

**DRAINAGE CONFORMANCE LETTER
FOR
WILLOW CREEK PUD LOTS 1/2**

LONE TREE, COLORADO

Prepared for:

Willow Creek PUD Lots 1/2
Park Meadows Dr. & Yosemite Dr.
Lone Tree, Douglas County, CO

Contact: Vogel & Associates
Phone: (303) 893-4288

Prepared by:

Bowman

1526 Cole Blvd, Suite 100
Lakewood, Colorado 80401

Contact: Thomas Pannell, PE
Phone: (303) 801-2900

JN: 020460-01-001
April 2023

Signature Page

“This conformance letter for the drainage design of Willow Creek PUD Lots 1/2 was prepared under my direct supervision in accordance with the provisions of the Douglas County Storm Drainage Design and Technical Criteria for the owners thereof. I understand that the City of Lone Tree does not and will not assume liability for drainage and erosion control facilities designed by others.

Thomas Pannell, PE
State of Colorado No. 53615
For and on behalf of Bowman Consulting

Furniture Row Colo, LLC hereby certifies that the drainage facilities for Willow Creek PUD Lots 1/2 shall be constructed according to the design presented in this report. I understand that the City of Lone Tree does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that the City of Lone Tree reviews drainage plans pursuant to Lone Tree Municipal Code, Chapter 15, Article 1; but cannot, on behalf of Willow Creek PUD Lots 1/2, guarantee that final drainage design review will absolve Furniture Row Colo, LLC and/or their successors and/or assigns of future liability for improper design. I further understand that approval of the Site Improvement Plan and Final Plat does not imply approval of my engineer’s drainage design.”

Name of Developer

Authorized Signature

1. General Location and Description

1.1 Purpose

The purpose of this drainage conformance letter is to show that the existing detention pond on this site is adequately sized for lots 1 and 2 of the Willow Creek PUD project.

1.2 Site Location

Willow Creek PUD Lots 1/2 (hereafter, the Site) is located in the City of Lone Tree, Portions of the West half of Section 3 and the Northeast quarter of Section 4, Quarter Section NW ¼, Township 6 South, Range 67W, Douglas County, Colorado. The Site is located in the northwest of the intersection of Park Meadows Drive and Yosemite Street. The Site consists of Lots 1 and 2 of the Park Meadows Subdivision, Filing 1, 1st Amendment and is bound by C-470 to the north, Park Meadows Drive to the south, and Willow Creek to the east.



Figure 1-1
Vicinity Map

1.3 Description of Property

The total area of the property is 25.29 acres. The ground cover is mainly short grasses with some trees and shrubs. Existing grades on the Site are moderate, ranging from 0-20% and averaging

around 4-7%. The slopes closer to Willow Creek are steeper, with some slopes over 30% near the creek banks. The Site generally slopes to the north and west towards Willow Creek.

Soils for the site are classified as NRCS hydrologic soils groups B and C per the Web Soil Survey from the USDA Natural Resources Conservation Service. See Appendix E for the soil map.

A small portion of the Site is within a regulatory floodplain per the Douglas County and City of Lone Tree Flood Insurance Rate Map (FIRM) Panel 42 Map No. 08035C0042F. See Appendix F for the FEMA Firm Panel.

The site was designed to drain into Pond H north of the site per the existing drainage report (Phase III Drainage Report, Pond H Upgrade, Parkway, Filing 2, 7th Amendment, March 25, 2018).

2. Drainage Basins and Sub-Basins

Existing Drainage Basins

Existing available drainage studies that impact the site are:

- Phase III Drainage Report, Pond H Upgrade, Parkway, Filing 2, 7th Amendment, March 25, 2018

See Appendix G for the above drainage study.

Basin F4 (4.56 ac) covers the west portion of the site. It is an existing basin per the existing basin map mentioned above. The existing report used an imperviousness of 85% for this area so we took the portion of this basin that is in our site and assumed a split of 15% landscaping, 68% hardscape, and 17% roof area. The estimated 5 year flow of this site is 8.01 cfs and the 100 year flow is 19.15 cfs. This basin is designed to flow to Pond H.

Basin H8 (20.73 ac) covers the east portion of the site. It is an existing basin per the existing basin map mentioned above. The existing report used an imperviousness of 80% for this area so we took the portion of this basin that is in our site and assumed a split of 20% landscaping, 64% hardscape, and 16% roof area. The estimated 5 year flow of this site is 38.43 cfs and the 100 year flow is 95.44 cfs. This basin is designed to flow to Pond H.

The existing drainage basin map can be found in Appendix A and the existing drainage calculations can be found in Appendix C.

Proposed Major Drainage Basins

Basin A1 (14.76 ac) encompasses Lot 1 of the site. It will consist of a mixed use building, individual residential units, asphalt parking/driveways, and landscaping areas. The 5 year flow of this site is 16.42 cfs and the 100 year flow is 48.30 cfs. This basin will outfall into Pond H as originally intended in the existing drainage report.

Basin A2 (10.53 ac) encompasses Lot 2 of the site. It will consist of individual residential units, asphalt parking/driveways, and landscaping areas. The 5 year flow of this site is 13.61 cfs and the 100 year flow is 38.56 cfs. This basin will outfall into Pond H as originally intended in the existing drainage report.

The proposed drainage basin map can be found in Appendix B and the proposed drainage calculations can be found in Appendix D.

3. Drainage Design Criteria

3.1 Development Criteria Reference

The Site was designed to comply with the Douglas County Storm Drainage Design and Technical Criteria Manual.

3.2 Hydrologic Criteria

The existing site was originally split into Basin F4 and H8 per the existing drainage report. The site used to drain into 2 ponds, Pond F and Pond H. Pond F no longer exists and Pond H was upgraded to handle the added capacity of Basin F4 as well as the other basins outside of our site that originally drained to Pond F. The existing site is not developed, but the existing drainage report designed Pond H to have capacity for the site in its developed condition. The assumption was that the imperviousness of the site would be 85% in Basin F4 and 80% in Basin H8 and has a composite imperviousness of 79.7%. The existing site is designed to produce a 5 year flow of 41.67 cfs and a 100 year flow of 102.74 cfs. The proposed site plan is designed to include much more pervious area than the assumptions made in the existing drainage report. This is because the site was originally zoned for commercial use and will now be used for residential/mixed use. The composite impervious area of the proposed site is 60.7%. The proposed site will produce a 5 year flow of 28.65 cfs and a 100 year flow of 82.91 cfs. We are reducing the designed flows for these 2 existing basins by 20% so therefore Pond H has capacity as designed.

4. Summary

The goal of this conformance letter is to prove that the existing regional detention pond (Pond H) is adequately designed to detain the drainage that will be generated by the project site. Pond H is a full-spectrum detention pond and therefore this site will meet water quality (WQCV) and excess urban runoff volume (EURV) standards based on the Mile High Flood District. The flows on-site will be reduced from the assumptions that were made in the existing drainage report to size the existing detention pond and therefore the site has adequate drainage infrastructure in place to develop for its intended use. The site improvement plans (SIP) will also require drainage conformance letters based on the specific uses and layouts at the time of the SIP application to the city. There is also proposed drainage improvements along Willow Creek by others that are shown in Appendix H.

LIST OF APPENDICES

Appendix A – Existing Basin Map

Appendix B – Drainage Basin Map

Appendix C – Existing Hydrologic Calculations

Appendix D – Proposed Hydrologic Calculations

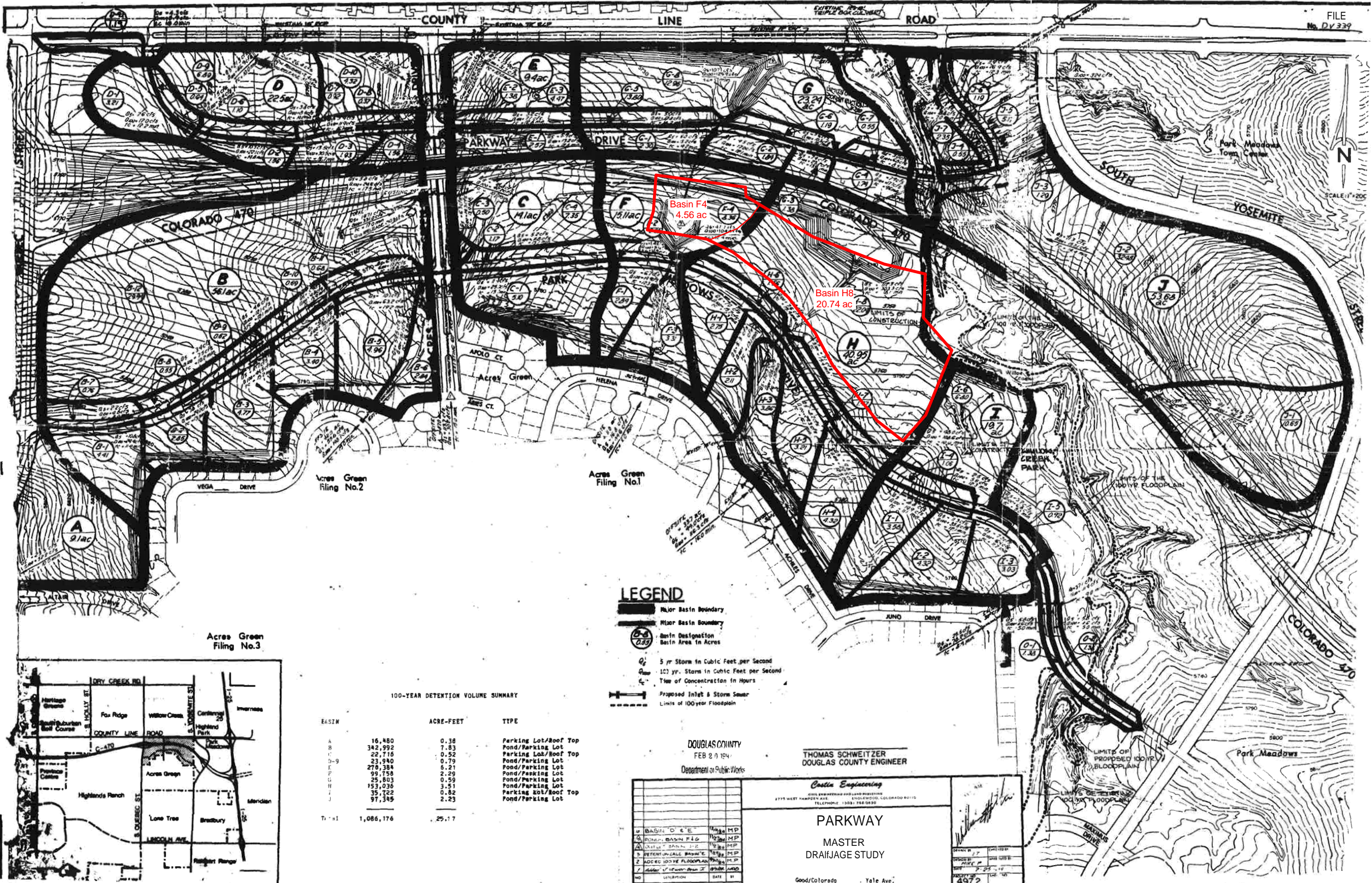
Appendix E – Soil Map

Appendix F – FEMA Firm Panel

Appendix G – Existing Drainage Report

Appendix H - Proposed Willow Creek Minimal Impact Drainage Plan

APPENDIX A – EXISTING BASIN MAP



Basin F4
4.56 ac

Basin H8
20.74 ac

LEGEND

- Major Basin Boundary
- Minor Basin Boundary
- Basin Designation
- Basin Area in Acres
- 5 yr Storm in Cubic Feet per Second
- 100 yr. Storm in Cubic Feet per Second
- Time of Concentration in Hours
- Proposed Inlet & Storm Sewer
- Limits of 100year Floodplain

100-YEAR DETENTION VOLUME SUMMARY

Basin	ACRE-FOOT	TYPE
A	16,480	0.38 Parking Lot/Roof Top
B	342,992	7.83 Pond/Parking Lot
C	22,716	0.52 Parking Lot/Roof Top
D-9	23,940	0.79 Pond/Parking Lot
E	278,384	6.21 Pond/Parking Lot
F	99,758	2.29 Pond/Parking Lot
G	25,803	0.59 Pond/Parking Lot
H	153,036	3.51 Pond/Parking Lot
I	35,722	0.82 Pond/Parking Lot
J	97,345	2.23 Pond/Parking Lot
Total	1,086,176	25.17

Acres Green Filing No.3

Acres Green Filing No.2

Acres Green Filing No.1



DOUGLAS COUNTY
FEB 20 1994
Department of Public Works

THOMAS SCHWEITZER
DOUGLAS COUNTY ENGINEER

Costin Engineering
CIVIL ENGINEERING AND SURVEYING
3775 WEST HAMPER AVE. ENGLEWOOD, COLORADO 80110
TELEPHONE: (303) 748-9830

**PARKWAY
MASTER
DRAINAGE STUDY**

NO.	DESCRIPTION	DATE	BY
1	DESIGN		
2	REVISIONS		

Good/Colorado Suite 300 Denver, CO 80222

4972



SCALE: 1" = 200'

APPENDIX B – DRAINAGE BASIN MAP



LEGEND:

- DESIGN POINT
- PROPOSED BASIN BOUNDARY
- EMERGENCY OVERFLOW PATH
- BASIN DESIGNATION**
- PROPOSED BASIN
- BASIN AREA**
- C1
- C100
- 350 EX. MAJOR CONTOUR
- 349 EX. MINOR CONTOUR
- 350 PROP. MAJOR CONTOUR
- 349 PROP. MINOR CONTOUR

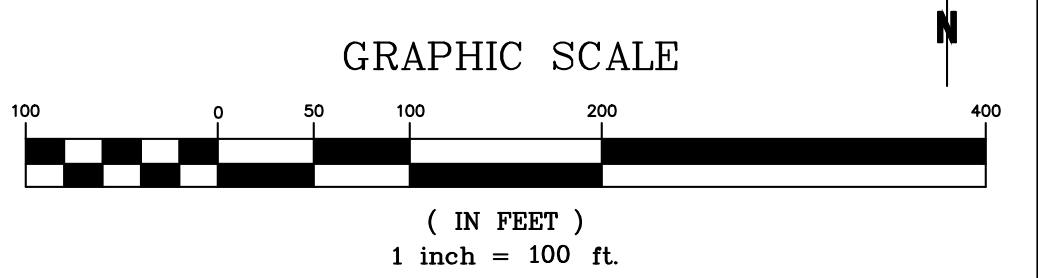
BASIN SUMMARY TABLE			
Basin	Area (acres)	5-yr (cfs)	100-yr (cfs)
A1	14.76	16.42	48.3
A2	10.53	13.61	38.6

DESIGN POINT SUMMARY TABLE				
Design Point	Contributing Basins	Area (acres)	5-yr (cfs)	100-yr (cfs)
1	A1	14.76	16.42	48.28
2	A2	10.53	13.61	38.56
3	A1, A2	25.29	28.65	82.91

REVISION	DESCRIPTION	DATE

DRAINAGE BASIN MAP
 WILLOW CREEK PUD
 LONE TREE
 COLORADO

SEAL		
NOT FOR CONSTRUCTION		
DESIGN KP	DRAWN KP	CHKD TP
SCALE H: 1" = 100' V: N/A		
JOB No. 020460-01-001		
DATE : 03/23/2023		
SHEET		
1 OF 1		



APPENDIX C – EXISTING HYDROLOGIC CALCULATIONS

Rainfall Data
Willow Creek PUD
Lone Tree, CO

Recurrence Interval (yrs)	1-hr Rainfall Depth (in)
2	0.84
5	1.10
10	1.33
25	1.68
50	1.97
100	2.28
500	3.08

APPENDIX D – PROPOSED HYDROLOGIC CALCULATIONS

Rainfall Data
Willow Creek PUD
Lone Tree, CO

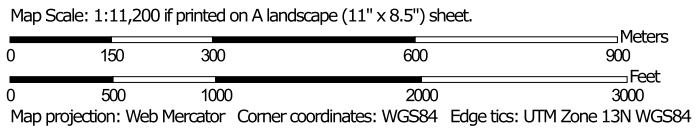
Recurrence Interval (yrs)	1-hr Rainfall Depth (in)
2	0.84
5	1.10
10	1.33
25	1.68
50	1.97
100	2.28
500	3.08

APPENDIX E – SOIL MAP

Soil Map—Arapahoe County, Colorado, and Castle Rock Area, Colorado




Soil Map may not be valid at this scale.




MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Arapahoe County, Colorado

Survey Area Data: Version 18, Sep 1, 2022

Soil Survey Area: Castle Rock Area, Colorado

Survey Area Data: Version 15, Sep 1, 2022

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021

MAP LEGEND

MAP INFORMATION

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FdC	Fondis silt loam, 3 to 5 percent slopes	5.0	0.8%
RID	Renohill-Litle clay loams, 3 to 9 percent slopes	14.6	2.4%
RtE	Renohill-Litle-Thedalund complex, 9 to 30 percent slopes	14.6	2.4%
Tc	Terrace escarpments	3.1	0.5%
Subtotals for Soil Survey Area		37.3	6.1%
Totals for Area of Interest		607.6	100.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
FoD	Fondis clay loam, 3 to 9 percent slopes	181.8	29.9%
Ma	Manzanola clay loam	11.8	1.9%
NsE	Newlin-Satanta complex, 5 to 20 percent slopes	18.5	3.0%
RmE	Renohill-Buick complex, 5 to 25 percent slopes	324.6	53.4%
Sn	Satanta loam	33.5	5.5%
Subtotals for Soil Survey Area		570.2	93.9%
Totals for Area of Interest		607.6	100.0%

Castle Rock Area, Colorado

NsE—Newlin-Satanta complex, 5 to 20 percent slopes

Map Unit Setting

National map unit symbol: jqzh
Elevation: 5,500 to 6,600 feet
Mean annual precipitation: 15 to 19 inches
Mean annual air temperature: 49 to 51 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Newlin and similar soils: 50 percent
Satanta and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Newlin

Setting

Landform: Knobs, drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Unconformable sandy and gravelly and/or mixed source alluvium

Typical profile

H1 - 0 to 8 inches: gravelly sandy loam
H2 - 8 to 17 inches: gravelly sandy clay loam
H3 - 17 to 22 inches: gravelly sandy loam
H4 - 22 to 60 inches: very gravelly sand

Properties and qualities

Slope: 5 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R049XC202CO - Loamy Foothill 14-19 PZ
Hydric soil rating: No

Description of Satanta

Setting

Landform: Knobs, drainageways
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits derived from mixed

Typical profile

H1 - 0 to 9 inches: loam
H2 - 9 to 30 inches: clay loam
H3 - 30 to 60 inches: loam

Properties and qualities

Slope: 5 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R049XY214CO - Gravelly Foothill
Hydric soil rating: No

Minor Components

Bresser

Percent of map unit: 6 percent
Hydric soil rating: No

Buick

Percent of map unit: 6 percent
Hydric soil rating: No

Truckton

Percent of map unit: 6 percent
Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 2 percent
Landform: Swales

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Castle Rock Area, Colorado
Survey Area Data: Version 15, Sep 1, 2022

Castle Rock Area, Colorado

RmE—Renohill-Buick complex, 5 to 25 percent slopes

Map Unit Setting

National map unit symbol: jqzy
Elevation: 5,500 to 6,200 feet
Mean annual precipitation: 15 to 17 inches
Mean annual air temperature: 48 to 50 degrees F
Frost-free period: 120 to 135 days
Farmland classification: Not prime farmland

Map Unit Composition

Renohill and similar soils: 50 percent
Buick and similar soils: 30 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Renohill

Setting

Landform: Hills
Landform position (three-dimensional): Side slope, base slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Weathered, calcareous clayey shale

Typical profile

H1 - 0 to 3 inches: clay loam
H2 - 3 to 12 inches: clay loam
H3 - 12 to 24 inches: clay loam
H4 - 24 to 28 inches: unweathered bedrock

Properties and qualities

Slope: 5 to 25 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: D
Ecological site: R049XC202CO - Loamy Foothill 14-19 PZ
Hydric soil rating: No

Description of Buick

Setting

Landform: Hills
Landform position (three-dimensional): Base slope, side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Eolian deposits over silty alluvium

Typical profile

H1 - 0 to 4 inches: loam
H2 - 4 to 15 inches: silty clay loam
H3 - 15 to 22 inches: loam
H4 - 22 to 60 inches: sandy clay loam

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: R049XC202CO - Loamy Foothill 14-19 PZ
Hydric soil rating: No

Minor Components

Manzanola

Percent of map unit: 6 percent
Hydric soil rating: No

Satanta

Percent of map unit: 6 percent
Hydric soil rating: No

Fondis

Percent of map unit: 6 percent
Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 2 percent

Landform: Swales

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Castle Rock Area, Colorado

Survey Area Data: Version 15, Sep 1, 2022

Castle Rock Area, Colorado

Sn—Satanta loam

Map Unit Setting

National map unit symbol: jr05

Elevation: 5,400 to 6,200 feet

Mean annual precipitation: 15 to 19 inches

Mean annual air temperature: 48 to 50 degrees F

Frost-free period: 120 to 135 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Satanta and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Satanta

Setting

Landform: Ridges, terraces

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Mixed source eolian deposits

Typical profile

H1 - 0 to 9 inches: loam

H2 - 9 to 30 inches: clay loam

H3 - 30 to 60 inches: loam

Properties and qualities

Slope: 1 to 4 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water

(Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 10 percent

Available water supply, 0 to 60 inches: High (about 10.2 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

Ecological site: R049XC202CO - Loamy Foothill 14-19 PZ

Hydric soil rating: No

Minor Components

Fondis

Percent of map unit: 5 percent

Hydric soil rating: No

Sampson

Percent of map unit: 5 percent

Hydric soil rating: No

Buick

Percent of map unit: 2 percent

Hydric soil rating: No

Englewood

Percent of map unit: 2 percent

Hydric soil rating: No

Aquic haplustolls

Percent of map unit: 1 percent

Landform: Swales

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Castle Rock Area, Colorado

Survey Area Data: Version 15, Sep 1, 2022

APPENDIX F – FEMA FIRM PANEL

is for use in administering the National Flood Insurance Program. It is necessary to identify all areas subject to flooding, particularly from local sources of small size. The community map repository should be more detailed information in areas where Base Flood Elevations...

of the Roadways were computed at cross sections and interpolated across sections. The Roadways were based on hydraulic considerations to requirements of the National Flood Insurance Program. Floodway...

is not in Special Flood Hazard Areas may be protected by Flood Structures. Refer to Section 2.4 "Flood Protection Measures" of the...

action used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 13. The horizontal datum was NAD 83, GRS80 spheroid. In...

vertical datum on this map are referenced to the North American Vertical Datum of 1988 (NAVD 88). These flood elevations must be compared to...

vertical datum on this map are referenced to the North American Vertical Datum of 1988 (NAVD 88). These flood elevations must be compared to...

current elevation, description, and/or location information for bench marks on this map, please contact the Information Services Branch of the...

information shown on this FIRM was provided by the Douglas County Engineer and the Town of Castle Rock (CO) Department. Additional input...

reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this area. As a result, the Flood Profiles and Floodway Data tables in the...

limits shown on this map are based on the best data available at the time of publication. Because changes do to accretions or dis accretions may...

or to the separately printed Map Index for an overview map of the region of map panels, community map repository addresses,...

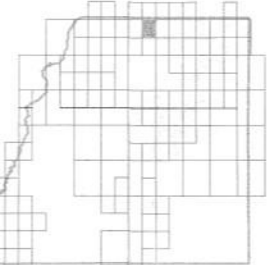
to FEMA Map Service Center at 1-800-368-6616 for information on products associated with this FIRM. Available products may include...

to questions about this map or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA-MAP (1-877-336-2747) or the FEMA website at http://www.fema.gov.

Douglas County Vertical Datum Offset Table. Table with 3 columns: Vertical Datum Offset (ft), Flooding Source, Vertical Datum Offset (ft).

at Boulder South elevations to NAVD 88. 3.10 feet were added to the NAVD 29 elevations.

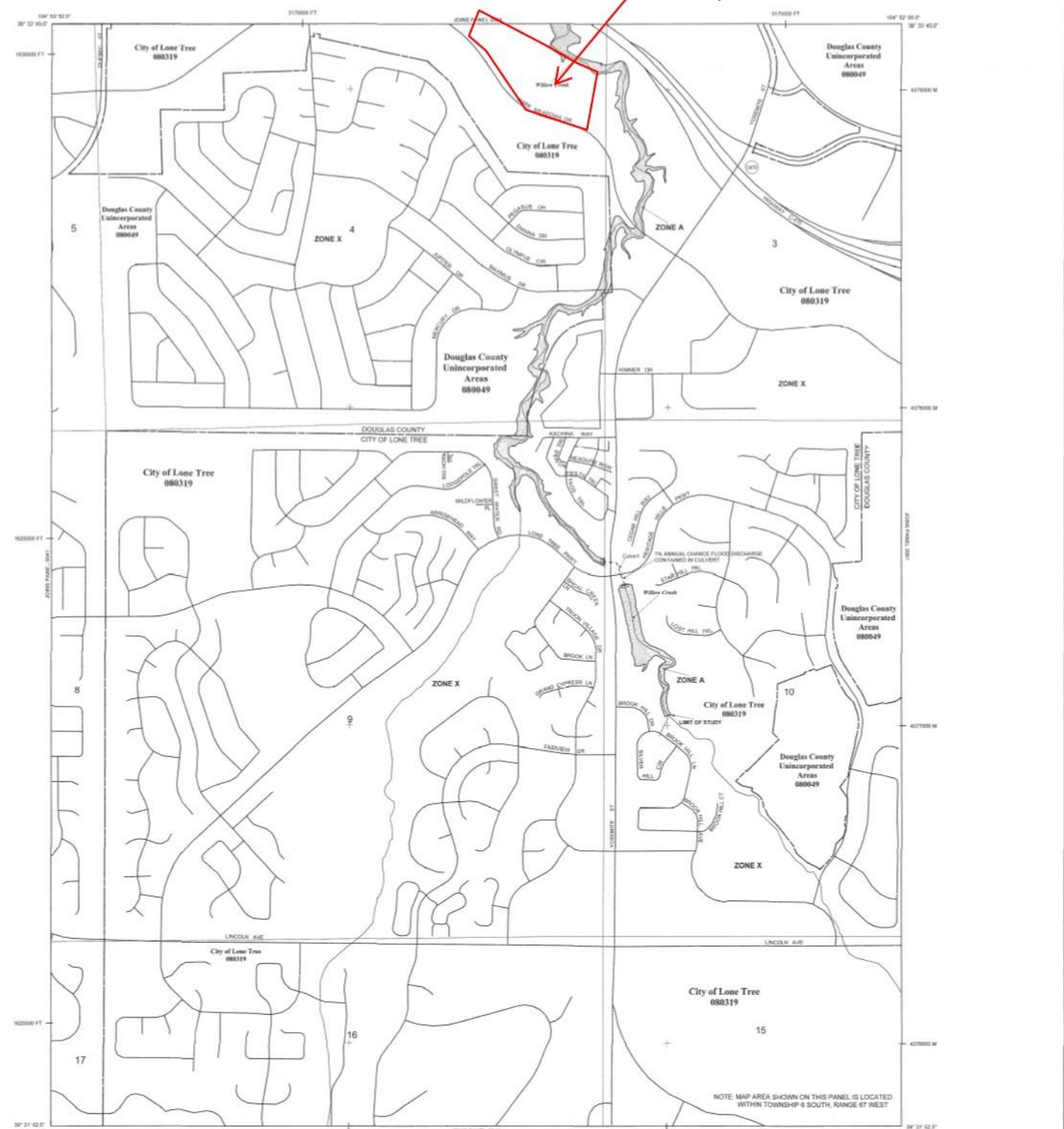
Panel Location Map



Flood Insurance Rate Map (FIRM) was produced through a partnership between the State of Colorado Water Conservation Urban Drainage and Flood Control District, and the Federal...

Additional flood hazard information and resources are available from local communities, the Colorado Water Conservation Board, and the Urban Drainage and Flood Control District.

Project Site



LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHA) SUBJECT TO THE 1% ANNUAL CHANCE FLOOD. ZONE A: No Base Flood Elevation determined. ZONE B: Base Flood Elevation determined. OTHER FLOOD AREAS: Areas of 0.2% annual chance flood...

MAP REPOSITORY: Refer to listing of Map Repositories on Map Index. EFFECTIVE DATE OF COUNTYPEWIDE FLOOD INSURANCE RATE MAP: SEPTEMBER 30, 2005. EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL: [blank]

PANEL 0042F

FIRM FLOOD INSURANCE RATE MAP

AND INCORPORATED INTO PANEL 42 OF 495

CONTAINS: COMMUNITY NUMBER, NUMBER, EASE. Includes Douglas County and Lone Tree, CO.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 6 SOUTH, RANGE 67 WEST

APPENDIX G – EXISTING DRAINAGE REPORT

STORM FLOW CALCULATIONS - New Furn Row Prop. @ 80% I (1)
POND H Re-Design - Showing Flow Summary For Pipe Sizing

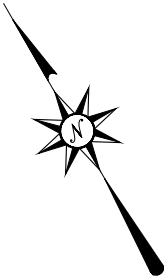
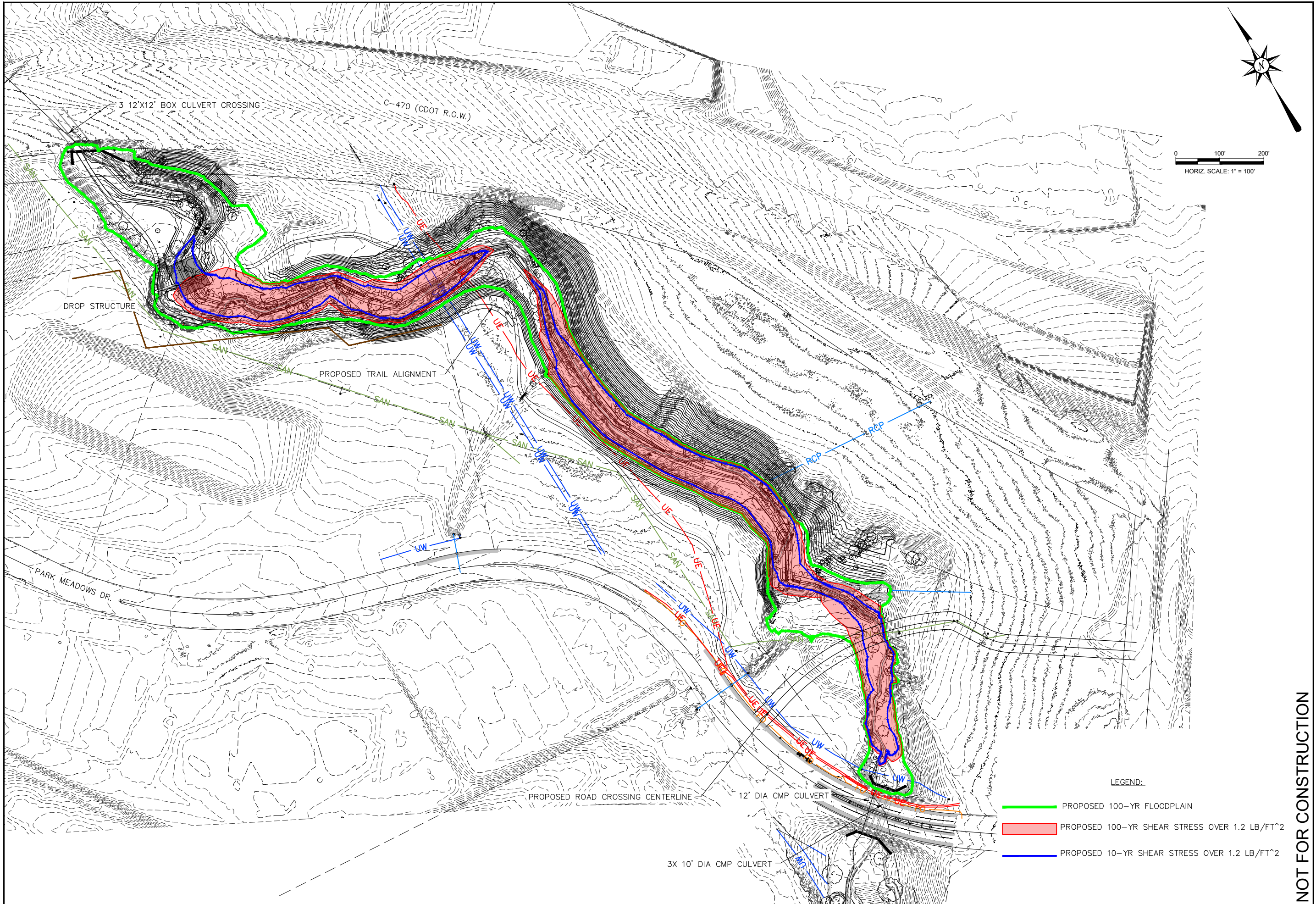
BASIN	Area (ac)	tc (min)	Runoff Coeff.	C*A (ac)	i (in/hr)	Q100 (cfs)	%I	%I*A
Lot 1A Report (Furniture Row) (2)								
A1	0.22	5.0	0.83	0.18			90	0.20
A2	0.42	5.3	0.90	0.38			87.06	0.37
B1	0.81	5.0	0.83	0.67			90	0.73
B2	1.00	6.3	0.94	0.94			97.1	0.97
C1	0.19	5.0	0.83	0.16			90	0.17
C2	1.10	5.5	0.92	1.01			92.64	1.02
Total to N. Outlet	3.74	6.3		3.34	7.5	25.1		
D1	0.81	5.0	0.83	0.67			90	0.73
D2	1.41	11.8	0.75	1.06			53.81	0.76
Total to S. Outlet	2.22	11.8		1.73	7.4	12.8		
E	0.43	5.0	0.50	0.22			0	0.00
Direct Runoff to Pond	0.43	5.0		0.22	6.6	1.5		
Parkway Master Drainage Study (Costin)								
Offsite F (3)	11.00	11.0	0.60	6.60	6.8	44.9	40	4.40
F1 (2)	2.89	12.3	0.89	2.57			85	2.46
F2 (2)	0.60	12.9	0.96	0.58			100	0.60
F3 (2)	3.31	12.4	0.89	2.95			85	2.81
F4 (2)	6.89	14.4	0.89	6.13			85	5.86
Into Pond F from South	24.69	14.4		18.83	6.0	113.0		
Pond F Subtotal (4)	31.08	14.4		24.12	6.0	144.7		
Offsite H	33.70	16.0	0.60	20.22			40	13.48
H1	2.75	11.3	0.82	2.26			80	2.20
H2	2.11	13.1	0.82	1.73			80	1.69
H3	3.86	17.0	0.82	3.17			80	3.09
H4	4.32	12.5	0.82	3.54			80	3.46
H5	3.21	16.1	0.82	2.63			80	2.57
H6	1.56	15.4	0.82	1.28			80	1.25
H7	1.47	15.4	0.82	1.21			80	1.18
To Pond H From PMD	52.98	17.0		36.04	5.5	198.2		
H8 (5)	22.04	18.1	0.85	18.62	5.3	98.7	80	17.63
I6 (6)	6.80	10.0	0.82	5.58	7.0	39.1	80	5.44
FR Parcels to Pond H	28.84	18.1		24.20	5.4	130.7		
(7)	81.82	18.1		60.24	5.4	325.3		
(8)	112.90	18.1		84.36	5.4	455.5		
CDOT								
West	10.02	11.8	0.94	9.42	6.7	62.6	95	9.52
East	1.23	5.0	0.94	1.16	8.8	10.2	95	1.17
(9)	11.25	11.8		10.58	6.7	70.9		
(10)	124.15	18.1	0.76	94.94	5.4	512.7	0.67	83.73

NOTES:

- (1) - Future Furniture Row Developed at 80% I, per UDFCD
- (2) - Per Lot 1A Report (Furniture Row)
- (3) - Per Costin - Acres Green Tributary Area
- (4) - Total Routed from Pond F inflows (pipe to Pond H)
- (5) - Basin H8 = Furn. Row. % 80% I, 50% C Soils, 50% B Soils
- (6) - Basin I6 = Furn. Row. 80%I, 50% B & 50% C/D Soils
- (7) - Total Routed to Pond H from South & East
- (8) - Total Routed to Pond H w/o CDOT Flows
- (9) - Total Routed CDOT Flows to Pond H
- (10) - Total Routed Flow into Pond H

**RATIONAL METHOD
PIPING SYSTEM FLOW
INPUTS**

APPENDIX H - PROPOSED WILLOW CREEK MINIMAL IMPACT DRAINAGE PLAN



0 100' 200'
HORIZ. SCALE: 1" = 100'

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 CENTENNIAL, CO 80112
 O: (720) 667-2063

PREPARED FOR:

MHFD
 MILE HIGH FLOOD DISTRICT

CITY OF LONE TREE

VERIFY SCALE:
 BAR IS ONE INCH
 ON ORIGINAL
 DRAWINGS



WILLOW CREEK PARK MEADOWS TO C470
 OVERALL PLAN

NOT FOR CONSTRUCTION

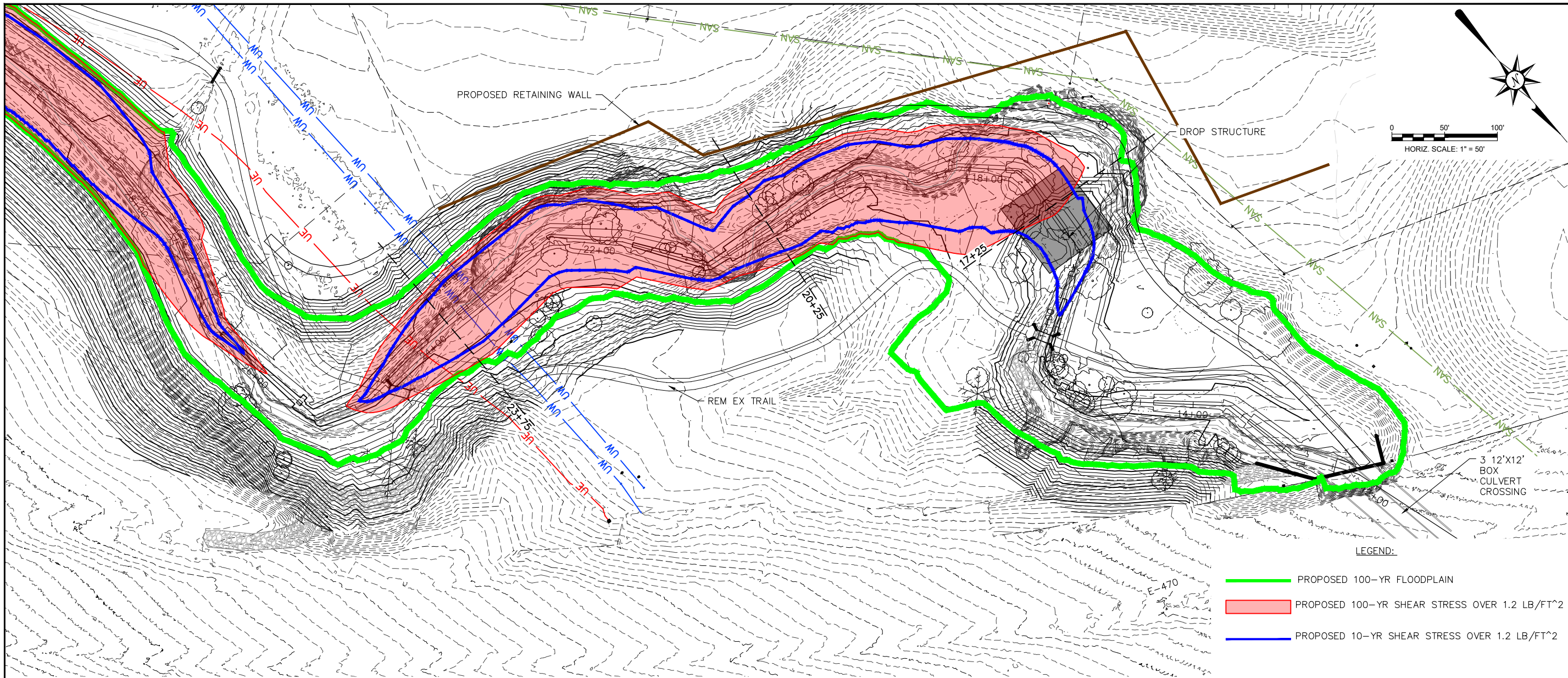
- LEGEND:
- PROPOSED 100-YR FLOODPLAIN
 - PROPOSED 100-YR SHEAR STRESS OVER 1.2 LB/FT²
 - PROPOSED 10-YR SHEAR STRESS OVER 1.2 LB/FT²

#	DATE	DESCRIPTION	INITIALS

DRAWN BY: PCVL
 DESIGNED BY: PCVL
 CHECKED BY: DPL

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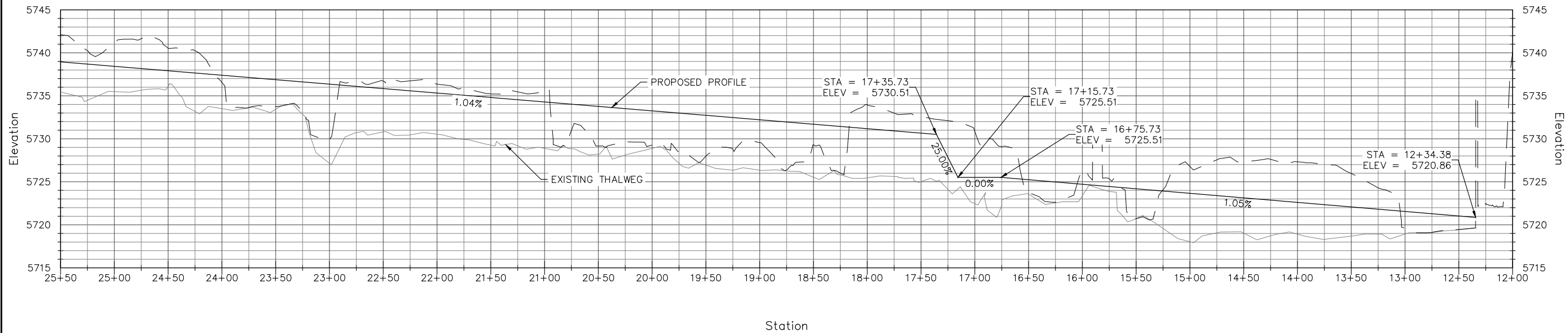
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Know what's below.
 Call before you dig.

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 - PROPOSED 100-YR SHEAR STRESS OVER 1.2 LB/FT²
 - PROPOSED 10-YR SHEAR STRESS OVER 1.2 LB/FT²

PROPOSED WILLOW CREEK PROFILE



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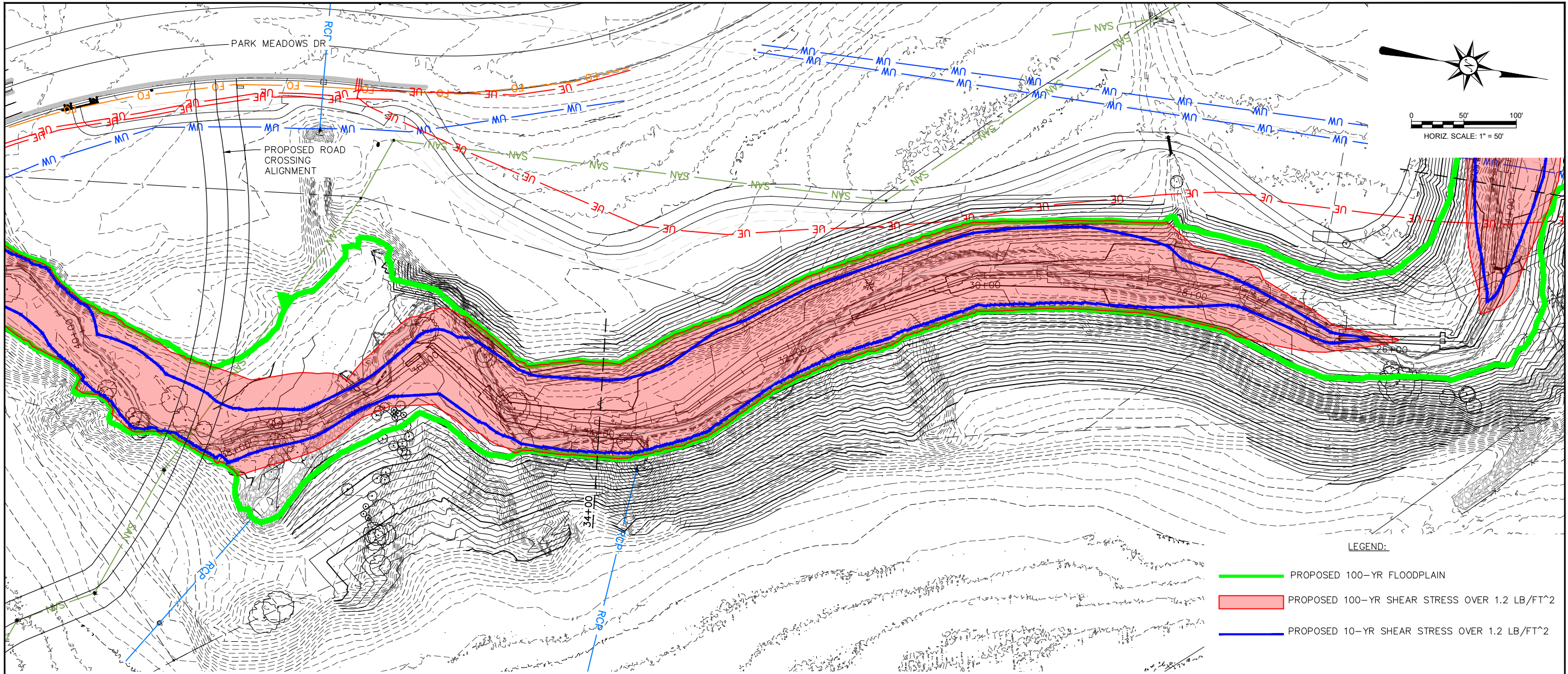
WILLOW CREEK PARK MEADOWS TO C470
 PLAN AND PROFILE (1 OF 2)

#	DATE	DESCRIPTION	INITIALS

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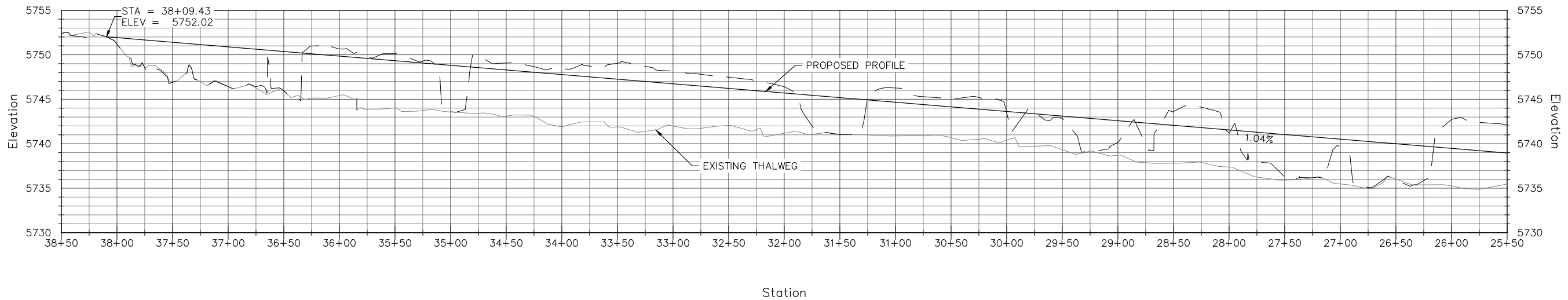
DATE
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- LEGEND:
- PROPOSED 100-YR FLOODPLAIN
 - PROPOSED 100-YR SHEAR STRESS OVER 1.2 LB/FT²
 - PROPOSED 10-YR SHEAR STRESS OVER 1.2 LB/FT²

PROPOSED WILLOW CREEK PROFILE



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WILLOW CREEK PARK MEADOWS TO C470
 PLAN AND PROFILE (2 OF 2)

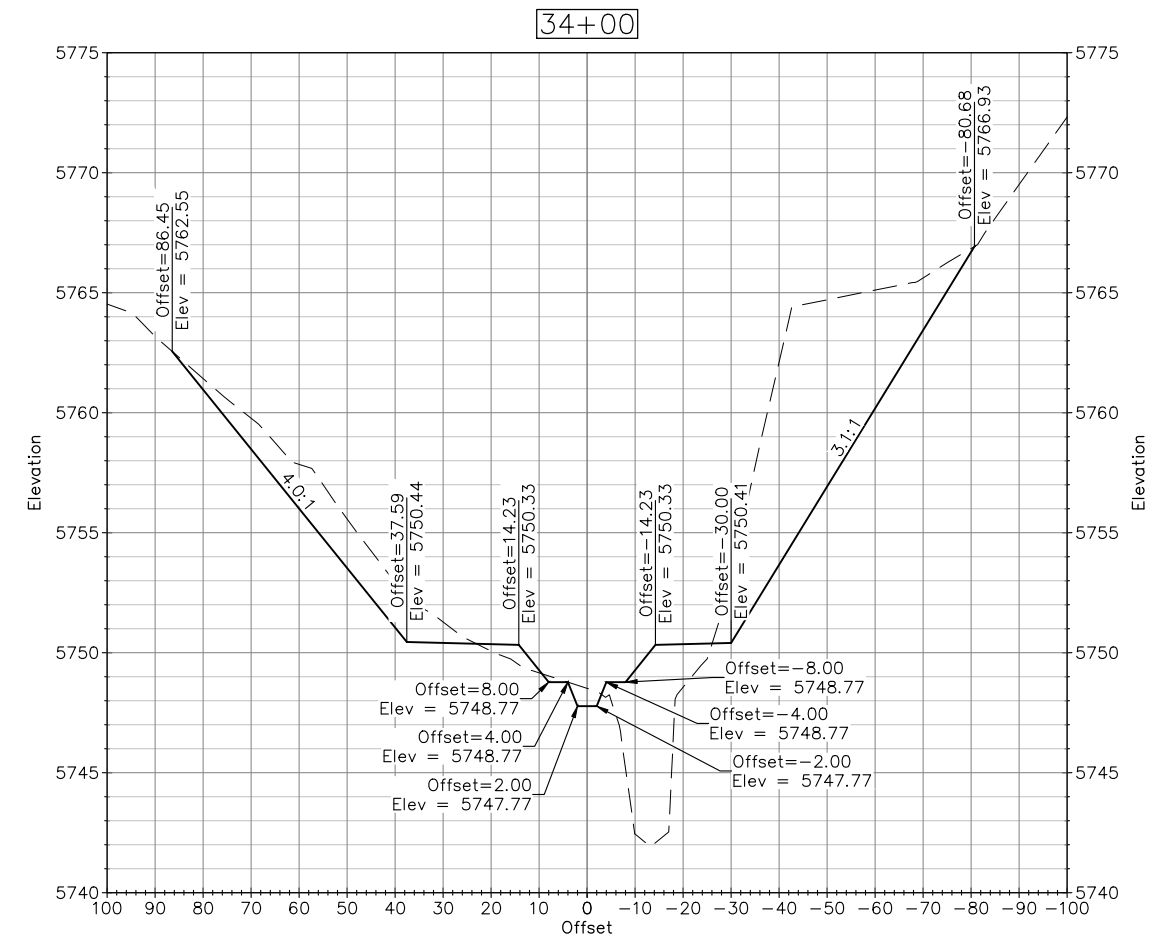
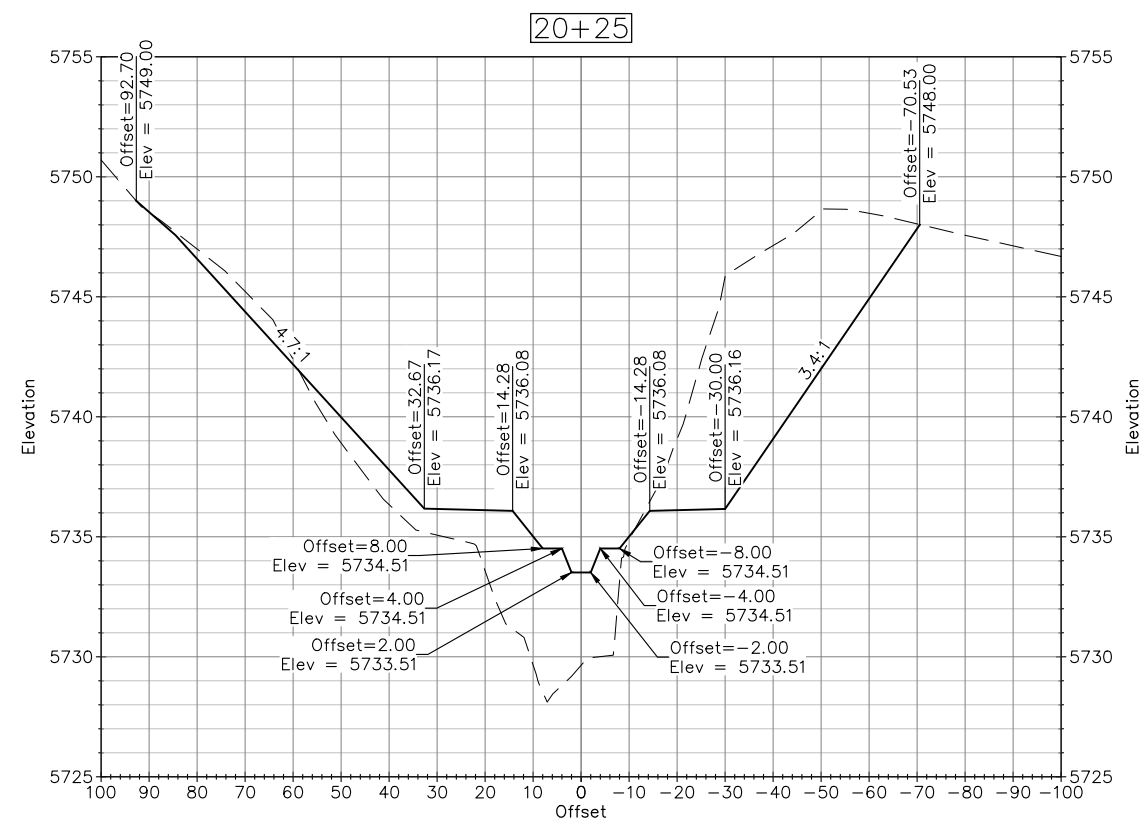
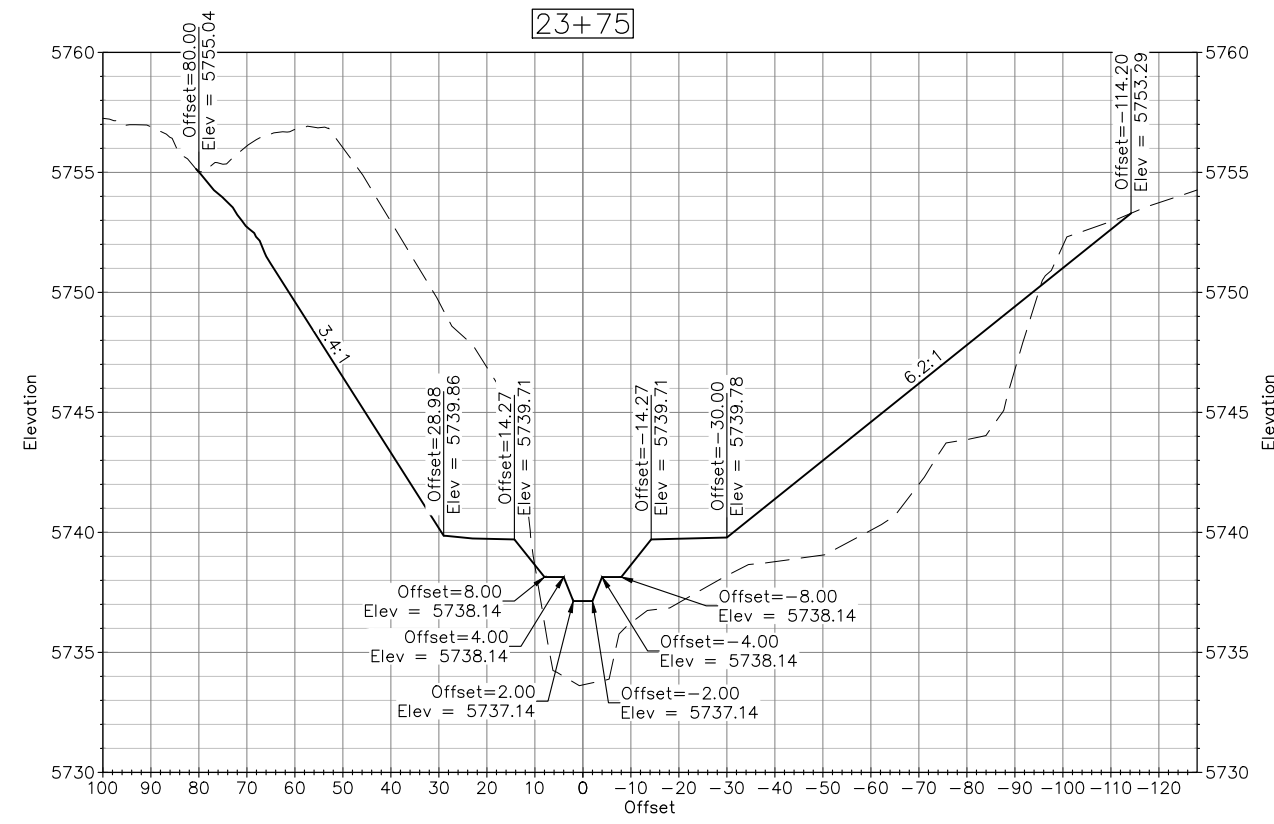
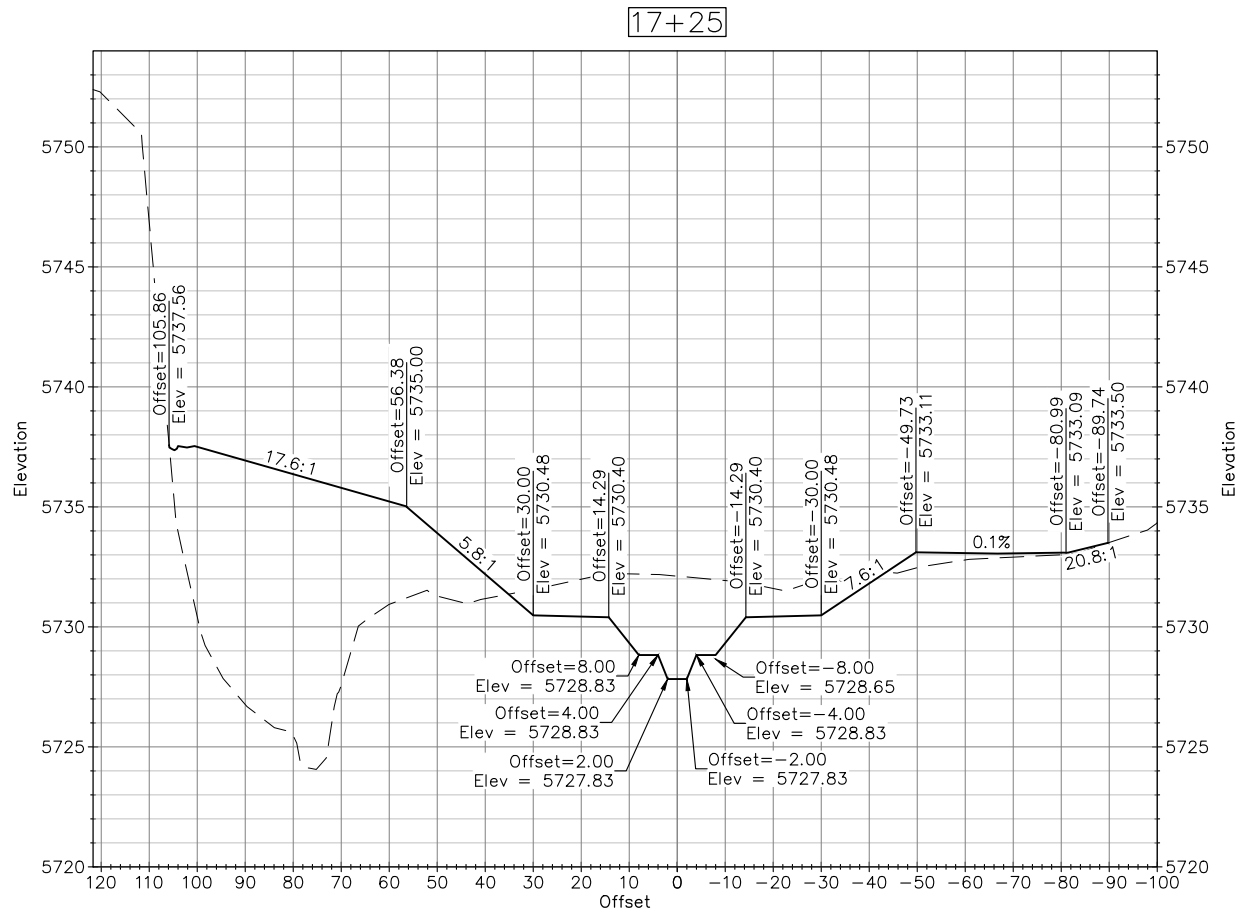
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 CITY OF LONE TREE

VERIFY SCALE:
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 DRAWINGS



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WILLOW CREEK PARK MEADOWS TO C470
 CROSS SECTIONS

#	DATE	DESCRIPTION	INITIALS

DRAWN BY: PCVL
 DESIGNED BY: PCVL
 CHECKED BY: DPL

DATE
 NOV 2023

SHEET
 4