A ▪ C ▪ G

Austin Civil Group, Inc.

Land Planning ▪ Civil Engineering ▪ Development Services

July 24, 2023

Sam Atkins, PE
City of Fruita Development Engineer
Fruita CO, 81521

**Re: 155 Mesa Street Subdivision**
**Drainage Letter Report**
**Fruita, CO 81521**

Dear Mr. Atkins, P.E.:

The purpose of this letter is to document the drainage conditions for a 0.2-acre site located at 155 Mesa Street. The property is proposing to be subdivided into a two-lot residential subdivision. The location of the project is depicted in the photo below:


**General Location Map**

123 n. 7th street ▪ suite 300 ▪ grand junction, colorado 81501 ▪ 970-242-7540 phone ▪ 970-255-1212 fax

**Existing Conditions**

The property currently has a single-family residence on the south of the lot and grass areas to the north side of the lot. A street view photo of the site is depicted below:

**155 N Mesa Street Looking West Along N Mesa St.**

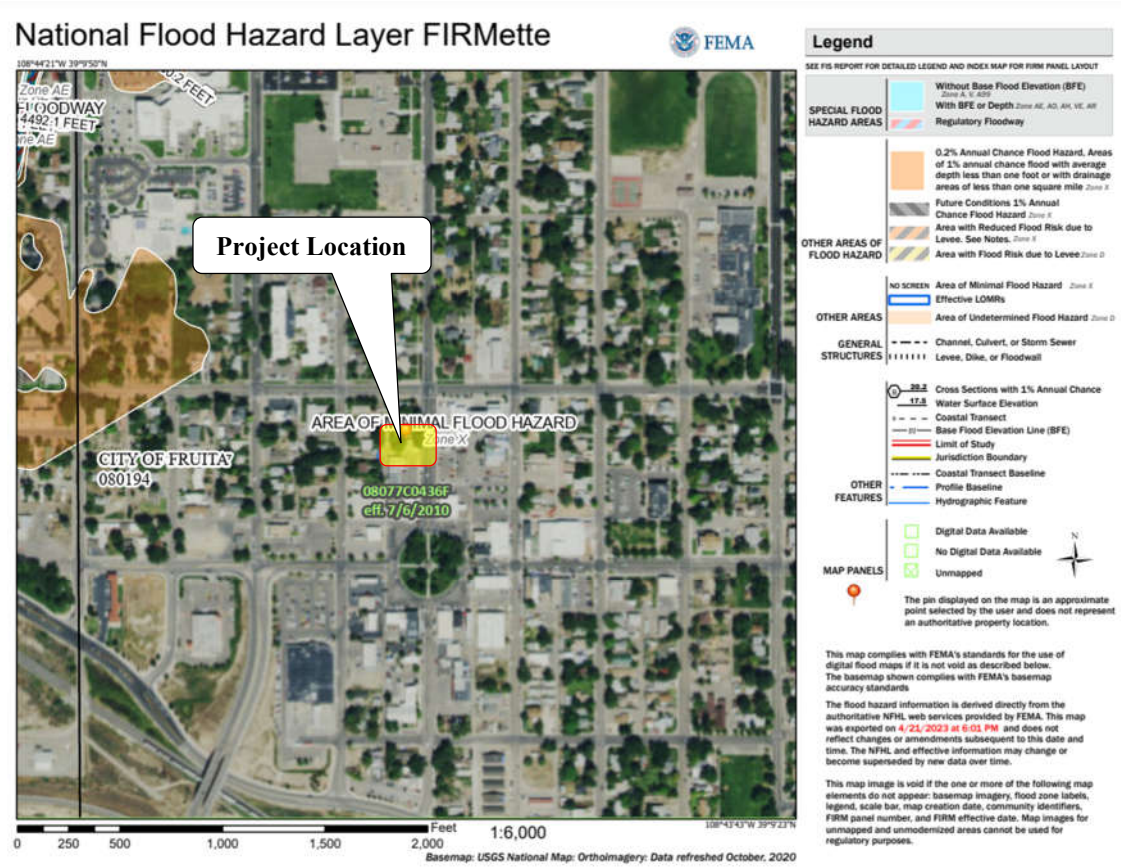
Existing drainage off the property can be delineated into one drainage basin. Stormwater runoff sheet flows east to west and discharges into the public alley along the west of the lot. The estimated 10-yr discharge rate from the site is 0.11 cfs and the 100-yr rate is 0.36 cfs. There are minor amounts of runoff from the adjacent properties to the north and south. Listed below is an air photo with 2-ft contour data depicting the site and surrounding topography and drainage flow direction:


**Property Contours & Drainage Conditions**

**Southern Property Line**

**Northern Property Line**

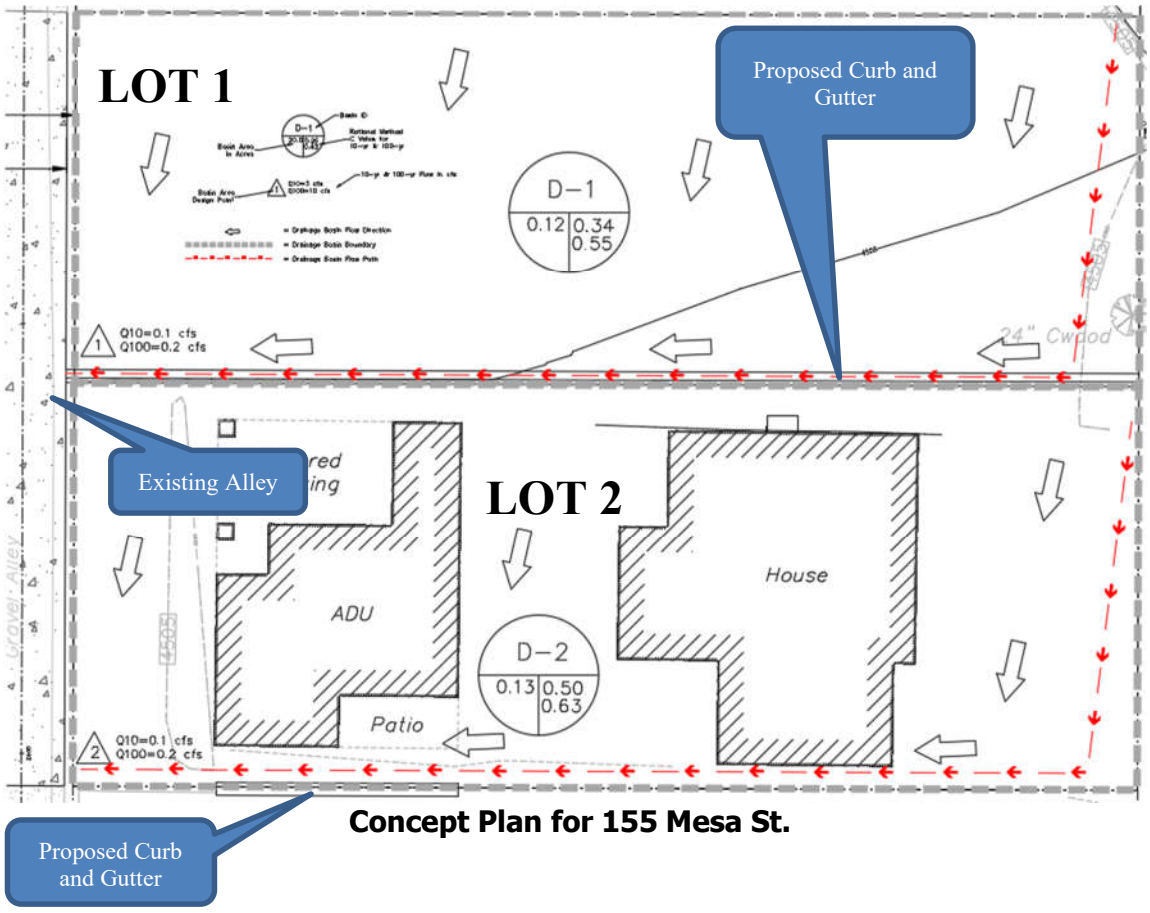
The subject property is located within Zone X, an area outside the 0.2% annual chance floodplain according to FIRM Map Number 08077C0436F (See below).




**FEMA Firmette Map**

**Proposed Conditions**

The subject property is proposing to be subdivided into two lots and will construct a new concrete alley along the west property line. A 6-in curb and gutter is proposed to be constructed along lot 1's southern lot line will collect all runoff from Lot 1. This will convey runoff to the alley. Drainage discharged to the new concrete alley will sheet flow south. Additionally, a second 6-in curb and gutter will collect runoff from the east side of Lot 1 and catch any runoff from the adjacent southern lot. This will minimize water from reaching the foundation of the original house and will discharge into the alley. A conceptual layout plan for the 2-lot subdivision with drainage facilities is depicted below:




**Concept Plan for 155 Mesa St.**

Subdividing the lot does not create any measureable increase in runoff. The 100-yr peak runoff for Lot 1 and 2's condition is 0.4 cfs, which is the same as the existing historic condition. The The peak runoff analysis was calculated using the Rational Method procedure as defined in the Mesa County Stormwater Management Manual (SWMM). A spreadsheet detailing the calculations is included as an attachment to this letter drainage report.

In conclusion, the proposed subdivision of this property and the subsequent residential development of the new lot creates negligable increase in runoff. Runoff will continue to discharge to the public alley at the west side of the site.

If you have any additional questions or concerns, please contact me at 970-242-7540.

Sincerely,

**Austin Civil Group, Inc.**


Mark Austin, P.E.
Civil Engineer

Attachments:

Rational Method Flow Analysis

Historic Drainage Path

Developed Drainage Path

**155 North Mesa - Fruita, Colorado**
**RATIONAL METHOD FLOW ANALYSIS**

| AREA + RUNOFF CURVE NUMBER CALCULATIONS | | | | | | | | | | | | | | | | | | TIME OF CONCENTRATION & RATE OF RUNOFF | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BASIN | STORM EVENT | SOIL | Total Basin Area (1) | Land Use and Areas | | | | | | | | | | | | Composite i(3) | Composite C(4) | Composite CN(5) | K(6) | Intitial Flow | | | Travel Time-Surface | | | | | Totals | | | |
| | | | | Landscape | | Roof | | Gravel | | Impervious | | Undeveloped | | Other | | | | | | Length | Slope | $t_i$(7) | Length | $S_w$ | Cv(8) | Vel(9) | $t_t$(10) | Average Slope(11) | $T_c$(12) | Intensity, I(13) | Runoff, Q(14) |
| | | | | i(2) | A(1) | i(2) | A(1) | i(2) | A(1) | i(2) | A(1) | i(2) | A(1) | i(2) | A(1) | | | | | feet | % | min. | feet | ft/ft | | ft/sec | min. | | min. | in./hr. | cfs |
| HISTORIC DRAINAGE BASINS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| H-1 | 10-YEAR | C | 0.20 | 0.02 | 0.15 | 0.90 | 0.04 | 0.40 | | 1.00 | 0.01 | 0.02 | | 0.60 | | 0.26 | 0.37 | 80 | 0.29 | 120 | 0.02 | 10.67 | | 0.002 | 7 | 0.3 | | 0.02 | 10.67 | 1.68 | 0.12 |
| | 100-YEAR | C | 0.20 | 0.02 | 0.15 | 0.90 | 0.04 | 0.40 | | 1.00 | 0.01 | 0.02 | | 0.60 | | 0.26 | 0.56 | 80 | 0.29 | 120 | 0.02 | 10.67 | | 0.002 | 7 | 0.3 | | 0.02 | 10.67 | 3.58 | 0.40 |
| DEVELOPMENT DRAINAGE BASINS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D-1 | 10-YEAR | C | 0.20 | 0.02 | 0.10 | 0.90 | 0.08 | 0.40 | | 1.00 | 0.10 | 0.02 | | 0.60 | | 0.62 | 0.52 | 89 | 0.47 | 120 | 0.02 | 10.67 | | 0.002 | 7 | 0.3 | | 0.02 | 10.67 | 1.68 | 0.18 |
| | 100-YEAR | C | 0.20 | 0.02 | 0.10 | 0.90 | 0.08 | 0.40 | | 1.00 | 0.10 | 0.02 | | 0.60 | | 0.62 | 0.64 | 89 | 0.47 | 120 | 0.02 | 10.67 | | 0.002 | 7 | 0.3 | | 0.02 | 10.67 | 3.58 | 0.46 |

(1) Area in acres
(2) Imperviousness Value from Table 701 of SWMM as a decimal
(3) Composite Impervious Value as a decimal - ((i1*A1)+(i2*A2)+(i3*A3)+(i4*A4)+(i5*A5)+(i6*A6))/(A1+A2+A3+A4+A5+A6)
(4) Runoff Coefficient from Table 702 in SWMM
(5) SCS Curve Number (CN) - SWMM Equation 708
(6) Flow Resistance Coefficients = Table 702 of SWMM with $C_{5\text{-}yr}$ Value Based on Soil Type and Imperviousness Value in (4)
(7) Initial or Overland Flow Time (minutes): $t_i = (1.8 * (1.1\text{-}K) * L_o^{1/2}) / S^{1/3}$ - Limited to 300-ft max = Per SWMM, Equation 702; $t_{imin}$ = 5 minutes; $t_{imax}$ = (L/180) + 10 (urbanized watersheds) Equation 704
(8) Travel Time Conveyance Coefficient per Table 703 of SWMM
(9) $V = C_v * S_w^{1/2}$ -- per SWMM Equation 703
(10) Travel Time in Concentrated Flow: $t_t = L/(V*60)$
(11) Average Slope as a Percentage
(12) Total $T_c = t_i + t_t$
(13) Average Intensity (in./hr.); $I_{10yr} = (28.9 * 0.63)/(10 + T_c)^{0.786}$; $I_{100yr} = (28.9 * 1.34)/(10 + T_c)^{0.786}$ -- per SWMM 604
(14) Storm Runoff: $Q_{cfs} = C * I_{(in/hr)} * A_{(acres)}$ -- per SWMM Equation 710

Manually Input Columns
Calculated Columns

N

0' 5 10 15

Basin ID
H–1
20.0 | 0.26 / 0.43
Basin Area in Acres
Rational Method C Value for 10–yr & 100–yr

1
Basin Area Design Point
Q10=3 cfs
Q100=10 cfs
10–yr & 100–yr Flow in cfs

= Drainage Basin Flow Direction
= Drainage Basin Boundary
= Drainage Basin Flow Path

H–1
0.2 | 0.37 / 0.56

Gravel Alley

4505

Covered Parking

ADU

Patio

House

24" Cwood

Drive

1
Q10=0.1 cfs
Q100=0.4 cfs

Know what's below. Call before you dig. 811

SCALE VERIFICATION
BAR IS ONE INCH ON ORIGINAL DRAWING
IF NOT ONE INCH ON THIS SHEET
ADJUST SCALES ACCORDINGLY

| NO | DESCRIPTION | DATE | BY |
|---|---|---|---|
| | REVISIONS | | |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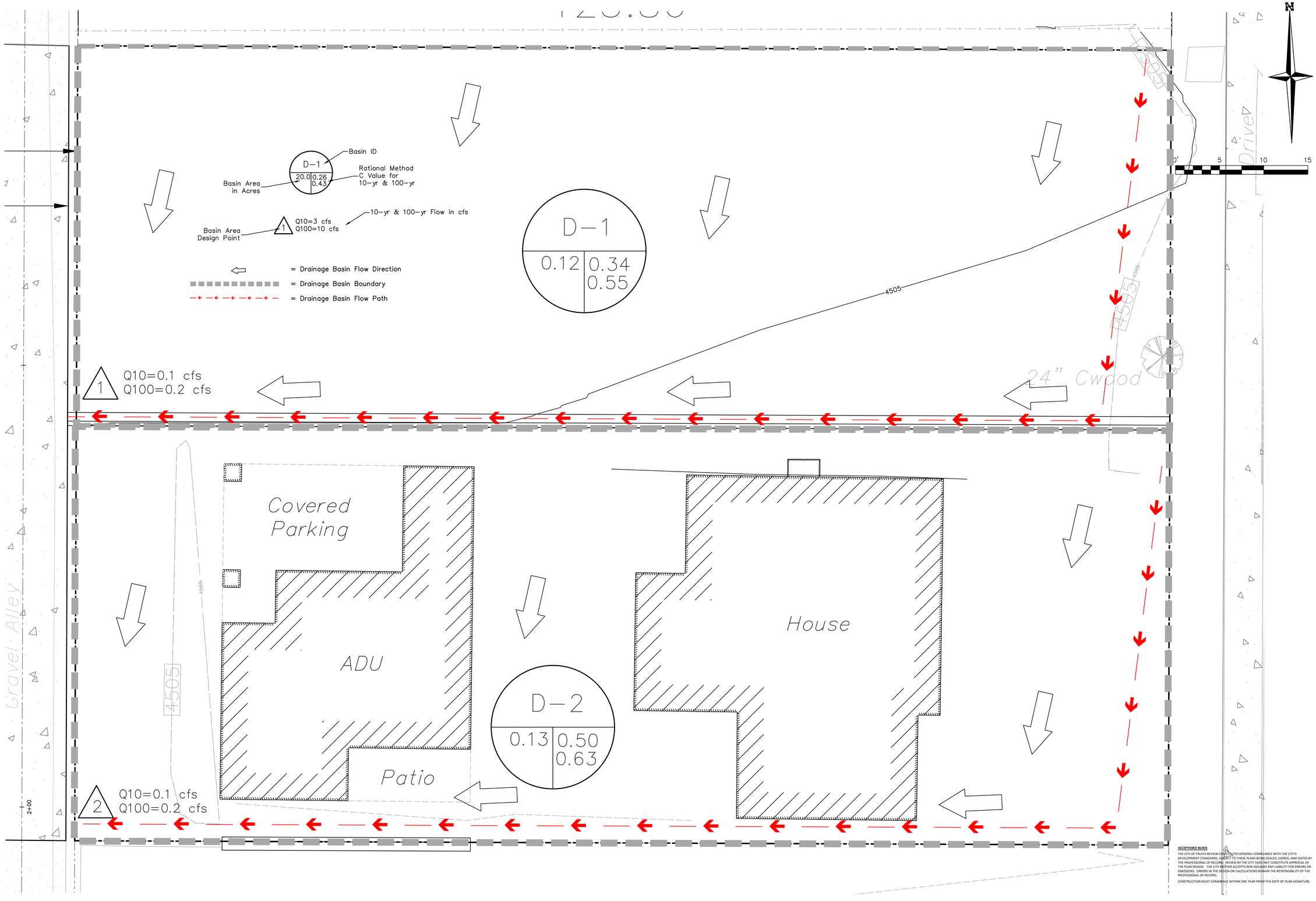
155 N MESA LOT SPLIT

Description
HISTORIC DRAINAGE
155 N MESA ST
FRUITA, CO

prepared for
JCI CONSTRUCTION

| DRAWN BY: | DESIGNED BY: | CHECKED BY: | APPROVED BY: |
|---|---|---|---|
| rrc | rrc | | MRA |

JOB NUMBER: 1330.0005
DATE: 6-13-23
SCALE: 1"=5'
SHEET NO: C7

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155 N MESA LOT SPLIT

description
DEVELOPED DRAINAGE
155 N MESA ST
FRUITA, CO

prepared for
JCI CONSTRUCTION

| DRAWN BY: | DESIGNED BY: | CHECKED BY: | APPROVED BY: |
|---|---|---|---|
| rrc | rrc | | MRA |

JOB NUMBER: 1330.0005
DATE: 6-13-23
SCALE: 1"=5'
SHEET NO: C7

ACCEPTANCE BLOCK

THE CITY OF FRUITA REVIEW CONSTITUTES GENERAL COMPLIANCE WITH THE CITY'S DEVELOPMENT STANDARDS, SUBJECT TO THESE PLANS BEING SEALED, SIGNED, AND DATED BY THE PROFESSIONAL OF RECORD. REVIEW BY THE CITY DOES NOT CONSTITUTE APPROVAL OF THE PLAN DESIGN. THE CITY NEITHER ACCEPTS NOR ASSUMES ANY LIABILITY FOR ERRORS OR OMISSIONS. ERRORS IN THE DESIGN OR CALCULATIONS REMAIN THE RESPONSIBILITY OF THE PROFESSIONAL OF RECORD.

CONSTRUCTION MUST COMMENCE WITHIN ONE YEAR FROM THE DATE OF PLAN SIGNATURE.

CITY DEVELOPMENT ENGINEER DATE