

EPC STORMWATER REVIEW COMMENTS
IN ORANGE BOXES WITH BLACK TEXT



MVE, INC.
ENGINEERS SURVEYORS

1903 kalaray street, suite 200
colorado springs, co 80909
719.576.0311

Drainage Letter

The Landings of Denmark

Filing No. 2

MVE Project No. 61108

December 29, 2022

PCD Proj No.: CDR-22-012

Drainage Letter

for

The Landings of Denmark
Filing No. 2
El Paso County, Colorado

Project No. 61108

December 29, 2022

prepared for:

Charles M. McAllister
PO Box 6797
Colorado Springs, CO 80934

prepared by:

MVE, Inc.
1903 Lelaray Street, Suite 200
Colorado Springs, CO 80909
719.576.0311

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61108-LOD-Drainage Letter.odt

Statements and Acknowledgments

Engineer's Statement

The attached drainage plan and report were prepared under my direction and supervision and are correct to the best of my knowledge and belief. Said drainage report has been prepared according to the criteria established by the County for drainage reports and said report is in conformity with the applicable master plan of the drainage basin. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

David R. Gorman, P.E.
For and on Behalf of MVE, Inc.

Colorado No. 31672

Date

Developer's Statement

I, the owner/developer have read and will comply with all of the requirements specified in this drainage report and plan.

Charles M. McAllister
PO Box 6797
Colorado Springs, CO 80934

Date

El Paso County

Filed in accordance with the requirements of the Drainage Criteria Manual, Volumes 1 and 2, El Paso County Engineering Criteria Manual and Land Development Code as amended.

Joshua Palmer, P.E.,
County Engineer / ECM Administrator

Date

Conditions:

Drainage Letter

The purpose of this Drainage Letter for The Landings of Denmark Filing No. 2 is to update the approved drainage report to allow the construction of the subdivision improvements which have not been constructed following the recording of the Final Plat on August 4, 2006. The approved drainage report is titled "Final Drainage Report The Landings of Denmark Filing No. 2" prepared by Premier Engineering, Inc., dated January, 2005. The property owners intend at this time to complete the subdivision improvements.

The existing subdivision known as "The Landings of Denmark Filing No. 2" is located in the West One-Half of Section 11, Township 13 South, Range 63 West of the 6th P.M., El Paso County, Colorado. The site is made up of two (2) separate parcels made up of 13 vacant lots located in the northwest and southeast corners of The Landings of Denmark Filing No. 1. The subdivision is located on the east side of Log Road, north of Falcon Highway, south of Highway 110, and west of McClelland Road. The Final Plat for The Landings of Denmark Filing No. 2 was recorded August 4, 2006 under Reception Number 206712385 of the records of El Paso County, Colorado. Copies of the recorded plat have been included for reference. The site is located in both the Hook and Line Ranch Drainage Basin (CHBS1800), and the La Vega Ranch Drainage Basin (CHBR0400). The subdivision is zone RR-5 and contains thirteen (5-acre rural) residential lots. The site is split into two (2) parcels (A and B). Parcel A is located northwest of The Landings of Denmark Filing No. 1, and Parcel B is located southeast of The Landings of Denmark Filing No. 1. The subdivision is 75.167± acres in area, including the right-of-way that was dedicated to El Paso County for Osteen Ct., and Byrd Ct.

Parcel A, which is located northwest of The Landings of Denmark Filing No. 1, is bounded on the north by an unplatted parcel containing a single-family residence, several detached garages/sheds, and an unpaved driveway (zone A-35). The east side of Parcel A is adjacent to a vacant unplatted parcel (zone PUD). Parcel A is bounded on the south by lots 57, 65, 66, and 67 of The Landings of Denmark Filing No. 1 (zone RR-5). Log Road borders the west side of the Parcel A. Three (3) vacant unplatted lots lie across Log Road to the west.

Parcel B, which is located southeast of The Landings of Denmark Filing No. 1, is bounded on the north by lot 115 of The Landings of Denmark Filing No. 1 and on the east by a vacant unplatted parcel (zone PUD). Parcel B is bounded on the west by lot 29 of The Landings of Denmark Filing No. 1 (zone RR-5). Falcon Highway borders the south side of the Parcel B. Three (3) unplatted lots, each containing a single-family residence, lie across Falcon Highway to the south.

All of The Landings of Denmark Filing No. 2 is vacant.

According to the Federal Emergency Management Agency's Flood Insurance Rate Map (FIRM) Community Panel Numbers 08041C0585G, and 08041C0595G, dated December 7, 2018, for El Paso County, Colorado the site is not located within any Federal Emergency Management Agency (FEMA) designated Special Flood Hazard Areas (SFHA). A portion of the **FIRM** is included with this Drainage Letter for reference.

According to the Natural Resources Conservation Service Web National Cooperative Soil Survey, the soil of the site is Truckton Sandy Loam (map unit 96), which is part of hydrologic soil group A.

Truckton Sandy Loam soil is typically deep and well drained. The permeability of the soil is moderate to rapid, surface runoff is medium and hazard of erosion is moderate. A portion of the **National Cooperative Soil Survey Map** is included with this Drainage Letter.

The existing drainage patterns of the The Landings of Denmark Filing No. 2 site are indicated in the attached **Drainage Map Historic Conditions**. The site is described by five (5) sub-basins: H1- H4 where sub-basins H1 and H3 include Filing No.2.

Parcel A drains easterly in sub-basin H1 to Design Point 1. This sub-basins features slopes of 5-10% within the Filing No. 2 parcel and slopes of 10-15% east of said parcel. The flows exit the site at Design Point 1 and into the gravel Right-of-way, McClelland Road.

Parcel B drains southerly in sub-basin H3 to Design Point 3. This sub-basins features average slopes of 0.5-2% with slopes of 1-2% within the Filing No. 2 parcel. This flow combines with flows from H4 west of Design Point 3. This runoff collects at DP3 where a portion of the runoff drains via the existing 30" CMP culvert that drains under Falcon Highway. The majority of this runoff continues northeast of DP3 and flows into H2 where it will combine flows at Design Point 2.

Sub-basin H4 drains in a southerly direction and flows to an existing 24" CMP owned by El Paso County. However, this pipe is currently silted full and is unable to drain any flows from this sub-basin. All flows from this sub-basin currently travel into H3 and H2 via the existing roadside ditch that drains to the east. This pipe requires immediate maintenance before any construction can begin.

All flows from the site eventually enter Chico Creek. The sub-basins are described in more detail in the previously approved Final Drainage Report.

The Proposed drainage patterns of the Drainage Letter site are indicated on the attached **Drainage Map Proposed Conditions** from the previously approved Final Drainage Report. The drainage patterns are described by four (4) onsite sub-basins, and four (4) offsite sub-basins. The site will continue to drain as in existing conditions with Parcel A draining offsite to the east and Parcel B draining offsite to the south. The sub-basins are described in more detail in the previously approved Final Drainage Report.

The proposed improvements to be constructed are Byrd Court, and O'Steen Court, public paved rural local roadways each in a 60' right-of-way. These roads will contain a roadside ditch draining into 2-24" RCP culvert with Flared End Sections and Type VL Riprap at the outlet . All flows from these sites will drain into a proposed trap channel that diverts the flows into the natural channels or existing drainage easements. The roadside ditches were sized to safely convey the stormwater runoff from the proposed roadways. Further details and calculations can be found in the previously approved Final Drainage Report and are included in this report's appendix.

The proposed development will not alter the existing basic drainage patterns of the site. The site will continue to drain off-site to the south and east as in existing conditions. The developed flow runoff quantities will not change from those described in the approved Final Drainage Report For The Landings of Denmark Filing No. 2.

Four Step Process:

The El Paso County Engineering Criteria Manual (Appendix I, Section I.7.2) requires the consideration of a “Four Step Process for receiving water protection that focuses on reducing runoff volumes, treating the water quality capture volume (WQCV), stabilizing drainageways, and implementing long term source controls”. The Four Step Process is incorporated in this project and the elements are discussed below.

The portion of the site that is contained within the 5-acre single family residential lots are excluded from Post Construction Stormwater Management requirements by ECM 1.7.1.B.5 due to the low development density as 5-acre lots. However, Byrd Court and O'Steen Court, which are both public roadways, are subject to Post Construction Stormwater Treatment requirements. This site will meet the requirements based the Runoff Reduction Standard indicated in ECM 1.7.1.C.3.

- 1) Runoff Reduction Practices are employed in this project. Impervious surfaces have been reduced as much as practically possible with the low residential density. All impervious surfaces on the site will drain to the surrounding pervious areas allowing infiltration and water quality mitigation. Minimized Directly Connected Impervious Areas (MDCIA) is employed on the project because runoff from the impervious areas of the future home sites will pass over the adjacent natural grassed areas for a distance of 25 feet to 300 feet before entering a roadside ditch or natural drainage way. Runoff from the paved public road will drain to the adjacent native vegetated roadside ditches that will capture and infiltrate runoff from the roadway surface. Runoff Reduction calculations are included in the appendix showing that the roadway runoff will infiltrate into the ground, evaporate, or evapotranspire a quantity of water equal to at least 60% of what the calculated WQCV would be if all impervious area for the applicable development site discharged without infiltration.
- 2) All drainage paths on the site will remain stabilized with the natural native grass lining. Disturbed areas will be reseeded. All culverts will have rip-rap aprons at the exits. The proposed grass-lined drainage channels for both roadways are adequate to convey the minor and major storm flows without erosion and sedimentation. No further stabilization is required.
- 3) The project contains no potentially hazardous uses. The site is exempted from the use of WQCV BMPs by ECM 1.7.1.B.5 by virtue of the large lot rural residential nature of the site having percent imperviousness of less than 10%. The site includes the use of permanent rip rap aprons at the culvert crossings to control potential sedimentation. The runoff in the roadside ditches of the public roadway will infiltrate into the ground, evaporate, or evapotranspire a quantity of water equal to at least 60% of what the calculated WQCV would be if all impervious area for the applicable development site discharged without infiltration. Runoff Reduction can be found in the Previously Approved Preliminary and Final Drainage Report and are included in this report's appendix.
- 4) The site contains no storage of potentially harmful substances or use of potentially harmful substances. No Site Specific or Other Source Control BMP's are required.

No offsite drainage improvements will be required for the project. Costs for public non-reimbursable drainage improvements are listed below:

| | | | | |
|--------------------------------|----|-----------|---|-----------------|
| 186 LF 24" RCP Pipe | at | \$83 / LF | = | \$ 15,438 |
| 8 - 24" RCP Flared End Section | at | \$498/ EA | = | \$ 3,984 |
| 22 Tons Rip-Rap Type VL | at | \$89 /ton | = | <u>\$ 1,958</u> |
| Total | | | = | \$ 21,380 |

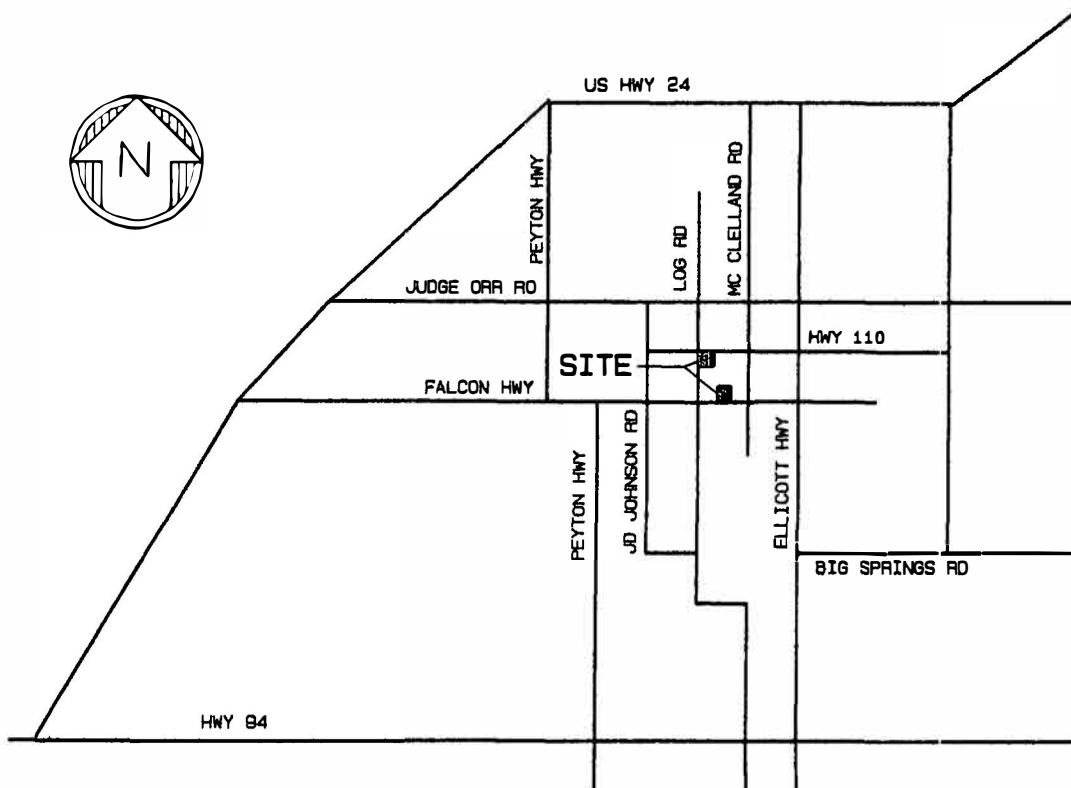
The Hook and Line Ranch and the La Vega Ranch Drainage Basins have not been studied and are not Fee Basins at this time. No Drainage Fees or Bridge Fees were due or paid for the proposed Final Plat of The Landings of Denmark Filing No. 2 at the time it was platted.

In Conclusion, the drainage patterns generated by the The Landings of Denmark site under proposed developed conditions are essentially the same as those which existed for the existing Plan. The site and drainage are substantially in accordance with the previously approved Drainage Report prepared at the time of the Plan in 2005. The proposed development as described in this Drainage Letter will have no adverse impacts to downstream and surrounding developments or downstream drainage ways or storm drain facilities.

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Unresolved: Provide inlet and outlet protection calculations and associated riprap sizing calcs.

| Attachments



VICINITY MAP

NO SCALE

National Flood Hazard Layer FIRMette

104°25'30"W 38°56'29"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS



0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*



OTHER AREAS OF FLOOD HAZARD



OTHER AREAS



GENERAL STRUCTURES



OTHER FEATURES



MAP PANELS



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on **7/27/2021 at 6:38 PM** and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.



Basemap: USGS National Map; Orthoimagery: Data refreshed October, 2020

National Flood Hazard Layer FIRMette

104°25'5"W 38°55'48"N



Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS

- Without Base Flood Elevation (BFE)
Zone A, V, A99
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*

Future Conditions 1% Annual Chance Flood Hazard *Zone X*

Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*

Area with Flood Risk due to Levee *Zone D*

OTHER AREAS OF FLOOD HAZARD

NO SCREEN Area of Minimal Flood Hazard *Zone X*

Effective LOMR

Area of Undetermined Flood Hazard *Zone D*

OTHER AREAS

GENERAL STRUCTURES

- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

Cross Sections with 1% Annual Chance Water Surface Elevation

Coastal Transect

Base Flood Elevation Line (BFE)

Limit of Study

Jurisdiction Boundary

Coastal Transect Baseline

Profile Baseline

Hydrographic Feature

OTHER FEATURES

Digital Data Available

No Digital Data Available

Unmapped

MAP PANELS



The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

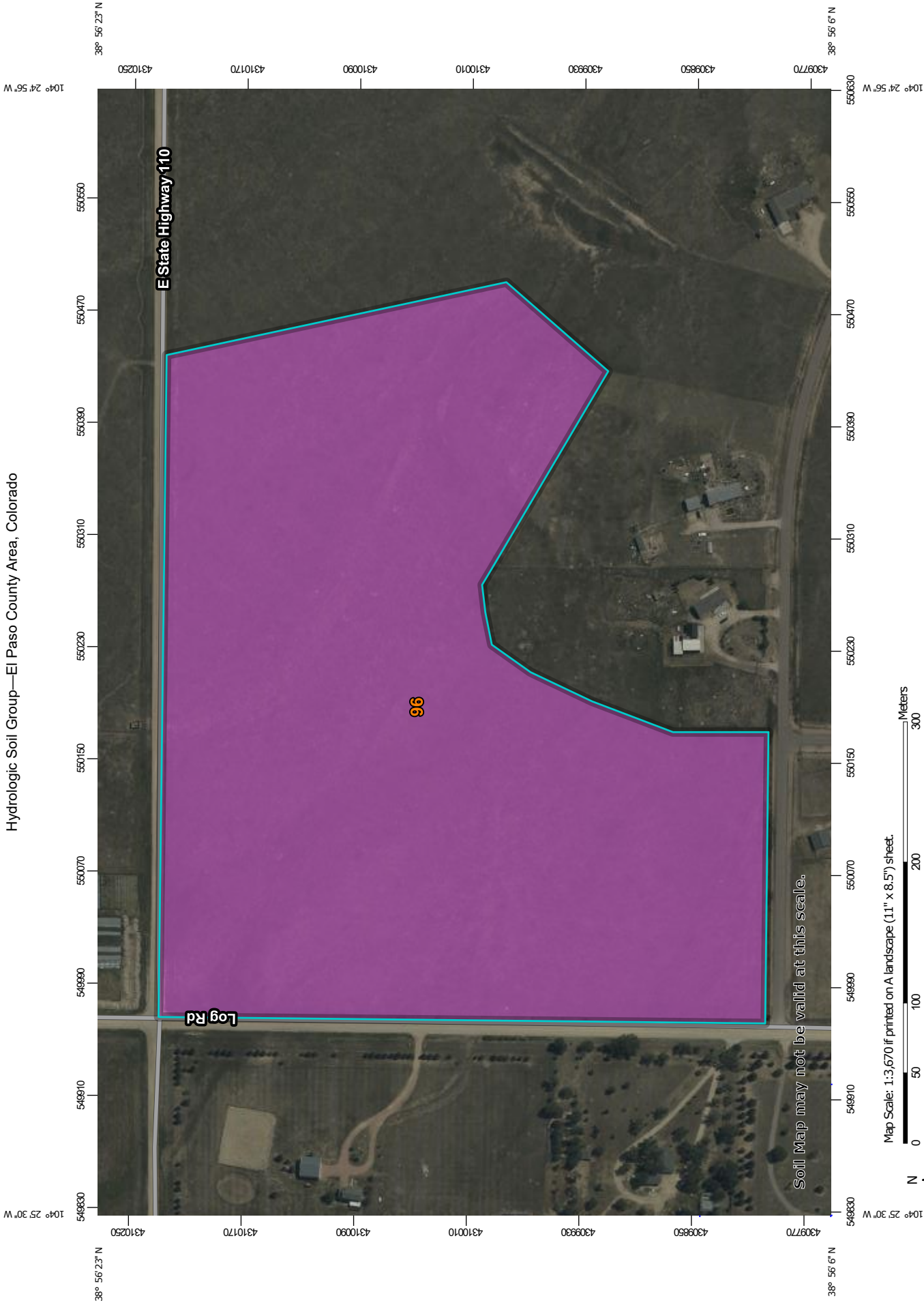
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0 250 500 1,000 1,500 2,000 Feet 1:6,000
 Basemap: USGS National Map: Orthoimagery: Data refreshed October, 2020
 104°24'27\"/>

Hydrologic Soil Group—El Paso County Area, Colorado



























Map Scale: 1:3,670 if printed on A landscape (11" x 8.5") sheet.










Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84



MAP LEGEND

| | |
|-------------------------------|--|
| Area of Interest (AOI) |  C |
| Area of Interest (AOI) |  C/D |
| Soils |  D |
| Soil Rating Polygons |  Not rated or not available |
| A |  |
| A/D |  |
| B |  |
| B/D |  |
| C |  |
| C/D |  |
| D |  |
| Not rated or not available |  |
| Soil Rating Lines |  A |
| A/D |  A/D |
| B |  B |
| B/D |  B/D |
| C |  C |
| C/D |  C/D |
| D |  D |
| Not rated or not available |  |
| Soil Rating Points |  A |
| A/D |  A/D |
| B |  B |
| B/D |  B/D |

| | |
|-----------------------|---|
| 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 1:24,000.

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: El Paso County Area, Colorado
 Survey Area Data: Version 18, Jun 5, 2020

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

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 2018

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.

Hydrologic Soil Group

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|--|--------|--------------|----------------|
| 96 | Truckton sandy loam, 0 to 3 percent slopes | A | 41.9 | 100.0% |
| Totals for Area of Interest | | | 41.9 | 100.0% |

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

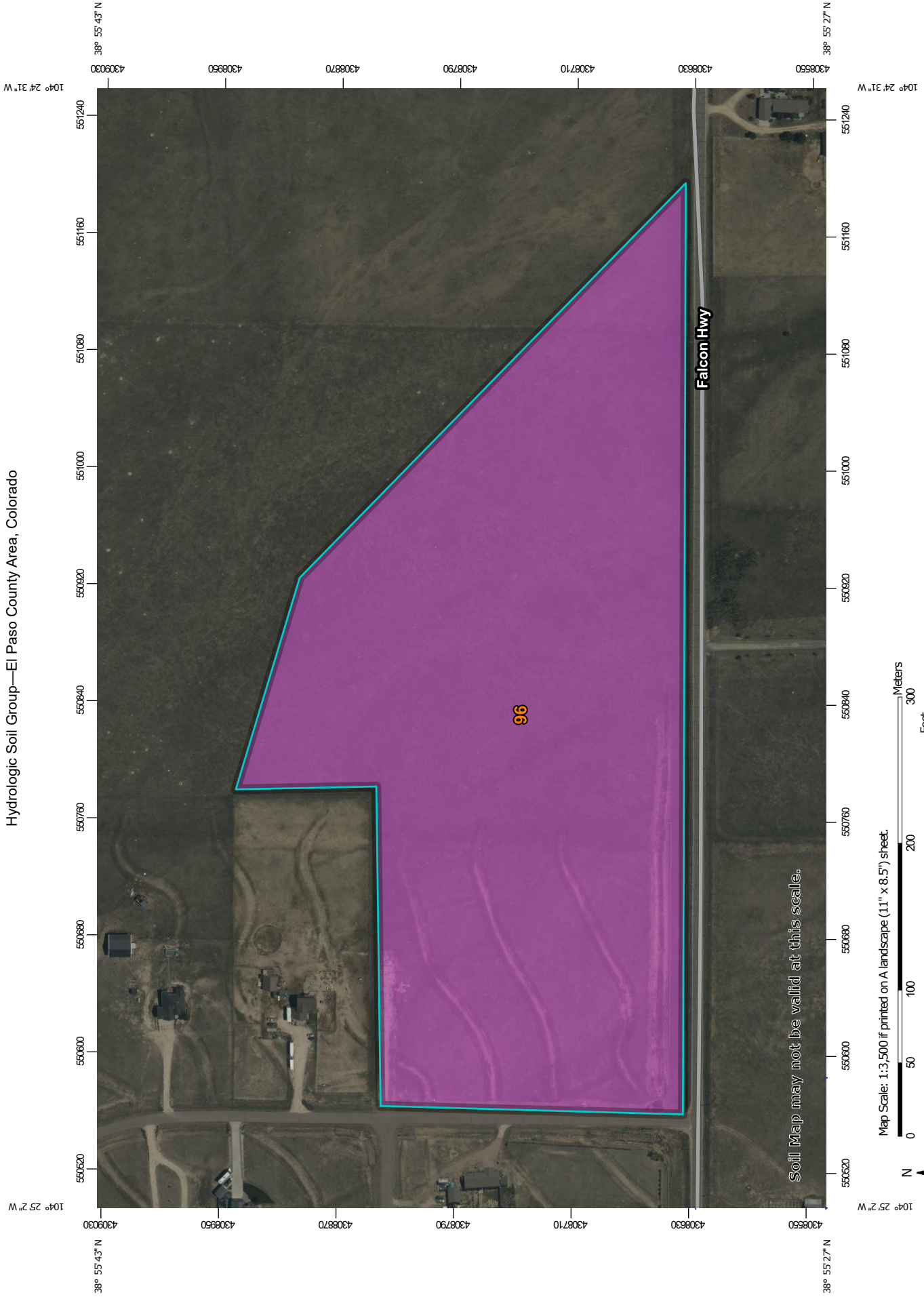
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group—El Paso County Area, Colorado



Soil Map may not be valid at this scale.

Map Scale: 1:3,500 if printed on A landscape (11" x 8.5") sheet.



































Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84



Natural Resources Conservation Service

Web Soil Survey National Cooperative Soil Survey

MAP LEGEND

| | |
|--|--|
| Area of Interest (AOI) |  C |
|  Area of Interest (AOI) |  C/D |
| Soils |  D |
| Soil Rating Polygons |  Not rated or not available |
|  A | Water Features |
|  A/D |  Streams and Canals |
|  B | Transportation |
|  B/D |  Rails |
|  C |  Interstate Highways |
|  C/D |  US Routes |
|  D |  Major Roads |
|  Not rated or not available |  Local Roads |
| Soil Rating Lines | Background |
|  A |  Aerial Photography |
|  A/D | |
|  B | |
|  B/D | |
|  C | |
|  C/D | |
|  D | |
|  Not rated or not available | |
| Soil Rating Points | |
|  A | |
|  A/D | |
|  B | |
|  B/D | |

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

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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)

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 Survey Area Data: Version 18, Jun 5, 2020

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

Date(s) aerial images were photographed: Sep 11, 2018—Oct 20, 2018

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.

Hydrologic Soil Group

| Map unit symbol | Map unit name | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|--|--------|--------------|----------------|
| 96 | Truckton sandy loam, 0 to 3 percent slopes | A | 30.2 | 100.0% |
| Totals for Area of Interest | | | 30.2 | 100.0% |

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Almost all areas of this soil are used as rangeland. A few areas of crops such as alfalfa and corn are grown under sprinkler irrigation.

This soil is well suited to the production of native vegetation suitable for grazing. It is best suited to deep-rooted grasses. The native vegetation is mainly cool- and warm-season grasses such as western wheatgrass, side-oats grama, and needleandthread.

Proper range management is needed to prevent excessive removal of the plant cover. Interseeding is used to improve the existing vegetation. Deferment of grazing in spring increases plant vigor and soil stability. Properly locating livestock watering facilities helps to control grazing.

Windbreaks and environmental plantings are fairly well suited to this soil. Blowing sand is the main limitation for the establishment of trees and shrubs. The soil is so loose that trees need to be planted in shallow furrows and plant cover needs to be maintained between the rows. Supplemental irrigation may be needed to insure survival. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, and Siberian elm. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.

This soil is suited to wildlife habitat. It is best suited to openland and rangeland wildlife habitat. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed.

This soil has good potential for use as homesites. The main limitation of this soil for roads and streets is frost action potential. Special designs for roads are needed to minimize this limitation. Practices are needed to control soil blowing and water erosion on construction sites where the plant cover has been removed. Capability subclass VIe, nonirrigated.

96—Truckton sandy loam, 0 to 3 percent slopes. This deep, well drained soil formed in alluvium and residuum derived from arkosic sedimentary rock on uplands. Elevation ranges from 6,000 to 7,000 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 135 days.

Typically, the surface layer is grayish brown sandy loam about 5 inches thick. The next layer is dark grayish brown sandy loam about 3 inches thick. The subsoil is brown sandy loam about 16 inches thick. The substratum is light yellowish brown coarse sandy loam to a depth of 60 inches or more.

Included with this soil in mapping are small areas of Blakeland loamy sand, 1 to 9 percent slopes; Bresser sandy loam, 0 to 3 percent slopes; Ellicott loamy coarse sand, 0 to 5 percent slopes; and Ustic Torrifluvents, loamy.

Permeability of this Truckton soil is moderately rapid. Effective rooting depth is 60 inches or more. Available water capacity is moderate. Surface runoff is slow, and the hazards of erosion and soil blowing are moderate.

This soil is used mainly for cultivated crops. It is also used for livestock grazing, for wildlife habitat, and as homesites.

Crops are commonly grown in combination with summer fallow because moisture is insufficient for annual cropping. Alfalfa can also be grown on this soil. When this soil is used as cropland, crop residue management and minimum tillage are necessary conservation practices.

This soil is well suited to the production of native vegetation suitable for grazing (fig. 7). It favors deep-rooted grasses. The native vegetation is mainly cool- and warm-season grasses such as western wheatgrass, side-oats grama, and needleandthread.

Proper range management is needed to prevent excessive removal of the plant cover. Interseeding is used to improve the existing vegetation. Deferment of grazing in spring increases plant vigor and soil stability. Properly locating livestock watering facilities helps to control grazing.

Windbreaks and environmental plantings generally are suited to this soil. Soil blowing is the main limitation to the establishment of trees and shrubs. This limitation can be overcome by cultivating only in the tree rows and leaving a strip of vegetation between the rows. Supplemental irrigation may be needed when planting and during dry periods. Trees that are best suited and have good survival are Rocky Mountain juniper, eastern redcedar, ponderosa pine, Siberian elm, Russian-olive, and hackberry. Shrubs that are best suited are skunkbush sumac, lilac, and Siberian peashrub.

This soil is suited to wildlife habitat. It is best suited to habitat for openland and rangeland wildlife. In cropland areas, habitat favorable for ring-necked pheasant, mourning dove, and many nongame species can be developed by establishing areas for nesting and escape cover. For pheasant, undisturbed nesting cover is vital and should be provided in plans for habitat development. This is especially true in areas of intensive farming. Rangeland wildlife, such as pronghorn antelope, can be encouraged by developing livestock watering facilities, properly managing livestock grazing, and reseeding range where needed.

This soil has good potential for use as homesites. The main limitation of this soil for roads and streets is frost-action potential. Special designs for roads are needed to overcome this limitation. Capability subclasses IIIe, nonirrigated, and IIe, irrigated.

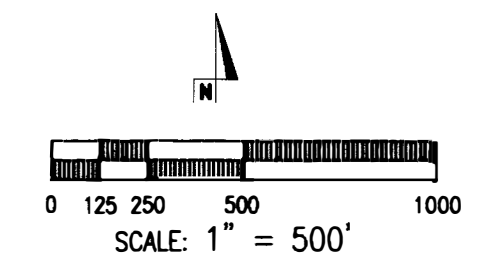
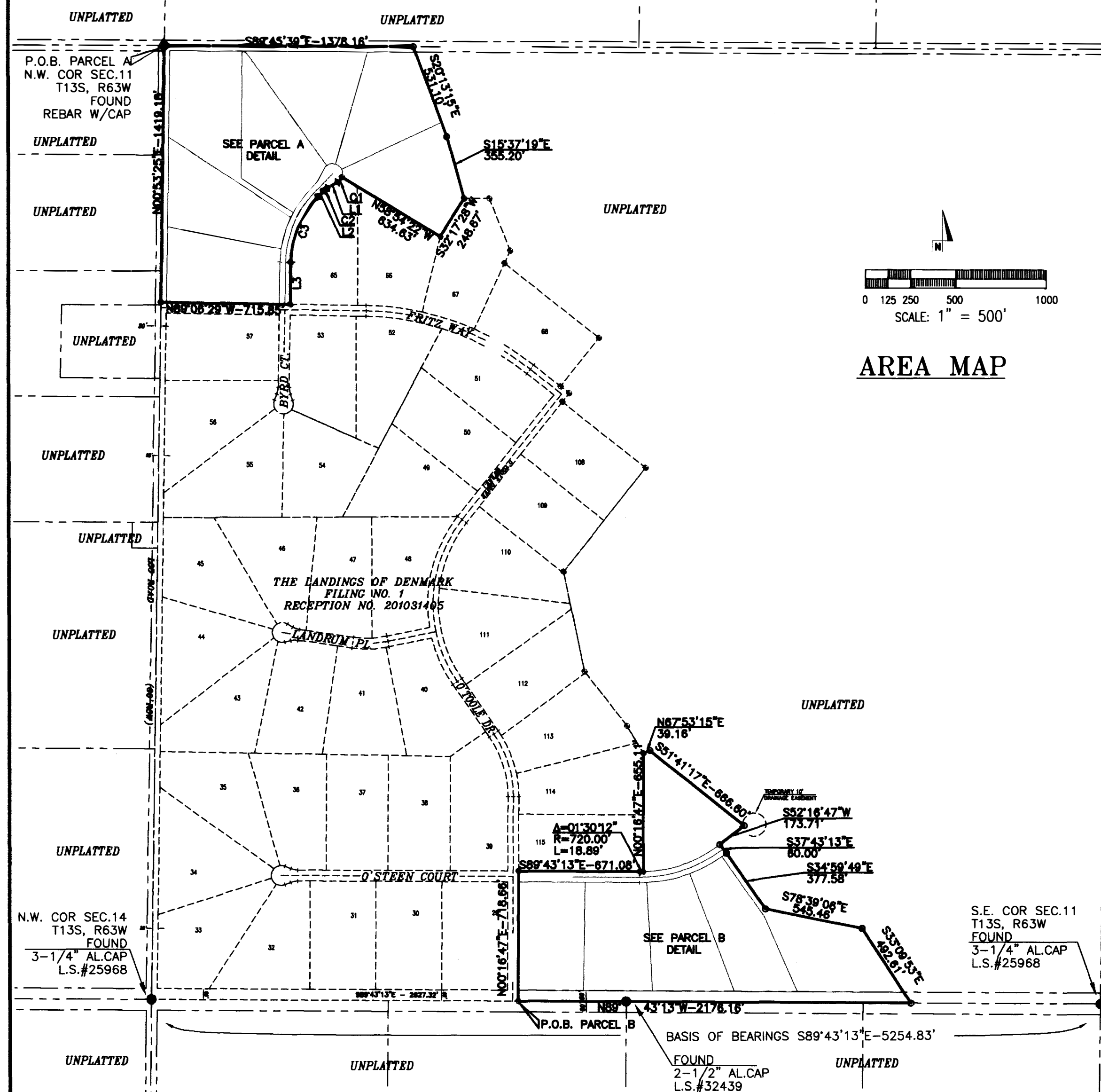
97—Truckton sandy loam, 3 to 9 percent slopes. This deep, well drained soil formed in alluvium and residuum derived from arkosic sedimentary rock on uplands. Elevation ranges from 6,000 to 7,000 feet. The average annual precipitation is about 15 inches, the average annual air temperature is about 47 degrees F, and the average frost-free period is about 135 days.

Typically, the surface layer is grayish brown sandy loam about 5 inches thick. The next layer is dark grayish brown sandy loam about 3 inches thick. The subsoil is brown sandy loam about 16 inches thick. The substratum is light yellowish brown coarse sandy loam to a depth of 60 inches or more.

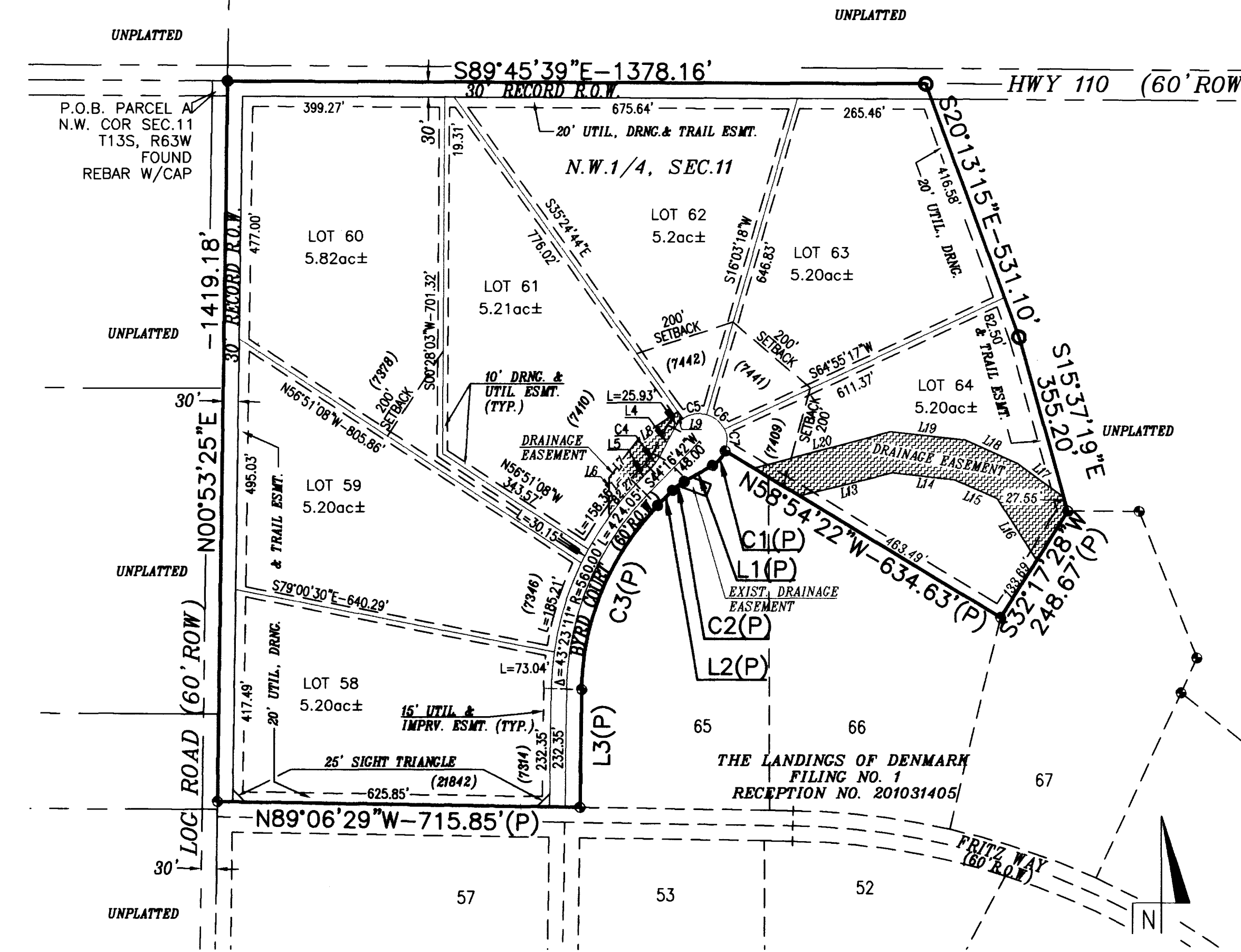
THE LANDINGS OF DENMARK FILING NO. 2

12385

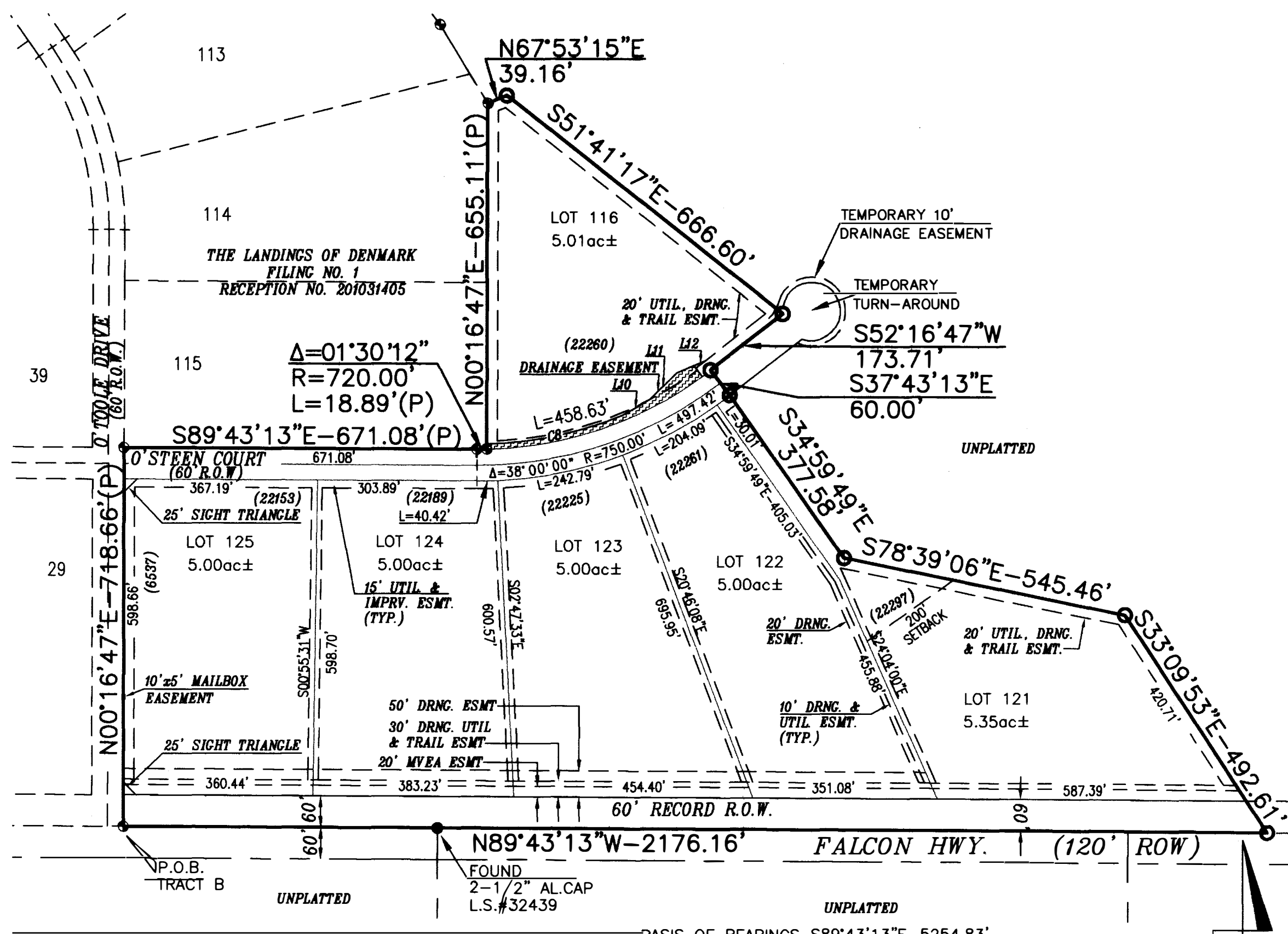
A Portion of the Northwest One-Quarter (N.W.1/4) of Section 11,
and a Portion of the South One-Half (S.1/2) of Section 11,
Township 13 South, Range 63 West of the 6th P.M.,
County of El Paso, State of Colorado



AREA MAP



PARCEL A



PARCEL B

PROPERTY TABLES

| LINE | BEARING | LENGTH |
|------|-------------|------------|
| L1 | S80°59'10"W | 64.20'(P) |
| L2 | S44°16'42"W | 41.95'(P) |
| L3 | S00°53'31"W | 232.35'(P) |
| L4 | N27°34'14"E | 64.20' |
| L5 | S44°16'42"W | 41.95' |

| CURVE | DELTA | RADIUS | LENGTH |
|-------|-----------|---------|------------|
| C1 | 40°12'55" | 55.00' | 38.60'(P) |
| C2 | 16°42'28" | 100.00' | 29.16'(P) |
| C3 | 43°23'11" | 530.00' | 401.33'(P) |
| C4 | 16°42'28" | 100.00' | 29.16' |
| C5 | 51°28'02" | 55.00' | 49.41' |
| C6 | 48°51'59" | 55.00' | 46.91' |
| C7 | 45°50'58" | 55.00' | 44.01' |

EASEMENT TABLES

| LINE | BEARING | LENGTH |
|------|-------------|---------|
| L6 | N00°00'58"E | 75.68' |
| L7 | N37°05'06"E | 98.84' |
| L8 | N55°44'39"E | 92.52' |
| L9 | S35°24'44"E | 17.25' |
| L10 | S35°53'12"W | 89.22' |
| L11 | S45°55'59"W | 73.38' |
| L12 | S67°03'39"W | 58.77' |
| L13 | N76°04'25"E | 188.93' |
| L14 | S83°47'44"E | 123.62' |
| L15 | S65°55'28"E | 92.40' |
| L16 | S32°44'47"E | 143.69' |
| L17 | S35°53'11"E | 118.06' |
| L18 | S65°55'28"E | 114.43' |
| L19 | S83°51'46"E | 147.94' |
| L20 | N74°59'22"E | 278.92' |

| CURVE | DELTA | RADIUS | LENGTH |
|-------|----------|---------|---------|
| C8 | 2°18'40" | 710.00' | 264.08' |

LEGEND

- BOUNDARY LINE
- - - LOT LINE
- (P) PLATTED LOT LINE
- - - EASEMENT LINE
- - - CENTERLINE
- - - ADJACENT LOT LINE
- SET #4 REBAR & CAP MARKED "PLSC RLS 25968"
- FOUND AS SHOWN
- ⊕ FOUND #4 REBAR & CAP "PLSC RLS 25968"
- ▨ DRAINAGE EASEMENT

PINNACLE LAND SURVEYING COMPANY, INC.
925 W. CUCHARRAS ST., C.S., CO 634-0751

NOTICE: ACCORDING TO COLORADO LAW YOU MUST COMMENCE ANY LEGAL ACTION BASED UPON ANY DEFECT IN THIS SURVEY WITHIN THREE YEARS AFTER YOU FIRST DISCOVER SUCH DEFECT. IN NO EVENT, MAY ANY ACTION BASED UPON ANY DEFECT IN THIS SURVEY BE COMMENCED MORE THAN TEN YEARS FROM THE DATE OF THE CERTIFICATION SHOWN HEREON.

THE LANDINGS OF DENMARK FILING NO. 2
DRAWN BY: CAJ/MWW CHECKED BY: JWT DATE: 03/08/05
JOB NO.: 01012100 DWG: 01012100P.DWG SHEET 2 OF 2

The Landings of Denmark Filing No. 1

Existing/Historic Conditions

Time of Concentration Computation Table

Project: **Denmark Subdivision - Onsite Existing Drainage Basins**

Project Number:

| Drainage Basin | Design Point | Overland Flow | | | | Travel Time | | | | Total Time of Concentration | | SCS | |
|----------------|--------------|-----------------|-----------------|---------------|----------------|-----------------|-----------------|-----------------|------------------------|-----------------------------|--------|--------|-------------------|
| | | Length (ft.) | Height (ft.) | C (10 yr.) | Time (min.) | Type | Length (ft.) | Height (ft.) | Velocity (ft./sec.) | Time (min.) | (min.) | (hr.) | Lag Time (hr.) |
| | | | | | | | | | | | | | |
| H1 | 1 | 200 | 2 | 0.25 | 22.48 | Natural Channel | 5900 | 55 | 2.60 | 37.83 | 60.3 | 1.0052 | 0.6031 |
| H2 | 2 | 300 | 4 | 0.25 | 25.04 | Natural Channel | 5715 | 65 | 2.79 | 34.20 | 59.2 | 0.9872 | 0.5923 |
| H3 | 3 | 400 | 5 | 0.25 | 29.53 | Natural Channel | 2850 | 32 | 2.36 | 20.11 | 49.6 | 0.8274 | 0.4965 |
| H4 | 4 | 400 | 4 | 0.25 | 31.79 | Natural Channel | 3460 | 40 | 2.50 | 23.09 | 54.9 | 0.9147 | 0.5488 |
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Prepared by: jcj

Checked by: jcj

Date: 6/28/00

Page 1 of 1

The Landings of Denmark Filing No. 1

Existing/Historic Conditions

Hydrologic Computation Table - Rational Method

Project: **Denmark Subdivision - Onsite Existing Drainage Basins**

Project Number:

| Drainage Basin | Design Point | Area | Area x "C" | | Development & Soil Type | Runoff Coefficient | | Time of Conc. (minutes) | Intensity (in. / hr.) | | Flow Rate (cfs) | |
|----------------|--------------|--------|------------|--------|-------------------------|--------------------|--------|-------------------------|-----------------------|--------|-----------------|--------|
| | | | 5 yr | 100 yr | | 5 yr | 100 yr | | 5 yr | 100 yr | 5 yr | 100 yr |
| H1 | 1 | 185.84 | 46.46 | 65.04 | Fair Pasture / Range | 0.25 | 0.35 | 60.31 | 1.49 | 2.59 | 69.0 | 168.7 |
| H2 | 2 | 211.87 | 52.97 | 74.15 | Fair Pasture / Range | 0.25 | 0.35 | 59.23 | 1.50 | 2.63 | 79.6 | 194.7 |
| H3 | 5 | 126.09 | 31.52 | 44.13 | Fair Pasture / Range | 0.25 | 0.35 | 49.65 | 1.69 | 2.95 | 53.3 | 130.4 |
| H4 | 6 | 65.09 | 16.27 | 22.78 | Fair Pasture / Range | 0.25 | 0.35 | 54.90 | 1.58 | 2.76 | 25.7 | 63.0 |
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Performed by: jcj

Checked by: jcj

Date: #####

The Landings of Denmark Filing No. 1

Existing/Historic Conditions

HYDROLOGIC SUMMARY TABLE
On-site Design / Discharge Points (Existing Conditions)

| Drainage Basin | Design Point | Drainage Area (Acres) | Flow Rate (c.f.s.) | |
|----------------|--------------|-----------------------|--------------------|----------|
| | | | 5 Year | 100 Year |
| H1 | 1 | 185.84 | 69.0 | 168.7 |
| H2 | 2 | 211.87 | 79.6 | 194.7 |
| H3 | 5 | 126.09 | 53.3 | 130.4 |
| H4 | 6 | 65.09 | 25.7 | 63.0 |
| | | | | |
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The Landings of Denmark Filing No. 2

Proposed Conditions

Time of Concentration Computation Table

Project **Denmark Subdivision No. 2 - Proposed Conditions**

Project Number

| Drainage Basin | Design Point | Overland Flow | | | | Travel Time | | | | Total Time of Concentration | | SCS Lag Time | |
|----------------|--------------|---------------|--------------|-----------|-------------|-----------------|--------------|--------------|--------------------|-----------------------------|--------|--------------|--------|
| | | Length (ft.) | Height (ft.) | C (5-yr.) | Time (min.) | Type | Length (ft.) | Height (ft.) | Velocity (ft./sec) | Time (min.) | (min.) | (hr.) | (hr.) |
| A | 1 | 300 | 3.5 | 0.27 | 25.5 | Natural Channel | 735 | 7 | 1.6 | 7.5 | 33.1 | 0.5516 | 0.0092 |
| B | | 300 | 5 | 0.27 | 22.7 | Natural Channel | 1050 | 16 | 2.1 | 8.3 | 31.0 | 0.5167 | 0.3100 |
| A,B,OS1&2 | 2 | 300 | 3.5 | 0.27 | 25.6 | Natural Channel | 6056 | 53 | 2.55 | 39.6 | 65.2 | 1.0867 | 0.6520 |
| OS3 | | 300 | 4 | 0.27 | 24.4 | Natural Channel | 1300 | 17 | 2.1 | 10.4 | 34.8 | 0.5802 | 0.0097 |
| C | | 300 | 5 | 0.25 | 23.3 | Natural Channel | 490 | 7 | 1.7 | 4.7 | 28.0 | 0.4664 | 0.2799 |
| C, OS3 | 3 | 300 | 4 | 0.27 | 24.4 | Natural Channel | 2020 | 19 | 2.0 | 16.5 | 41.0 | 0.6828 | 0.4097 |
| D | | 300 | 5 | 0.27 | 22.7 | Natural Channel | 260 | 4 | 1.5 | 2.8 | 25.5 | 0.4255 | 0.2553 |
| | | | | | | Grass Channel | 1350 | 9 | 1.9 | 11.7 | 37.2 | 0.6200 | 0.3720 |
| C,D,OS3&4 | 5 | | | | 50.4 (OS4) | Grass Channel | 1350 | 9 | 1.9 | 11.7 | 62.1 | | |

Prepared by jcj

Checked by jcj

Date

Page 1 of 2

Premier Engineering

The Landings of Denmark, Filing No. 2

Proposed Conditions

Hydrologic Computation Table - Rational Method

Project **Denmark Subdivision No. 2 - Proposed Conditions**

Project Number

| Drainage Basin | Design Point | Area | Area x "C" | | Development & Soil Type | Runoff Coefficient | | Time of Conc. (minutes) | Intensity (in / hr) | | Flow Rate (c.f.s.) | |
|----------------|--------------|--------|------------|--------|---------------------------------|--------------------|--------|-------------------------|---------------------|--------|--------------------|--------|
| | | | 5.yr | 100.yr | | 5.yr | 100.yr | | 5.yr | 100.yr | 5.yr | 100.yr |
| A | 1 | 25 90 | 6 99 | 9 58 | Five Acre Development | 0 27 | 0 37 | 33 1 | 2 19 | 3 82 | 15 3 | 36 6 |
| B | | 14 17 | 3 83 | 5 24 | Five Acre Development | 0 27 | 0 37 | 31 0 | 2 27 | 3 97 | 8 7 | 20 8 |
| C | | 7 42 | 2 00 | 2 75 | Five Acre Development | 0 27 | 0 37 | 28 0 | 2 42 | 4 22 | 4 8 | 11 6 |
| D | | 36 12 | 9 75 | 13 36 | Five Acre Development | 0 27 | 0 37 | 37 2 | 2 03 | 3 55 | 19 8 | 47 5 |
| A,B,OS1&2 | 2 | 182 11 | 46 44 | 64 65 | Five Acre Development Rangeland | 0 26 | 0 36 | 65 2 | 1 41 | 2 46 | 65 4 | 159 0 |
| C, OS3 | 3 | 30 74 | 8 30 | 11 37 | Five Acre Development | 0 27 | 0 37 | 41 0 | 1 91 | 3 34 | 15 9 | 38 0 |
| D | | 30 02 | 8 11 | 11 11 | Five Acre Development | 0 27 | 0 37 | 37 2 | 2 03 | 3 55 | 16 5 | 39 5 |
| C D, OS3&4 | 5 | 132 84 | 35 87 | 49 15 | Five Acre Development | 0 27 | 0 37 | 62 1 | 1 46 | 2 54 | 52 2 | 125 0 |

Performed by JCJ

Checked by JCJ

Date 6/23/04

Page 1 of 2

Premier Engineering

Per Drainage Map, OS5 also is part of this DP. Please reconcile between spreadsheet and map to show same information.

Flows do not match summary table on drainage map.

The Landings of Denmark, Filing No. 2 Proposed Conditions

HYDROLOGIC SUMMARY TABLE
On-site Sub-basins

| Drainage Basin | Design Point | Drainage Area (Acres) | Flow Rate (cfs) | |
|----------------|--------------|-----------------------|-----------------|----------|
| | | | 5 Year | 100 Year |
| A | 1 | 25.9 | 15.3 | 36.6 |
| B | | 14.17 | 8.7 | 20.8 |
| C | | 7.42 | 4.8 | 11.6 |
| A,B,OS1&2 | 2 | 182.11 | 65.4 | 159.0 |
| C, OS3 | 3 | 30.74 | 15.9 | 38.0 |
| D | | 30.02 | 16.5 | 39.5 |
| C D,OS3&4 | 5 | 132.84 | 52.2 | 125.0 |
| | | | | |
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| | | | | |

OS-5 Calculation

From The Landings of Denmark, Filing No. 1: Proposed Conditions

Time of Concentration Computation Table

Project: **Denmark Subdivision - Proposed Conditions**

Project Number:

| Drainage Basin | Design Point | Overland Flow | | | | Travel Time | | | | | Total Time of Concentration | | SCS Lag Time |
|----------------|--------------|---------------|--------------|-----------|-------------|-----------------|--------------|--------------|---------------------|-------------|-----------------------------|--------|--------------|
| | | Length (ft.) | Height (ft.) | C (5 yr.) | Time (min.) | Type | Length (ft.) | Height (ft.) | Velocity (ft./sec.) | Time (min.) | (min.) | (hr.) | (hr.) |
| A1 | | 300 | 3 | 0.27 | 26.88 | Natural Channel | 690 | 8 | 1.73 | 6.66 | 33.5 | 0.5591 | 0.0093 |
| B1 | | 300 | 3 | 0.27 | 26.88 | Natural Channel | 1300 | 19 | 2.18 | 9.93 | 36.8 | 0.6135 | 0.3681 |
| B2 | | 200 | 2 | 0.27 | 21.95 | Grass Channel | 1250 | 15 | 2.57 | 8.10 | 30.0 | 0.5008 | 0.3005 |
| B3 | | 300 | 3 | 0.27 | 26.88 | Natural Channel | 350 | 4 | 1.47 | 3.97 | 30.9 | 0.5143 | 0.3086 |
| C1 | | 300 | 4 | 0.27 | 24.45 | Natural Channel | 1300 | 17 | 2.09 | 10.36 | 34.8 | 0.5802 | 0.3481 |
| D1 | | 300 | 4 | 0.27 | 24.45 | Natural Channel | 2150 | 23 | 2.17 | 16.49 | 40.9 | 0.6824 | 0.4094 |
| D2 | | 300 | 3 | 0.27 | 26.88 | Natural Channel | 1550 | 17 | 2.03 | 12.70 | 39.6 | 0.6597 | 0.3958 |
| D3 | | 300 | 4 | 0.27 | 24.45 | Natural Channel | 730 | 8 | 1.71 | 7.11 | 31.6 | 0.5260 | 0.3156 |
| E1 | 6 | 300 | 3.7 | 0.27 | 25.09 | Natural Channel | 4030 | 41 | 2.46 | 27.28 | 52.4 | 0.8727 | 0.5236 |
| OS1 | | 300 | 4 | 0.25 | 25.04 | Natural Channel | 6040 | 55 | 2.59 | 38.87 | 63.9 | 1.0652 | 0.6391 |
| OS2 | | 300 | 5.5 | 0.25 | 22.54 | Natural Channel | 4065 | 43 | 2.50 | 27.05 | 49.6 | 0.8265 | 0.4959 |
| OS3 | | 300 | 5 | 0.25 | 23.26 | Natural Channel | 1440 | 19 | 2.15 | 11.17 | 34.4 | 0.5739 | 0.0096 |

Prepared by: jcj

Checked by: jcj

Date: 6/28/00

Page 1 of 2

Premier Engineering

Original Filing No. 2 Drainage Report omitted this sub-basin. Now represents OS-5 on Proposed Conditions Drainage Map.

OS-5 Calculation

From The Landings of Denmark Filing No.1: Proposed Conditions

Hydrologic Computation Table - Rational Method

Project: **Denmark Subdivision - Proposed Conditions**

Project Number:

| Drainage Basin | Design Point | Area | Area x "C" | | Development & Soil Type | Runoff Coefficient | | Time of Conc. (minutes) | Intensity (in. / hr.) | | Flow Rate (cfs) | |
|----------------|--------------|--------|------------|---------|-------------------------|--------------------|---------|-------------------------|-----------------------|---------|-----------------|---------|
| | | | 5 yr. | 100 yr. | | 5 yr. | 100 yr. | | 5 yr. | 100 yr. | 5 yr. | 100 yr. |
| A1 | | 21.40 | 5.78 | 7.92 | Five Acre Development | 0.27 | 0.37 | 33.55 | 2.17 | 3.79 | 12.5 | 30.0 |
| B1 | | 21.59 | 5.83 | 7.99 | Five Acre Development | 0.27 | 0.37 | 36.81 | 2.05 | 3.58 | 11.9 | 28.6 |
| B2 | | 9.47 | 2.56 | 3.50 | Five Acre Development | 0.27 | 0.37 | 30.05 | 2.32 | 4.05 | 5.9 | 14.2 |
| B3 | | 19.23 | 5.19 | 7.12 | Five Acre Development | 0.27 | 0.37 | 30.86 | 2.28 | 3.98 | 11.8 | 28.3 |
| C1 | | 23.32 | 6.30 | 8.63 | Five Acre Development | 0.27 | 0.37 | 34.81 | 2.12 | 3.70 | 13.3 | 31.9 |
| D1 | | 30.02 | 8.11 | 11.11 | Five Acre Development | 0.27 | 0.37 | 40.94 | 1.92 | 3.35 | 15.5 | 37.2 |
| D2 | | 25.33 | 6.84 | 9.37 | Five Acre Development | 0.27 | 0.37 | 39.58 | 1.96 | 3.42 | 13.4 | 32.0 |
| D3 | | 10.63 | 2.87 | 3.93 | Five Acre Development | 0.27 | 0.37 | 31.56 | 2.25 | 3.93 | 6.5 | 15.5 |
| E1 | 6 | 65.09 | 17.57 | 24.08 | Five Acre Development | 0.27 | 0.37 | 52.36 | 1.63 | 2.85 | 28.7 | 68.7 |
| OS1 | | 166.84 | 45.05 | 61.73 | Rangeland | 0.27 | 0.37 | 63.91 | 1.43 | 2.49 | 64.3 | 153.9 |
| OS2 | | 157.60 | 42.55 | 58.31 | Rangeland | 0.27 | 0.37 | 49.59 | 1.69 | 2.96 | 72.0 | 172.4 |
| OS3 | | 43.55 | 11.76 | 16.11 | Rangeland | 0.27 | 0.37 | 34.43 | 2.13 | 3.73 | 25.1 | 60.1 |

Performed by: JCJ

Checked by: JCJ

Date: 6/28/00

Page 1 of 2

Premier Engineering

Original Filing No. 2 Drainage Report omitted this sub-basin. Now represents OS-5 on Proposed Conditions Drainage Map.

OS-5 Calculation

From The Landings of Denmark Filing No. 1: Proposed Conditions

HYDROLOGIC SUMMARY TABLE
On-site Design / Discharge Points (Proposed Conditions)

| Drainage Basin | Design Point | Drainage Area (Acres) | Flow Rate (c.f.s.) | |
|-------------------|--------------|-----------------------|--------------------|----------|
| | | | 5 Year | 100 Year |
| A1, OS1 | 1 | 188.24 | 67.7 | 165.2 |
| B1-3, OS2 | 2 | 207.89 | 81.7 | 198.7 |
| D1, D2 | 3 | 55.35 | 25.8 | 61.8 |
| D1-3 | 4 | 65.98 | 28.2 | 67.6 |
| D1-3, C1 , OS3 | 5 | 132.85 | 46.7 | 112.9 |
| E1 | 6 | 65.09 | 28.7 | 68.7 |
| | | | | |
| | | | | |
| | | | | |

Original Filing No. 2 Drainage Report omitted this sub-basin. Now represents OS-5 on Proposed Conditions Drainage Map.

Design Point 7 Calculation

From The Landings of Denmark Filing No.1: Proposed Conditions

HYDROLOGIC SUMMARY TABLE
On-site Design / Discharge Points (Proposed Conditions)

| Drainage Basin | Design Point | Drainage Area (Acres) | Flow Rate (c.f.s.) | |
|-------------------|--------------|-----------------------|--------------------|----------|
| | | | 5 Year | 100 Year |
| A1, OS1 | 1 | 188.24 | 67.7 | 165.2 |
| B1-3, OS2 | 2 | 207.89 | 81.7 | 198.7 |
| D1, D2 | 3 | 55.35 | 25.8 | 61.8 |
| D1-3 | 4 | 65.98 | 28.2 | 67.6 |
| D1-3, C1 , OS3 | 5 | 132.85 | 46.7 | 112.9 |
| E1 | 6 | 65.09 | 28.7 | 68.7 |
| | | | | |
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Proposed Design Point 7 includes Filing No. 1's Proposed Design Point 2. However, the original calculation for Design Point 2 does not account for additional flows from OS-3.

Culvert Report

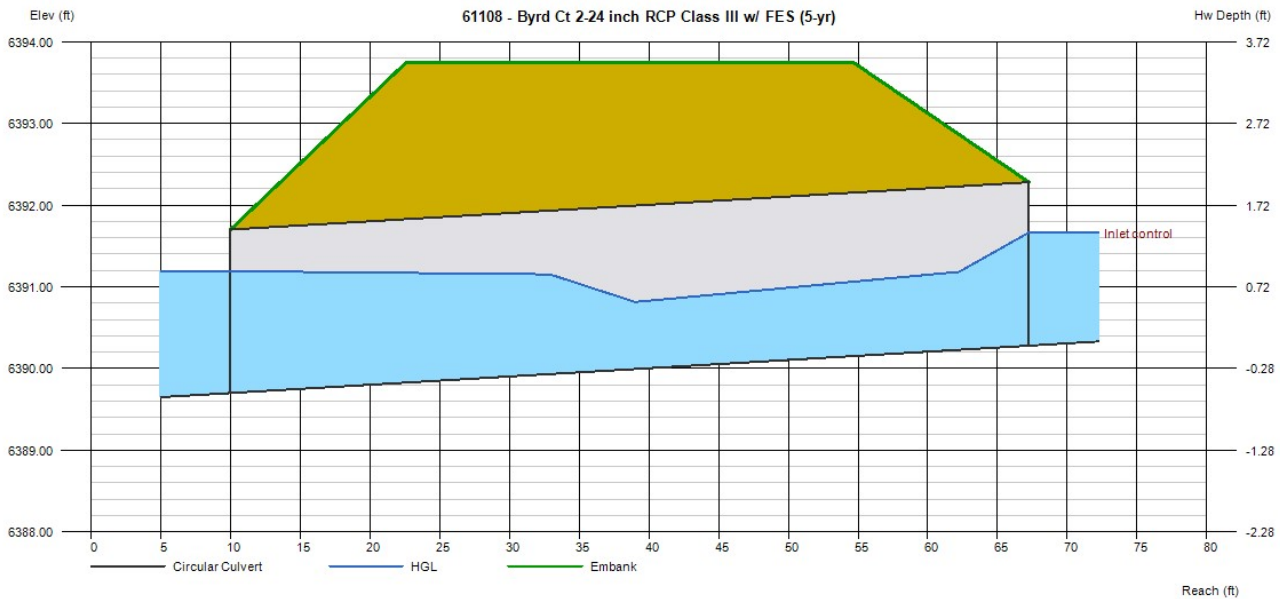
61108 - Byrd Ct 2-24 inch RCP Class III w/ FES (5-yr)

| | |
|---------------------|--------------------------------|
| Invert Elev Dn (ft) | = 6389.70 |
| Pipe Length (ft) | = 57.25 |
| Slope (%) | = 1.01 |
| Invert Elev Up (ft) | = 6390.28 |
| Rise (in) | = 24.0 |
| Shape | = Circular |
| Span (in) | = 24.0 |
| No. Barrels | = 2 |
| n-Value | = 0.013 |
| Culvert Type | = Circular Concrete |
| Culvert Entrance | = Groove end projecting (C) |
| Coeff. K,M,c,Y,k | = 0.0045, 2, 0.0317, 0.69, 0.2 |

| | |
|--------------------|-----------|
| Embankment | |
| Top Elevation (ft) | = 6393.75 |
| Top Width (ft) | = 32.00 |
| Crest Width (ft) | = 50.00 |

| | |
|---------------------|------------|
| Calculations | |
| Qmin (cfs) | = 15.30 |
| Qmax (cfs) | = 15.30 |
| Tailwater Elev (ft) | = (dc+D)/2 |

| | |
|--------------------|-----------------|
| Highlighted | |
| Qtotal (cfs) | = 15.30 |
| Qpipe (cfs) | = 15.30 |
| Qovertop (cfs) | = 0.00 |
| Veloc Dn (ft/s) | = 3.05 |
| Veloc Up (ft/s) | = 4.98 |
| HGL Dn (ft) | = 6391.19 |
| HGL Up (ft) | = 6391.26 |
| Hw Elev (ft) | = 6391.67 |
| Hw/D (ft) | = 0.69 |
| Flow Regime | = Inlet Control |



Culvert Report

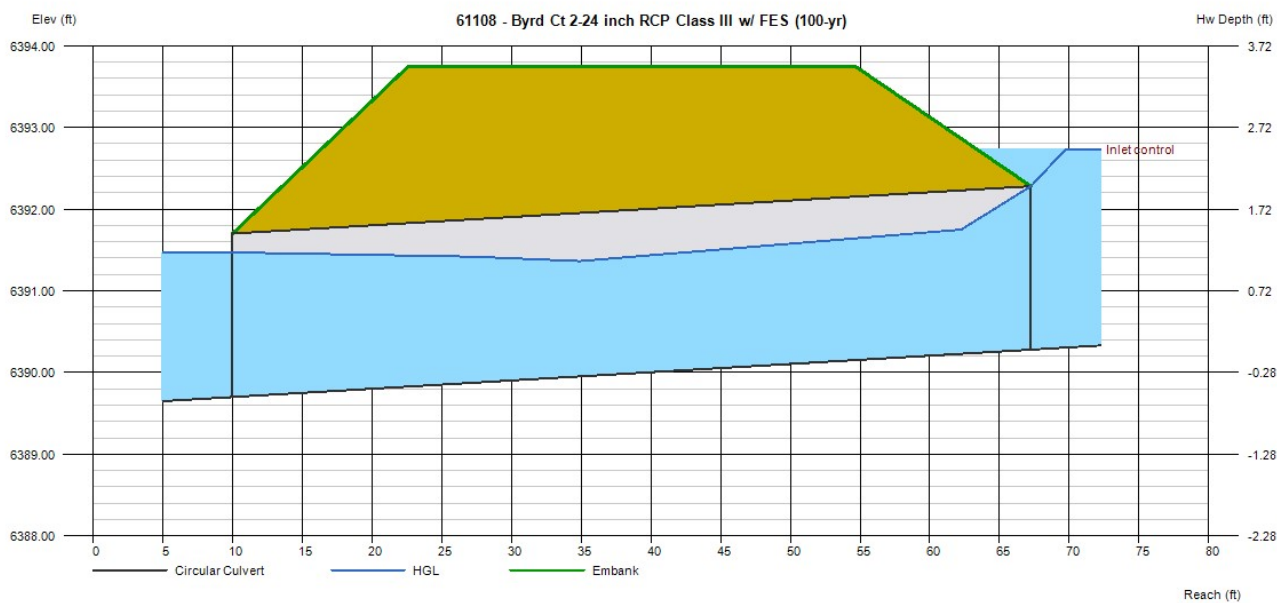
61108 - Byrd Ct 2-24 inch RCP Class III w/ FES (100-yr)

| | |
|---------------------|--------------------------------|
| Invert Elev Dn (ft) | = 6389.70 |
| Pipe Length (ft) | = 57.25 |
| Slope (%) | = 1.01 |
| Invert Elev Up (ft) | = 6390.28 |
| Rise (in) | = 24.0 |
| Shape | = Circular |
| Span (in) | = 24.0 |
| No. Barrels | = 2 |
| n-Value | = 0.013 |
| Culvert Type | = Circular Concrete |
| Culvert Entrance | = Groove end projecting (C) |
| Coeff. K,M,c,Y,k | = 0.0045, 2, 0.0317, 0.69, 0.2 |

| | |
|--------------------|-----------|
| Embankment | |
| Top Elevation (ft) | = 6393.75 |
| Top Width (ft) | = 32.00 |
| Crest Width (ft) | = 50.00 |

| | |
|---------------------|-----------------|
| Calculations | |
| Qmin (cfs) | = 36.60 |
| Qmax (cfs) | = 36.60 |
| Tailwater Elev (ft) | = (dc+D)/2 |
| Highlighted | |
| Qtotal (cfs) | = 36.60 |
| Qpipe (cfs) | = 36.60 |
| Qovertop (cfs) | = 0.00 |
| Veloc Dn (ft/s) | = 6.22 |
| Veloc Up (ft/s) | = 7.05 |
| HGL Dn (ft) | = 6391.47 |
| HGL Up (ft) | = 6391.82 |
| Hw Elev (ft) | = 6392.74 |
| Hw/D (ft) | = 1.23 |
| Flow Regime | = Inlet Control |

Provide calculations for riprap outlet protection. (Type, length, width, etc)



Channel Report

61108-Byrd Ct Trap Channel - 5yr

Trapezoidal

Bottom Width (ft) = 10.00
 Side Slopes (z:1) = 3.00, 3.00
 Total Depth (ft) = 2.00
 Invert Elev (ft) = 10.00
 Slope (%) = 0.70
 N-Value = 0.035

Highlighted

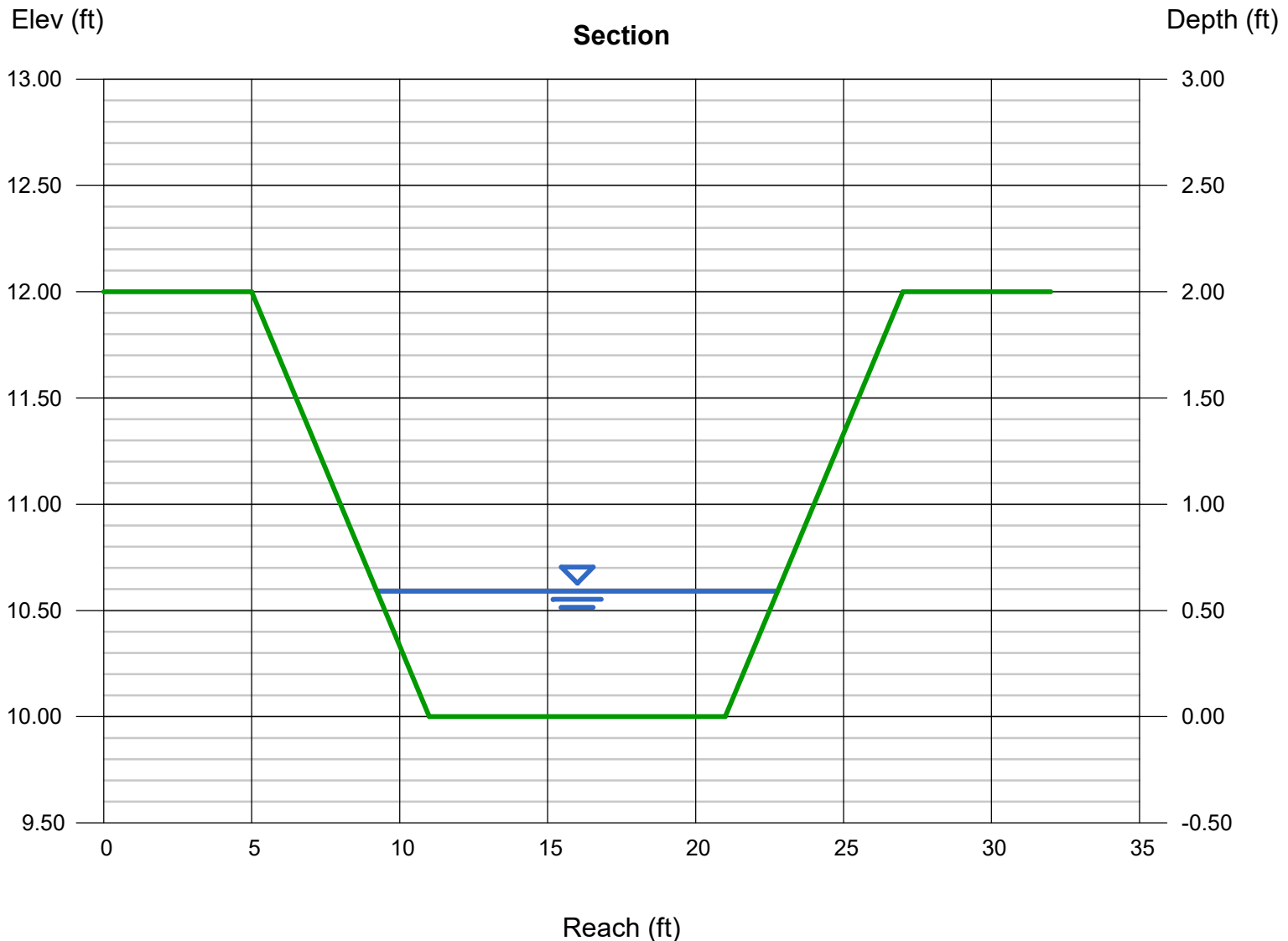
Depth (ft) = 0.59
 Q (cfs) = 15.30
 Area (sqft) = 6.94
 Velocity (ft/s) = 2.20
 Wetted Perim (ft) = 13.73
 Crit Depth, Yc (ft) = 0.41
 Top Width (ft) = 13.54
 EGL (ft) = 0.67

Calculations

Compute by: Known Q
 Known Q (cfs) = 15.30

Min side slopes for road side ditch is 4:1 per DCM Section 6.5.3 & 10.5.1

Indicate if this is for drainage channel or roadside ditch. Please provide additional calculation for whichever one this is not.



Channel Report

61108-Byrd Ct Trap Channel - 100 yr

Trapezoidal

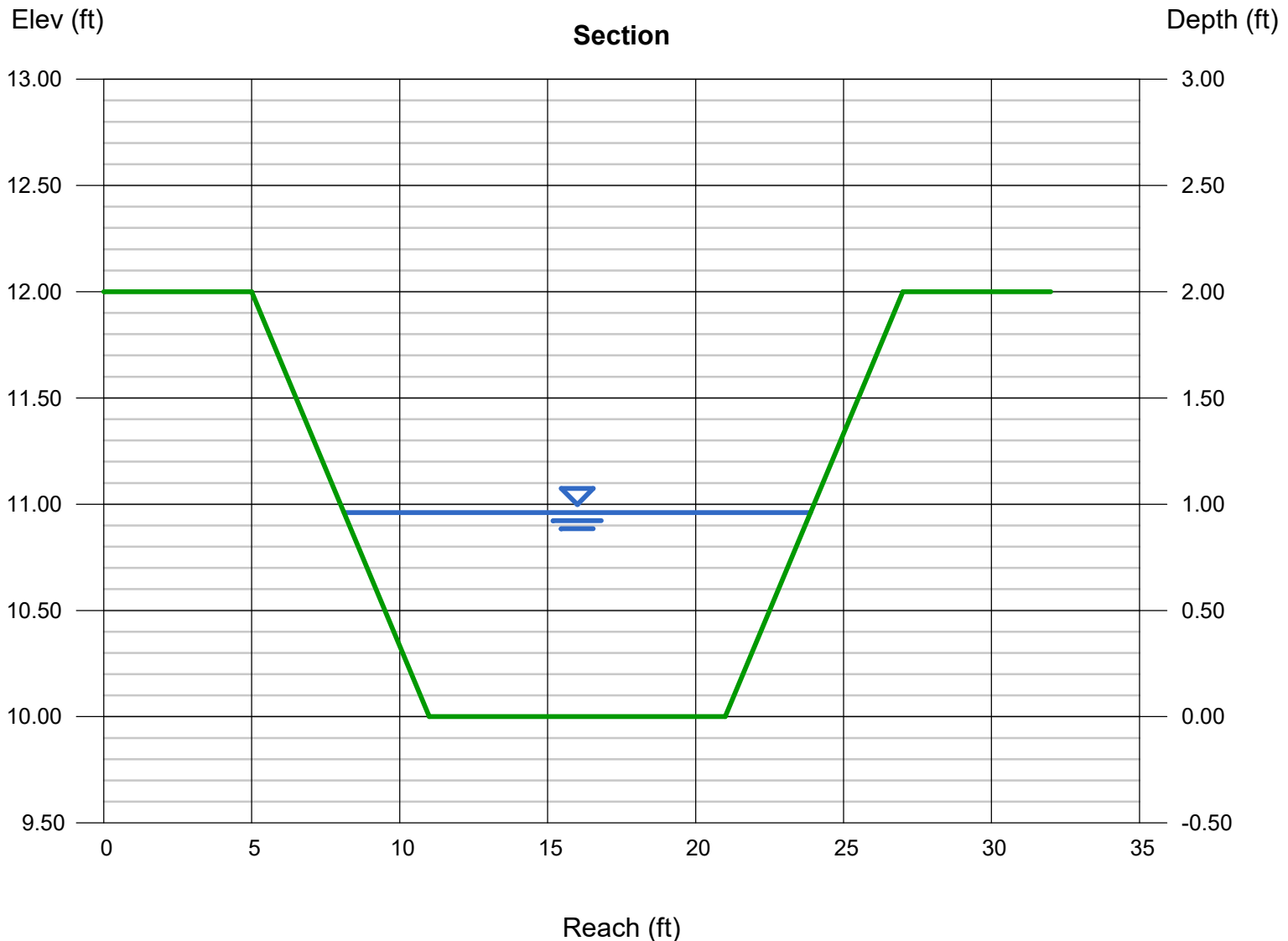
Bottom Width (ft) = 10.00
Side Slopes (z:1) = 3.00, 3.00
Total Depth (ft) = 2.00
Invert Elev (ft) = 10.00
Slope (%) = 0.70
N-Value = 0.035

Highlighted

Depth (ft) = 0.96
Q (cfs) = 36.60
Area (sqft) = 12.36
Velocity (ft/s) = 2.96
Wetted Perim (ft) = 16.07
Crit Depth, Yc (ft) = 0.70
Top Width (ft) = 15.76
EGL (ft) = 1.10

Calculations

Compute by: Known Q
Known Q (cfs) = 36.60



Culvert Report

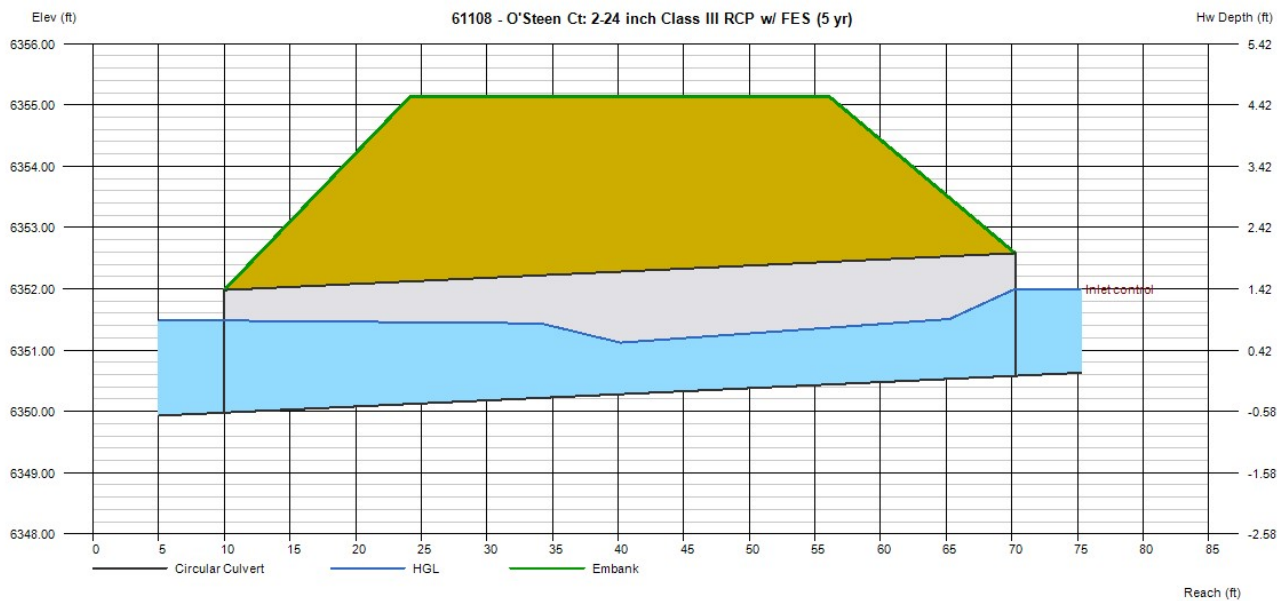
61108 - O'Steen Ct: 2-24 inch Class III RCP w/ FES (5 yr)

| | |
|---------------------|--------------------------------|
| Invert Elev Dn (ft) | = 6349.98 |
| Pipe Length (ft) | = 60.25 |
| Slope (%) | = 1.00 |
| Invert Elev Up (ft) | = 6350.58 |
| Rise (in) | = 24.0 |
| Shape | = Circular |
| Span (in) | = 24.0 |
| No. Barrels | = 2 |
| n-Value | = 0.013 |
| Culvert Type | = Circular Concrete |
| Culvert Entrance | = Groove end projecting (C) |
| Coeff. K,M,c,Y,k | = 0.0045, 2, 0.0317, 0.69, 0.2 |

| | |
|--------------------|-----------|
| Embankment | |
| Top Elevation (ft) | = 6355.13 |
| Top Width (ft) | = 32.00 |
| Crest Width (ft) | = 50.00 |

| | |
|---------------------|------------|
| Calculations | |
| Qmin (cfs) | = 15.90 |
| Qmax (cfs) | = 15.90 |
| Tailwater Elev (ft) | = (dc+D)/2 |

| | |
|--------------------|-----------------|
| Highlighted | |
| Qtotal (cfs) | = 15.90 |
| Qpipe (cfs) | = 15.90 |
| Qovertop (cfs) | = 0.00 |
| Veloc Dn (ft/s) | = 3.14 |
| Veloc Up (ft/s) | = 5.04 |
| HGL Dn (ft) | = 6351.48 |
| HGL Up (ft) | = 6351.58 |
| Hw Elev (ft) | = 6352.00 |
| Hw/D (ft) | = 0.71 |
| Flow Regime | = Inlet Control |



Culvert Report

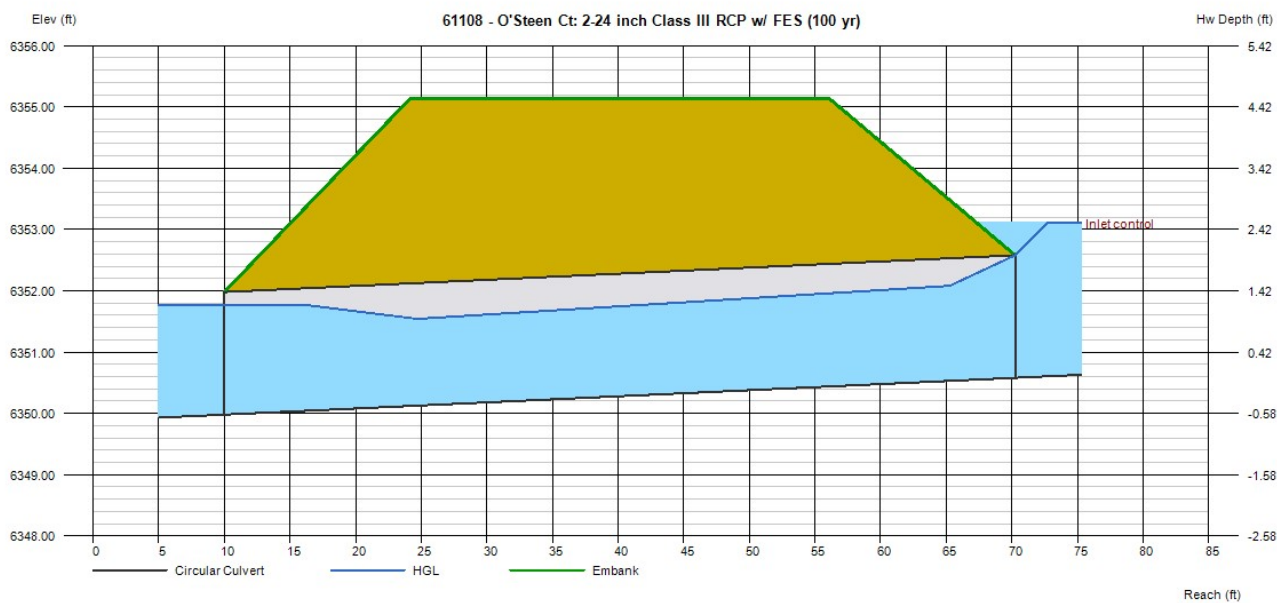
61108 - O'Steen Ct: 2-24 inch Class III RCP w/ FES (100 yr)

| | |
|---------------------|--------------------------------|
| Invert Elev Dn (ft) | = 6349.98 |
| Pipe Length (ft) | = 60.25 |
| Slope (%) | = 1.00 |
| Invert Elev Up (ft) | = 6350.58 |
| Rise (in) | = 24.0 |
| Shape | = Circular |
| Span (in) | = 24.0 |
| No. Barrels | = 2 |
| n-Value | = 0.013 |
| Culvert Type | = Circular Concrete |
| Culvert Entrance | = Groove end projecting (C) |
| Coeff. K,M,c,Y,k | = 0.0045, 2, 0.0317, 0.69, 0.2 |

| | |
|--------------------|-----------|
| Embankment | |
| Top Elevation (ft) | = 6355.13 |
| Top Width (ft) | = 32.00 |
| Crest Width (ft) | = 50.00 |

| | |
|---------------------|-----------------|
| Calculations | |
| Qmin (cfs) | = 38.00 |
| Qmax (cfs) | = 38.00 |
| Tailwater Elev (ft) | = (dc+D)/2 |
| Highlighted | |
| Qtotal (cfs) | = 38.00 |
| Qpipe (cfs) | = 38.00 |
| Qovertop (cfs) | = 0.00 |
| Veloc Dn (ft/s) | = 6.42 |
| Veloc Up (ft/s) | = 7.20 |
| HGL Dn (ft) | = 6351.76 |
| HGL Up (ft) | = 6352.15 |
| Hw Elev (ft) | = 6353.11 |
| Hw/D (ft) | = 1.26 |
| Flow Regime | = Inlet Control |

Provide calculations for riprap outlet protection. (Type, length, width, etc)



Channel Report

61108-O'Steen Ct 10 Bottom Width Transition to 8' Bottom Width Trap Channel-5yr

Trapezoidal

Bottom Width (ft) = 10.00
Side Slopes (z:1) = 2.00, 2.00
Total Depth (ft) = 2.00
Invert Elev (ft) = 10.00
Slope (%) = 3.00
N-Value = 0.050

Highlighted

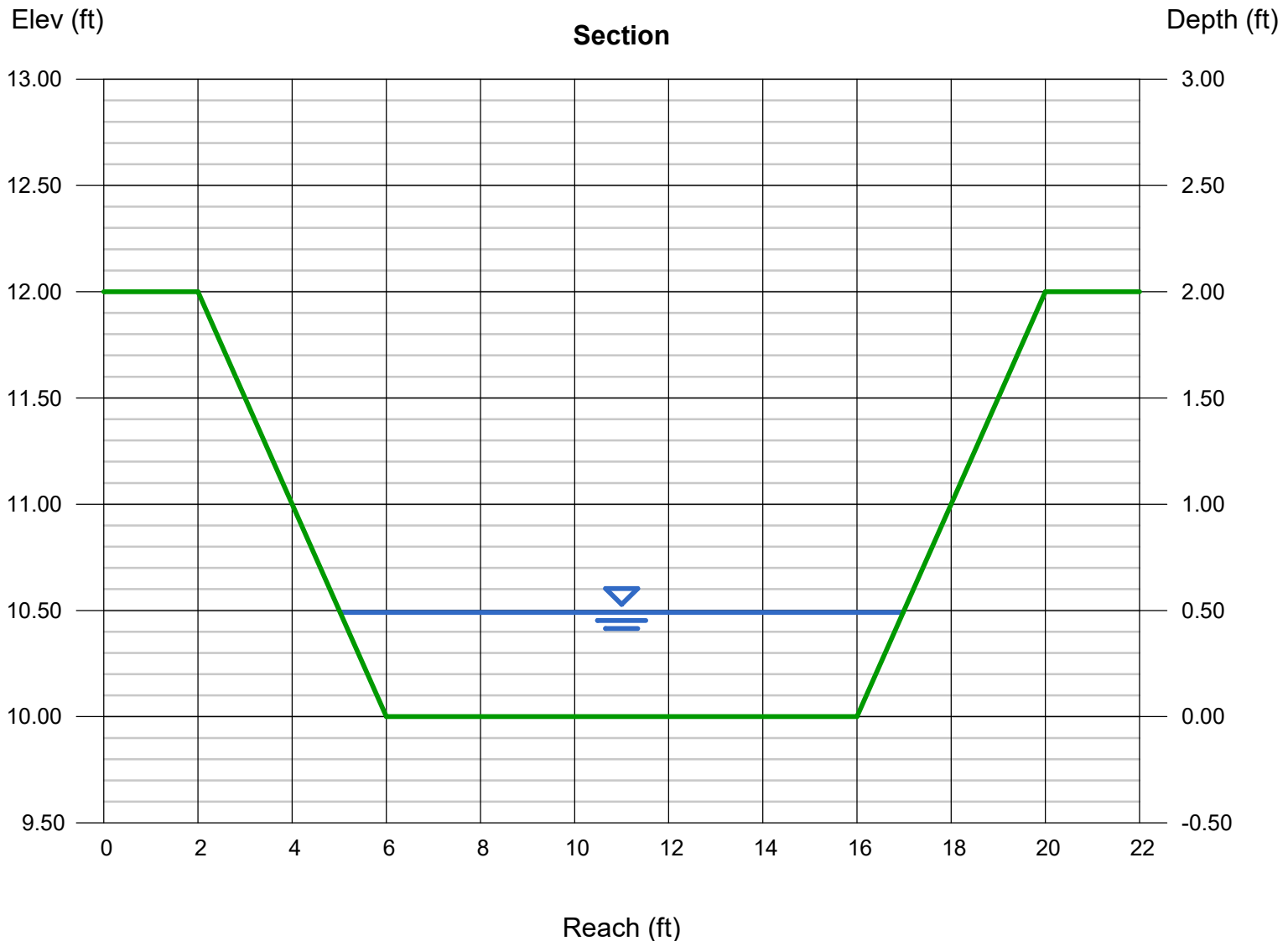
Depth (ft) = 0.49
Q (cfs) = 15.90
Area (sqft) = 5.38
Velocity (ft/s) = 2.96
Wetted Perim (ft) = 12.19
Crit Depth, Yc (ft) = 0.42
Top Width (ft) = 11.96
EGL (ft) = 0.63

Calculations

Compute by: Known Q
Known Q (cfs) = 15.90

Min side slopes for road side ditch is 4:1 per DCM Section 6.5.3 & 10.5.1

Indicate if this is for drainage channel or roadside ditch. Please provide additional calculation for whichever one this is not.



Channel Report

61108-O'Steen Ct 10 Bottom Width Transition to 8' Bottom Width Trap Channel-100yr

Trapezoidal

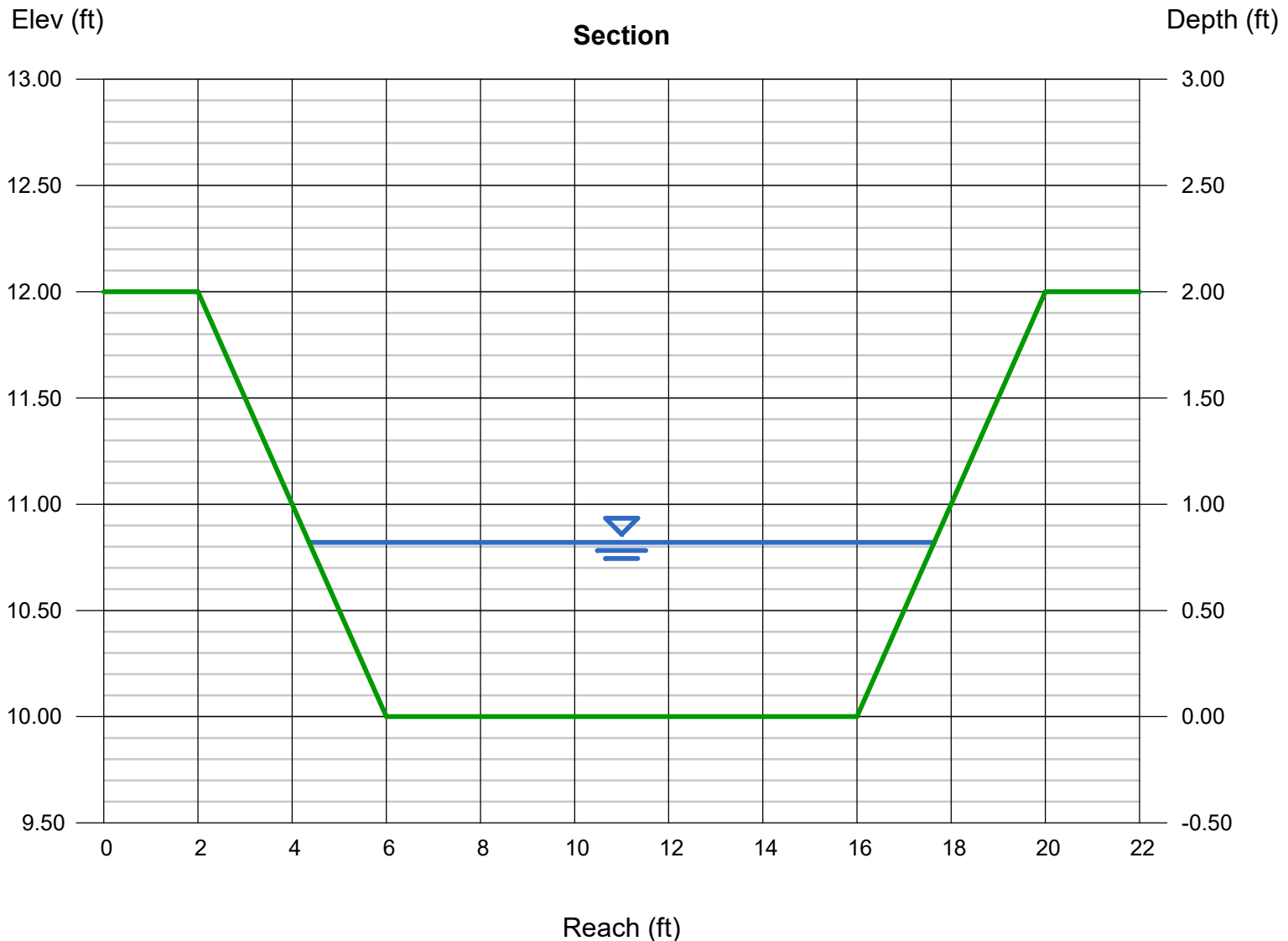
Bottom Width (ft) = 10.00
Side Slopes (z:1) = 2.00, 2.00
Total Depth (ft) = 2.00
Invert Elev (ft) = 10.00
Slope (%) = 3.00
N-Value = 0.050

Highlighted

Depth (ft) = 0.82
Q (cfs) = 38.00
Area (sqft) = 9.54
Velocity (ft/s) = 3.98
Wetted Perim (ft) = 13.67
Crit Depth, Yc (ft) = 0.73
Top Width (ft) = 13.28
EGL (ft) = 1.07

Calculations

Compute by: Known Q
Known Q (cfs) = 38.00



Channel Report

61108-O'Steen Ct Trap Channel- 5 yr

Trapezoidal

Bottom Width (ft) = 8.00
Side Slopes (z:1) = 3.00, 3.00
Total Depth (ft) = 2.00
Invert Elev (ft) = 10.00
Slope (%) = 1.00
N-Value = 0.035

Highlighted

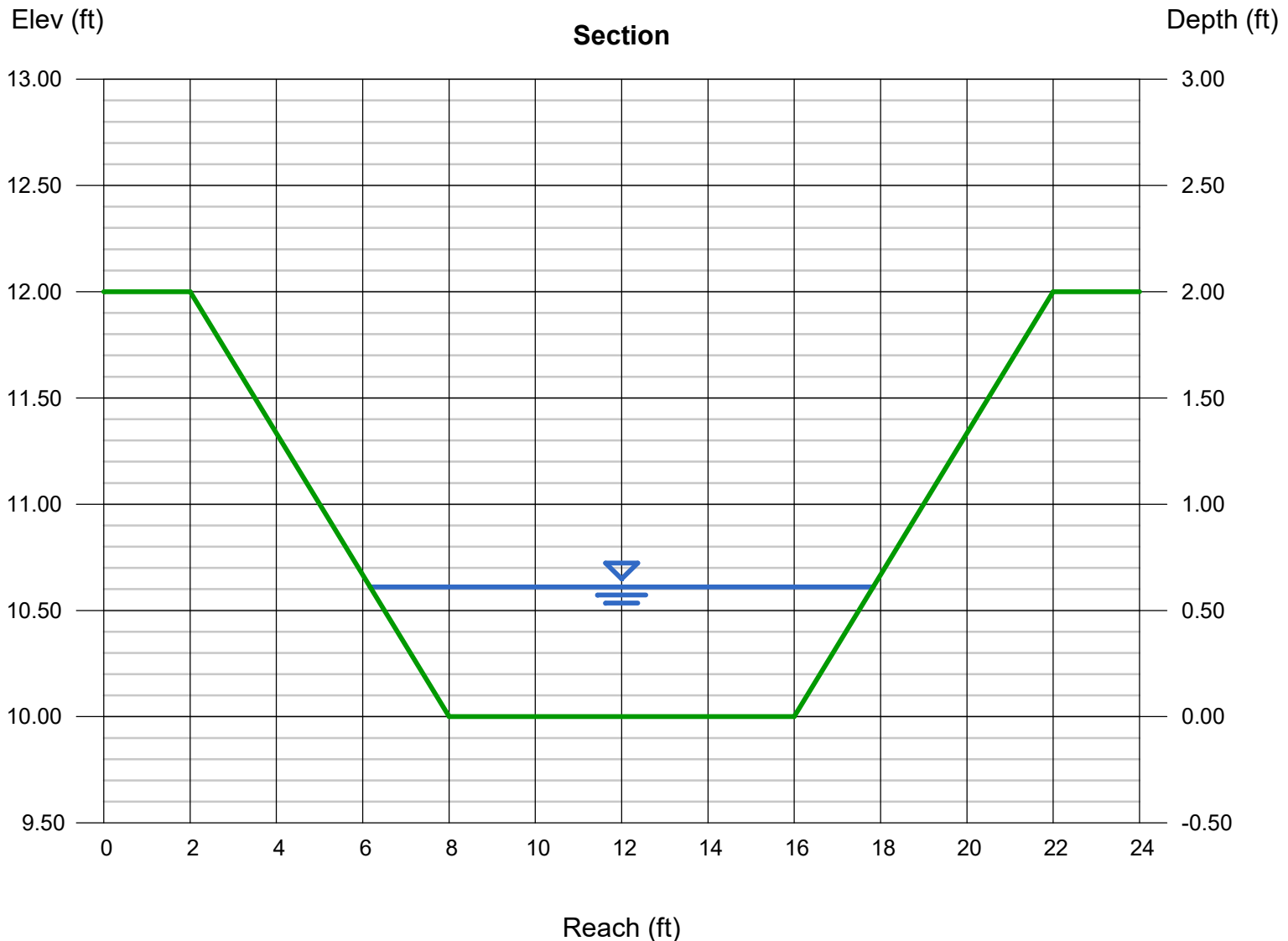
Depth (ft) = 0.61
Q (cfs) = 15.90
Area (sqft) = 6.00
Velocity (ft/s) = 2.65
Wetted Perim (ft) = 11.86
Crit Depth, Yc (ft) = 0.47
Top Width (ft) = 11.66
EGL (ft) = 0.72

Calculations

Compute by: Known Q
Known Q (cfs) = 15.90

Min side slopes for road side ditch is 4:1 per DCM Section 6.5.3 & 10.5.1

Indicate if this is for drainage channel or roadside ditch. Please provide additional calculation for whichever one this is not.



Channel Report

61108-O'Steen Ct Trap Channel-100yr

Trapezoidal

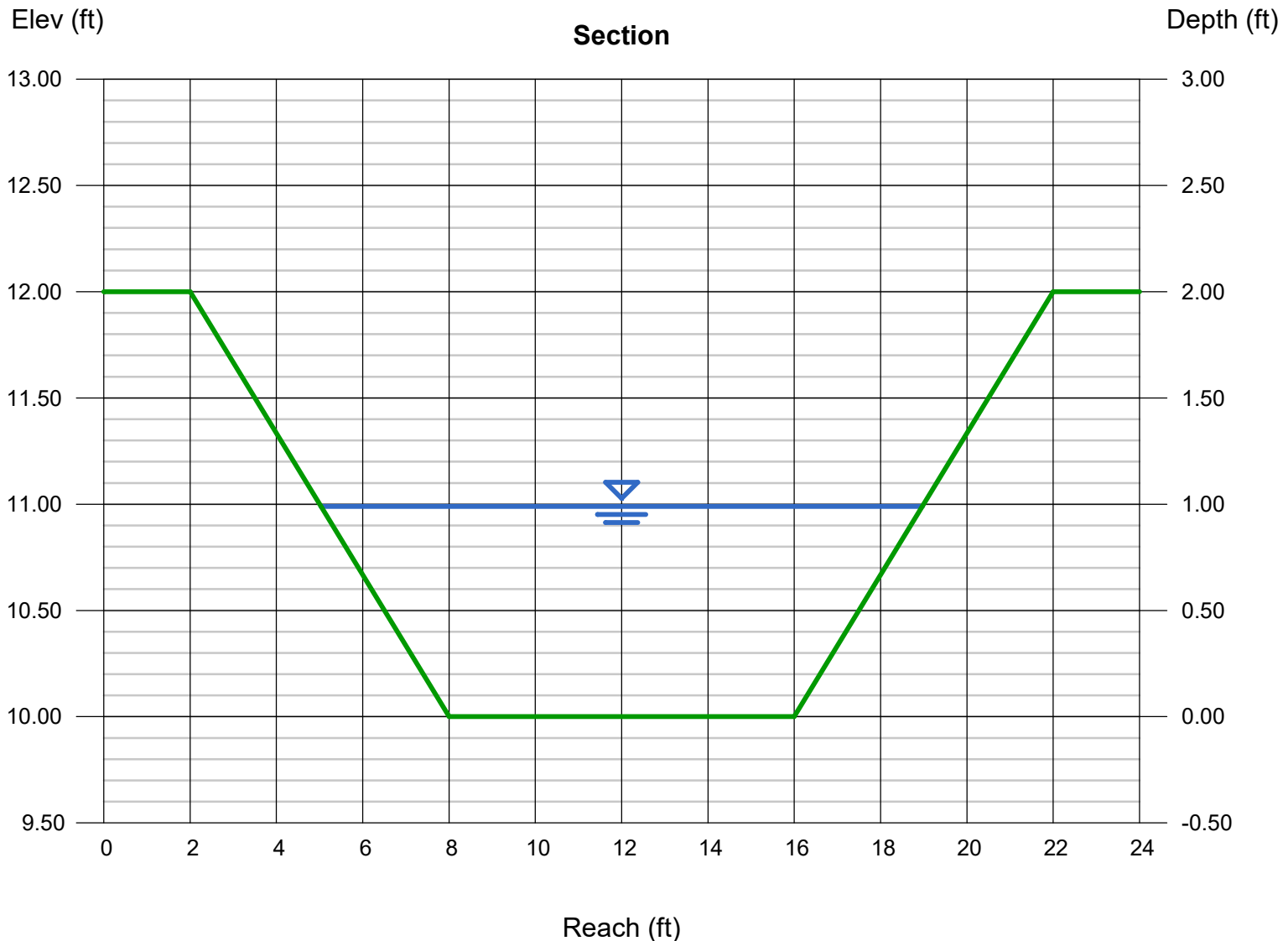
Bottom Width (ft) = 8.00
Side Slopes (z:1) = 3.00, 3.00
Total Depth (ft) = 2.00
Invert Elev (ft) = 10.00
Slope (%) = 1.00
N-Value = 0.035

Highlighted

Depth (ft) = 0.99
Q (cfs) = 38.00
Area (sqft) = 10.86
Velocity (ft/s) = 3.50
Wetted Perim (ft) = 14.26
Crit Depth, Yc (ft) = 0.80
Top Width (ft) = 13.94
EGL (ft) = 1.18

Calculations

Compute by: Known Q
Known Q (cfs) = 38.00



HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0.00 cfs

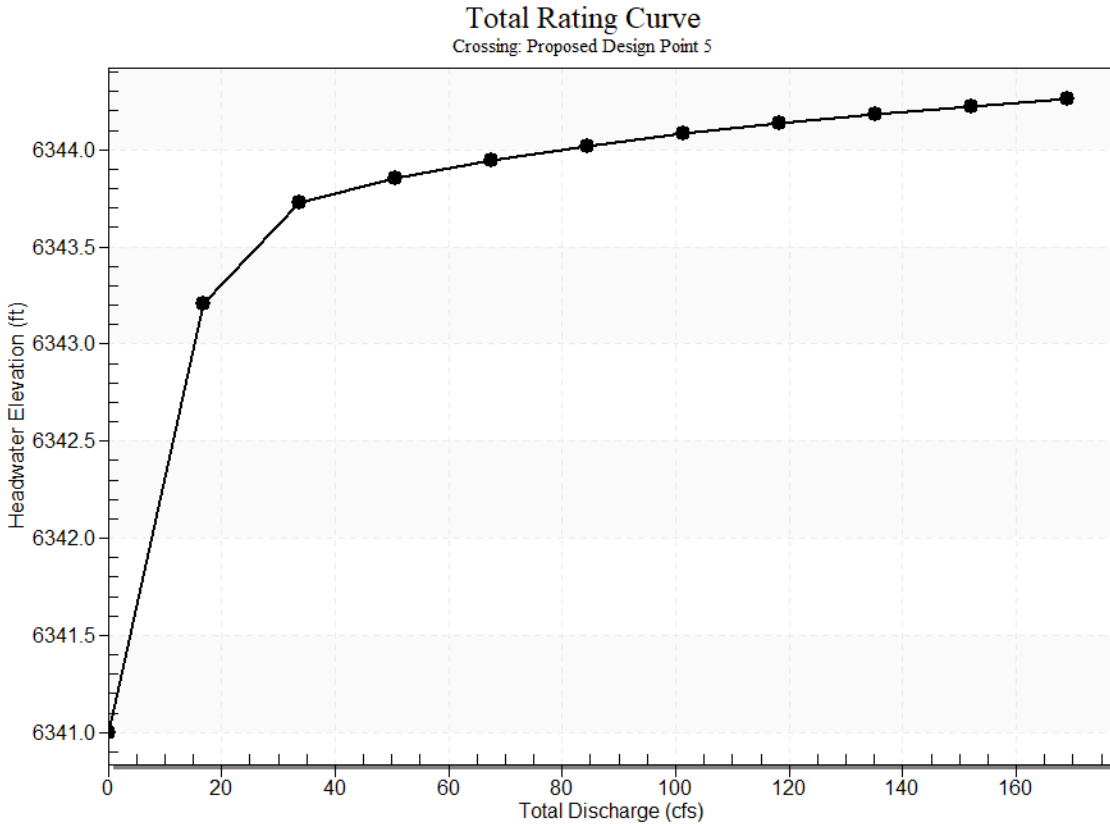
Design Flow: 67.50 cfs

Maximum Flow: 169.00 cfs

Table 1 - Summary of Culvert Flows at Crossing: Proposed Design Point 5

| Headwater Elevation (ft) | Total Discharge (cfs) | Culvert 1 Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|--------------------------|-----------------------|---------------------------|-------------------------|-------------|
| 6341.00 | 0.00 | 0.00 | 0.00 | 1 |
| 6343.21 | 16.90 | 16.90 | 0.00 | 1 |
| 6343.73 | 33.80 | 22.37 | 11.24 | 12 |
| 6343.85 | 50.70 | 23.59 | 26.80 | 7 |
| 6343.94 | 67.50 | 24.46 | 42.79 | 6 |
| 6344.02 | 84.50 | 25.16 | 59.05 | 5 |
| 6344.08 | 101.40 | 25.73 | 75.52 | 5 |
| 6344.14 | 118.30 | 26.21 | 91.68 | 4 |
| 6344.19 | 135.20 | 26.65 | 108.20 | 4 |
| 6344.23 | 152.10 | 27.00 | 124.66 | 3 |
| 6344.26 | 169.00 | 27.30 | 141.56 | 3 |
| 6343.66 | 19.32 | 19.32 | 0.00 | Overtopping |

Rating Curve Plot for Crossing: Proposed Design Point 5



1. Culvert Data: Culvert 1

Table 2 - Culvert Summary Table: Culvert 1

| Total Discharge (cfs) | Culvert Discharge (cfs) | Headwater Elevation (ft) | Inlet Control Depth (ft) | Outlet Control Depth (ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | Tailwater Depth (ft) | Outlet Velocity (ft/s) | Tailwater Velocity (ft/s) |
|-----------------------|-------------------------|--------------------------|--------------------------|---------------------------|-----------|-------------------|---------------------|-------------------|----------------------|------------------------|---------------------------|
| 0.00 | 0.00 | 6341.00 | 0.00 | 0.00 | 0-NF | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 16.90 | 16.90 | 6343.21 | 2.21 | 0.667 | 6-FFc | 0.98 | 1.39 | 1.39 | 1.26 | 6.03 | 3.52 |
| 33.80 | 22.37 | 6343.73 | 2.73 | 1.277 | 6-FFt | 1.15 | 1.61 | 1.64 | 1.64 | 6.56 | 4.19 |
| 50.70 | 23.59 | 6343.85 | 2.85 | 1.640 | 6-FFt | 1.19 | 1.65 | 1.91 | 1.91 | 5.86 | 4.64 |
| 67.50 | 24.46 | 6343.94 | 2.94 | 1.926 | 6-FFt | 1.21 | 1.68 | 2.13 | 2.13 | 5.50 | 4.98 |
| 84.50 | 25.16 | 6344.0 | 3.02 | 2.176 | 6-FFt | 1.23 | 1.71 | 2.31 | 2.31 | 5.31 | 5.27 |

| | | | | | | | | | | | |
|--------|-----------|---------|------|-------|-------|------|------|------|------|-------|------|
| 0 cfs | 6 cfs | .02 | | 1 | FFt | | | | | | |
| 101.40 | 25.73 cfs | 6344.08 | 3.08 | 2.383 | 6-FFt | 1.25 | 1.73 | 2.50 | 2.48 | 5.24 | 5.51 |
| 118.30 | 26.21 cfs | 6344.14 | 3.14 | 2.572 | 4-FFf | 1.26 | 1.75 | 1.26 | 2.62 | 10.56 | 5.73 |
| 135.20 | 26.65 cfs | 6344.19 | 3.19 | 2.745 | 4-FFf | 1.27 | 1.76 | 1.27 | 2.76 | 10.61 | 5.92 |
| 152.10 | 27.00 cfs | 6344.23 | 3.23 | 2.901 | 4-FFf | 1.28 | 1.77 | 1.28 | 2.88 | 10.64 | 6.10 |
| 169.00 | 27.30 cfs | 6344.26 | 3.26 | 3.044 | 4-FFf | 1.29 | 1.78 | 1.29 | 3.00 | 10.67 | 6.26 |

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

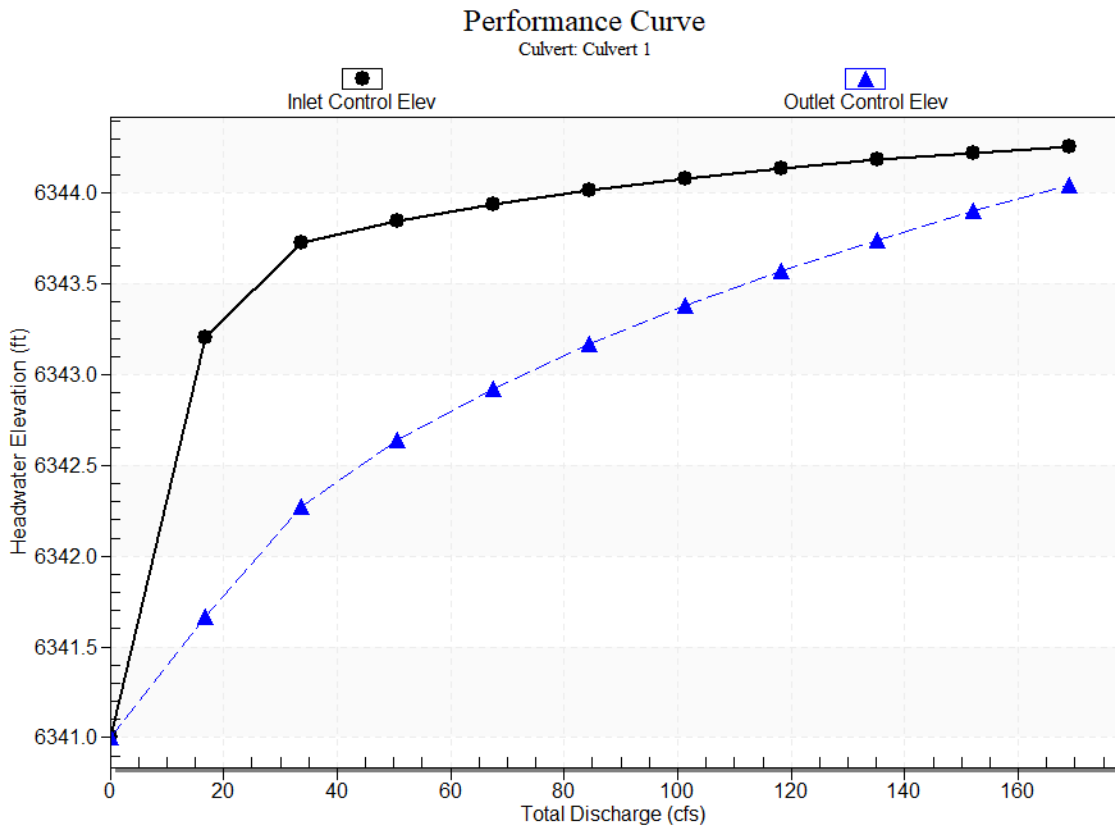
Inlet Elevation (invert): 6341.00 ft,

Outlet Elevation (invert): 6339.80 ft

Culvert Length: 44.46 ft,

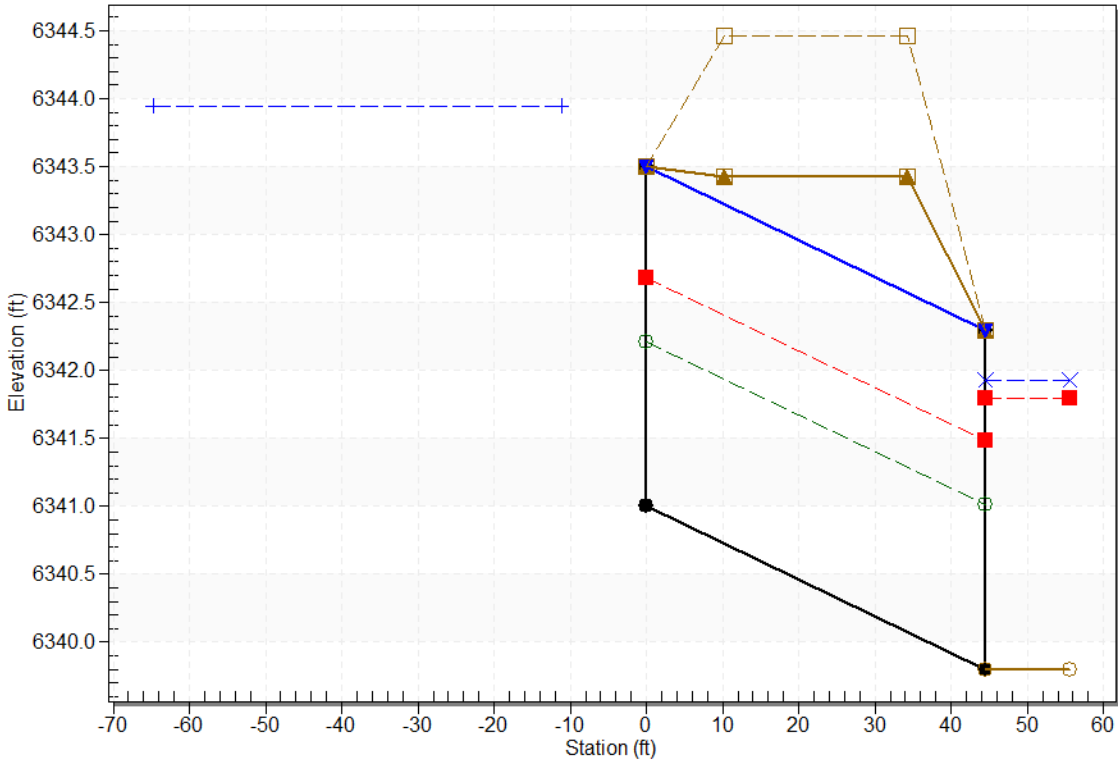
Culvert Slope: 0.0270

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1

Crossing - Proposed Design Point 5, Design Discharge - 67.5 cfs
Culvert - Culvert 1, Culvert Discharge - 24.5 cfs



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6341.00 ft

Outlet Station: 44.44 ft

Outlet Elevation: 6339.80 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.50 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0170

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting ($K_e=0.9$)

Inlet Depression: None

Tailwater Data for Crossing: Proposed Design Point 5

Table 3 - Downstream Channel Rating Curve (Crossing: Proposed Design Point 5)

| Flow (cfs) | Water Surface Elev (ft) | Velocity (ft/s) | Depth (ft) | Shear (psf) | Froude Number |
|------------|-------------------------|-----------------|------------|-------------|---------------|
| 0.00 | 6339.80 | 0.00 | 0.00 | 0.00 | 0.00 |
| 16.90 | 6341.06 | 1.26 | 3.52 | 0.79 | 0.78 |
| 33.80 | 6341.44 | 1.64 | 4.19 | 1.02 | 0.82 |
| 50.70 | 6341.71 | 1.91 | 4.64 | 1.19 | 0.84 |
| 67.50 | 6341.92 | 2.13 | 4.98 | 1.33 | 0.85 |
| 84.50 | 6342.11 | 2.31 | 5.27 | 1.44 | 0.86 |
| 101.40 | 6342.27 | 2.48 | 5.51 | 1.54 | 0.87 |
| 118.30 | 6342.42 | 2.62 | 5.73 | 1.64 | 0.88 |
| 135.20 | 6342.56 | 2.76 | 5.92 | 1.72 | 0.89 |
| 152.10 | 6342.68 | 2.88 | 6.10 | 1.80 | 0.90 |
| 169.00 | 6342.80 | 3.00 | 6.26 | 1.87 | 0.90 |

Tailwater Channel Data - Proposed Design Point 5

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 3.00 (.:1)

Channel Slope: 0.0100

Channel Manning's n: 0.0300

Channel Invert Elevation: 6339.80 ft

Does existing downstream channel have the depth to carry this flow? Per ECM Section 3.2.4, need to show that flows release into a "suitable outfall".

Roadway Data for Crossing: Proposed Design Point 5

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

Irregular Roadway Cross-Section

| Coord No. | Station (ft) | Elevation (ft) |
|-----------|--------------|----------------|
| 0 | 0.00 | 6343.43 |
| 1 | 48.23 | 6343.66 |
| 2 | 97.79 | 6344.01 |
| 3 | 143.59 | 6344.29 |
| 4 | 192.15 | 6344.46 |
| 5 | 239.77 | 6344.32 |
| 6 | 283.26 | 6344.20 |
| 7 | 327.91 | 6344.17 |
| 8 | 376.63 | 6344.19 |

Roadway Surface: Paved

Roadway Top Width: 24.00 ft

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 0.00 cfs

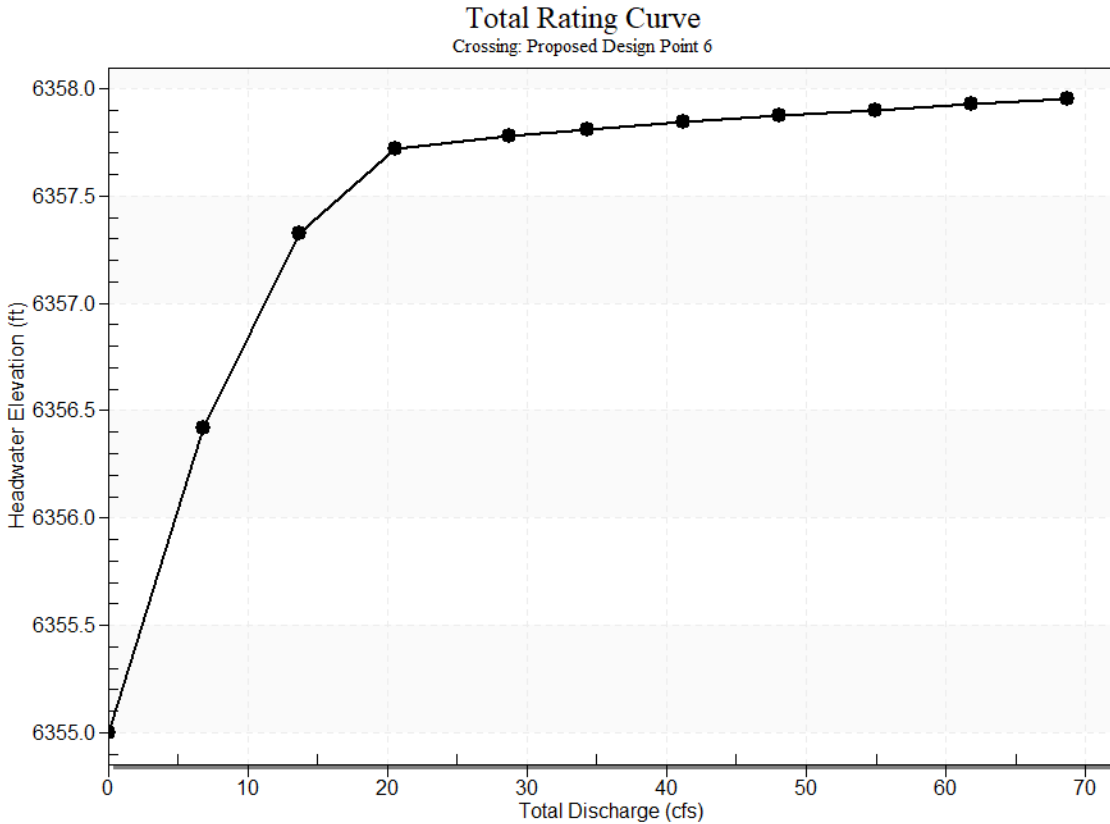
Design Flow: 28.70 cfs

Maximum Flow: 68.70 cfs

Table 1 - Summary of Culvert Flows at Crossing: Proposed Design Point 6

| Headwater Elevation (ft) | Total Discharge (cfs) | Culvert 1 Discharge (cfs) | Roadway Discharge (cfs) | Iterations |
|--------------------------|-----------------------|---------------------------|-------------------------|-------------|
| 6355.00 | 0.00 | 0.00 | 0.00 | 1 |
| 6356.42 | 6.87 | 6.87 | 0.00 | 1 |
| 6357.32 | 13.74 | 13.74 | 0.00 | 1 |
| 6357.72 | 20.61 | 16.25 | 4.22 | 16 |
| 6357.78 | 28.70 | 16.59 | 11.92 | 5 |
| 6357.81 | 34.35 | 16.72 | 17.44 | 4 |
| 6357.85 | 41.22 | 16.83 | 24.28 | 4 |
| 6357.87 | 48.09 | 16.92 | 30.89 | 3 |
| 6357.90 | 54.96 | 17.01 | 37.76 | 3 |
| 6357.93 | 61.83 | 16.98 | 44.74 | 3 |
| 6357.95 | 68.70 | 16.84 | 51.79 | 3 |
| 6357.62 | 15.64 | 15.64 | 0.00 | Overtopping |

Rating Curve Plot for Crossing: Proposed Design Point 6



1. Culvert Data: Culvert 1

Table 2 - Culvert Summary Table: Culvert 1

| Total Discharge (cfs) | Culvert Discharge (cfs) | Headwater Elevation (ft) | Inlet Control Depth (ft) | Outlet Control Depth (ft) | Flow Type | Normal Depth (ft) | Critical Depth (ft) | Outlet Depth (ft) | Tailwater Depth (ft) | Outlet Velocity (ft/s) | Tailwater Velocity (ft/s) |
|-----------------------|-------------------------|--------------------------|--------------------------|---------------------------|-----------|-------------------|---------------------|-------------------|----------------------|------------------------|---------------------------|
| 0.00 | 0.00 | 6355.00 | 0.00 | 0.00 | 0-NF | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6.87 | 6.87 | 6356.42 | 1.42 | 0.39 | 6-FFc | 1.01 | 0.93 | 0.93 | 0.67 | 4.80 | 5.14 |
| 13.74 | 13.74 | 6357.32 | 2.32 | 1.93 | 6-FFc | 1.68 | 1.33 | 1.33 | 0.87 | 6.17 | 6.12 |
| 20.61 | 16.25 | 6357.72 | 2.72 | 2.66 | 6-FFc | 2.00 | 1.45 | 1.45 | 1.01 | 6.65 | 6.77 |
| 28.70 | 16.59 | 6357.78 | 2.78 | 2.77 | 6-FFc | 2.00 | 1.47 | 1.47 | 1.14 | 6.71 | 7.35 |
| 34.30 | 16.70 | 6357.81 | 2.80 | 2.81 | 6-FFc | 2.00 | 1.47 | 1.47 | 1.22 | 6.74 | 7.69 |

| | | | | | | | | | | | | |
|-------|-------|------|------|------|-----|------|------|------|------|------|------|--|
| 5 cfs | 2 cfs | .81 | | 1 | FFc | | | | | | | |
| 41.2 | 16.8 | 6357 | 2.82 | 2.84 | 6- | 2.00 | 1.48 | 1.48 | 1.31 | 6.76 | 8.05 | |
| 2 cfs | 3 cfs | .85 | | 5 | FFc | | | | | | | |
| 48.0 | 16.9 | 6357 | 2.84 | 2.87 | 6- | 2.00 | 1.48 | 1.48 | 1.38 | 6.78 | 8.37 | |
| 9 cfs | 2 cfs | .87 | | 5 | FFc | | | | | | | |
| 54.9 | 17.0 | 6357 | 2.85 | 2.90 | 6- | 2.00 | 1.49 | 1.49 | 1.46 | 6.79 | 8.65 | |
| 6 cfs | 1 cfs | .90 | | 3 | FFc | | | | | | | |
| 61.8 | 16.9 | 6357 | 2.85 | 2.92 | 6- | 2.00 | 1.49 | 1.52 | 1.52 | 6.62 | 8.91 | |
| 3 cfs | 8 cfs | .93 | | 8 | FFt | | | | | | | |
| 68.7 | 16.8 | 6357 | 2.82 | 2.95 | 6- | 2.00 | 1.48 | 1.58 | 1.58 | 6.32 | 9.15 | |
| 0 cfs | 4 cfs | .95 | | 2 | FFt | | | | | | | |

Culvert Barrel Data

Culvert Barrel Type Straight Culvert

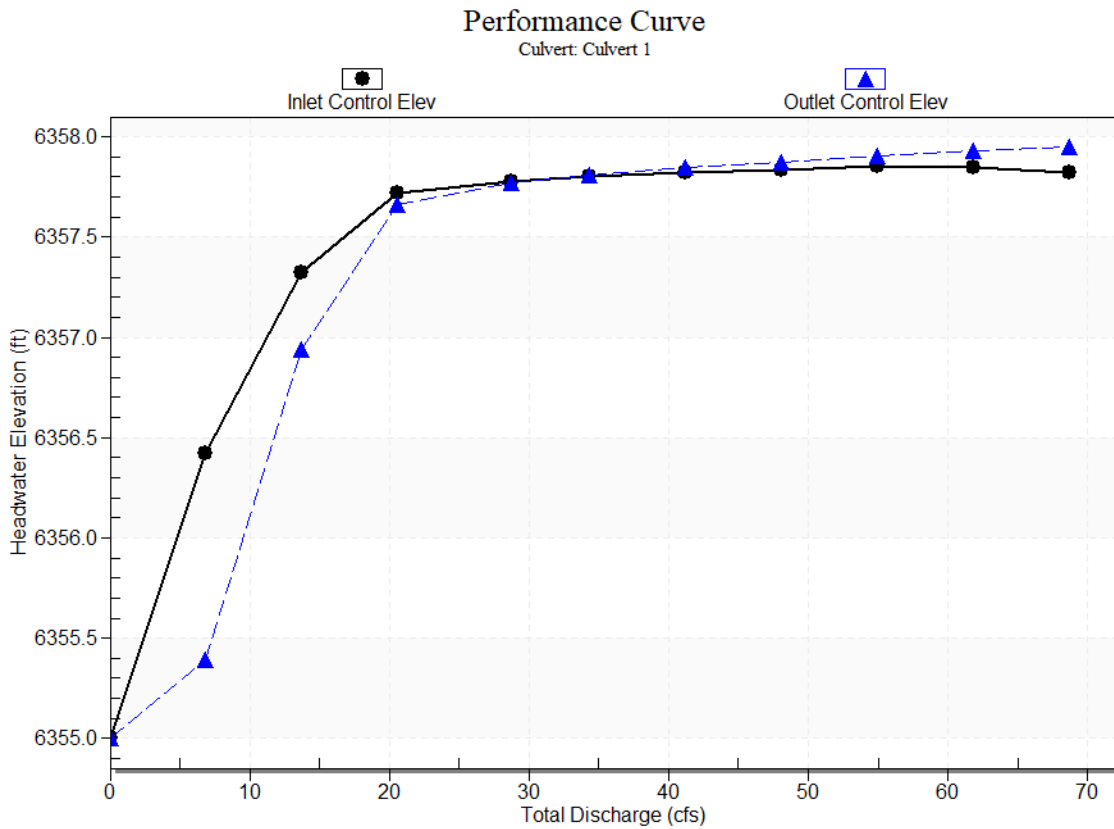
Inlet Elevation (invert): 6355.00 ft,

Outlet Elevation (invert): 6354.08 ft

Culvert Length: 49.12 ft,

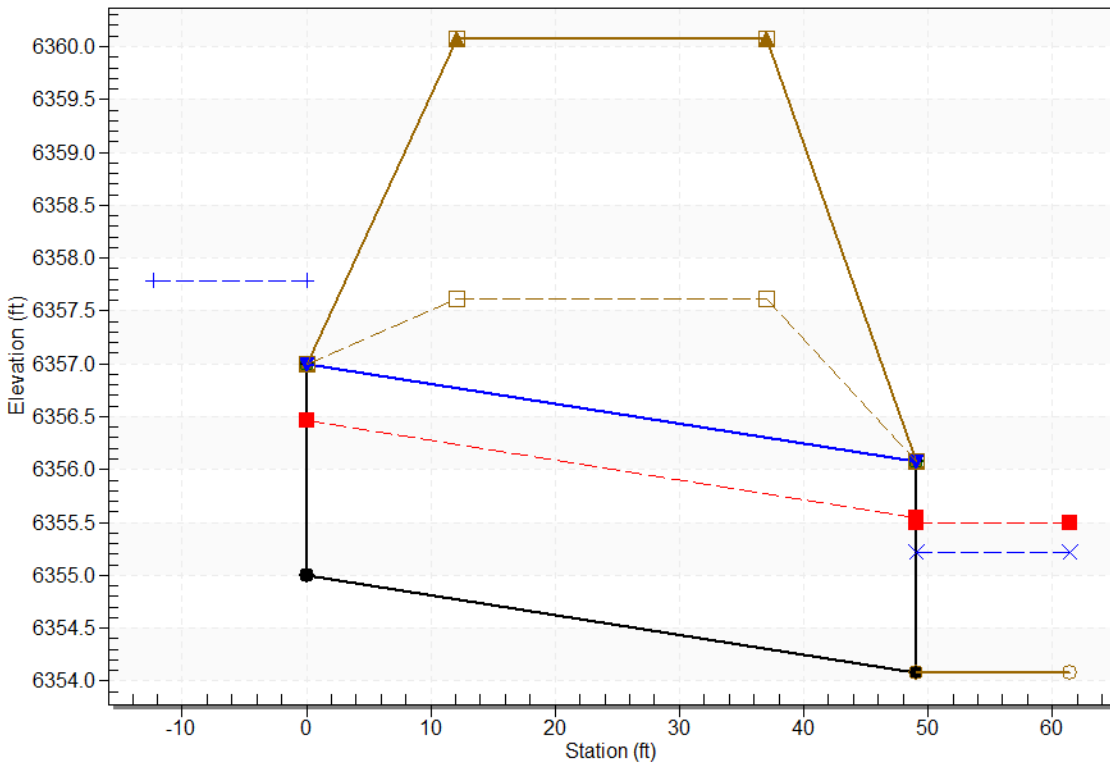
Culvert Slope: 0.0187

Culvert Performance Curve Plot: Culvert 1



Water Surface Profile Plot for Culvert: Culvert 1

Crossing - Proposed Design Point 6, Design Discharge - 28.7 cfs
Culvert - Culvert 1, Culvert Discharge - 16.6 cfs



Site Data - Culvert 1

Site Data Option: Culvert Invert Data

Inlet Station: 0.00 ft

Inlet Elevation: 6355.00 ft

Outlet Station: 49.11 ft

Outlet Elevation: 6354.08 ft

Number of Barrels: 1

Culvert Data Summary - Culvert 1

Barrel Shape: Circular

Barrel Diameter: 2.00 ft

Barrel Material: Corrugated Steel

Embedment: 0.00 in

Barrel Manning's n: 0.0300

Value is high for a CSP, please refer to Figure 6C in DCM.

Culvert Type: Straight

Inlet Configuration: Thin Edge Projecting

Inlet Depression: None

Tailwater Data for Crossing: Proposed Design Point 6

Table 3 - Downstream Channel Rating Curve (Crossing: Proposed Design Point 6)

| Flow (cfs) | Water Surface Elev (ft) | Velocity (ft/s) | Depth (ft) | Shear (psf) | Froude Number |
|------------|-------------------------|-----------------|------------|-------------|---------------|
| 0.00 | 6354.08 | 0.00 | 0.00 | 0.00 | 0.00 |
| 6.87 | 6354.75 | 0.67 | 5.14 | 2.08 | 1.57 |
| 13.74 | 6354.95 | 0.87 | 6.12 | 2.70 | 1.64 |
| 20.61 | 6355.09 | 1.01 | 6.77 | 3.14 | 1.68 |
| 28.70 | 6355.22 | 1.14 | 7.35 | 3.56 | 1.72 |
| 34.35 | 6355.30 | 1.22 | 7.69 | 3.81 | 1.74 |
| 41.22 | 6355.39 | 1.31 | 8.05 | 4.08 | 1.76 |
| 48.09 | 6355.46 | 1.38 | 8.37 | 4.32 | 1.77 |
| 54.96 | 6355.54 | 1.46 | 8.65 | 4.54 | 1.79 |
| 61.83 | 6355.60 | 1.52 | 8.91 | 4.75 | 1.80 |
| 68.70 | 6355.66 | 1.58 | 9.15 | 4.94 | 1.81 |

Tailwater Channel Data - Proposed Design Point 6

Tailwater Channel Option: Triangular Channel

Side Slope (H:V): 3.00 (1:1)

Channel Slope: 0.0500

Channel Manning's n: 0.0300

Channel Invert Elevation: 6354.08 ft

Does existing downstream channel have the depth to carry this flow? Per ECM Section 3.2.4, need to show that flows release into a "suitable outfall".

Roadway Data for Crossing: Proposed Design Point 6

Roadway Profile Shape: Irregular Roadway Shape (coordinates)

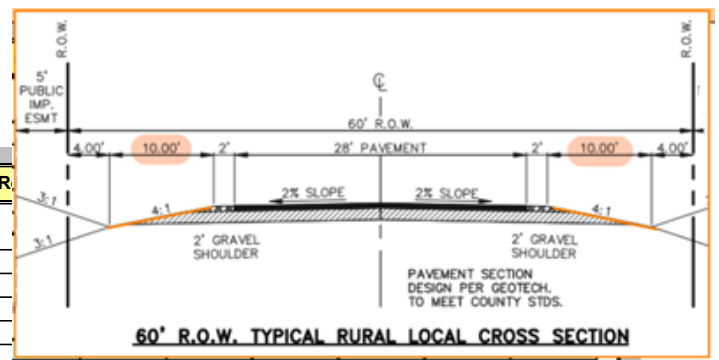
Irregular Roadway Cross-Section

| Coord No. | Station (ft) | Elevation (ft) |
|-----------|--------------|----------------|
| 0 | 0.00 | 6360.07 |
| 1 | 38.46 | 6359.43 |
| 2 | 82.27 | 6358.89 |
| 3 | 129.27 | 6358.56 |
| 4 | 177.03 | 6358.26 |
| 5 | 222.27 | 6357.98 |
| 6 | 272.14 | 6357.71 |
| 7 | 323.36 | 6357.66 |
| 8 | 371.08 | 6357.62 |

Roadway Surface: Paved

Roadway Top Width: 25.00 ft

With a V ditch, you can use the portion of the ditch where the SW sheet flows off the road into the ditch for RPA (i.e. half the ditch) and the slope would be the fall from the road to the bottom of the ditch. So in the example provided the slope would be 0.25 and the RPA would be the length of the ditch times 10 feet.



Design Procedure Form: Runoff R
UD-BMP (Version 3.07, March 2018)

Designer: JO
 Company: M.V.E., Inc.
 Date: December 23, 2022
 Project: THE LANDINGS OF DENMARK FILING NO 2
 Location: _____

SITE INFORMATION (User Input in Blue Cells)

WQCV Rainfall Depth 0.60 inches
 Depth of Average Runoff Producing Storm, d_6 = 0.43 inches (for Watersheds Outside of the Denver Region, Figure 3-1 in USDCM Vol. 3)

interface width should be the length of the roadway where water is sheet flowing off into the ditch

| Area Type | UIA:RPA | UIA:RPA | | | | | | | | | | | |
|------------------------------|---------|------------|--|--|--|--|--|--|--|--|--|--|--|
| Area ID | BYRD CT | O'STEEN CT | | | | | | | | | | | |
| Downstream Design Point ID | 1 | 3 | | | | | | | | | | | |
| Downstream BMP Type | None | None | | | | | | | | | | | |
| DCIA (ft ²) | -- | -- | | | | | | | | | | | |
| UIA (ft ²) | 27,114 | 40,933 | | | | | | | | | | | |
| RPA (ft ²) | 20,370 | 36,460 | | | | | | | | | | | |
| SPA (ft ²) | -- | -- | | | | | | | | | | | |
| HSG A (%) | 100% | 100% | | | | | | | | | | | |
| HSG B (%) | 0% | 0% | | | | | | | | | | | |
| HSG C/D (%) | 0% | 0% | | | | | | | | | | | |
| Average Slope of RPA (ft/ft) | 0.250 | 0.250 | | | | | | | | | | | |
| UIA:RPA Interface Width (ft) | 100.00 | 100.00 | | | | | | | | | | | |

CALCULATED RUNOFF RESULTS

| Area ID | BYRD CT | O'STEEN CT | | | | | | | | | | | |
|-------------------------------------|---------|------------|--|--|--|--|--|--|--|--|--|--|--|
| UIA:RPA Area (ft ²) | 47,484 | 77,393 | | | | | | | | | | | |
| L / W Ratio | 4.75 | 7.74 | | | | | | | | | | | |
| UIA / Area | 0.5710 | 0.5289 | | | | | | | | | | | |
| Runoff (in) | 0.00 | 0.00 | | | | | | | | | | | |
| Runoff (ft ³) | 0 | 0 | | | | | | | | | | | |
| Runoff Reduction (ft ³) | 1130 | 1706 | | | | | | | | | | | |

CALCULATED WQCV RESULTS

| Area ID | BYRD CT | O'STEEN CT | | | | | | | | | | | |
|-----------------------------------|---------|------------|--|--|--|--|--|--|--|--|--|--|--|
| WQCV (ft ³) | 1130 | 1706 | | | | | | | | | | | |
| WQCV Reduction (ft ³) | 1130 | 1706 | | | | | | | | | | | |
| WQCV Reduction (%) | 100% | 100% | | | | | | | | | | | |
| Untreated WQCV (ft ³) | 0 | 0 | | | | | | | | | | | |

CALCULATED DESIGN POINT RESULTS (sums results from all columns with the same Downstream Design Point ID)

| Downstream Design Point ID | 1 | 3 | | | | | | | | | | | |
|--|--------|--------|--|--|--|--|--|--|--|--|--|--|--|
| DCIA (ft ²) | 0 | 0 | | | | | | | | | | | |
| UIA (ft ²) | 27,114 | 40,933 | | | | | | | | | | | |
| RPA (ft ²) | 20,370 | 36,460 | | | | | | | | | | | |
| SPA (ft ²) | 0 | 0 | | | | | | | | | | | |
| Total Area (ft ²) | 47,484 | 77,393 | | | | | | | | | | | |
| Total Impervious Area (ft ²) | 27,114 | 40,933 | | | | | | | | | | | |
| WQCV (ft ³) | 1,130 | 1,706 | | | | | | | | | | | |
| WQCV Reduction (ft ³) | 1,130 | 1,706 | | | | | | | | | | | |
| WQCV Reduction (%) | 100% | 100% | | | | | | | | | | | |
| Untreated WQCV (ft ³) | 0 | 0 | | | | | | | | | | | |

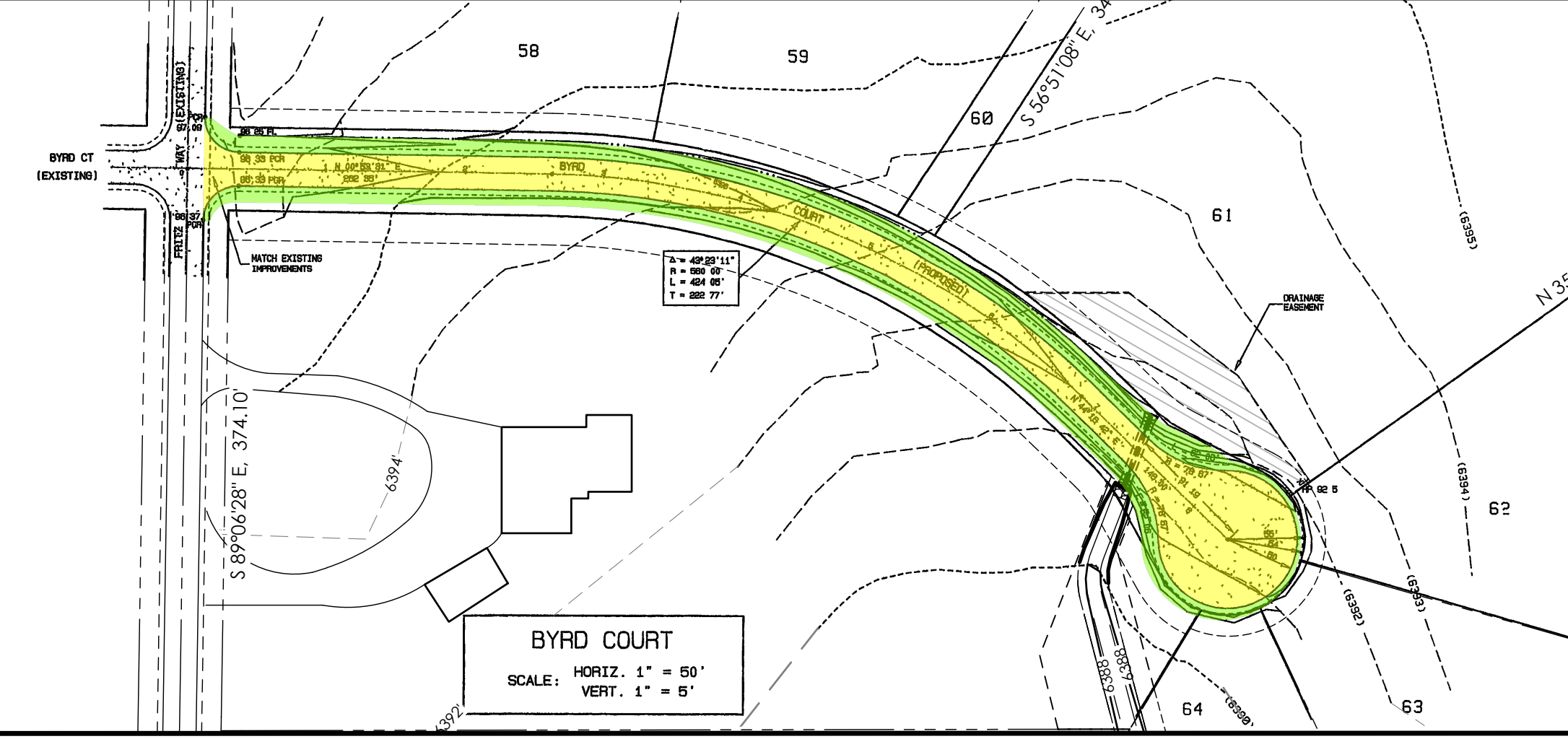
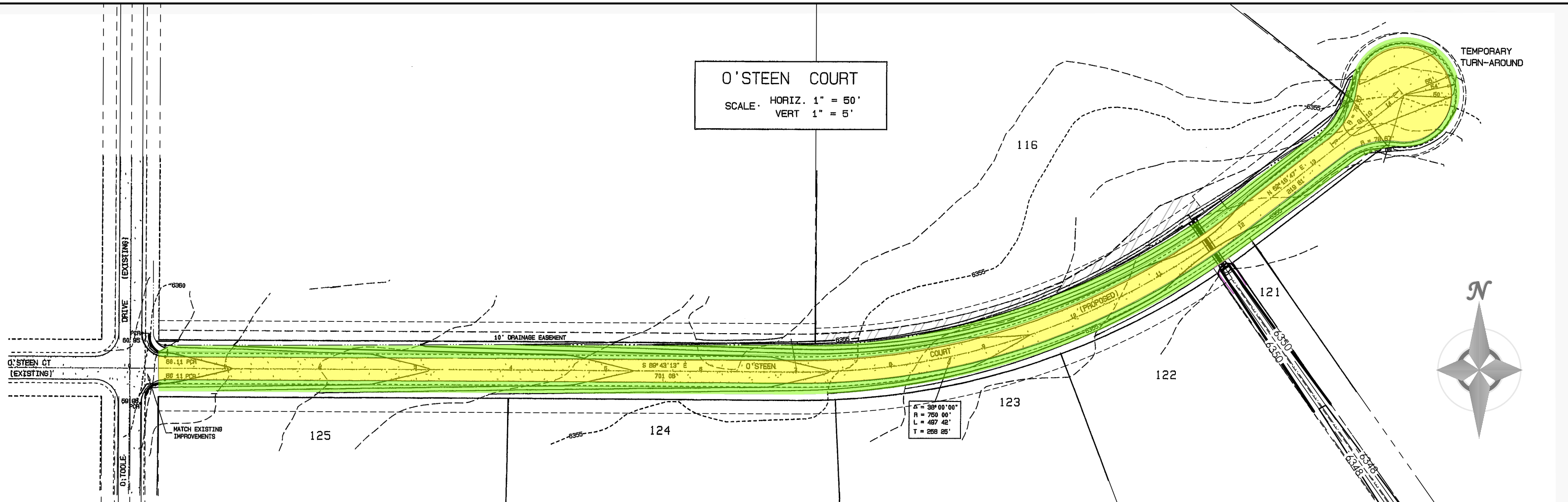
CALCULATED SITE RESULTS (sums results from all columns in worksheet)

| | |
|--|---------|
| Total Area (ft ²) | 124,877 |
| Total Impervious Area (ft ²) | 68,047 |
| WQCV (ft ³) | 2,835 |
| WQCV Reduction (ft ³) | 2,835 |
| WQCV Reduction (%) | 100% |
| Untreated WQCV (ft ³) | 0 |

Okay - Meets 60% WQCV Requirement for Runoff Reduction



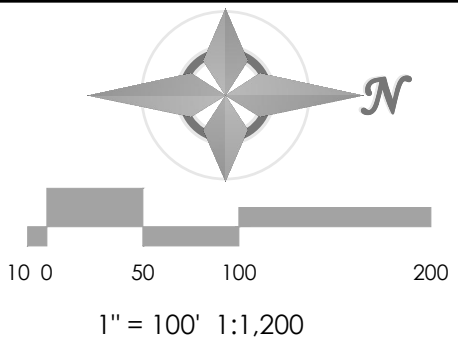
O'STEEN COURT
 SCALE: HORIZ. 1" = 50'
 VERT 1" = 5'



BYRD COURT
 SCALE: HORIZ. 1" = 50'
 VERT. 1" = 5'

SURFACE TYPES

| | |
|-----------------------------------|--|
| UNCONNECTED IMPERVIOUS AREA (UIA) | |
| RECEIVING PERVIOUS AREA (RPA) | |



| | |
|---------------|-----------------|
| TITLE: | BMP AREA |
| DRAWING NO. | BMP_MAP |
| MVE PROJ. NO. | 61108 |
| DRAWN: | JO |
| ENGINEER: | DRG |
| CHECKED: | 12/29/22 |

UPDATED BY
MONUMENT VALLEY ENGINEERS INC.

MVE

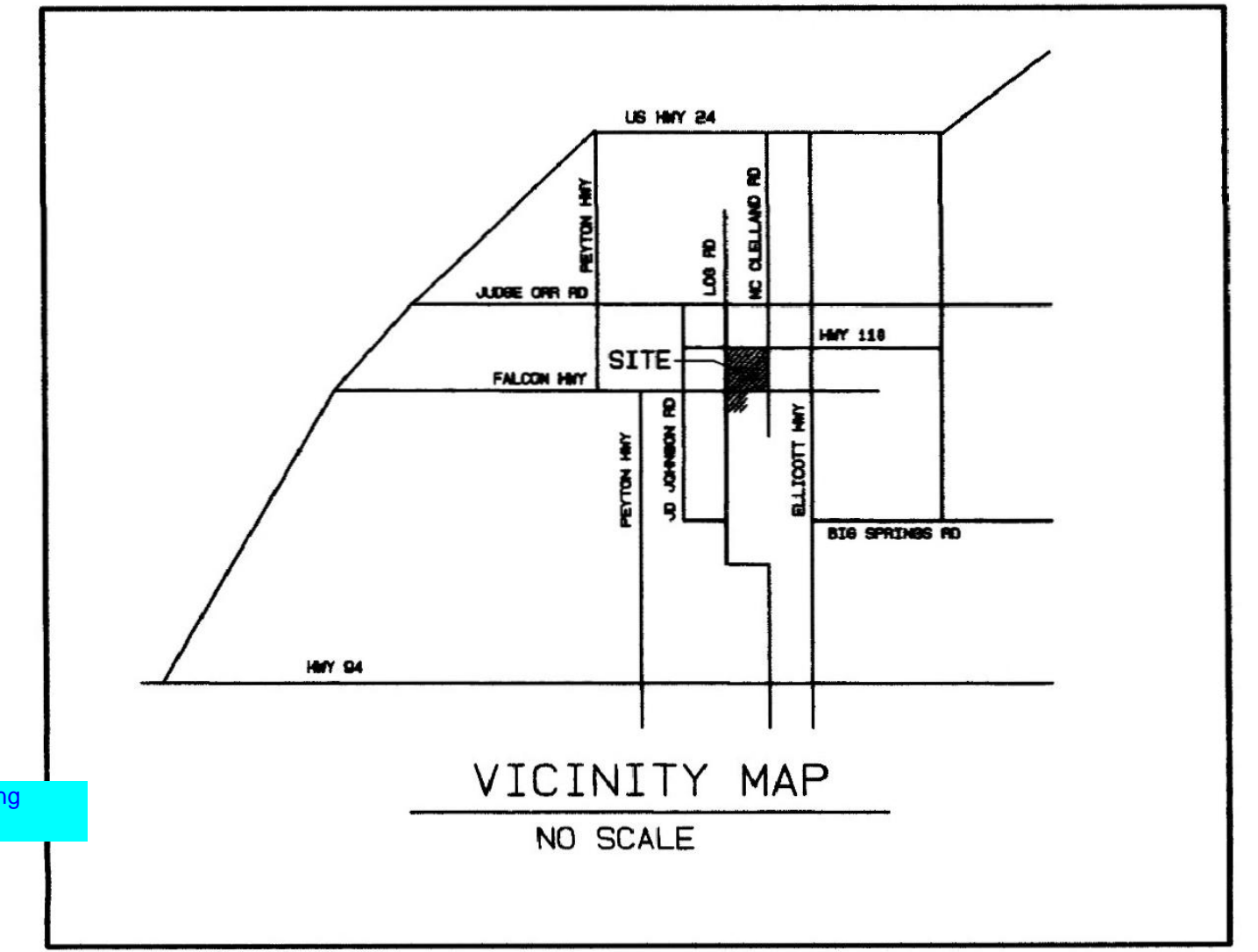
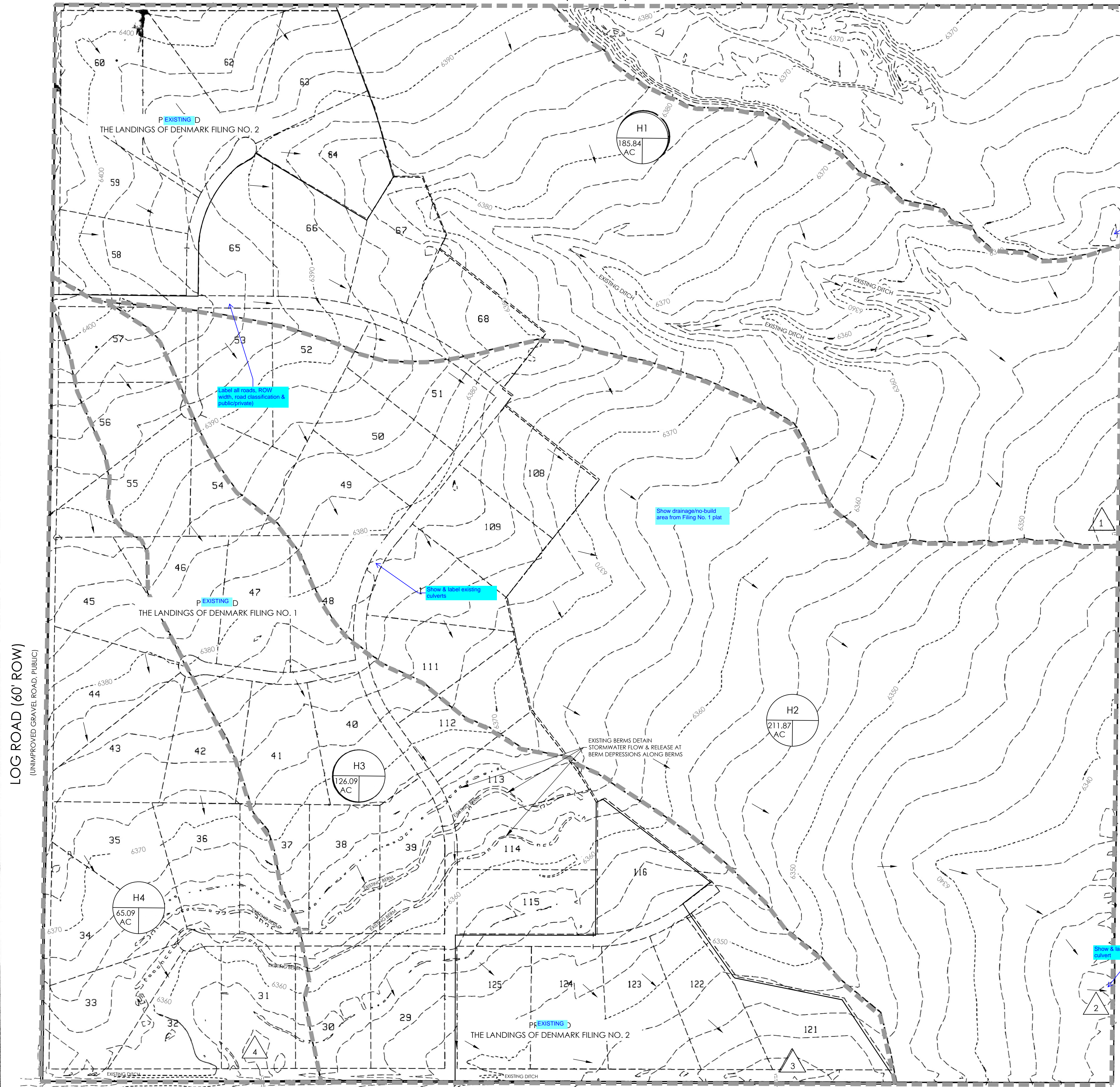
ENGINEERS * SURVEYORS
 1903 LELARAY STREET, SUITE 200
 COLORADO SPRINGS, CO 80909
 Phone (719) 635-5736
 Fax (719) 635-5450
 E-mail mve@mvecivil.com

PREPARATION DATE: **12/29/22**

UNPLATTED

HIGHWAY 110 (60' ROW)

(UNIMPROVED COUNTY ROAD, PUBLIC)



Peak Flow Rate Summary Table

Existing Conditions

| Sub-basin | Design Point | Area (AC) | Peak Flow Rate (CFS) | |
|-----------|--------------|-----------|----------------------|----------|
| | | | 5 Year | 100 Year |
| H1 | 1 | 185.84 AC | 69.0 | 168.7 |
| H2 | 2 | 211.87 AC | 79.6 | 194.7 |
| H3 | 3 | 126.09 AC | 53.3 | 130.4 |
| H4 | 4 | 65.09 AC | 25.7 | 63.0 |

NOTES:
 1. ALL ROADS WITHIN THE LANDINGS AT DENMARK FILINGS NO. 1 & NO. 2 WILL BE WITHIN 60' RIGHT OF WAY (PUBLIC) & CLASSIFIED AS RURAL LOCAL.
 2. SEE THE LANDINGS AT DENMARK FILINGS NO. 1 & 2' PLATS UNDER EASEMENTS FOR DESCRIPTION OF UTILITY, DRAINAGE, AND TRAIL EASEMENTS.

LEGEND

- EXISTING BASIN BOUNDARY
- DIRECTION OF FLOW
- - - (7290) EXISTING CONTOUR
- ▲ DESIGN POINT
- ▭ EXISTING CMP CULVERT
- H1
185.84 ac
AREA IN ACRES



SCALE 1" = 200'

THE LANDINGS OF DENMARK
 SUBDIVISION

FILING NO. 2
 FINAL DRAINAGE PLAN
 HISTORIC EXISTING CONDITIONS

THE LANDINGS OF DENMARK
 FILING NO. 2
 FINAL DRAINAGE BASIN MAINTENANCE
 HISTORIC CONDITIONS

PRINT DATE: 12/29/22

| | | |
|--|---------------|--|
| TITLE DRAINAGE REPORT HIST. DRAINAGE | EXDRAIN | ENGINEERS + SURVEYORS 1900 LEXARNEY STREET, SUITE 200 COLORADO SPRINGS, CO 80909 Phone: (719) 635-5736 Fax: (719) 635-5450 E-mail: mva@mvacivil.com |
| DRAWN: JO | ENGINEER: DRG | PREPARATION DATE: 12/29/22 |
| CHECKED: 12/29/22 | | |

PREMIER ENGINEERING, INC.
 Professional Civil Engineers
 2110 Vickers Drive
 Colorado Springs, CO 80918
 (719) 598 8951
 PremierEng@aol.com

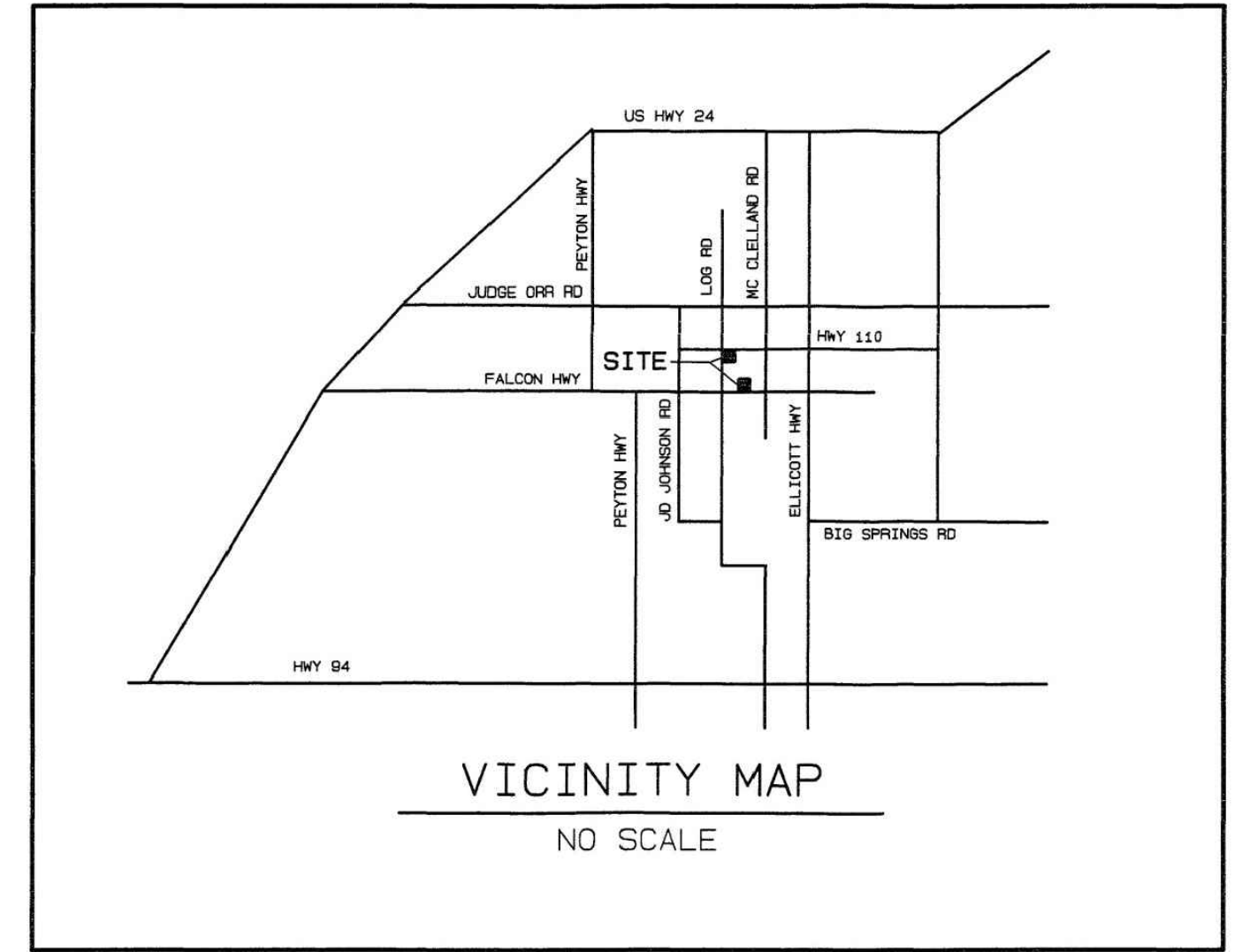
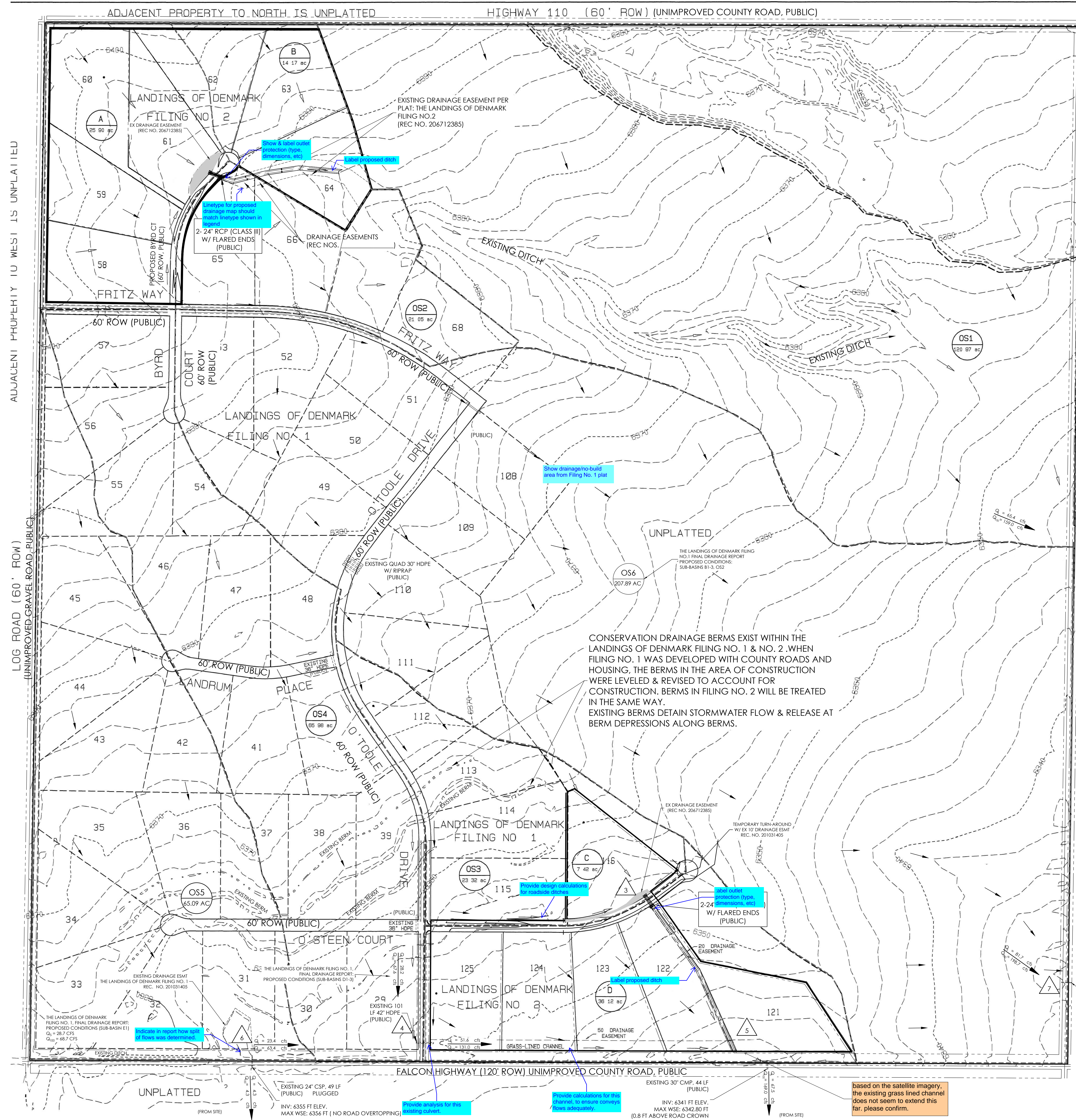
UNPLATTED

LOG ROAD (60' ROW)
 (UNIMPROVED GRAVEL ROAD, PUBLIC)

MCCLELLAND ROAD (60' ROW)
 (UNIMPROVED GRAVEL ROAD, PUBLIC)

FALCON HIGHWAY (120' ROW)
 UNIMPROVED COUNTY ROAD, PUBLIC

UNPLATTED



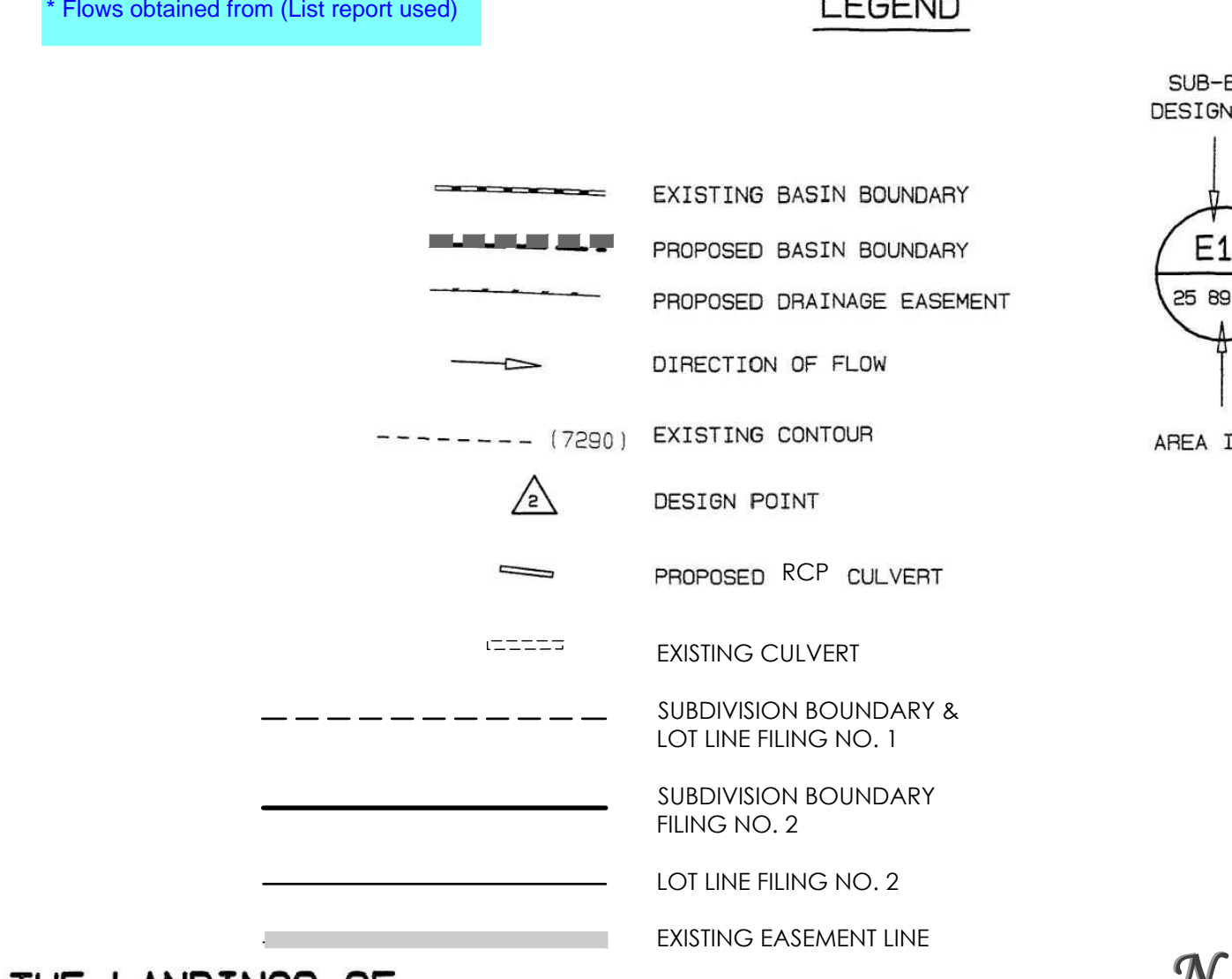
NOTE:
1. ALL ROADS WITHIN THE LANDINGS OF DENMARK FILINGS NO. 1 & NO. 2 WILL BE WITHIN 60' RIGHT OF WAY (PUBLIC) & CLASS RURAL LOCAL.

PEAK FLOW RATE SUMMARY TABLE
PROPOSED CONDITIONS

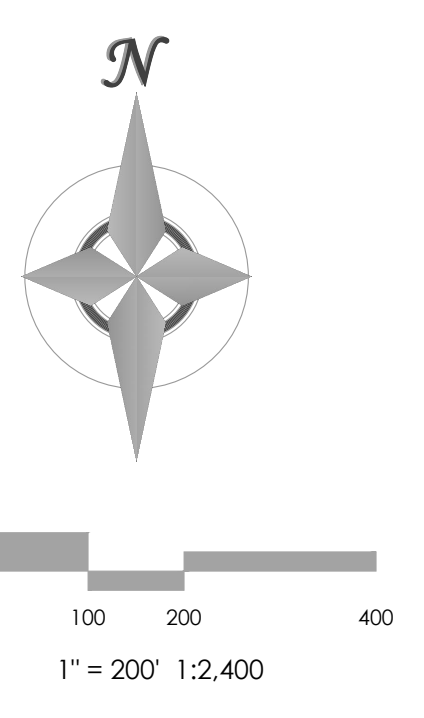
| SUB-BASIN | DESIGN POINT | PEAK FLOW RATE (CFS) | |
|---------------------|--------------|----------------------|----------|
| | | 5 YEAR | 100 YEAR |
| A | 1 | 15.3 | 36.6 |
| B | | 8.7 | 20.8 |
| C | | 4.6 | 11.6 |
| D | | 19.8 | 47.5 |
| OS4 | | 28.2 | 67.6 |
| A,B,OS1-2 | 2 | 65.4 | 159.0 |
| C, OS3 | 3 | 15.9 | 38.0 |
| OS4, OS5 | 4 | 51.6 | 131.0 |
| OS5, OS4, OS3, C, D | 5 | 67.5 | 169.0 |
| OS5 | 6 | 28.7 | 68.7 |
| OS6 | 7 | 81.7 | 198.7 |

Flows shown at DP: 5 are for nearby information in hydrology spreadsheet. Please reconcile and update pages accordingly.

Flows obtained from (List report used)



THE LANDINGS OF DENMARK
SUBDIVISION
FILING NO. 2
FINAL DRAINAGE PLAN
PROPOSED CONDITIONS
SCALE: 1" = 200 FEET



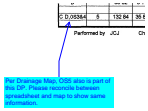
THE LANDINGS OF DENMARK
FILING NO. 2
FINAL DRAINAGE BASIN MAP
PROPOSED CONDITIONS

PRINT DATE: 12/29/22

| | | |
|--|--|---|
| THE DRAINAGE REPORT PROP. DRAINAGE DRAWING NO. PPDRAIN MVE PROJ. NO. 61108 ENGINEER JGD CHECKED DSG DATE 12/29/22 | UPDATED BY MONUMENT VALLEY ENGINEERS INC. ENGINEERS + SURVEYORS 1903 ULLMAY STREET, SUITE 200 COLORADO SPRINGS, CO 80909 Phone (719) 635-5736 Fax (719) 635-5400 E-mail: mv@mcvalley.com | PREMIER ENGINEERING, INC. Professional Civil Engineers 2110 Vickers Drive Colorado Springs CO 80918 (719) 598 6951 PremierEng@aol.com |
|--|--|---|

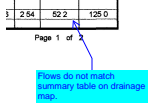
V2_Drainage Letter Redlines.pdf Markup Summary

CDurham (40)



Subject: Callout
Page Label: 27
Author: CDurham
Date: 3/13/2023 10:27:42 AM
Length: 0
Area: 0
Volume: 0

Per Drainage Map, OS5 also is part of this DP. Please reconcile between spreadsheet and map to show same information.

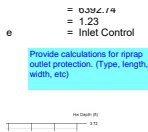


Subject: Callout
Page Label: 27
Author: CDurham
Date: 3/13/2023 10:32:50 AM
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Volume: 0

Flows do not match summary table on drainage map.

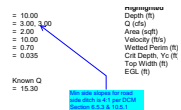
| | |
|------|-------|
| 15.9 | 38.0 |
| 16.5 | 39.5 |
| 62.2 | 125.0 |

Subject: Highlight
Page Label: 28
Author: CDurham
Date: 3/13/2023 10:33:12 AM
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Area: 0
Volume: 0



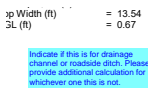
Subject: Text Box
Page Label: 34
Author: CDurham
Date: 3/13/2023 1:42:11 PM
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Provide calculations for riprap outlet protection. (Type, length, width, etc)



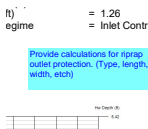
Subject: Callout
Page Label: 35
Author: CDurham
Date: 3/13/2023 11:21:25 AM
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Volume: 0

Min side slopes for road side ditch is 4:1 per DCM Section 6.5.3 & 10.5.1



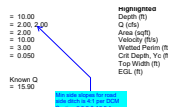
Subject: Text Box
Page Label: 35
Author: CDurham
Date: 3/13/2023 11:43:40 AM
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Volume: 0

Indicate if this is for drainage channel or roadside ditch. Please provide additional calculation for whichever one this is not.



Subject: Text Box
Page Label: 38
Author: CDurham
Date: 3/13/2023 1:41:51 PM
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Area: 0
Volume: 0

Provide calculations for riprap outlet protection. (Type, length, width, etc)



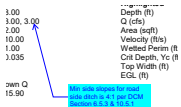
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Page Label: 39
Author: CDurham
Date: 3/13/2023 11:20:07 AM
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Volume: 0

Min side slopes for road side ditch is 4:1 per DCM Section 6.5.3 & 10.5.1



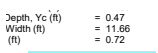
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Page Label: 39
Author: CDurham
Date: 3/13/2023 11:43:31 AM
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Volume: 0

Indicate if this is for drainage channel or roadside ditch. Please provide additional calculation for whichever one this is not.



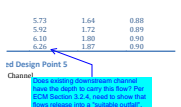
Subject: Callout
Page Label: 41
Author: CDurham
Date: 3/13/2023 11:21:06 AM
Length: 0
Area: 0
Volume: 0

Min side slopes for road side ditch is 4:1 per DCM Section 6.5.3 & 10.5.1



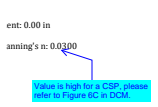
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Page Label: 41
Author: CDurham
Date: 3/13/2023 1:41:21 PM
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Volume: 0

Indicate if this is for drainage channel or roadside ditch. Please provide additional calculation for whichever one this is not.



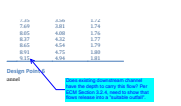
Subject: Callout
Page Label: 48
Author: CDurham
Date: 3/13/2023 11:29:15 AM
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Area: 0
Volume: 0

Does existing downstream channel have the depth to carry this flow? Per ECM Section 3.2.4, need to show that flows release into a "suitable outfall".



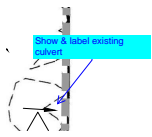
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Page Label: 53
Author: CDurham
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Value is high for a CSP, please refer to Figure 6C in DCM.



Subject: Callout
Page Label: 54
Author: CDurham
Date: 3/13/2023 11:44:40 AM
Length: 0
Area: 0
Volume: 0

Does existing downstream channel have the depth to carry this flow? Per ECM Section 3.2.4, need to show that flows release into a "suitable outfall".



Subject: Callout
Page Label: 58
Author: CDurham
Date: 3/13/2023 1:20:17 PM
Length: 0
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Volume: 0

Show & label existing culvert



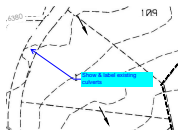
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EXISTING



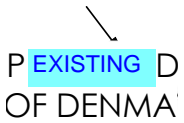
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EXISTING



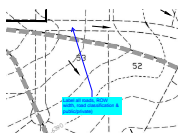
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Show & label existing culverts



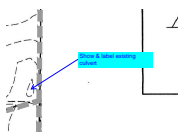
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EXISTING



Subject: Callout
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Area: 0
Volume: 0

Label all roads, ROW width, road classification & public/private)



Subject: Callout
Page Label: 58
Author: CDurham
Date: 3/13/2023 1:23:15 PM
Length: 0
Area: 0
Volume: 0

Show & label existing culvert



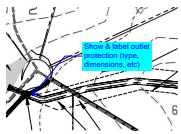
Subject: Text Box
Page Label: 58
Author: CDurham
Date: 3/13/2023 1:24:16 PM
Length: 0
Area: 0
Volume: 0

Show drainage/no-build area from Filing No. 1 plat



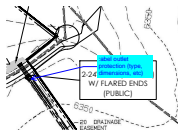
Subject: Text Box
Page Label: 58
Author: CDurham
Date: 3/13/2023 1:24:45 PM
Length: 0
Area: 0
Volume: 0

\Existing



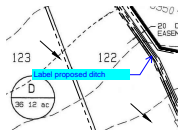
Subject: Callout
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:27:15 PM
Length: 0
Area: 0
Volume: 0

Show & label outlet protection (type, dimensions, etc)



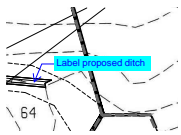
Subject: Callout
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:27:32 PM
Length: 0
Area: 0
Volume: 0

:abel outlet protection (type, dimensions, etc)



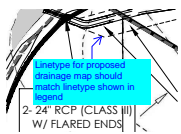
Subject: Callout
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:27:55 PM
Length: 0
Area: 0
Volume: 0

Label proposed ditch



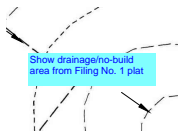
Subject: Callout
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:28:12 PM
Length: 0
Area: 0
Volume: 0

Label proposed ditch



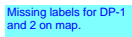
Subject: Callout
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:29:05 PM
Length: 0
Area: 0
Volume: 0

Linetype for proposed drainage map should match linetype shown in legend



Subject: Text Box
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:30:00 PM
Length: 0
Area: 0
Volume: 0

Show drainage/no-build area from Filing No. 1 plat



Subject: Text Box
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:30:38 PM
Length: 0
Area: 0
Volume: 0

Missing labels for DP-1 and 2 on map.



Subject: Text Box
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:33:42 PM
Length: 0
Area: 0
Volume: 0

* Flows obtained from (List report used)



Subject: Text Box
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:31:25 PM
Length: 0
Area: 0
Volume: 0

*



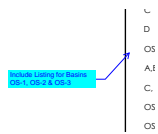
Subject: Text Box
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:31:31 PM
Length: 0
Area: 0
Volume: 0

*



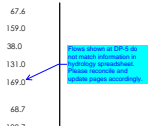
Subject: Text Box
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:31:38 PM
Length: 0
Area: 0
Volume: 0

*



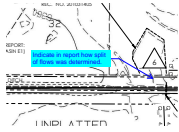
Subject: Callout
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:31:59 PM
Length: 0
Area: 0
Volume: 0

Include Listing for Basins OS-1, OS-2 & OS-3



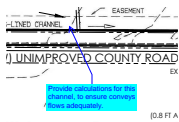
Subject: Callout
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:33:23 PM
Length: 0
Area: 0
Volume: 0

Flows shown at DP-5 do not match information in hydrology spreadsheet. Please reconcile and update pages accordingly.



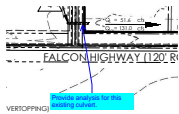
Subject: Callout
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:34:07 PM
Length: 0
Area: 0
Volume: 0

Indicate in report how split of flows was determined.



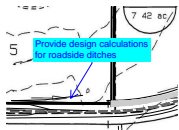
Subject: Callout
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:37:41 PM
Length: 0
Area: 0
Volume: 0

Provide calculations for this channel, to ensure conveys flows adequately.



Subject: Callout
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:38:25 PM
Length: 0
Area: 0
Volume: 0

Provide analysis for this existing culvert.



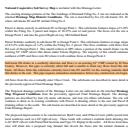
Subject: Callout
Page Label: 59
Author: CDurham
Date: 3/13/2023 1:39:43 PM
Length: 0
Area: 0
Volume: 0

Provide design calculations for roadside ditches

dotprete (6)

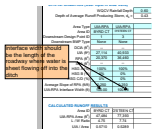


Subject: Stormwater Comments Color
Page Label: 1
Author: dotprete
Date: 3/15/2023 3:47:25 PM
Length: 0
Area: 0
Volume: 0



Subject: Highlight
Page Label: 5
Author: dotprete
Date: 3/15/2023 10:11:26 AM
Length: 0
Area: 0
Volume: 0

Sub-basin H4 drains in a southerly direction and flows to an existing 24" CMP owned by El Paso County. However, this pipe is currently silted full and is unable to drain any flows from this sub-basin.
 All flows from this sub-basin currently travel into H3 and H2 via the existing roadside ditch that drains to the east. This pipe requires immediate maintenance before any construction can begin.



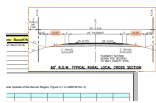
Subject: Text Box
Page Label: 56
Author: dotprete
Date: 3/15/2023 10:47:29 AM
Length: 0
Area: 0
Volume: 0

interface width should be the length of the roadway where water is sheet flowing off into the ditch

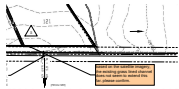


Subject: Text Box
Page Label: 56
Author: dotprete
Date: 3/15/2023 10:53:59 AM
Length: 0
Area: 0
Volume: 0

With a V ditch, you can only use the portion of the ditch where the SW sheet flows off the road into the ditch for RPA (i.e. half the ditch) and the slope would be the fall from the road to the bottom of the ditch. So in the example provided the slope would be 0.25 and the RPA would be the length of the ditch times 10 feet.



Subject: Image
Page Label: 56
Author: dotprete
Date: 3/15/2023 10:51:22 AM
Length: 0
Area: 0
Volume: 0



Subject: Callout
Page Label: 59
Author: dotprete
Date: 3/15/2023 11:22:38 AM
Length: 0
Area: 0
Volume: 0

based on the satellite imagery, the existing grass lined channel does not seem to extend this far. please confirm.

Mikayla Hartford (1)



Subject: Engineer
Page Label: 7
Author: Mikayla Hartford
Date: 3/15/2023 9:40:53 AM
Length: 0
Area: 0
Volume: 0

Unresolved: Provide inlet and outlet protection calculations and associated riprap sizing calcs.