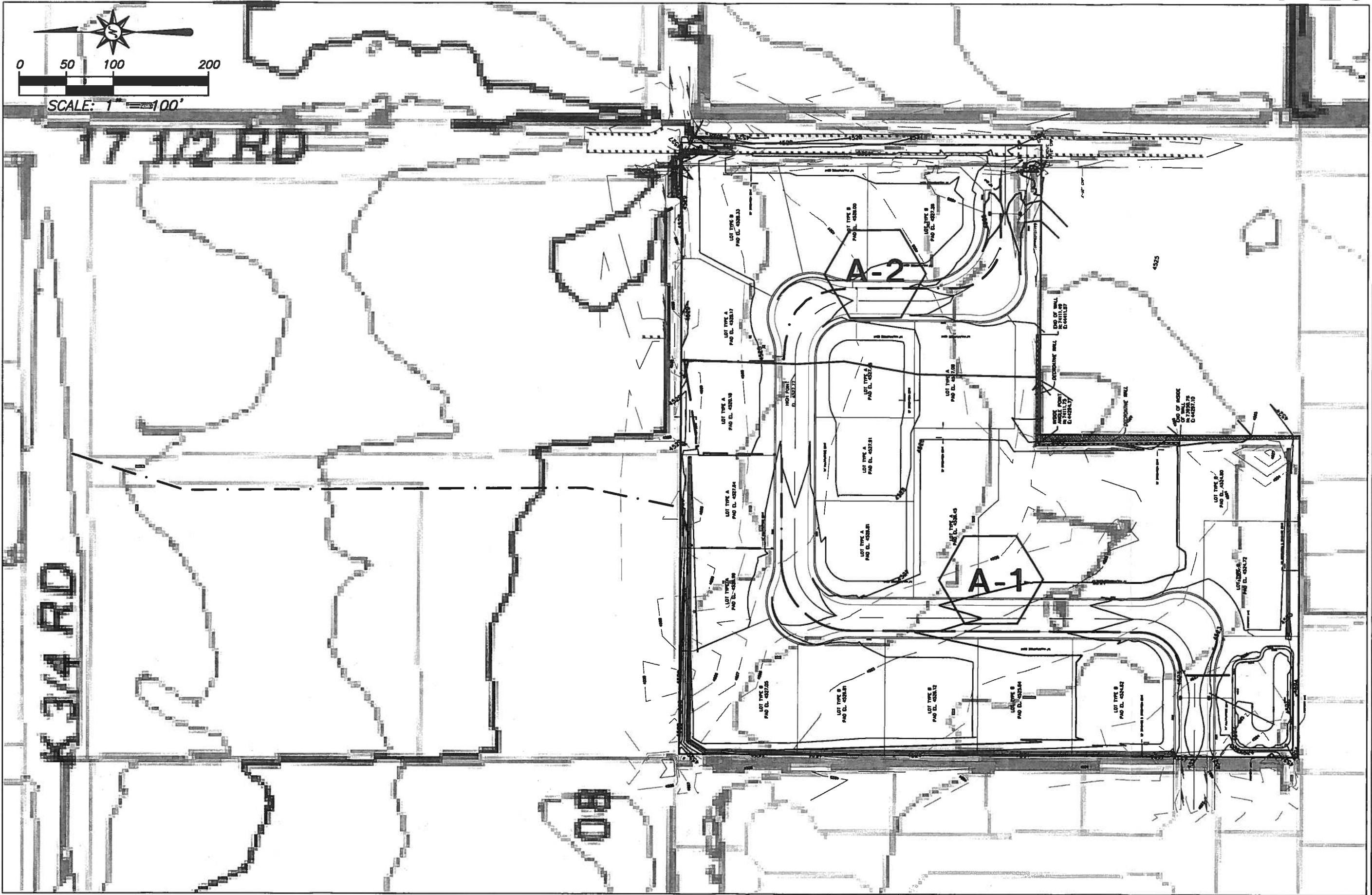
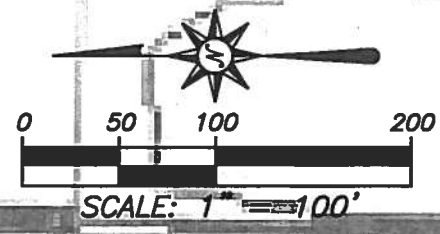
ELMWOOD ESTATES
FRUITA, CO

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 244 NORTH 7th STREET
 GRAND JUNCTION, COLORADO 81501 (970) 245-4089

PRJ NO.: 20509 FILE NAME: elmwood-drainage

DATE: 12/14/05

DRAWN: wsm
CHK'D: wsm



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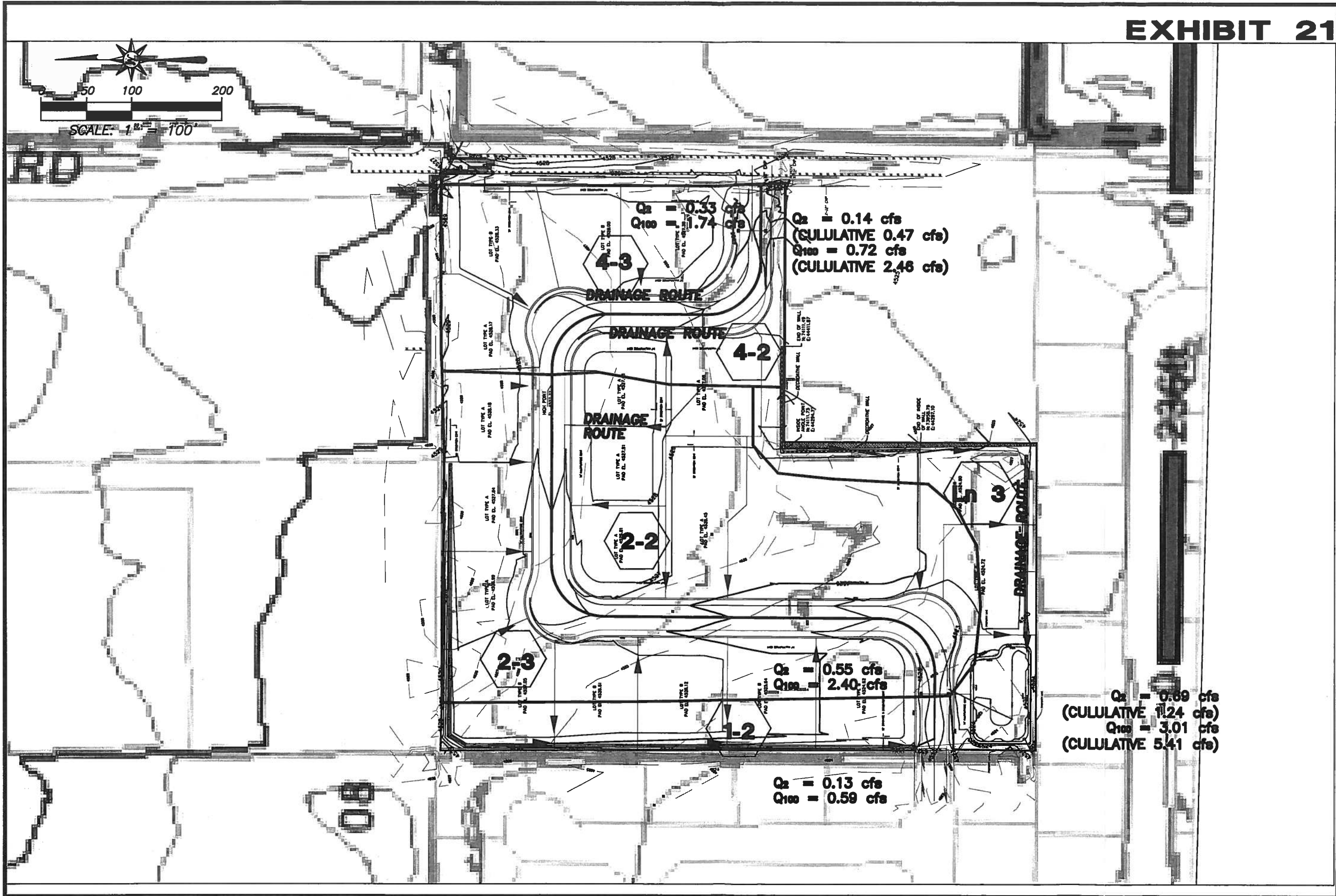
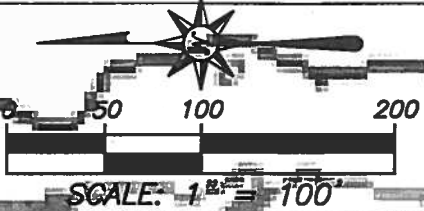
**DRAINAGE MAP
DEVELOPED
CONDITIONS**

DATE: 12/14/05 DRAWN: wsm CHK'D: wsm

**ELMWOOD ESTATES
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PRJ NO.: 20509 FILE NAME: elmwood-drainage

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STORM SEWER DESIGN

ELMWOOD ESTATES FRUITA, CO

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