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Final Drainage Letter for Flying Horse Foundation

October 2025

HR Green Project No: 2502010

Prepared For:

Owner: Jeffrey B. Smith

Owner Representative: Drew Balsick

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PPR258

Engineer's Statement

This report and plan for the drainage design of the development, Flying Horse Foundation, was prepared by me (or under my direct supervision) and is correct to the best of my knowledge and belief. Said report and plan has been prepared in accordance with the *El Paso County Drainage Criteria* Manual and is in conformity with the master plan of the drainage basin. I understand that El Paso County does not and will not assume liability for drainage facilities designed by others. I accept responsibility for any liability caused by any negligent acts, errors or omissions on my part in preparing this report.

RDL 10/30/2025

Richie Lyon, PE Date

State of Colorado No. 53921

For and on behalf of HR Green Development, LLC

Developer's Statement

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

Flying Horse Development, LLC

10/30/2025

Drew Balsick Date

Vice President

Flying Horse Development, LLC

2138 Flying Horse Club Drive

Colorado Springs, CO 80921

El Paso County

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

Daniel Torres, P.E.
Digitally signed by Daniel Torres, P.E.
Reason: Authorized signatory as County Engineer designee
Date: 2025.11.20 16:20:30-07'00'

11/20/2025

Joshua Palmer, P.E. Date

County Engineer/ECM Administrator

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I. General Purpose, Location and Description

a. Purpose

The purpose of this Final Drainage Letter for the Flying Horse Foundation is to describe the on-site and off-site drainage patterns, existing and proposed storm infrastructure, and to safely route developed stormwater to adequate drainageways. This Final Drainage Letter details the change in site layout and impervious areas which yield new peak stormwater runoff quantities to downstream existing drainageways and storm infrastructure. The design intent is to convey on-site stormwater via existing natural tertiary drainageways to stormwater quality treatment facilities downstream of the site. The existing downstream drainage pattern and concept remain unchanged in this letter. Drainage design for amended areas and analysis of existing stormwater infrastructure downstream of the development is provided to demonstrate compliance with County stormwater criteria and consistency with previously approved plans and reports.

b. Location

The existing parcel number 5100000291 (legally described as NE4SW4, W2NW4SE4 OF SEC 31-11-65, TOG WITH R/W OVER N 30 FT OF NE4NW4SE4, NE4SE4 SD SEC 31) totals 60.57 acres. The existing parcel is to be a single lot for the proposed special use of a philanthropic foundation development of 40.008 acres and is herein referred to as the 'Site' in this report. The remaining area to the west of the site is to remain unplatted as a future development tract for Flying Horse North. The site is in the northeast quarter of the southwest quarter of Section 31, Township 11 South, Range 65 West of the 6th P.M., Colorado Springs, El Paso County, Colorado.

The site is bound to the east by the Country View Estates subdivision, and to the south by the Palmer Divide subdivision. The undeveloped land to the north, west, and southwest of the site are future planned Flying Horse North subdivision filings. A vicinity map is presented in Appendix A.

There are no public roadways internal to the site but there is an existing 50' width access easement that extends from Black Forest Road through the north boundary of Country View Estates to this property. This is the existing primary driveway access to the site. The property is not within a Streamside Zone or FEMA floodplain. There are no existing no-build or preservation easements or areas within the parcel nor are there are platted areas that prohibit development. With the Site remaining above 35 acres, a Final Plat is not required and any established lot lines and easements are to be done by separate instrument.

c. Description of Existing Conditions

The existing site (zoned RR-5) contains improvements such as a two-story single-family home, barns, sheds, stables and a gravel driveway. The existing vegetative cover is 90 percent as evidenced by a field survey and aerial imagery. The existing vegetation includes native grasses and weeds, shrubs, and pinyon pine trees. The development site generally slopes from west to east at an average of 6% grade. The northwest 20 percent of the site is sloped between 0.5% and 10% to three off-site basins containing undeveloped land and golf course, one to the northwest, one to the north, and one to the northeast, that are analyzed in this letter. Stormwater in the southeast 80 percent of site is conveyed to an existing natural tertiary drainageway which ultimately leads to an existing private 18 inch HDPE pipe that crosses under the existing gravel driveway.

The site consists of Peyton-Pring complex and Peyton sandy loam per the USDA, NRCS web soil survey. This soil is categorized as Hydrologic Soil Group B. The NRCS soil survey is presented in Appendix A.

d. Description of Proposed Conditions

The proposed site layout removes an existing 3,250 square foot two-story single family residential home and proposes a 52,000 square foot horse riding arena. A 26-foot wide gravel driveway starting at the southern end of Stableford Terrace within Tract F of Flying Horse North Filing No. 4 is to be the new primary entrance to the site. Approximately 500 lineal feet of existing gravel roadway is to be reconstructed and 1,100 lineal feet is ultimately to be installed for a secondary entrance to future Flying Horse North filings with the future extension of Sandbagger Drive that is to be done as a part of a future Filing No. 6.

The proposed area of disturbance of approximately 6.9 acres contains the footprint of the proposed riding arena building, gravel driveway, overlot grading for corral areas, the associated daylight grading to the existing surface, and construction control measures. There are off-site disturbances proposed for the paved driveway entry from Stableford Terrace and the future secondary access is shown in its final graded condition. The existing electric meter and line are to be relocated/replaced as needed to connect to the proposed structure. The existing OWTS is to be abandoned, and a new system is to be constructed, as shown on the Site Development Plan. The existing well is to remain as is and a new pump and water line is to be installed. Other utilities are not expected to encumber construction.

e. Floodplain Statement

Based on FEMA Firm map 08041C0315G dated December 7, 2018, the site is Zone X, which are areas determined to be outside the 0.2% annual chance flood. No portion of the site is within a designated FEMA floodplain.

II. Drainage Basins and Subbasins

a. Major Basin Description

Flying Horse Foundation is located within the East Cherry Creek Basin. There is not a current planning study of the drainage basin, but generally it slopes from southwest to northeast. The basin eventually flows into the South Platte River.

The site drains to an existing tertiary drainage channel via overland sheet flow where it is then channelized and routed to a driveway side swale which then ultimately flows under the private driveway for 14820 Black Forest Road into an undeveloped basin.

b. Existing Basin Description

The existing basins are delineated using the existing drainage patterns. Undeveloped land, golf course, and 5-acre residential lots comprise the existing basins. The total on-site area has a composite imperviousness of 3.3% and the total off-site area have a composite imperviousness of 6.4%.

The following basins have been assigned.

Existing Basin A has a tributary area of **71.85 acres with a minor (5-year event) runoff of 24.92 cfs and major (100-year event) runoff of 126.51 cfs**.

The on-site portion of the basin contains improvements such as barns, stables, a single-family residential home, and a gravel driveway. The basin contains the area in the southeast 80 percent of the site. The existing on-site vegetation coverage includes native grasses and weeds, shrubs, and sparse pinyon pine

at 90 percent. Stormwater runoff overland sheet flows over rooftops of buildings and the surrounding landscape and is channelized within the existing tertiary drainageway.

The off-site portion of the basin is located to the southwest, south, and east of the property and contains parts of Country View Estates and Palmer Ridge subdivisions. The off-site basin area contains 5-acre residential lots and undeveloped area. The existing off-site vegetation coverage includes native grasses and weeds, shrubs, and sparse pinyon pine at 90 percent. Stormwater runoff overland sheet flows over rooftops of buildings and the surrounding landscape and is conveyed to the existing tertiary drainageway where it is channelized.

The basin ultimately flows from the southwest to the northeast through the drainageway and drains to **Design Point 1**, a private 18 inch HDPE culvert pipe.

Existing Basin B has a tributary area of **56.86 acres with a minor (5-year event) runoff of 24.59 cfs and major (100-year event) runoff of 101.18 cfs**. The off-site portion of the basin is located to the northeast of the site and consists of 5-acre single family residential lots. The on-site portion of the basin includes part of the gravel driveway and undeveloped land. The existing vegetation coverage includes native grasses and weeds, shrubs, and sparse pinyon pine at 90 percent. Basin B accepts stormwater from Basin A via **Design Point** 1. Stormwater within Basin B is routed through roadside channels and drainage swales which ultimately flow to **Design Point 2**, Pond A within Flying Horse North Filing No. 4.

Existing Basin C has a tributary area of **58.17 acres with a minor (5-year event) runoff of 15.09 cfs and major (100-year event) runoff of 96.97 cfs**. The off-site portion of the basin is located to the north of the site and consists of undeveloped land. The on-site portion of the basin is on the north end of the site. The basin is fully comprised of undeveloped land. The existing vegetation coverage includes native grasses and weeds, shrubs, and sparse pinyon pine at 90 percent. Stormwater within Basin C overland flows over the natural terrain into an existing tertiary drainage channel which ultimately flows under Old Stagecoach Road via a public 48 inch RCP culvert pipe (**Design Point 3**).

Existing Basin D has a tributary area of **78.69 acres with a minor (5-year event) runoff of 21.18 cfs and major (100-year event) runoff of 132.40 cfs**. The off-site portion of the basin is located to the northwest of the site and consists of undeveloped land and golf course. The on-site portion of the basin improvements such as a barn and stables and is categorized as 5-acre residential. The existing vegetation coverage includes native grasses and weeds, shrubs, and sparse pinyon pine at 90 percent. Stormwater within Basin D overland sheet flows over building roofs and golf course area and is collected in a natural existing tertiary drainage channel which flows to northwest through the adjacent golf course and ultimately is conveyed to **Design Point 4**, detention pond in the northwest of the basin.

Existing Basin J has a tributary area of **46.48 acres with a minor (5-year event) runoff of 10.22 cfs and major (100-year event) runoff of 75.05 cfs**. The off-site portion of the basin is located to the south and to the west of the site and consists of 5-acre residential lots and undeveloped land. The on-site portion does not contain any improvements. The existing vegetation coverage includes native grasses and weeds, shrubs, and sparse pinyon pine at 90 percent. Stormwater within Basin J overland sheet flows over roofs and existing topography and is collected in a natural existing tertiary drainage channel (**Design Point 5**) which flows to northwest into the adjacent golf course and ultimately into the downstream irrigation pond 13.

Drainage maps detailing the existing basins are included in Appendix E.

c. Proposed Basin Description

Proposed Basins A and D differ from the existing basins. The proposed Basin A has increased area compared to the existing Basin A due to changes in site grading and decreased imperviousness due to removal of the existing home on the basin. Proposed Basin D increases in imperviousness due to the pole barn and driveway addition. The total on-site area has a composite imperviousness of 7.8% and the total off-site area has a composite imperviousness of 6.5%.

The following basins are delineated per the site layout.

Proposed Basin A has a tributary area of **71.36 acres with a minor (5-year event) runoff of 24.52 cfs and major (100-year event) runoff of 125.39 cfs**.

The on-site area of the basin located in the eastern portion of the site contains existing improvements that will remain such as barns, stables, and a gravel driveway. The existing on-site vegetation coverage includes native grasses and weeds, shrubs, and sparse pinyon pine at 90 percent. Stormwater runoff overland sheet flows over rooftops of existing buildings and the surrounding landscape and is channelized within the existing tertiary drainageway. A proposed swale south of the proposed pole barn conveys flow to the existing tertiary drainageway. The existing 3,250 square foot two-story single family residential home is to be demolished. This decreases the imperviousness of Basin A from 6.39% in the existing condition to 6.22% in the proposed condition.

The off-site portion of the basin is located to the south and east of the property and is to remain unchanged from the existing condition. The off-site basin area contains 5-acre residential lots and undeveloped area. The existing off-site vegetation coverage includes native grasses and weeds, shrubs, and sparse pinyon pine at 90 percent. Stormwater runoff overland sheet flows over rooftops of buildings and the surrounding landscape and is conveyed to the existing tertiary drainageway where it is channelized.

The basin ultimately flows to the northeast through the existing drainageway and drains to **Design Point 1**, an existing private 18 inch HDPE culvert pipe.

Proposed Basin B has a tributary area of **55.86 acres with a minor (5-year event) runoff of 24.59 cfs and major (100-year event) runoff of 101.18 cfs**.

The off-site portion of the basin is located to the northeast of the site and consists of 2.5-acre residential lots and undeveloped land. The on-site portion of the basin includes undeveloped land. The existing vegetation coverage includes native grasses and weeds, shrubs, and sparse pinyon pine at 90 percent. Basin B accepts stormwater from Basin A via **Design Point** 1. Downstream of **Design Point** 1, stormwater is conveyed via a 60 inch RCP culvert under Rubble Drive. The hydraulic capacity of this culvert, documented in the Flying Horse North Filing No. 4 Final Drainage Report as Culvert 2 (DPA4), is provided within Appendix C of this report and is sufficient for the decreased flow to the culvert. Stormwater within Basin B is routed through culverts, roadside channels and drainage swales which ultimately flow to **Design Point 2**, Pond A within Flying Horse North Filing No. 4. The existing pond has capacity to accept, treat, and release the minimally decreased flows due to this development.

Proposed Basin C has a tributary area of **58.17 acres with a minor (5-year event) runoff of 15.09 cfs and major (100-year event) runoff of 96.97 cfs**. The off-site portion of the basin is located to the north of the site and consists of 2.5-acre residential lots and undeveloped land. The on-site portion of the basin is on the north end of the site and contains undeveloped land. The existing vegetation coverage includes

native grasses and weeds, shrubs, and sparse pinyon pine at 90 percent and is to be unchanged. Stormwater within Basin C overland flows over the existing topography into a natural existing tertiary drainage channel which ultimately flows under Old Stagecoach Road via a public 48 inch RCP culvert pipe (**Design Point 3**).

Proposed Basin D has a tributary area of **79.99 acres with a minor (5-year event) runoff of 24.81 cfs and major (100-year event) runoff of 138.23 cfs**. The off-site portion of the basin is located to the northwest of the site and consists of 2.5-acre residential lots, undeveloped land and golf course. The on-site portion of the basin contains existing improvements such as a barn and stables and a well. Proposed improvements within the basin include a 52,000 square foot pole barn, paved areas, grading of corral areas, and reconstruction of the gravel driveway. The existing vegetation coverage includes native grasses and weeds, shrubs, and sparse pinyon pine at 90 percent and is to be unchanged. Stormwater within Basin D overland flows over existing and proposed topography and is collected in a natural existing tertiary drainage channel which flows to northwest through the adjacent golf course and ultimately is conveyed to **Design Point** 4, the Filing No. 1 irrigation reservoir (Pond 13) northwest of the basin.

Proposed Basin J has a tributary area of **45.67 acres with a minor (5-year event) runoff of 10.04 cfs and major (100-year event) runoff of 73.74 cfs**. The off-site portion of the basin is located to the south and to the west of the site and consists of 5-acre residential lots and undeveloped land. The on-site portion does not contain any existing or proposed improvements. The existing vegetation coverage includes native grasses and weeds, shrubs, and sparse pinyon pine at 90 percent. Stormwater within Basin J overland sheet flows over roofs and existing topography and is collected in a natural existing tertiary drainage channel (**Design Point 5**) which flows to northwest into the adjacent golf course and ultimately into the downstream irrigation pond 13. Flows are minimally decreased from existing due to the basin size becoming smaller in the proposed condition.

Two summary tables are provided below showing the increase in 5-year storm and 100-year storm event runoff to each design point.

CUMULATIVE DESIGN POINT SUMMARY TABLE - 5 YR STORM							
Design Point	Contributing Basins	Tributary Area (ac.)	Ex. Composite % Imperviousness	Pr. Composite % Imperviousness	Ex. ΣQ_5 (cfs)	Pr. ΣQ_5 (cfs)	% Increase Q_5 (cfs)
1	A	71.36	6.39%	6.22%	24.70	24.53	-0.71%
2	A, B	127.22	8.31%	8.31%	49.48	49.09	-0.79%
3	C	58.17	3.42%	3.42%	15.09	15.09	0.00%
4	D	79.99	3.79%	5.99%	21.18	24.81	17.17%
5	J	45.67	2.00%	2.00%	10.22	10.04	-1.74%

CUMULATIVE DESIGN POINT SUMMARY TABLE - 100 YR STORM							
Design Point	Contributing Basins	Tributary Area (ac.)	Ex. Composite % Imperviousness	Pr. Composite % Imperviousness	Ex. ΣQ_{100} (cfs)	Pr. ΣQ_{100} (cfs)	% Increase Q_{100} (cfs)
1	A	71.36	6.39%	6.22%	126.51	125.39	-0.88%
2	A, B	127.22	8.31%	8.31%	227.55	226.43	-0.49%
3	C	58.17	3.42%	3.42%	96.97	96.97	0.00%
4	D	79.99	3.79%	5.99%	132.40	138.23	4.40%
5	J	45.67	2.00%	2.00%	75.05	73.74	-1.74%

Hydraulic analysis of on-site and off-site basins shows that the proposed peak runoff events are marginally decreased (with the exception of **Design Point 4)** and ultimately drain to permanent control measures that have sufficient capacity. The proposed increase in peak runoff to **Design Point 4** is acceptable per Classic's FDR and the design report for the irrigation reservoir (Pond 13) titled *Flying Horse North Irrigation Reservoir Embankment Design Report*. The Foundation site area falls within the Classic basins OS-13 and OS-14, which are tributary to Pond 13 and assumed to be 2-acre residential area. The overall imperviousness for the site area tributary to Pond 13 is 6.7%, which is under the assumed percent imperviousness value of 11% for 2-acre residential lots. Because the proposed imperviousness is less than the assumed imperviousness in the design report, the existing irrigation reservoir (Pond 13) has ample capacity for the developed condition flows and volumes. The existing pond is functioning as intended and the design of the pond, including the structure height and orifice plate are sufficient and unaffected by this development.

The existing Filing No. 4 Pond A functions as intended and maintains acceptable storage and treatment capacity and release rates without any modifications as drainage patterns remain unchanged and the flows to the pond are minimally decreased.

The development of the Foundation site does not adversely affect the existing eastern tertiary swale through Country View Estates to the east due to the reduction of impervious area tributary to the drainageway by way of removal of the existing single-family residence on the Foundation property and proposed roof drains that are to drain the stormwater from the Foundation building roof due northwest.

Drainage maps detailing the proposed basins are included in Appendix E.

III. Drainage Design Criteria

a. Development Criteria Reference

The drainage analysis of existing and proposed storm sewer system follows the criteria from the *El Paso County Drainage Criteria Manual Volumes 1 and 2* (EPC DCM, latest revision October 2018).

b. Hydrologic Criteria

Hydrologic data was obtained from the *El Paso County, Colorado Drainage Criteria Manual – Chapter 5 Storm Runoff Methods of Analysis.* Off-site drainage improvements are designed for the 5-year storm (minor event) and 100-year storm (major event) using rainfall values from NOAA Atlas 14 below. Runoff was calculated per *El Paso County, Colorado Drainage Criteria Manual – Section 5.2 - Rational Method.*

Rainfall Depths for Site Location		
Return Period (yr)	5	100
1-hr Rainfall Depth (in)	1.50	2.52

c. Hydraulic Criteria

Hydraulic criteria for culvert sizing were obtained from the *El Paso County, Colorado Drainage Criteria Manual – Chapter 9 Culvert Design.* Hydraulic criteria for swale sizing was obtained from the *El Paso County, Colorado Drainage Criteria Manual – Chapter 10 Open Channels and Structures.*

Existing tertiary drainage channel capacities are analyzed utilizing hydraulic modeling (AutoCAD Civil 3D Hydraflow Express channel analysis tool) by designing user-defined channels at various points along the channel with the proper Manning's coefficient, geometry of designed sections, and slopes. These user-defined capacity calculations are provided to determine the minor 5-year storm and major 100-year storm capacities in various areas of the existing channel to ensure that they have freeboard in a storm event.

Existing and proposed culvert capacities are analyzed utilizing hydraulic modeling (AutoCAD Civil 3D Hydraflow Express culvert analysis tool) by defining pipe and embankment geometry and elevations, pipe roughness, and flows through the culverts. These culvert capacity calculations are provided to ensure that the headwater surface elevations have freeboard in the minor 5-year storm and major 100-year storm events and the water surface does not overtop the embankments.

The particular areas of interest are the natural tertiary swales through the golf course downstream of the Site that drain directly to the Filing 1 Irrigation Pond 13. Section views and analysis of minor and major storm water surface elevations for the existing and developed conditions are included in Appendix C.

IV. Drainage Facility Design

a. General Concept

This Final Drainage Letter analyzes existing infrastructure affected by the development of the proposed Flying Horse Foundation site. The area was most recently studied in the "Preliminary Drainage Report for Flying Horse North Preliminary Plan and Final Drainage Report for Flying Horse North Filing No. 1" prepared by Classic Consulting Engineers and Surveyors, revised June 2018. This report differs from the Classic report due to development within basins OS-13, OS-14, and OS-15.

Stormwater generated within the western portion of the site flows northwest through existing natural drainageways and golf course into an irrigation reservoir known as Pond 13 per Classic's PDR. Although Basin D (OS-13 and OS-14 in Classic's report) increases in imperviousness due to the development from the existing condition, the overall site imperviousness remains less than assumed in the "Flying Horse North Irrigation Reservoir Embankment Design Report" prepared by Classic Consulting Engineers and Surveyors, August 2018 (see Appendix D). Therefore, the irrigation reservoir has capacity to provide stormwater detention and water quality treatment for the area tributary to it in the proposed condition. Downstream existing channel stormwater depths and velocities are analyzed (see Appendix C) for the major and minor storm events, and no improvements are proposed as they have freeboard and the velocities are below the maximum for natural unlined channels per DCM criteria.

Stormwater generated within the eastern portion of the site concentrates within the existing natural drainageway and flows off-site to the northeast through the Country View Estates subdivision and ultimately to the Flying Horse North Filing No. 4 Pond A. The design for Pond A assumed no development for its tributary area within this Foundation Site and that remains true as the development's new impervious areas drain due northwest and not toward Pond A. Disturbed area to the south and east of the proposed building, tributary to Pond A and totaling 0.76 acres, is excluded from water quality treatment per ECM Appendix I.7.1.B.7 as it is land disturbance to undeveloped land that will remain undeveloped. There are no modifications proposed for Pond A. Flows within this drainageway are conveyed under the existing private gravel driveway that starts at Black Forest Road via an existing private 18 inch HDPE culvert (Rec. No. 099035037). Hydraulic analysis for this culvert pipe, provided in Appendix C, shows the maximum before overtopping the gravel driveway is 18 cfs, so overtopping is anticipated in major storms. For this reason, a secondary driveway access is planned from the future Sandbagger Drive roadway extension. The scope of work for this development does not include any existing access road or culvert reconstruction in the vicinity of Country View Estates as the proposed conditions do not increase stormwater runoff in this direction.

It is demonstrated within this letter that the change in stormwater peak runoff for the minor and major storm events is considered minimal and follows the assumptions of the existing infrastructure design. No improvements or modifications are prescribed for existing infrastructure as it was assessed and deemed sufficient per county standards. Stormwater quality treatment and detention is provided for all disturbed areas by the existing off-site irrigation reservoir Pond 13 of Flying Horse North Filing No. 1 and the existing off-site full spectrum detention Pond A of Flying Horse North Filing No. 4. The existing off-site PCMs currently function as intended and will continue to function as intended. The stormwater has a suitable outfall on-site that drains downstream to off-site developments and infrastructure that will experience no negative impacts due to development of this site.

b. Major Drainageways

There are no formal major drainageways within the project boundary. The development is located within the East Cherry Creek Basin. There is not a current planning study of the drainage basin, but generally it slopes from southwest to northeast. The basin eventually flows into the South Platte River. The stormwater runoff from Basin A outfalls into Basin B. The combined area of Basin A and Basin B are captured by the full spectrum detention pond, Pond A, within Flying Horse North Filing No. 4. The stormwater runoff from Basin D is captured by the irrigation reservoir, Pond 13, within Flying Horse North Filing No. 1 which provides water quality treatment and detention. There are no anticipated negative impacts to surrounding and downstream developments, stormwater infrastructure, or drainageways.

c. Inspection and Maintenance

Inspection and maintenance to be provided by property owner to ensure private storm culverts operate as designed.

d. Grading and Erosion Control Plan

Due to the project disturbance area, a separate Grading and Erosion Control plan will be required. The Grading and Erosion Control Plan will be submitted for review and approval with subsequent submittals of this FDL.

e. Four Step Method to Minimize Adverse Impacts of Urbanization

In accordance with the *El Paso County, Colorado Drainage Criteria Manual – Chapter 7 Runoff Reduction Methods*, the site has implemented the four-step process to minimize adverse impacts of urbanization.

Step 1 – Reducing Runoff Volumes: The project site and surrounding areas are categorized as large lot (greater than 2.5 acre) single family residential, golf course, and undeveloped prairie which have low imperviousness and runoff coefficients. The developed areas are disbursed with open land areas of vegetation between which provide runoff reduction into the pervious soil. The developed condition of the Foundation site is relatively low imperviousness with use of gravel driveway and pervious soil as the stabilized corral area surface.

Step 2 – Treat and slowly release the WQCV: Water quality treatment is provided by the existing off-site water quality and detention facilities downstream. Runoff from pervious areas of the site is treated via infiltration through the pervious surrounding soil and removal of pollutants via phytoremediation before reaching the existing off-site detention ponds. The existing Filing No. 1 Irrigation Pond 13 to the northwest treats the majority of this development's runoff, and Flying Horse North Filing No. 4 Pond A to the northeast treats the remaining runoff. The existing off-site full spectrum detention ponds capture all the disturbed site area and slowly release the WQCV of the disturbed site area. The ponds are working as designed and no modifications are proposed. A map is provided in Appendix E showing the disturbed areas tributary to the existing off-site ponds and a table with a summary of the water quality treatment.

Step 3 – Stabilize stream channels: The existing tertiary drainageways are assessed for stormwater runoff capacity, velocity, and shear stress. Permanent construction control measures are to be installed as deemed necessary based on shear stress within open channel areas to stabilize the drainageways and allow for vegetative growth which assists in minimizing erosion.

Step 4 – Consider the need for source controls: No industrial uses are proposed within this development and therefore no industrial source controls are proposed. The developed area is not anticipated to have uses that would require commercial source controls such as a grease trap/interceptor at this time. Should the uses of that building change, the appropriate source controls will be implemented to meet code requirements.

f. Drainage and Bridge Fees

As of the October 2025, the East Cherry Creek Basin does not have any drainage, bridge, or pond fees and therefore no drainage basin fees are due.

g. Hydraulic Grade Line Calculations

Hydraulic Grade Line analysis for the existing 18 inch HDPE storm culvert under the existing driveway and the existing 60 inch RCP storm culvert under Rubble Drive in Flying Horse North Filing No. 4 are presented in Appendix C.

V. Summary

The Flying Horse Foundation development remains consistent with pre-development drainage conditions and planned drainage conditions. This FDL presents the layout changes to the site and the resultant drainage changes with design solutions for these revisions. The existing tertiary drainageways were assessed for developed conditions and existing downstream permanent control measures are shown to have sufficient stormwater capacity for the developed conditions. The proposed development will not adversely affect downstream stormwater infrastructure or surrounding developments and meets the latest El Paso County drainage criteria.

VI. Drawings

Please refer to the appendices for vicinity and drainage basin maps.

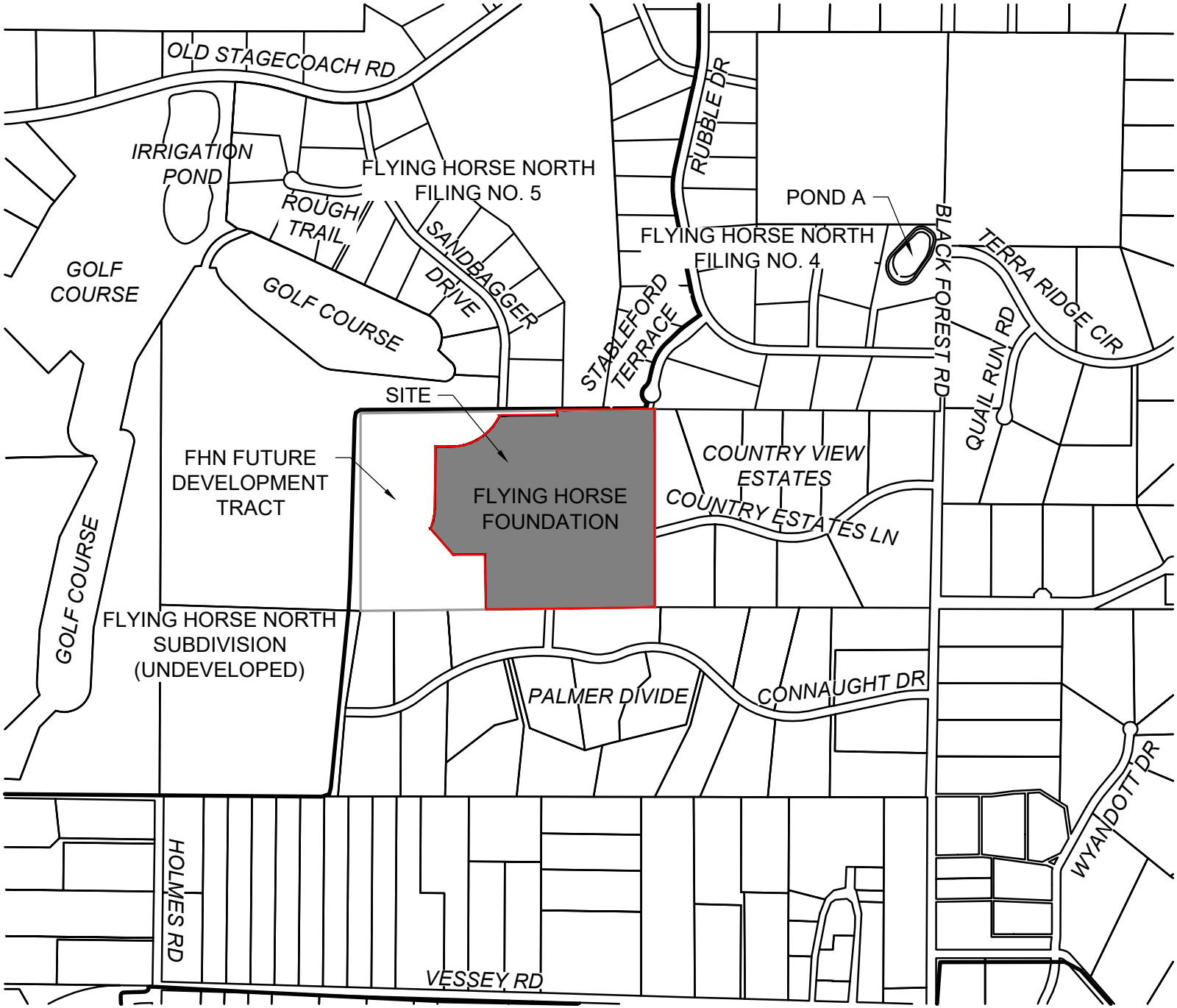
VII. References

1. El Paso County – Drainage Criteria Manual Volume 1, Revised October 2018.
2. El Paso County – Drainage Criteria Manual Volume 2, Revised October 2018.
3. Urban Storm Drainage Criteria Manual, Urban Drainage Flood Control District, January 2018.
4. “Final Drainage Report for Country View Estates”, approved December 1998 and prepared by Associated Design Professionals, Inc.
5. “Preliminary Plan Country View Estates” prepared by Associated Design Professionals, Inc.
6. “Preliminary Drainage Report for Flying Horse North Preliminary Plan and Final Drainage Report for Flying Horse North Filing No. 1”, revised June 2018 and prepared by Classic Consulting Engineers & Surveyors
7. “Flying Horse North Irrigation Reservoir Embankment Design Report” prepared August 2018 by Classic Consulting Engineers & Surveyors

APPENDIX A – VICINITY MAP, SOIL MAP, FEMA MAP

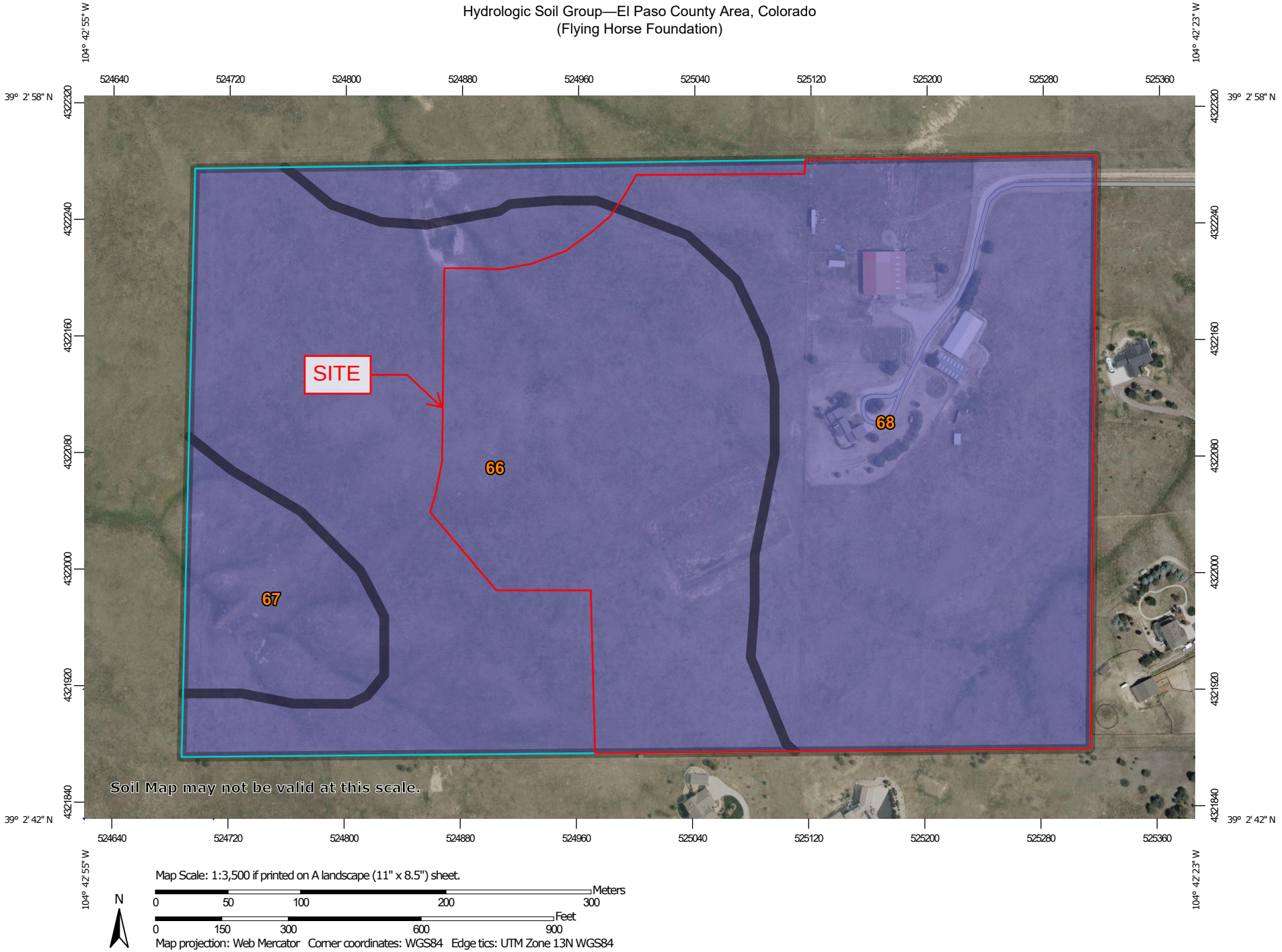
VICINITY MAP

FLYING HORSE FOUNDATION



N.T.S.

Hydrologic Soil Group—El Paso County Area, Colorado
(Flying Horse Foundation)



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

N

Meters
0 50 100 200 300

Feet
0 150 300 600 900

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

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 23, Aug 29, 2025

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

Date(s) aerial images were photographed: Jul 23, 2024—Aug 4, 2024

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
66	Peyton sandy loam, 1 to 5 percent slopes	B	32.3	51.5%
67	Peyton sandy loam, 5 to 9 percent slopes	B	4.4	7.0%
68	Peyton-Pring complex, 3 to 8 percent slopes	B	26.0	41.5%
Totals for Area of Interest			**62.7**	**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

National Flood Hazard Layer FIRMette

FEMA

104°42'57"W 39°3'5"N

104°42'20"W 39°2'37"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

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

OTHER AREAS OF FLOOD HAZARD
- 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
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

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

OTHER FEATURES
- 20.2 / 17.5 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

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

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 10/1/2025 at 4:39 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.

APPENDIX B – HYDROLOGIC CALCULATIONS

FLYING HORSE FOUNDATION
EXISTING CONDITIONS
EL PASO COUNTY, COLORADO

Calc'd by:	**CMD**
Checked by:	**RDL**
Date:	**10/1/2025**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
A	71.85	6.40	0.13	0.38	24.92	126.51
B	55.86	10.99	0.17	0.42	24.59	101.18
C	58.17	3.42	0.09	0.36	15.09	96.97
D	78.69	3.79	0.10	0.36	21.18	132.40
J	46.48	2.00	0.08	0.35	10.22	75.05
ONSITE TOTAL	40.04	3.3%	0.09	0.36	13.89	70.50
OFFSITE TOTAL	224.53	6.4%	0.13	0.38	82.11	461.59
GRAND TOTAL	311.04	5.9%	0.12	0.38	96.00	532.10

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	A	24.92	126.51	71.85	4.60
2	A, B	49.48	227.55	127.71	5.27
3	C	15.09	96.97	58.17	1.99
4	D	21.18	132.40	78.69	2.98
5	J	10.22	75.05	46.48	0.93

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FLYING HORSE FOUNDATION

EXISTING CONDITIONS

EL PASO COUNTY, COLORADO

Calc'd by:	CMD
Checked by:	RDL
Date:	10/1/2025

COMPOSITE 'C' FACTORS

BASIN	GRAVEL	ROOF	RESIDENTIAL (2.5 AC LOT)	RESIDENTIAL (5.0 AC LOT)	GOLF COURSE / UNDEVELOPED	TOTAL	SOIL TYPE	GRAVEL			ROOF			RESIDENTIAL (2.5 AC LOT)			RESIDENTIAL (5.0 AC LOT)			GOLF COURSE / UNDEVELOPED			COMPOSITE IMPERVIOUSNESS & C		
	ACRES							%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5**	C_{100}**	%I	C_5*	C_{100}*	%I	C_5	C_{100}	%I	C_5	C_{100}
A	0.33	0.28	0.00	53.17	18.07	71.85	B	80	0.59	0.70	90.00	0.71	0.81	11	0.17	0.42	7	0.14	0.39	2	0.08	0.35	6.40	0.13	0.38
B	0.00	0.00	55.73	0.13	0.00	55.86	B	80	0.59	0.70	90.00	0.71	0.81	11	0.17	0.42	7	0.14	0.39	2	0.08	0.35	10.99	0.17	0.42
C	0.00	0.00	9.08	0.13	48.96	58.17	B	80	0.59	0.70	90.00	0.71	0.81	11	0.17	0.42	7	0.14	0.39	2	0.08	0.35	3.42	0.09	0.36
D	0.00	0.21	11.94	2.89	63.86	78.69	B	80	0.59	0.70	90.00	0.71	0.81	11	0.17	0.42	7	0.14	0.39	2	0.08	0.35	3.79	0.10	0.36
J	0.00	0.00	0.00	0.00	46.48	46.48	B	80	0.59	0.70	90.00	0.71	0.81	11	0.17	0.42	7	0.14	0.39	2	0.08	0.35	2.00	0.08	0.35
TOTAL ONSITE	**0.33**	**0.28**	**0.00**	**0.00**	**39.43**	**40.04**																	**3.25%**	**0.09**	**0.36**
TOTAL OFFSITE	**0.00**	**0.21**	**76.75**	**56.32**	**91.46**	**224.53**																	**6.42%**	**0.13**	**0.38**
GRAND TOTAL	**0.33**	**0.49**	**76.75**	**56.32**	**130.89**	**264.57**																	**5.94%**	**0.12**	**0.38**

NOTES:

*Runoff coefficient determined by composite coefficient calculation utilizing lawn and impervious pavement coefficients at a 93% and 7% ratio.
*Runoff coefficient determined by composite coefficient calculation utilizing lawn and impervious pavement coefficients at a 89% and 11% ratio.

HRGreen

FLYING HORSE FOUNDATION
EXISTING CONDITIONS
EL PASO COUNTY, COLORADO

Calc'd by:	**CMD**
Checked by:	**RDL**
Date:	**10/1/2025**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL	*tc=(L/180)+10*	Design tc
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)	*tc max*	*tc design (min)*
A	0.13	71.85	300	2.08	24.2	10	2490	3.04	1.7	23.8	48.0	25.5	25.5
B	0.17	55.86	300	5.70	16.5	10	2930	3.61	1.9	25.7	42.2	27.9	27.9
C	0.09	58.17	300	4.50	19.3	10	2400	2.60	1.6	24.8	44.2	25.0	25.0
D	0.10	78.69	300	1.30	29.2	10	2400	6.70	2.6	15.5	44.6	25.0	25.0
J	0.08	46.48	300	5.00	18.9	10	2418	4.14	2.0	19.8	38.7	25.1	25.1

HRGreen

FLYING HORSE FOUNDATION
EXISTING CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by:	CMD
Checked by:	RDL
Date:	10/1/2025

		DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	
1	A	71.85	0.13	25.50	9.14	2.72	**24.92**					
2	B	55.86	0.17	27.94	9.50	2.59	**24.59**					
								26.75	18.65	2.65	**49.48**	COMBINED FLOW FROM BASINS A AND B
3	C	58.17	0.09	25.00	5.48	2.75	**15.09**					
4	D	78.69	0.10	25.00	7.69	2.75	**21.18**					
5	J	46.48	0.08	25.10	3.72	2.75	**10.22**					

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FLYING HORSE FOUNDATION
EXISTING CONDITIONS
DESIGN STORM: 100-YEAR

Calc'd by:	CMD
Checked by:	RDL
Date:	10/1/2025

		DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	
1	A	71.85	0.38	25.50	27.66	4.57	**126.51**					
2	B	55.86	0.42	27.94	23.30	4.34	**101.18**					
								26.62	50.96	4.47	**227.55**	COMBINED FLOW FROM BASINS A AND B
3	C	58.17	0.36	25.00	20.97	4.62	**96.97**					
4	D	78.69	0.36	25.00	28.64	4.62	**132.40**					
5	J	46.48	0.35	25.10	16.27	4.61	**75.05**					

FLYING HORSE FOUNDATION
PROPOSED CONDITIONS
EL PASO COUNTY, COLORADO

Calc'd by:	**CMD**
Checked by:	**RDL**
Date:	**10/1/2025**

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
A	71.36	6.22	0.13	0.38	24.52	125.39
B	55.86	10.99	0.17	0.42	24.59	101.18
C	58.17	3.42	0.09	0.36	15.09	96.97
D	79.99	5.99	0.11	0.37	24.81	138.23
J	45.67	2.00	0.08	0.35	10.04	73.74
ONSITE TOTAL	40.04	2.9%	0.09	0.35	13.76	70.35
OFFSITE TOTAL	271.00	6.3%	0.12	0.38	85.31	465.14
GRAND TOTAL	311.04	5.9%	0.12	0.38	99.07	535.49

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	A	24.52	125.39	71.36	4.44
2	A, B	49.09	226.43	127.22	5.19
3	C	15.09	96.97	58.17	1.99
4	D	24.81	138.23	79.99	4.79
5	J	10.04	73.74	45.67	0.91

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FLYING HORSE FOUNDATION

PROPOSED CONDITIONS

EL PASO COUNTY, COLORADO

Calc'd by:	CMD
Checked by:	RDL
Date:	10/1/2025

COMPOSITE 'C' FACTORS

BASIN	GRAVEL	ROOF	RESIDENTIAL (2.5 AC LOT)	RESIDENTIAL (5.0 AC LOT)	GOLF COURSE / UNDEVELOPED	TOTAL	SOIL TYPE	GRAVEL			ROOF			RESIDENTIAL (2.5 AC LOT)			RESIDENTIAL (5.0 AC LOT)			GOLF COURSE / UNDEVELOPED			COMPOSITE IMPERVIOUSNESS & C		
	ACRES							%I	C_5	C_{100}	%I	C_5	C_{100}	%I	C_5*	C_{100}*	%I	C_5**	C_{100}**	%I	C_5	C_{100}	%I	C_5	C_{100}
A	0.27	0.16	0.00	53.17	17.76	71.36	B	80	0.59	0.70	90.00	0.71	0.81	11	0.17	0.42	7	0.14	0.39	2	0.08	0.35	6.22	0.13	0.38
B	0.00	0.00	55.73	0.13	0.00	55.86	B	80	0.59	0.70	90.00	0.71	0.81	11	0.17	0.42	7	0.14	0.39	2	0.08	0.35	10.99	0.17	0.42
C	0.00	0.00	9.08	0.13	48.96	58.17	B	80	0.59	0.70	90.00	0.71	0.81	11	0.17	0.42	7	0.14	0.39	2	0.08	0.35	3.42	0.09	0.36
D	0.92	1.43	11.94	2.89	62.81	79.99	B	80	0.59	0.70	90.00	0.71	0.81	11	0.17	0.42	7	0.14	0.39	2	0.08	0.35	5.99	0.11	0.37
J	0.00	0.00	0.00	0.00	45.67	45.67	B	80	0.59	0.70	90.00	0.71	0.81	11	0.17	0.42	7	0.14	0.39	2	0.08	0.35	2.00	0.08	0.35
SITE-POND13	0.92	1.43	0.00	0.00	39.78	42.12	B	80	0.59	0.70	90.00	0.71	0.81	11	0.17	0.42	8	0.14	0.39	2	0.08	0.35	6.68	0.11	0.37
TOTAL ONSITE	**0.27**	**0.16**	**0.00**	**0.00**	**39.61**	**40.04**																	**2.88%**	**0.09**	**0.35**
TOTAL OFFSITE	**0.92**	**1.43**	**76.75**	**56.32**	**135.59**	**271.00**																	**6.31%**	**0.12**	**0.38**
GRAND TOTAL	**1.19**	**1.59**	**76.75**	**56.32**	**175.20**	**311.04**																	**5.87%**	**0.12**	**0.38**

NOTES:

*Runoff coefficient determined by composite coefficient calculation utilizing lawn and impervious pavement coefficients at a 89% and 11% ratio.

**Runoff coefficient determined by composite coefficient calculation utilizing lawn and impervious pavement coefficients at a 93% and 7% ratio.

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FLYING HORSE FOUNDATION
PROPOSED CONDITIONS
EL PASO COUNTY, COLORADO

Calc'd by:	**CMD**
Checked by:	**RDL**
Date:	**10/1/2025**

TIME OF CONCENTRATION

BASIN DATA			OVERLAND TIME (T_i)			TRAVEL TIME (T_t)					TOTAL	*tc=(L/180)+10*	Design tc
DESIGNATION	C_5	AREA (ac)	LENGTH (ft)	SLOPE %	t_i (min)	C_V	LENGTH (ft)	SLOPE %	V (ft/s)	t_t (min)	t_c (min)	*tc max*	*tc design (min)*
A	0.13	71.36	300	2.08	24.2	10	2490	3.04	1.7	23.8	48.0	25.5	25.5
B	0.17	55.86	300	5.70	16.5	10	2930	3.61	1.9	25.7	42.2	27.9	27.9
C	0.09	58.17	300	4.50	19.3	10	2400	2.60	1.6	24.8	44.2	25.0	25.0
D	0.11	79.99	300	4.50	19.0	10	2400	2.60	1.6	24.8	43.8	25.0	25.0
J	0.08	45.67	300	5.00	18.9	10	2418	4.14	2.0	19.8	38.7	25.1	25.1

HRGreen

FLYING HORSE FOUNDATION
PROPOSED CONDITIONS
DESIGN STORM: 5-YEAR

Calc'd by:	CMD
Checked by:	RDL
Date:	10/1/2025

		DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
DESIGN POINT	BASIN ID	AREA (ac)	C_5	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_5*A (ac)	I (in./ hr.)	Q (cfs)	
1	A	71.36	0.13	25.50	9.00	2.72	**24.52**					
2	B	55.86	0.17	27.94	9.50	2.59	**24.59**					
								26.76	18.50	2.65	**49.09**	COMBINED FLOW FROM BASINS A AND B
3	C	58.17	0.09	25.00	5.48	2.75	**15.09**					
4	D	79.99	0.11	25.00	9.01	2.75	**24.81**					
5	J	45.67	0.08	25.10	3.65	2.75	**10.04**					

HRGreen

FLYING HORSE FOUNDATION
PROPOSED CONDITIONS
DESIGN STORM: 100-YEAR

Calc'd by:	CMD
Checked by:	RDL
Date:	10/1/2025

		DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
DESIGN POINT	BASIN ID	AREA (ac)	C_{100}	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	t_c (min)	C_{100}*A (ac)	I (in./ hr.)	Q (cfs)	
1	A	71.36	0.38	25.50	27.42	4.57	**125.39**					
2	B	55.86	0.42	27.94	23.30	4.34	**101.18**					
								26.62	50.71	4.46	**226.43**	COMBINED FLOW FROM BASINS A AND B
3	C	58.17	0.36	25.00	20.97	4.62	**96.97**					
4	D	79.99	0.37	25.00	29.90	4.62	**138.23**					
5	J	45.67	0.35	25.10	15.98	4.61	**73.74**					

APPENDIX C – HYDRAULIC CALCULATIONS

Culvert Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Apr 16 2025

DP1 100-Yr WSEL - Existing 18 IN. HDPE Culvert

Invert Elev Dn (ft)	=	7560.54
Pipe Length (ft)	=	50.62
Slope (%)	=	2.88
Invert Elev Up (ft)	=	7562.00
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
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

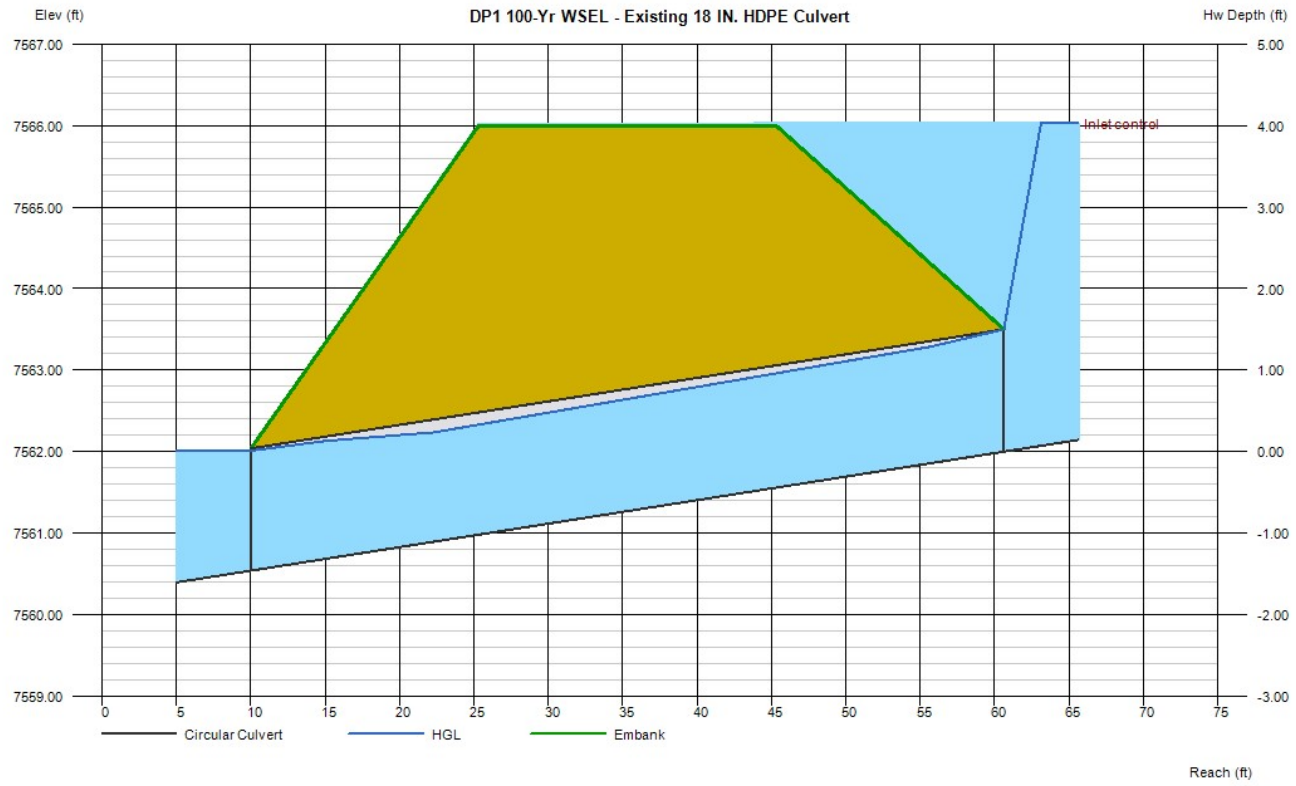
Top Elevation (ft)	=	7566.00
Top Width (ft)	=	20.00
Crest Width (ft)	=	50.00

Calculations

Qmin (cfs)	=	18.00
Qmax (cfs)	=	18.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	18.00
Qpipe (cfs)	=	17.24
Qovertop (cfs)	=	0.76
Veloc Dn (ft/s)	=	9.80
Veloc Up (ft/s)	=	9.88
HGL Dn (ft)	=	7562.01
HGL Up (ft)	=	7563.44
Hw Elev (ft)	=	7566.03
Hw/D (ft)	=	2.69
Flow Regime	=	Inlet Control



Culvert Report

Culvert 2 (DPA4) capacity calculation from Flying Horse North Filing No. 4 FDR.

Culvert 2 - DPA4 (100-Year)

Invert Elev Dn (ft)	=	7545.83
Pipe Length (ft)	=	210.30
Slope (%)	=	1.19
Invert Elev Up (ft)	=	7548.34
Rise (in)	=	60.0
Shape	=	Circular
Span (in)	=	60.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

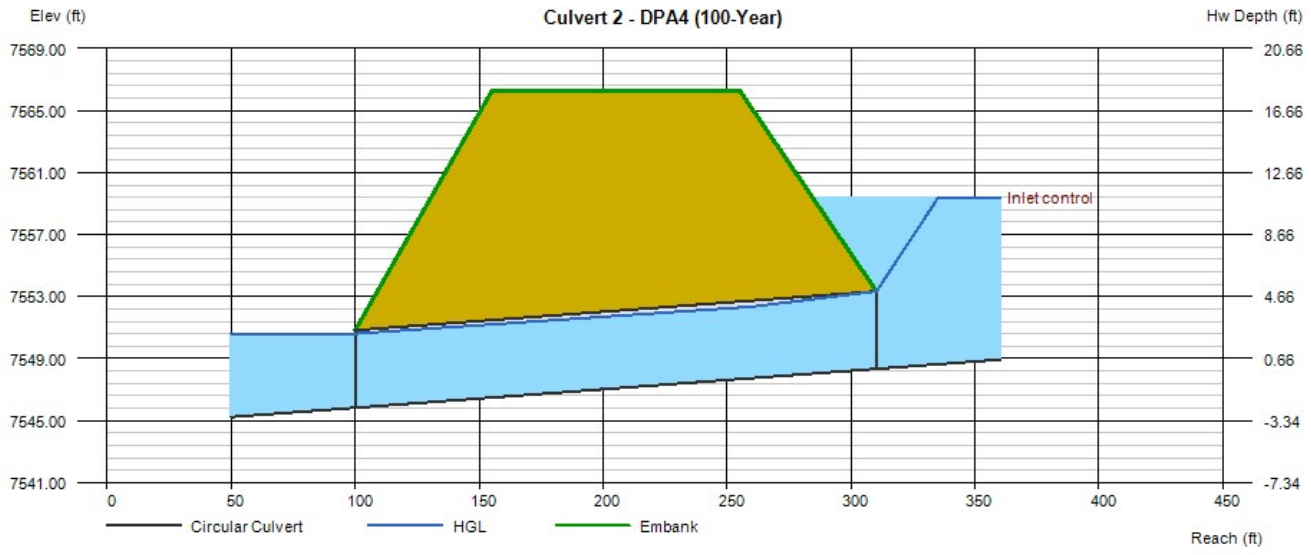
Top Elevation (ft)	=	7566.27
Top Width (ft)	=	100.00
Crest Width (ft)	=	270.00

Calculations

Qmin (cfs)	=	274.00
Qmax (cfs)	=	274.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	274.00
Qpipe (cfs)	=	274.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	14.18
Veloc Up (ft/s)	=	14.59
HGL Dn (ft)	=	7550.61
HGL Up (ft)	=	7552.90
Hw Elev (ft)	=	7559.41
Hw/D (ft)	=	2.21
Flow Regime	=	Inlet Control



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Oct 1 2025

Channel Section I1 - Pr. 5 Yr Storm Event

Trapezoidal

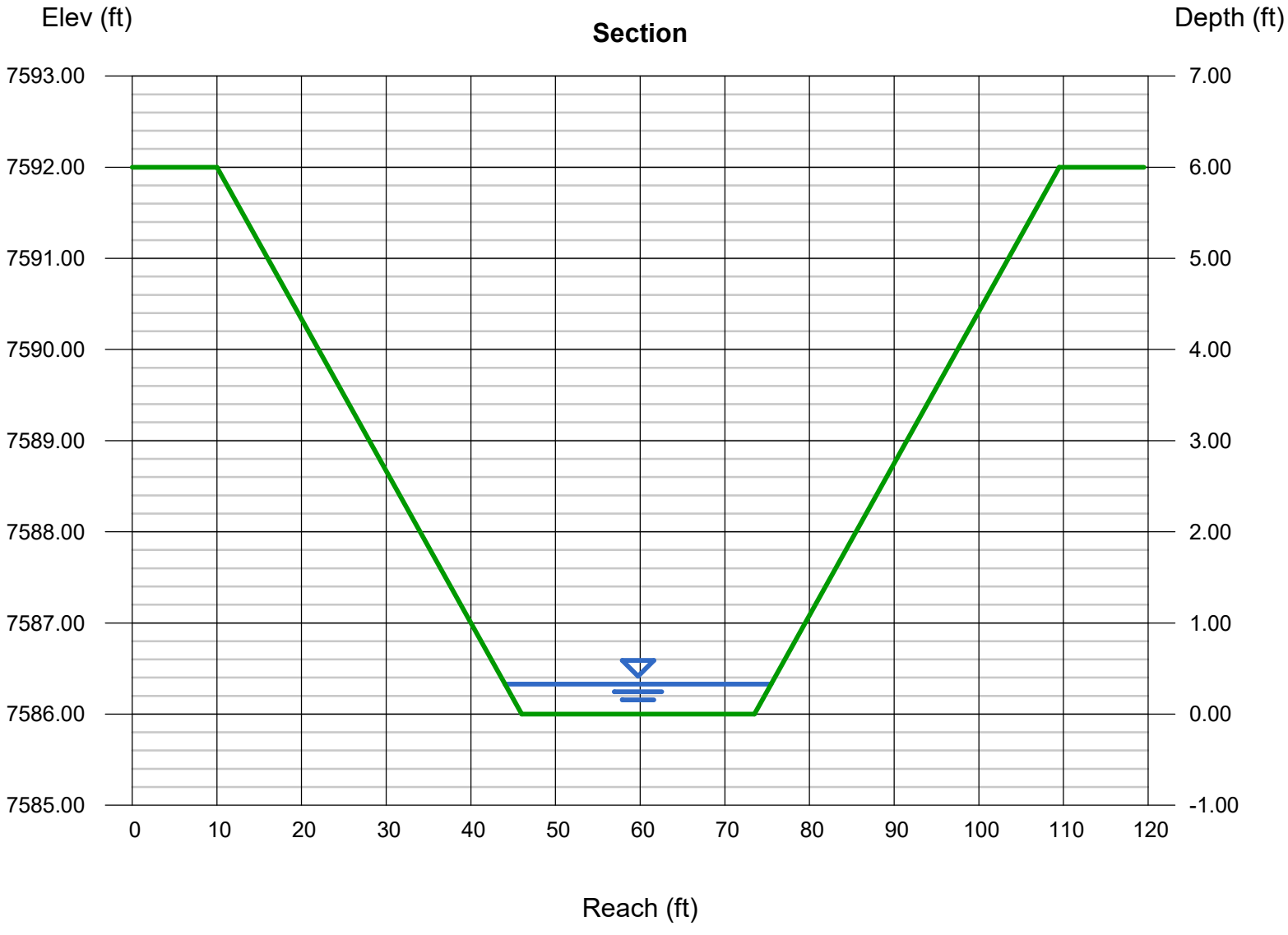
Bottom Width (ft)	= 27.50
Side Slopes (z:1)	= 6.00, 6.00
Total Depth (ft)	= 6.00
Invert Elev (ft)	= 7586.00
Slope (%)	= 3.90
N-Value	= 0.050

Calculations

Compute by:	Known Q
Known Q (cfs)	= 24.81

Highlighted

Depth (ft)	= 0.33
Q (cfs)	= 24.81
Area (sqft)	= 9.73
Velocity (ft/s)	= 2.55
Wetted Perim (ft)	= 31.51
Crit Depth, Yc (ft)	= 0.29
Top Width (ft)	= 31.46
EGL (ft)	= 0.43



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Oct 1 2025

Channel Section I1 - Pr. 100 Yr Storm Event

Trapezoidal

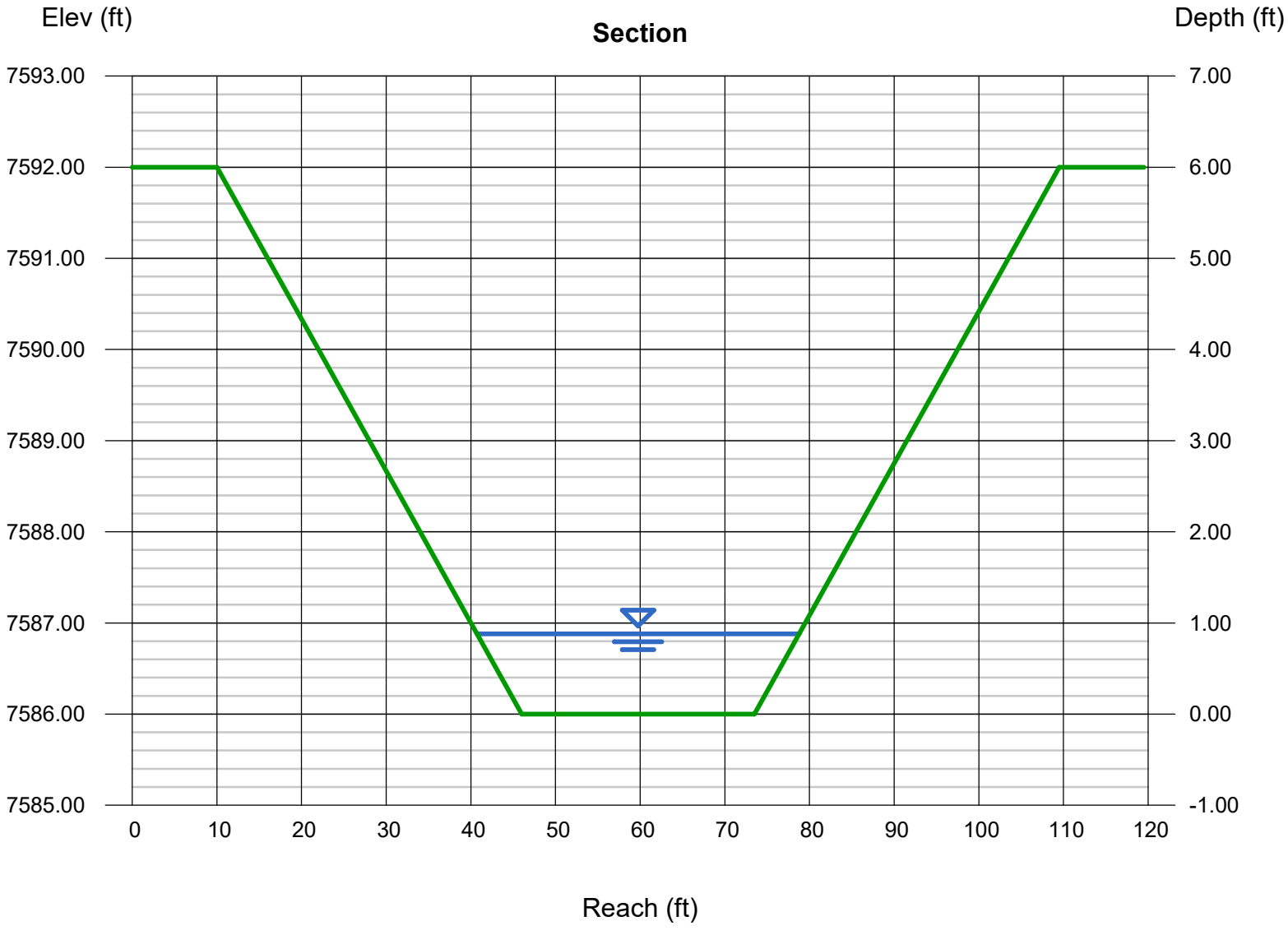
Bottom Width (ft)	= 27.50
Side Slopes (z:1)	= 6.00, 6.00
Total Depth (ft)	= 6.00
Invert Elev (ft)	= 7586.00
Slope (%)	= 3.90
N-Value	= 0.050

Calculations

Compute by:	Known Q
Known Q (cfs)	= 138.23

Highlighted

Depth (ft)	= 0.88
Q (cfs)	= 138.23
Area (sqft)	= 28.85
Velocity (ft/s)	= 4.79
Wetted Perim (ft)	= 38.21
Crit Depth, Yc (ft)	= 0.87
Top Width (ft)	= 38.06
EGL (ft)	= 1.24



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Oct 1 2025

Channel Section I2 - Pr. 5 Yr Storm Event

User-defined

Invert Elev (ft)	= 7552.00
Slope (%)	= 3.00
N-Value	= 0.050

Calculations

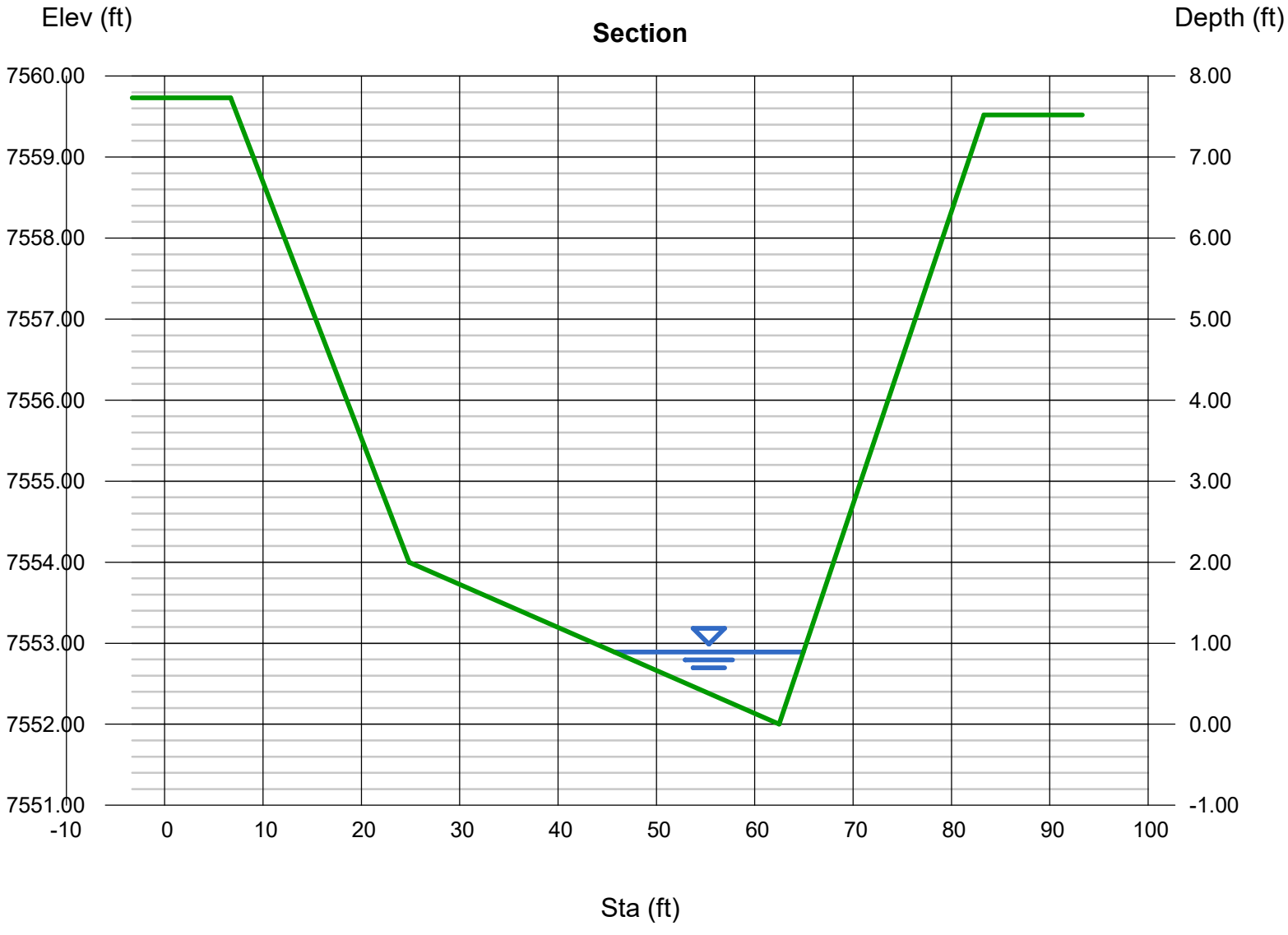
Compute by:	Known Q
Known Q (cfs)	= 24.81

Highlighted

Depth (ft)	= 0.89
Q (cfs)	= 24.81
Area (sqft)	= 8.55
Velocity (ft/s)	= 2.90
Wetted Perim (ft)	= 19.38
Crit Depth, Yc (ft)	= 0.81
Top Width (ft)	= 19.20
EGL (ft)	= 1.02

(Sta, El, n)-(Sta, El, n)...

(6.70, 7559.73)-(24.86, 7554.00, 0.050)-(62.47, 7552.00, 0.050)-(83.30, 7559.52, 0.050)



Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Wednesday, Oct 1 2025

Channel Section I2 - Pr. 100 Yr Storm Event

User-defined

Invert Elev (ft)	= 7552.00
Slope (%)	= 3.00
N-Value	= 0.050

Calculations

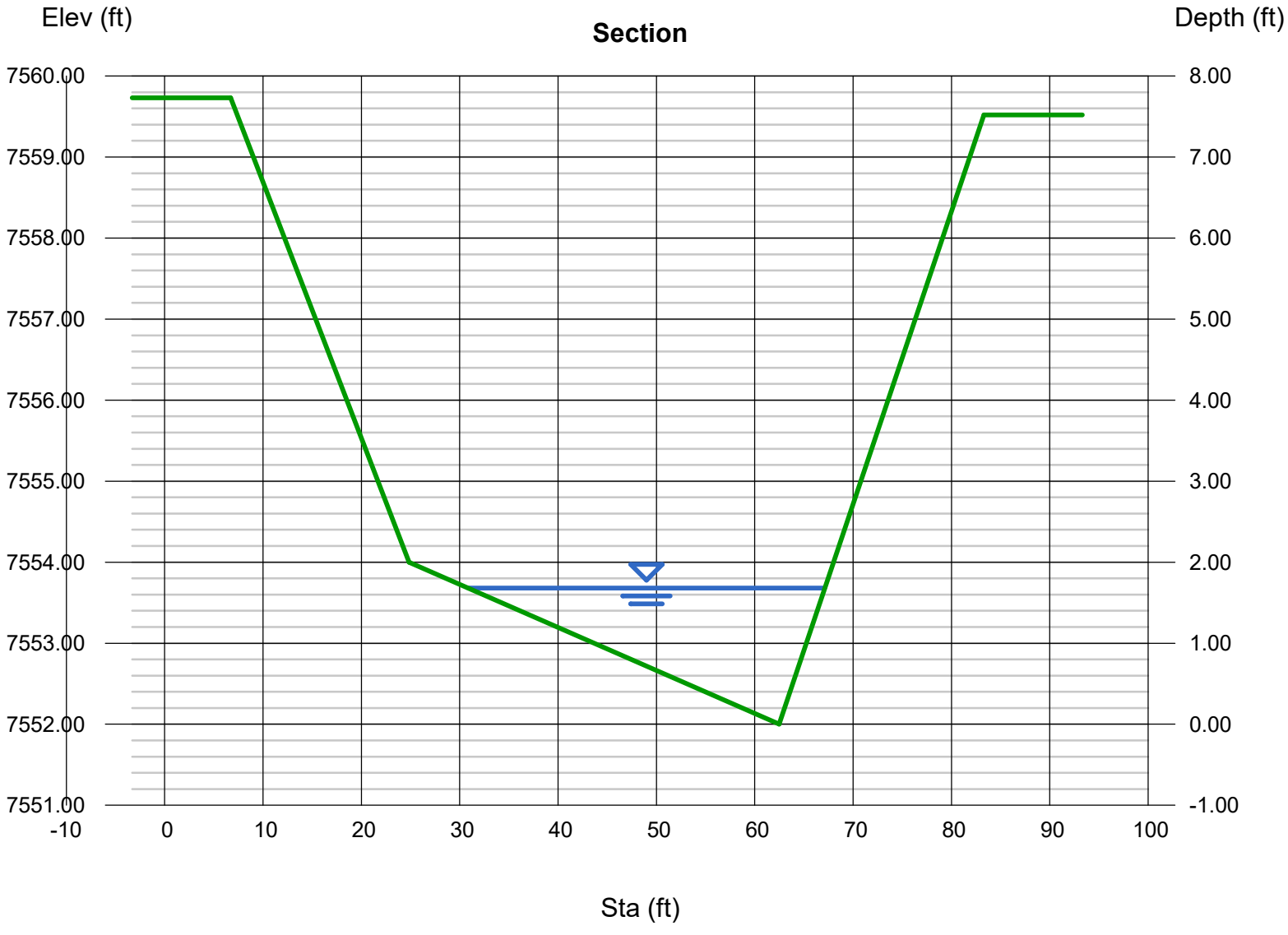
Compute by:	Known Q
Known Q (cfs)	= 138.23

Highlighted

Depth (ft)	= 1.68
Q (cfs)	= 138.23
Area (sqft)	= 30.45
Velocity (ft/s)	= 4.54
Wetted Perim (ft)	= 36.59
Crit Depth, Yc (ft)	= 1.60
Top Width (ft)	= 36.25
EGL (ft)	= 2.00

(Sta, El, n)-(Sta, El, n)...

(6.70, 7559.73)-(24.86, 7554.00, 0.050)-(62.47, 7552.00, 0.050)-(83.30, 7559.52, 0.050)



Riprap Sizing - Southeastern Swale				
q (cfs/ft)	S (ft/ft)	C_f	n	D_{50} min. (in)
4.00	0.023	2	0	3.92

Type VL Riprap (D_{50} = 6") will be utilized for the outlet protection.

$$D_{50} = 5.23\ S^{0.43}\ (1.35 C_f\ q)^{0.56}$$ Equation 13-9

Where:

D_{50} = median rock size (in)
S = longitudinal slope (ft/ft)
C_f = concentration factor (1.0 to 3.0)
q = unit discharge (cfs/ft)

When:

η (porosity) = 0.0 (i.e., for buried soil riprap)

APPENDIX D – REFERENCE MATERIAL

2339

FINAL

DRAINAGE REPORT

FOR

COUNTRY VIEW ESTATES

Prepared For:
Northgate Investment
940 Carlson Drive
Colorado Springs, CO 80916

Prepared By:
Associated Design Professionals, Inc.
1861 Austin Bluffs Parkway, Suite 101
Colorado Springs, Colorado 80918
(719) 266-5212

October 15, 1998
980308

ADP
Associated Design Professionals, Inc.

ENGINEERS STATEMENT:

The attached drainage plan and report were prepared under my direction and supervision 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 City/County for drainage reports and said report is in conformity with the 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.

Michael A. Bartusek, P.E., #23329

DEVELOPER'S STATEMENT:

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

Northgate Investments
Business Name

By: _____

Title: Manager

Address: 940 Carlson Drive
Colorado Springs, CO 80916

EL PASO COUNTY:
Filed in accordance with Section 51.1 of the El Paso Land Development Code, as amended.

John A. McCarty, P.E.
County Engineer/Manager

12-30-98
Date

Conditions:

COUNTRY VIEW ESTATES
FINAL DRAINAGE REPORT

GENERAL

This is a drainage study for a 60.41 acre site described as being in the Southeast quarter of Section 31, Township 11 South, Range 65 West of the 6TH PM. The site is located within the Cherry Creek Basin, Northeast of Colorado Springs in Black Forest, Colorado, El Paso County. The site is a proposed subdivision consisting of eleven lots no smaller than five acres. This study will consider the impact, if any, on the existing development and neighboring properties.

The site is located west of Black Forest Road on the proposed public road, Country View Lane. No portion of the site is located within a designated FEMA 100-year floodplain as designated on Map No. 080059-0045B dated December 16, 1986. According to the El Paso County Area Soil Survey, the soil on the site is classified as a Peyton-Pring complex. This soil can be described as having a moderate permeability, slow to medium surface runoff and moderate hazard of erosion. The soil classification is B.

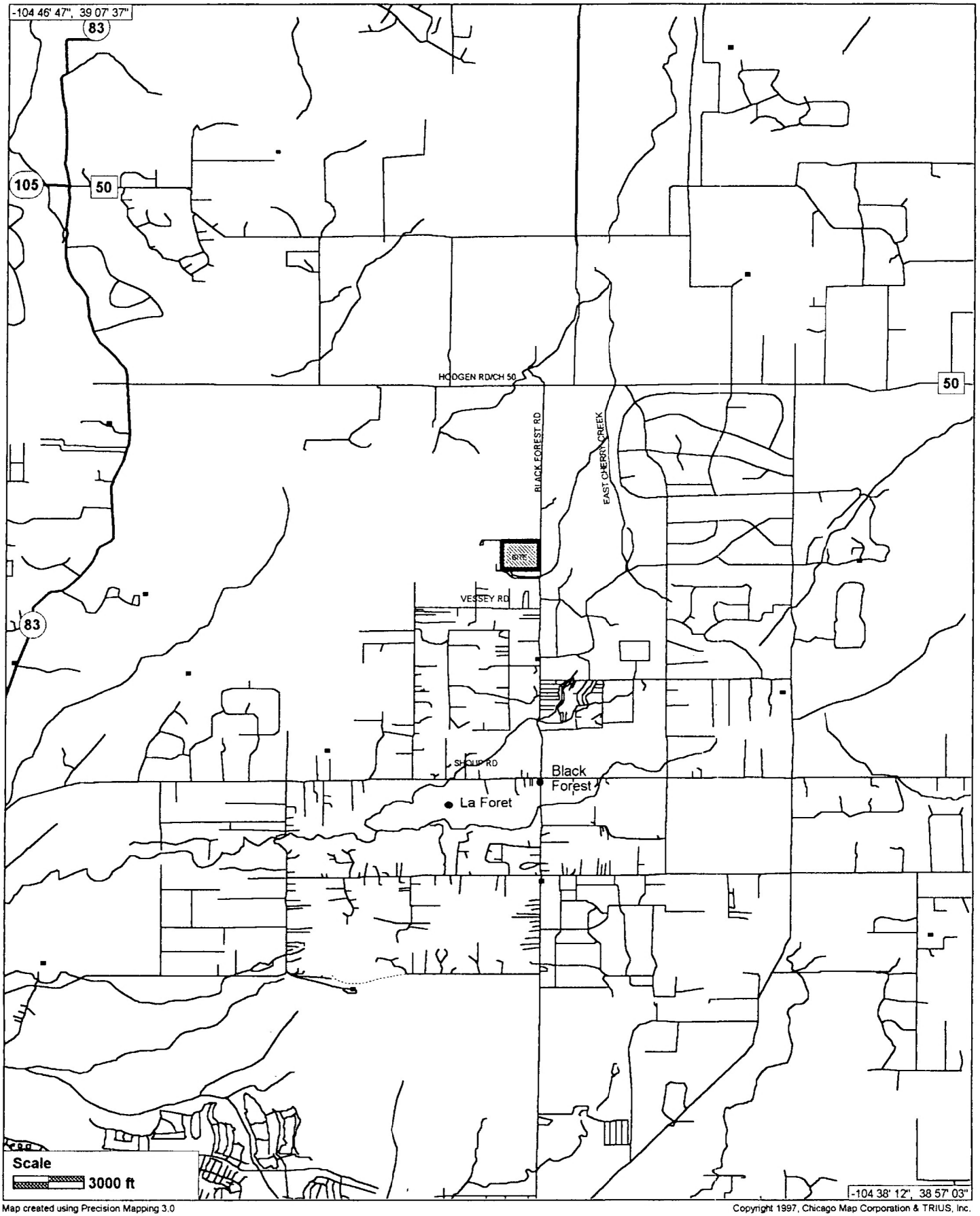
METHOD OF COMPUTATIONS:

The Methodology utilized for this report is in accordance with the City/County Drainage Criteria Manual. The Rational Method for computation of runoff was used.

$$Q = cia$$

Where Q = maximum rate of runoff in cubic feet per second
c = runoff coefficient representing drainage area characteristics
I = average rainfall intensity, in inches per hour, for the duration required for the runoff to become established
a = drainage basin size in acres

COUNTRY VIEW ESTATES - VICINITY MAP



Map created using Precision Mapping 3.0

EXISTING DRAINAGE CHARACTERISTICS

The site is currently undeveloped and has been utilized as pasture land. It is currently vegetated by range land grasses. Grades on the site vary from four to ten percent. Since no overlot grading will occur on the site, there will be no difference between the boundaries for existing conditions and developed conditions. The only difference will be the time of concentrations. Basin A drains southerly through overland flow to the Black Forest Road Ditch which continues south. Off-site Basin OS1 combines with Basin B and drains easterly to an existing 30-inch CMP across Black Forest Road. Basins C and J drain north by overland flow to natural swales dividing the basins. Off-site Basin OS3 combines with Basin F and flows into the westerly pond site. Basins OS2, D, E, G, H and I combine with the flows from the westerly pond site and flows into the eastern pond site. Flow from the pond sites travel to the north across an existing driveway through an existing 18-inch HDPE. This flow continues northerly approximately 1500 linear feet where it crosses Black Forest Road.

Based on the existing conditions of the site, the following storm flows will result:

Sub-Basin	5-Year Flow (CFS)	100-Year Flow (CFS)	Accumulated Flows 5-Year	Accumulated Flows 100-Year
A	0.5	1.2	--	--
B	7.2	17.5	13.7	33.4
C	1.2	3.0	--	--
D	5.9	14.3	6.7	16.3
E	3.3	8.2	--	--
F	5.3	12.9	22.3	54.5
G	2.2	5.3	--	--
H	1.2	2.9	4.2	10.4
I	9.1	22.2	28.2	69.1
J	6.6	16.1	31.6	77.2
OS1	1.7	4.1	--	--
OS2	1.7	4.1	--	--
OS3	19.0	46.5	--	--

Cumulative flow at the existing driveway before development equal 31.6 CFS for a 5-year storm and 77.2 CFS for a 100-year storm. The combined flows leaving Basin B at Black Forest Road is estimated to be 13.7 CFS for a 5-year storm and 33.4 for a 100-year storm.

PROPOSED DRAINAGE CHARACTERISTICS

The proposed development will consist of the construction of Country View Lane and the development of 11 lots. This development will consist of a single family dwelling and drive for each lot. There will be ditches constructed on each side of Country View Lane to intercept flows along the roadway. Two pipes will be installed across the new roadway. These pipes will convey the 100-year storm event with 3.3 CFS intercepted by an 18-inch CMP in the eastern pipe and 17.4 CFS intercepted in a 24-inch CMP in the western pipe. A 2-inch bottom ditch will be constructed around the proposed cul-de-sac to intercept flow from the existing swale from the south in Basin E of 9.0 CFS for the 100 year flow. Estimated flow depth in the ditch will be 0.5 ft. A portion of this ditch will be riprap lined along the north side of the cul-de-sac.

As detailed in the Existing Conditions section, there will be no changes to the existing drainage patterns due to this project. The proposed roadway will bisect the existing drainage basins; however, flow will continue northerly through two (2) culverts and join back into the existing swales. Basin A will not be affected by this subdivision. Basin OS1 combines with Basin B and continues flowing across Black Forest Road through the existing 30-inch CMP. The 100-year flow is estimated at 34.7 CFS, 1.3 CFS greater than existing.

Basin C flows will be intercepted by the Country View Lane roadside ditches and transported through a proposed 18-inch CMP. The 100-year flow of 3.3 CFS will continue through Basin J in an existing natural swale.

The off-site Basin OS2 will continue flowing through Basin D. The combined flow of 17.4 CFS for the 100-year storm will be directed into roadside ditches and then cross the roadway

in a 24-inch CMP. This flow will continue northerly through Basin I within a ten-foot natural swale.

Basin E will be intercepted by the proposed cul-de-sac ditch and be directed around the roadway within a riprap-lined ditch. The 100-year flow of 9.0 CFS will be directed to a natural swale within Basin H. These flows will continue northerly until they intersect with the easterly swale.

The off-site Basin OS3 combines with flows from Basin F through an existing swale. These flows drained through an existing stock pond, which has been removed. From this point, the existing swale turns easterly and travels through Basin G. The 100-year flow at this point is 63.6 CFS. This flow will continue easterly and combine with flows from Basins H and I. The combined flow of 71.9 CFS for the 100-year storm will flow through another existing pond site, which has been removed. These flows continue to an existing 18-inch HDPE along the northerly drive.

Based on the developed conditions of the site, the following storm flows will result:

Sub-Basin	5-Year Flow (CFS)	100-Year Flow (CFS)	Accumulated Flows 5-Year	Accumulated Flows 100-Year
A	0.5	1.2	--	--
B	8.2	19.3	14.4	34.7
C	1.4	3.3	--	--
D	6.4	15.2	7.3	17.4
E	3.8	9.0	--	--
F	6.0	14.2	22.8	55.4
G	2.5	5.9	23.2	56.2
H	1.4	3.2	4.8	11.4
I	10.3	24.4	29.9	71.9
J	7.5	17.8	33.7	80.9
OS1	8.3	20.3	--	--
OS2	1.7	4.1	--	--
OS3	19.0	46.5	--	--

Cumulative developed flow from this site, coming into the 18-inch pipe beneath the existing driveway is equal to 33.7 CFS for a 5-year storm and 80.9 CFS for a 100-year storm. The

developed cumulative flows to the 30-inch CMP under Black Forest Road is 14.4 CFS for a 5-year storm and 34.7 CFS for a 100-year storm.

DRAINAGE IMPROVEMENT COSTS

The drainage facilities proposed under this Drainage Report are in accordance with the requirements of the City/County Drainage Manual. The proposed non-reimbursable drainage improvements are as follows:

Description	Quantity
18" CMP	54 LF
24" CMP	60 LF
Riprap Type L	115 CY

For improvements costs, see the attached signed Bid from Lacy Excavating, Inc.

EROSION CONTROL COSTS

No overlot grading will be performed within this subdivision; therefore, the erosion control measures proposed are only for grading necessary to construct Country View Lane and the associated drainage improvements. These erosion control items are delineated on the Roadway Construction plans. The estimated erosion control costs are as follows:

Item	Quantity	Unit Cost	Cost
Silt Fence	1,600 LF	$2/LF	$3,200
Ditch Checks	3 Each	$20/EA	60
Reseeding	2.5 Acres	$1,000/AC	2,500
		Total	$5,760

Associated Design Professionals, Inc. cannot, and does not, guarantee that the construction cost will not vary from these opinions of probable construction costs. These opinions represent our best judgment as design professionals familiar with the construction industry and this development. The Bid from Lacy Excavating, Inc. also includes the costs for erosion control.

SUMMARY

The site drainage will cause no damage to adjacent property owners. The drainage pattern is not being changed. Riprap areas will be placed at the downstream end of the proposed culverts to prevent erosion. The existing North Drive is proposed to be raised three inches in the area of the 18-inch culvert to prevent overtopping of the roadway. The estimated flow increase at the north drive for the 100-year storm is 0.1 CFS, which represents a negligible flow increase. The existing pond sites have been eliminated and will be seeded as part of this project. No overlot grading will take place. No other improvements are required to avoid damage to adjacent properties. All areas disturbed by construction will be reseeded and erosion control measures will be installed during construction of the proposed road and homesites.

LACY EXCAVATING, INC.
2180 Victor Place
Colorado Springs CO 80915
(719) 570-7176 FAX (719) 574-6333

PROJECT	Countryview Estates	BID DATE:	10/28/98
	Blackforest Colorado		

			YES	NO
		F.O.B. Jobsite	XXX	
Submitted to:	R.B.J. Enterprises	Installed	XXX	
Contact:	Rudy	Tax Inc.	XXX	
Address:		Posted/Prevailing wage		
	Street	Is bond included?		
		Can you bond project?		
	CITY STATE ZIP CODE	Bond Rate/Cost		
		MBE WBE DBE		
PHONE:	FAX:	Addenda / None		

	DESCRIPTION	BID AMOUNT
	Strip and grade road ditch	$24,500.00
	Road base/delivery, and grader	Inc.
	Reseeding slopes, cut areas	Inc.
	Two Culverts	$2,066.00
	Install Rip Rap at end of culverts	Inc.
	Silt Fence per D.O.T. regulations	

	YES	NO		
Per Plans & Specs			Total Bid	$26,566.00

SPECIFIC QUALIFICATIONS OR EXCLUSIONS:

EXCLUDES:	

Alt. No.	Description	Amt. Add/Deduct

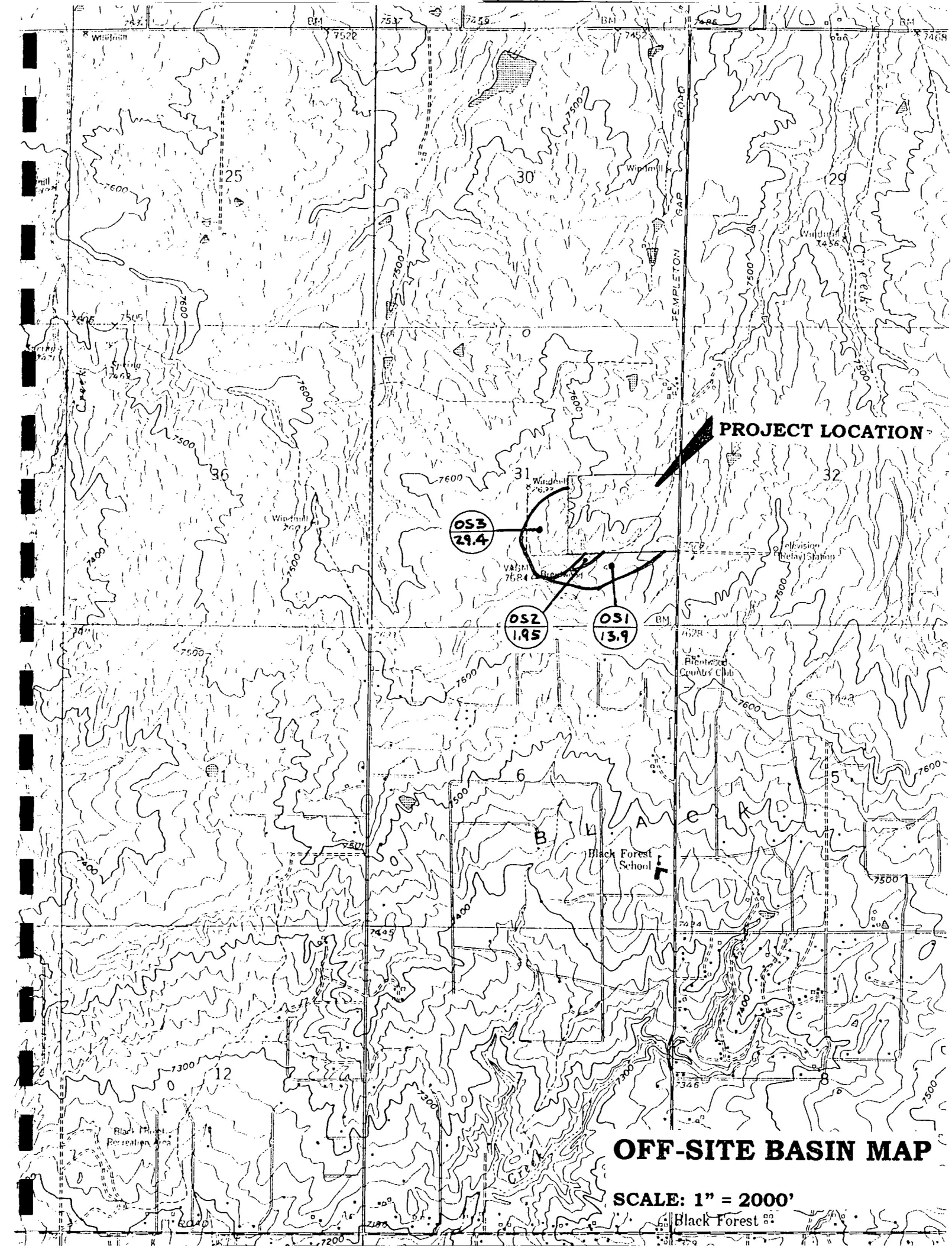
Mark Underwood

Bidder's Authorized Signature
Michael W. Underwood

President
Title

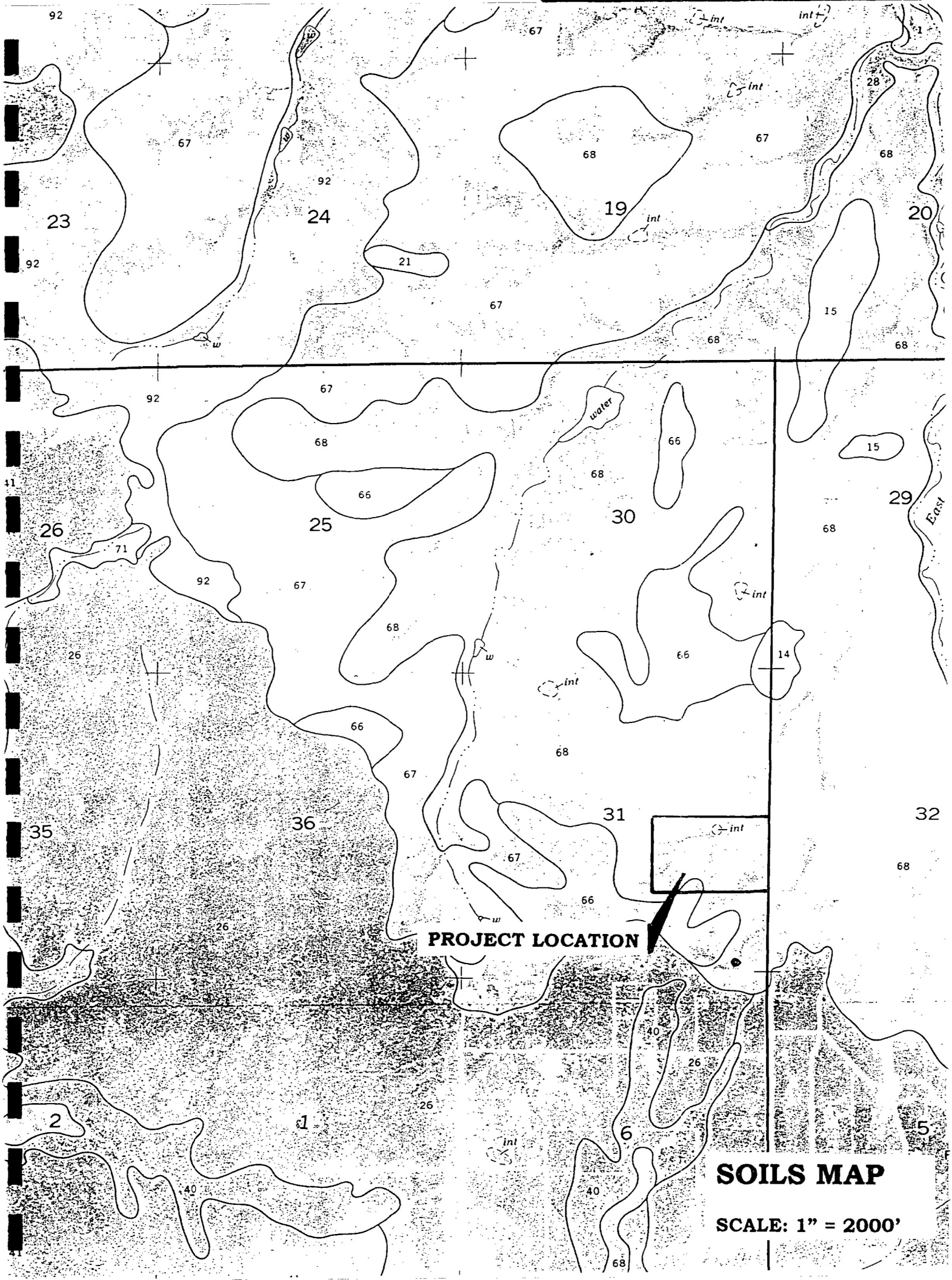
Appendix A

Design Calculations



OFF-SITE BASIN MAP

SCALE: 1" = 2000'


PROJECT LOCATION
SOILS MAP
SCALE: 1" = 2000'
water
East
int
w

CARDER CONCRETE PRODUCTS COMPANY
8311 W. CARDER CT.
LITTLETON, CO 80125
(303) 791-1600 (303) 791-1710 FAX

DATE PAGE of

AVERAGE 'C' FACTOR CALCULATION

5 ACRE LOTS = 217,800 SF

DRIVEWAY - 100' X 20' = 2,000 SF $C_5 = 0.8$ $C_{100} = 0.85$

HOUSE - = 4000 SF $C_5 = 0.9$ $C_{100} = 0.95$

ROADWAY - 300' (AVG) X 16' = 4800 SF $C_5 = 0.9$ $C_{100} = 0.95$

10,800 SF

UNDEVELOPED LAND = 217,800 - 10,800 = 207,000 SF $C_5 = 0.25$ $C_{100} = 0.35$

AVG C_5

$$\frac{2000 \times 0.8 + 4000 \times 0.9 + 4800 \times 0.9 \times 207,000 \times 0.25}{217,800} = 0.28$$

AVG C_{100}

$$\frac{2000 \times 0.85 + 4000 \times 0.95 + 4800 \times 0.95 + 207,000 \times 0.35}{217,800} = 0.38$$

By _____

COUNTRY VIEW ESTATES

PROJ. #980306

DRAINAGE CALCULATION SHEET

08/17/98

							Initial Tci			Travel Time								length	vel.		
AREA DESIG.	AREA (acre)	C5 (5 yr)	C100 (100 yr)	C5 X A	C100 X A	L (ft)	Slope (%)	ti (min)	L (ft)	Slope (%)	V (fps)	Tt (min)	TC (min)	I5 (in/hr)	I100 (in/hr)	Q5 (cfs)	Q100 (cfs)	L (feet)	V (fps)	^t (min)	AREA DESIG.
EXISTING CONDITIONS																					
A	0.53	0.25	0.35	0.13	0.19	250	8.00	12.65	0	1.00	1.00	0.00	12.65	3.65	6.38	0.48	1.18				
OS1	13.90	0.25	0.35	3.48	4.87	500	4.00	22.49	1300	5.40	3.60	6.02	28.51	2.39	4.17	8.30	20.30	750	3.0	4.17	OS1
B	10.93	0.25	0.35	2.73	3.83	500	5.60	20.13	750	4.30	3.00	4.17	24.30	2.62	4.57	7.16	17.50				B
DP 1				6.21	8.69								32.68	2.20	3.85	13.67	33.44				DP 1
C	1.44	0.25	0.35	0.36	0.50	250	5.00	14.78	0	1.00	1.00	0.00	14.78	3.40	5.94	1.22	2.99	750	3.2	3.91	C
OS2	1.95	0.25	0.35	0.49	0.68	200	4.00	14.23	0	1.00	1.00	0.00	14.23	3.46	6.04	1.69	4.13	800	3.3	4.04	OS2
D	6.79	0.25	0.35	1.70	2.38	200	6.00	12.44	375	4.70	3.30	1.89	14.34	3.45	6.02	5.85	14.31				D
DP 2				2.19	3.06								18.27	3.06	5.34	6.68	16.33	650	3.2	3.39	DP 2
E	3.76	0.25	0.35	0.94	1.32	200	8.50	11.09	420	4.30	3.00	2.33	13.43	3.56	6.21	3.34	8.17	400	3.7	1.80	E
H	1.30	0.25	0.35	0.33	0.46	200	7.50	11.56	250	5.60	3.70	1.13	12.69	3.65	6.38	1.19	2.90				H
DP 3				1.27	1.77								15.23	3.35	5.85	4.24	10.36				DP 3
OS3	29.40	0.25	0.35	7.35	10.29	500	4.00	22.49	600	8.00	4.30	2.33	24.82	2.59	4.52	19.02	46.51	600	3.4	2.94	OS3
F	7.30	0.25	0.35	1.83	2.56	500	8.00	17.89	400	3.25	2.70	2.47	20.36	2.89	5.04	5.27	12.88				F
DP 4				9.18	12.85								27.76	2.43	4.24	22.27	54.45	250	1.3	3.21	DP 4
G	2.83	0.25	0.35	0.71	0.99	520	8.00	18.25	0	1.00	1.00	0.00	18.25	3.06	5.34	2.16	5.29				G
OS3-G				9.88	13.84								30.97	2.28	3.97	22.49	54.99				OS3-G
DP5				11.15	15.61								30.97	2.28	3.97	25.37	62.03	630	1.3	8.08	DP5
I	12.63	0.25	0.35	3.16	4.42	450	8.00	16.98	475	2.00	2.20	3.60	20.57	2.87	5.01	9.06	22.16				I
DP 6				14.31	20.03								39.04	1.97	3.45	28.24	69.05	200	1.3	2.56	DP 6
J	9.39	0.25	0.35	2.35	3.29	500	6.40	19.26	300	2.00	2.20	2.27	21.53	2.80	4.89	6.57	16.07				J
DP 7				16.65	23.31								41.61	1.90	3.31	31.58	77.21				DP 7

							Initial Tci			Travel Time								length	vel.		
AREA	AREA	C5	C100	C5 X A	C100 X A		Slope	ti		Slope	V	Tt	TC	I5	I100	Q5	Q100	L	V	^t	AREA
DESIG.	(acre)	(5 yr)	(100 yr)			L (ft)	(%)	(min)	L (ft)	(%)	(fps)	(min)	(min)	(in/hr)	(in/hr)	(cfs)	(cfs)	(feet)	(fps)	(min)	DESIG.
DEVELOPED CONDITIONS																					
A	0.53	0.25	0.35	0.13	0.19	250	8.00	12.65	0	1.00	1.00	0.00	12.65	3.65	6.38	0.48	1.18				
OS1	13.90	0.25	0.35	3.48	4.87	500	4.00	22.49	1300	5.40	3.60	6.02	28.51	2.39	4.17	8.30	20.30	750	3.0	4.17	OS1
B	10.93	0.28	0.38	3.06	4.15	500	5.60	19.42	750	4.30	3.00	4.17	23.59	2.66	4.65	8.15	19.32				B
DP 1				6.54	9.02								32.68	2.20	3.85	14.40	34.70				DP 1
C	1.44	0.28	0.38	0.40	0.55	250	5.00	14.25	0	1.00	1.00	0.00	14.25	3.46	6.04	1.39	3.30	750	3.2	3.91	C
OS2	1.95	0.25	0.35	0.49	0.68	200	4.00	14.23	0	1.00	1.00	0.00	14.23	3.46	6.04	1.69	4.13	800	3.3	4.04	OS2
D	6.79	0.28	0.38	1.90	2.58	200	6.00	12.01	600	4.70	3.30	3.03	15.04	3.37	5.89	6.41	15.19				D
DP 2				2.39	3.26								18.27	3.06	5.34	7.30	17.41	650	3.2	3.39	DP 2
E	3.76	0.28	0.38	1.05	1.43	200	8.50	10.70	420	4.30	3.00	2.33	13.04	3.61	6.30	3.80	9.00	400	3.7	1.80	E
H	1.30	0.28	0.38	0.36	0.49	200	7.50	11.15	250	5.60	3.70	1.13	12.28	3.70	6.47	1.35	3.20				H
DP 3				1.42	1.92								14.84	3.39	5.92	4.80	11.39				DP 3
OS3	29.40	0.25	0.35	7.35	10.29	500	4.00	22.49	600	8.00	4.30	2.33	24.82	2.59	4.52	19.02	46.51	600	3.4	2.94	OS3
F	7.30	0.28	0.38	2.04	2.77	500	8.00	17.26	400	3.25	2.70	2.47	19.73	2.93	5.13	6.00	14.22				F
DP 4				9.39	13.06								27.76	2.43	4.24	22.80	55.38	250	1.3	3.21	DP 4
G	2.83	0.28	0.38	0.79	1.08	520	8.00	17.61	0	1.00	1.00	0.00	17.61	3.11	5.44	2.47	5.85				G
OS3-G				10.19	14.14								30.97	2.28	3.97	23.18	56.20				OS3-G
DP5				11.60	16.06								30.97	2.28	3.97	26.40	63.84	630	1.3	8.08	DP5
I	12.63	0.28	0.38	3.54	4.80	450	8.00	16.38	475	2.00	2.20	3.60	19.98	2.92	5.09	10.31	24.44				I
DP 6				15.14	20.86								39.04	1.97	3.45	29.89	71.93	200	1.3	2.56	DP 6
J	9.39	0.28	0.38	2.63	3.57	500	6.40	18.58	300	2.00	2.20	2.27	20.86	2.85	4.98	7.49	17.76				J
DP 7				17.77	24.43								41.61	1.90	3.31	33.69	80.91				DP 7

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW ESTATES

Comment: CULVERT CAPACITY

Solve For Full Flow Capacity

Given Input Data:

Diameter.....	1.50 ft
Slope.....	0.0200 ft/ft
Manning's n.....	0.024
Discharge.....	8.05 cfs

Computed Results:

Full Flow Capacity.....	8.05 cfs
Full Flow Depth.....	1.50 ft
Velocity.....	4.55 fps
Flow Area.....	1.77 sf
Critical Depth....	1.10 ft
Critical Slope....	0.0254 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	8.05 cfs
QMAX @.94D.....	8.66 cfs
Froude Number.....	FULL

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW ESTATES

Comment: CULVERT CAPACITY

Solve For Full Flow Capacity

Given Input Data:

Diameter.....	2.00 ft
Slope.....	0.0250 ft/ft
Manning's n.....	0.024
Discharge.....	19.37 cfs

Computed Results:

Full Flow Capacity.....	19.37 cfs
Full Flow Depth.....	2.00 ft
Velocity.....	6.17 fps
Flow Area.....	3.14 sf
Critical Depth....	1.58 ft
Critical Slope....	0.0267 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	19.37 cfs
QMAX @.94D.....	20.84 cfs
Froude Number.....	FULL

Open Channel Flow Module, Version 3.16 (c) 1990
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Circular Channel Analysis & Design
Solved with Manning's Equation

Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW ESTATES

Comment: CULVERT CAPACITY

Solve For Full Flow Capacity

Given Input Data:

Diameter.....	2.50 ft
Slope.....	0.0400 ft/ft
Manning's n.....	0.024
Discharge.....	44.44 cfs

Computed Results:

Full Flow Capacity.....	44.44 cfs
Full Flow Depth.....	2.50 ft
Velocity.....	9.05 fps
Flow Area.....	4.91 sf
Critical Depth....	2.22 ft
Critical Slope....	0.0357 ft/ft
Percent Full.....	100.00 %
Full Capacity.....	44.44 cfs
QMAX @.94D.....	47.80 cfs
Froude Number.....	FULL

PROJECT: COUNTRY VIEW ESTATES

STATION: BLACK FOREST RD CULVERT A

SHEET _____ OF _____

CULVERT DESIGN FORM

DESIGNER / DATE: MAB / 4/24/98

REVIEWER / DATE: _____ / _____

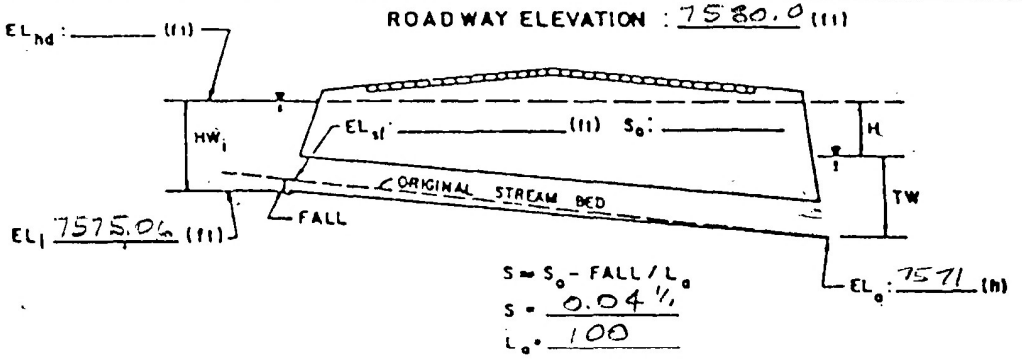
HYDROLOGICAL DATA

SEE ADD'L SHTS.

- ☐ METHOD: _____
- ☐ DRAINAGE AREA: _____ ☐ STREAM SLOPE: 2%
- ☐ CHANNEL SHAPE: b=4' - Z=4
- ☐ ROUTING: _____ ☐ OTHER: _____

DESIGN FLOWS / TAILWATER

R.I. (YEARS)	FLOW (cfs)	TW (ft)
100	34.7	1.0
5	14.4	0.7



CULVERT DESCRIPTION: MATERIAL - SHAPE - SIZE - ENTRANCE	TOTAL FLOW Q (cfs)	FLOW PER BARREL Q/N (1)	HEADWATER CALCULATIONS: INLET CONTROL HW_i/D (2)	HW_i	FALL (3)	EL_hi (4)	OUTLET CONTROL TW (5)	d_c	(d_c+D)/2	h_o (6)	k_e	H (7)	EL_ho (8)	CONTROL HEADWATER ELEVATION	OUTLET VELOCITY	COMMENTS
30" CMP - PROJECTING	34.7		1.15	3.75		78.81	1.0	2.0	2.25	2.25	0.9	4.0	77.25	78.81	10.0	EXISTING
" "	14.4		0.8	2.00		77.06	0.7	1.3	1.90	1.90	0.9	0.75	73.65	77.06	8.1	CULVERT

TECHNICAL FOOTNOTES:

(1) USE Q/NB FOR BOX CULVERTS

(2) HW_i/D = HW/D OR HW_i/D FROM DESIGN CHARTS

(3) FALL = $HW_i - (EL_{hd} - EL_{sf})$; FALL IS ZERO FOR CULVERTS ON GRADE

(4) EL_{hi} = HW_i + EL_i (INVERT OF INLET CONTROL SECTION)

(5) TW BASED ON DOWN STREAM CONTROL OR FLOW DEPTH IN CHANNEL.

(6) h_o = TW or $(d_c + D/2)$ (WHICHEVER IS GREATER)

(7) $H = \left[1 + k_e + (29n^2 L)/R^{1.33}\right] V^2/2g$

(8) $EL_{ho} = EL_o + H + h_o$

SUBSCRIPT DEFINITIONS:

a. APPROXIMATE
i. CULVERT FACE
hd. DESIGN HEADWATER
hi. HEADWATER IN INLET CONTROL
ho. HEADWATER IN OUTLET CONTROL
1 INLET CONTROL SECTION
o. OUTLET
sf. STREAMBED AT CULVERT FACE
tw. TAILWATER

COMMENTS / DISCUSSION:

CULVERT BARREL SELECTED:

SIZE: _____

SHAPE: _____

MATERIAL: _____

ENTRANCE: _____

PROJECT: COUNTRY VIEW ESTATES

STATION: 7+40 - CULVERT D

SHEET _____ OF _____

CULVERT DESIGN FORM

DESIGNER / DATE: MAS / 4/24/96

REVIEWER / DATE: _____ / _____

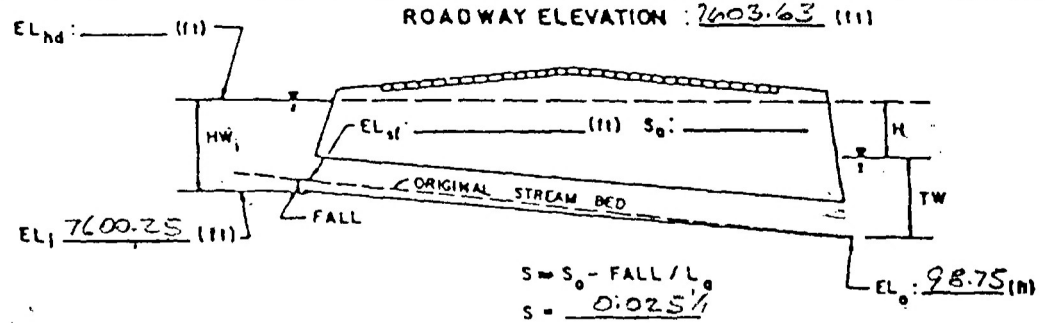
HYDROLOGICAL DATA

SEE ADD'L SHTS.

- ☐ METHOD: _____
- ☐ DRAINAGE AREA: _____ ☐ STREAM SLOPE: 2%
- ☐ CHANNEL SHAPE: b= 2' Z = 3
- ☐ ROUTING: _____ ☐ OTHER: _____

DESIGN FLOWS/TAILWATER

R.I. (YEARS)	FLOW (cfs)	TW (ft)
100	17.4	0.9
5	7.3	0.61



S = S_o - FALL / L_o

S = 0.025%

L_o = 60

CULVERT DESCRIPTION: MATERIAL - SHAPE - SIZE - ENTRANCE	TOTAL FLOW Q (cfs)	FLOW PER BARREL Q/N (1)	HEADWATER CALCULATIONS: INLET CONTROL HW_i/D (2)	HW_i	FALL (3)	EL_{hi} (4)	OUTLET CONTROL TW (5)	d_c	$\frac{d_c+D}{2}$	h_o (6)	L_e	H (7)	EL_{ho} (8)	CONTROL HEADWATER ELEVATION	OUTLET VELOCITY	COMMENTS
24" CMP - PROJECTING	17.4		1.45	2.9		03.15	0.9	1.5	1.75	1.75	0.9	1.95	02.45	03.15	7.0	20' RIPRAP
" "	7.3		0.75	1.5		01.75	0.6	1.1	1.55	1.55	0.9	0.45	00.75	01.75	5.7	"

TECHNICAL FOOTNOTES:

(1) USE Q/NB FOR BOX CULVERTS

(2) HW_i/D = HW/D OR HW_i/D FROM DESIGN CHARTS

(3) FALL = $HW_i - (EL_{hd} - EL_{sf})$; FALL IS ZERO FOR CULVERTS ON GRADE

(4) EL_{hi} = HW_i + EL_i (INVERT OF INLET CONTROL SECTION)

(5) TW BASED ON DOWN STREAM CONTROL OR FLOW DEPTH IN CHANNEL.

(6) h_o = TW or $(d_c + D/2)$ (WHICHEVER IS GREATER)

(7) $H = \left[1 + k_e + (29n^2 L)/R^{1.33}\right] V^2/2g$

(8) $EL_{ho} = EL_o + H + h_o$

SUBSCRIPT DEFINITIONS:

a. APPROXIMATE
f. CULVERT FACE
hd. DESIGN HEADWATER
hi. HEADWATER IN INLET CONTROL
ho. HEADWATER IN OUTLET CONTROL
i INLET CONTROL SECTION
o. OUTLET
sf. STREAMBED AT CULVERT FACE
tw. TAILWATER

COMMENTS / DISCUSSION:

CULVERT BARREL SELECTED:

SIZE: _____

SHAPE: _____

MATERIAL: _____

ENTRANCE: _____

PROJECT: COUNTRY VIEW ESTATES

STATION: 14+50 - CULVERT C

SHEET _____ OF _____

CULVERT DESIGN FORM

DESIGNER / DATE: MAS / 4/24/96

REVIEWER / DATE: _____ / _____

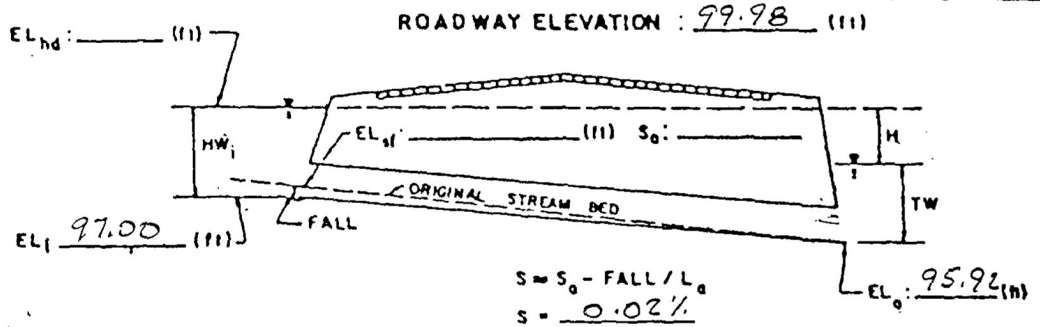
HYDROLOGICAL DATA

SEE ADD'L ENTS.

- ☐ METHOD: _____
- ☐ DRAINAGE AREA: _____ ☐ STREAM SLOPE: 2%
- ☐ CHANNEL SHAPE: b=2' z=3
- ☐ ROUTING: _____ ☐ OTHER: _____

DESIGN FLOWS/TAILWATER

R.I. (YEARS)	FLOW (cfs)	TW (ft)
100	3.3	0.4
5	1.4	0.3



$S \approx S_o - FALL / L_o$

$S = 0.02\%$

$L_o = 5'$

CULVERT DESCRIPTION: MATERIAL - SHAPE - SIZE - ENTRANCE	TOTAL FLOW Q (cfs)	FLOW PER BARREL Q/N (1)	HEADWATER CALCULATIONS: INLET CONTROL HW_i/D (2)	HW_i	FALL (3)	EL_{hi} (4)	OUTLET CONTROL TW (5)	d_c	$\frac{d_c+D}{2}$	h_o (6)	h_e	H (7)	EL_{ho} (8)	CONTROL HEADWATER ELEVATION	OUTLET VELOCITY	COMMENTS
18" CMP - PROJECTING	3.3		0.7	1.05		98.05	0.4	0.75	1.13	1.13	0.9	0.3	97.35	98.05	4.3	10' R-PRAP
" "	1.4		0.4	0.6		97.60	0.3	0.5	1.0	1.0	0.9	0.2	97.12	97.60	3.4	" "

TECHNICAL FOOTNOTES:

(1) USE Q/NB FOR BOX CULVERTS

(2) HW_i/D = HW/D OR HW_i/D FROM DESIGN CHARTS

(3) FALL = $HW_i - (EL_{hd} - EL_{sf})$; FALL IS ZERO FOR CULVERTS ON GRADE

(4) EL_{hi} = HW_i + EL_i (INVERT OF INLET CONTROL SECTION)

(5) TW BASED ON DOWN STREAM CONTROL OR FLOW DEPTH IN CHANNEL.

(6) h_o = TW or $(d_c + D/2)$ (WHICHEVER IS GREATER)

(7) $H = \left[1 + k_e + (29n^2 L)/R^{1.33}\right] V^2/2g$

(8) $EL_{ho} = EL_o + H + h_o$

SUBSCRIPT DEFINITIONS:

- e. APPROXIMATE
- f. CULVERT FACE
- hd. DESIGN HEADWATER
- hi. HEADWATER IN INLET CONTROL
- ho. HEADWATER IN OUTLET CONTROL
- i. INLET CONTROL SECTION
- o. OUTLET
- sf. STREAMBED AT CULVERT FACE
- tw. TAILWATER

COMMENTS / DISCUSSION:

CULVERT BARREL SELECTED:

SIZE: _____

SHAPE: _____

MATERIAL: _____

ENTRANCE: _____

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY******************

JOB TR-20                                          SUMMARY   NOPLOTS
TITLE 001  COUNTRY VIEW ESTATES TR20 RUN  24 HR. 100 YR. STORM
TITLE      EXISTING CONDITIONS W/ TYPE II STORM & DET BASINS : CVEX
  5 RAINFL 7                 0.5
  8              0.0000      0.0040      0.0080      0.0100      0.0140
  8              0.0190      0.0220      0.0260      0.0300      0.0450
  8              0.0600      0.1000      0.7100      0.7500      0.7750
  8              0.8000      0.8200      0.8300      0.8400      0.8500
  8              0.8600      0.8700      0.8750      0.8850      0.8900
  8              0.9000      0.9050      0.9100      0.9200      0.9250
  8              0.9300      0.9350      0.9400      0.9450      0.9500
  8              0.9550      0.9600      0.9650      0.9700      0.9730
  8              0.9750      0.9800      0.9830      0.9870      0.9900
  8              0.9930      0.9960      0.9999      1.0000      1.0000
  9 ENDTBL
  2 XSECTN   001              1.0
  8                        7559.5         0.0         0.0
  8                        7559.7        10.0         3.00
  8                        7559.9        20.0         4.88
  8                        7560.1        50.0         9.29
  8                        7560.3       100.0        15.30
  8                        7560.7       200.0        25.36
  9 ENDTBL
  3 STRUCT      01
  8                        7559.5         0.0         0.0
  8                        7561.5        10.0         0.05
  8                        7563.5        16.0         0.35
  8                        7565.5        21.0         1.00
  8                        7567.5        25.0         2.50
  8                        7568.0        50.0         3.05
  9 ENDTBL
  6 RUNOFF 1 001       5     0.120      66.9         0.694   1
  6 RESVOR 2    01 5   2    7559.5                           1
    ENDATA
  7 INCREM 6                 0.10
  7 COMPUT 7 001      01     0.0          4.40         1.0    7 2  01  01
    ENDCMP 1
    ENDJOB 2
0*******************************END OF 80-80 LIST*********************************


 XECUTIVE CONTROL OPERATION INCREM                                                    RECORD ID
+                                  MAIN TIME INCREMENT =   .10 HOURS


 EXECUTIVE CONTROL OPERATION COMPUT                                                   RECORD ID
+                                  FROM XSECTION   1
                                                 TO STRUCTURE  1
       STARTING TIME =    .00    RAIN DEPTH =  4.40    RAIN DURATION=  1.00    RAIN TABLE NO.= 7    ANT. MOIST. COND= 2
       ALTERNATE NO.= 1          STORM NO.= 1    MAIN TIME INCREMENT =   .10 HOURS


 OPERATION RUNOFF   CROSS SECTION   1
```

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.31	77.11	(RUNOFF)
10.43	4.02	(RUNOFF)
12.69	3.53	(RUNOFF)
14.20	3.51	(RUNOFF)
18.90	2.16	(RUNOFF)
23.58	1.55	(RUNOFF)

OPERATION RESVOR STRUCTURE 1

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.90	24.97	7567.48
10.46	4.02	7560.30
12.75	3.49	7560.20
14.26	3.47	7560.19
18.95	2.16	7559.93
23.63	1.54	7559.81

EXECUTIVE CONTROL OPERATION ENDCMP RECORD ID

\+ COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL OPERATION ENDJOB RECORD ID

1

SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
(A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 1													
XSECTION 1	RUNOFF	.12	7	2	.10	.0	4.40	24.00	1.39	---	6.31	77.11	642.6
STRUCTURE 1	RESVOR	.12	7	2	.10	.0	4.40	24.00	1.39	7567.48	6.90	24.97	208.1

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

```
 XSECTION/          DRAINAGE
 STRUCTURE            AREA       STORM NUMBERS.....
   ID                (SQ MI)          1

0 STRUCTURE   1          .12
  ------------------------------
    ALTERNATE    1                  24.97
0 XSECTION    1          .12
  ------------------------------
    ALTERNATE    1                  77.11
1END OF  1 JOBS IN THIS RUN
```

```
******************80-80 LIST OF INPUT DATA FOR TR-20 HYDROLOGY******************

JOB TR-20                                          SUMMARY   NOPLOTS
TITLE 001  COUNTRY VIEW ESTATES TR20 RUN  24 HR. 100 YR. STORM
TITLE      DEVELOPED CONDITIONS W/ TYPE II STORM & DET BASINS : CVE
5 RAINFL 7                0.5
8              0.0000      0.0040      0.0080      0.0100      0.0140
8              0.0190      0.0220      0.0260      0.0300      0.0450
8              0.0600      0.1000      0.7100      0.7500      0.7750
8              0.8000      0.8200      0.8300      0.8400      0.8500
8              0.8600      0.8700      0.8750      0.8850      0.8900
8              0.9000      0.9050      0.9100      0.9200      0.9250
8              0.9300      0.9350      0.9400      0.9450      0.9500
8              0.9550      0.9600      0.9650      0.9700      0.9730
8              0.9750      0.9800      0.9830      0.9870      0.9900
8              0.9930      0.9960      0.9999      1.0000      1.0000
9 ENDTBL
2 XSECTN   001              1.0
8                         7559.5         0.0         0.0
8                         7559.7        10.0         3.00
8                         7559.9        20.0         4.88
8                         7560.1        50.0         9.29
8                         7560.3       100.0        15.30
8                         7560.7       200.0        25.36
9 ENDTBL
3 STRUCT      01
8                         7559.5         0.0         0.0
8                         7561.5        10.0         0.05
8                         7563.5        16.0         0.35
8                         7565.5        21.0         1.00
8                         7567.5        25.0         2.50
8                         7567.75       25.5         3.05
8                         7568.0        50.0         3.75
9 ENDTBL
6 RUNOFF 1 001       5     0.120      67.7         0.694   1
6 RESVOR 2    01 5   2    7559.5                           1
  ENDATA
7 INCREM 6                0.10
7 COMPUT 7 001      01     0.0          4.40         1.0    7 2  01  01
  ENDCMP 1
  ENDJOB 2
0*******************************END OF 80-80 LIST*********************************


 EXECUTIVE CONTROL OPERATION INCREM                                                    RECORD ID
                                    MAIN TIME INCREMENT =   .10 HOURS


 EXECUTIVE CONTROL OPERATION COMPUT                                                    RECORD ID
                                    FROM XSECTION   1
                                                      TO STRUCTURE  1
       STARTING TIME =   .00    RAIN DEPTH =  4.40    RAIN DURATION=  1.00    RAIN TABLE NO.= 7    ANT. MOIST. COND= 2
       ALTERNATE NO.= 1         STORM NO.= 1    MAIN TIME INCREMENT =   .10 HOURS


 OPERATION RUNOFF   CROSS SECTION   1
```

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.31	80.96	(RUNOFF)
10.43	4.12	(RUNOFF)
12.69	3.61	(RUNOFF)
14.20	3.58	(RUNOFF)
18.89	2.21	(RUNOFF)
23.58	1.58	(RUNOFF)

OPERATION RESVOR STRUCTURE 1

PEAK TIME(HRS)	PEAK DISCHARGE(CFS)	PEAK ELEVATION(FEET)
6.91	25.16	7567.58
10.46	4.12	7560.32
12.75	3.57	7560.21
14.26	3.55	7560.21
18.95	2.21	7559.94
23.63	1.57	7559.81

EXECUTIVE CONTROL OPERATION ENDCMP RECORD ID

COMPUTATIONS COMPLETED FOR PASS 1

EXECUTIVE CONTROL OPERATION ENDJOB RECORD ID

1

SUMMARY TABLE 1 - SELECTED RESULTS OF STANDARD AND EXECUTIVE CONTROL INSTRUCTIONS IN THE ORDER PERFORMED
(A STAR(*) AFTER THE PEAK DISCHARGE TIME AND RATE (CFS) VALUES INDICATES A FLAT TOP HYDROGRAPH
A QUESTION MARK(?) INDICATES A HYDROGRAPH WITH PEAK AS LAST POINT.)

SECTION/ STRUCTURE ID	STANDARD CONTROL OPERATION	DRAINAGE AREA (SQ MI)	RAIN TABLE #	ANTEC MOIST COND	MAIN TIME INCREM (HR)	PRECIPITATION BEGIN (HR)	PRECIPITATION AMOUNT (IN)	PRECIPITATION DURATION (HR)	RUNOFF AMOUNT (IN)	PEAK DISCHARGE ELEVATION (FT)	PEAK DISCHARGE TIME (HR)	PEAK DISCHARGE RATE (CFS)	PEAK DISCHARGE RATE (CSM)
ALTERNATE 1 STORM 1													
SECTION 1	RUNOFF	.12	7	2	.10	.0	4.40	24.00	1.45	---	6.31	80.96	674.7
STRUCTURE 1	RESVOR	.12	7	2	.10	.0	4.40	24.00	1.45	7567.58	6.91	25.16	209.7

1

SUMMARY TABLE 3 - DISCHARGE (CFS) AT XSECTIONS AND STRUCTURES FOR ALL STORMS AND ALTERNATES

XSECTION/ STRUCTURE ID		DRAINAGE AREA (SQ MI)	STORM NUMBERS..... 1
STRUCTURE	1	.12	
ALTERNATE	1		25.16
XSECTION	1	.12	
ALTERNATE	1		80.96

END OF 1 JOBS IN THIS RUN

Appendix B

Roadside Ditch Capacity

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: DITCH CAPACITY - STA 0+50 - 2+70 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	4.00:1 (H:V)
Right Side Slope.	4.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0200 ft/ft
Discharge.....	1.90 cfs

Computed Results:

Depth.....	0.46 ft
Velocity.....	2.22 fps
Flow Area.....	0.86 sf
Flow Top Width...	3.70 ft
Wetted Perimeter.	3.82 ft
Critical Depth...	0.43 ft
Critical Slope...	0.0311 ft/ft
Froude Number....	0.81 (flow is Subcritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: DITCH CAPACITY - STA 0+50 - 2+70 - 100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	4.00:1 (H:V)
Right Side Slope.	4.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0200 ft/ft
Discharge.....	4.50 cfs

Computed Results:

Depth.....	0.64 ft
Velocity.....	2.75 fps
Flow Area.....	1.64 sf
Flow Top Width...	5.12 ft
Wetted Perimeter.	5.27 ft
Critical Depth...	0.60 ft
Critical Slope...	0.0278 ft/ft
Froude Number....	0.86 (flow is Subcritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: DITCH CAPACITY - STA 2+70 - 7+40 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	4.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0300 ft/ft
Discharge.....	3.20 cfs

Computed Results:

Depth.....	0.55 ft
Velocity.....	3.03 fps
Flow Area.....	1.06 sf
Flow Top Width...	3.85 ft
Wetted Perimeter.	4.00 ft
Critical Depth...	0.55 ft
Critical Slope...	0.0289 ft/ft
Froude Number....	1.02 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: DITCH CAPACITY - STA 2+70 - 7+40 - 100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	4.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0300 ft/ft
Discharge.....	7.60 cfs

Computed Results:

Depth.....	0.76 ft
Velocity.....	3.76 fps
Flow Area.....	2.02 sf
Flow Top Width...	5.32 ft
Wetted Perimeter.	5.54 ft
Critical Depth...	0.78 ft
Critical Slope...	0.0258 ft/ft
Froude Number....	1.07 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: DITCH CAPACITY - STA 7+40 - 10+66 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	4.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0200 ft/ft
Discharge.....	3.20 cfs

Computed Results:

Depth.....	0.59 ft
Velocity.....	2.60 fps
Flow Area.....	1.23 sf
Flow Top Width...	4.15 ft
Wetted Perimeter.	4.32 ft
Critical Depth...	0.55 ft
Critical Slope...	0.0289 ft/ft
Froude Number....	0.84 (flow is Subcritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: DITCH CAPACITY - STA 7+40 - 10+66 - 100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	4.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0200 ft/ft
Discharge.....	7.60 cfs

Computed Results:

Depth.....	0.82 ft
Velocity.....	3.23 fps
Flow Area.....	2.35 sf
Flow Top Width...	5.74 ft
Wetted Perimeter.	5.98 ft
Critical Depth...	0.78 ft
Critical Slope...	0.0258 ft/ft
Froude Number....	0.89 (flow is Subcritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: DITCH CAPACITY - STA 10+66 - 14+50 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	4.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0330 ft/ft
Discharge.....	1.10 cfs

Computed Results:

Depth.....	0.36 ft
Velocity.....	2.40 fps
Flow Area.....	0.46 sf
Flow Top Width...	2.53 ft
Wetted Perimeter.	2.64 ft
Critical Depth...	0.36 ft
Critical Slope...	0.0333 ft/ft
Froude Number....	1.00 (flow is Critical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: DITCH CAPACITY - STA 10+66 - 14+50 -100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	4.00:1 (H:V)
Right Side Slope.	3.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0330 ft/ft
Discharge.....	2.50 cfs

Computed Results:

Depth.....	0.49 ft
Velocity.....	2.95 fps
Flow Area.....	0.85 sf
Flow Top Width...	3.45 ft
Wetted Perimeter.	3.59 ft
Critical Depth...	0.50 ft
Critical Slope...	0.0299 ft/ft
Froude Number....	1.05 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: DITCH CAPACITY - STA 14+50 - 16+00 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	4.00:1 (H:V)
Right Side Slope.	4.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0100 ft/ft
Discharge.....	0.30 cfs

Computed Results:

Depth.....	0.26 ft
Velocity.....	1.08 fps
Flow Area.....	0.28 sf
Flow Top Width...	2.11 ft
Wetted Perimeter.	2.18 ft
Critical Depth...	0.20 ft
Critical Slope...	0.0398 ft/ft
Froude Number....	0.52 (flow is Subcritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: DITCH CAPACITY - STA 14+50 - 16+00 -100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	4.00:1 (H:V)
Right Side Slope.	4.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0100 ft/ft
Discharge.....	0.80 cfs

Computed Results:

Depth.....	0.38 ft
Velocity.....	1.38 fps
Flow Area.....	0.58 sf
Flow Top Width...	3.05 ft
Wetted Perimeter.	3.14 ft
Critical Depth...	0.30 ft
Critical Slope...	0.0350 ft/ft
Froude Number....	0.56 (flow is Subcritical)

Appendix C

Swale Capacity

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 1 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	10.00:1 (H:V)
Right Side Slope.	10.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0500 ft/ft
Discharge.....	14.40 cfs

Computed Results:

Depth.....	0.59 ft
Velocity.....	4.18 fps
Flow Area.....	3.45 sf
Flow Top Width...	11.74 ft
Wetted Perimeter.	11.80 ft
Critical Depth...	0.66 ft
Critical Slope...	0.0260 ft/ft
Froude Number....	1.36 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 1 - 100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	10.00:1 (H:V)
Right Side Slope.	10.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0500 ft/ft
Discharge.....	34.70 cfs

Computed Results:

Depth.....	0.82 ft
Velocity.....	5.21 fps
Flow Area.....	6.66 sf
Flow Top Width...	16.33 ft
Wetted Perimeter.	16.41 ft
Critical Depth...	0.94 ft
Critical Slope...	0.0231 ft/ft
Froude Number....	1.44 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 2 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	15.00:1 (H:V)
Right Side Slope.	15.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0600 ft/ft
Discharge.....	1.40 cfs

Computed Results:

Depth.....	0.20 ft
Velocity.....	2.26 fps
Flow Area.....	0.62 sf
Flow Top Width...	6.10 ft
Wetted Perimeter.	6.11 ft
Critical Depth...	0.22 ft
Critical Slope...	0.0373 ft/ft
Froude Number....	1.25 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 2 - 100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	15.00:1 (H:V)
Right Side Slope.	15.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0600 ft/ft
Discharge.....	3.30 cfs

Computed Results:

Depth.....	0.28 ft
Velocity.....	2.80 fps
Flow Area.....	1.18 sf
Flow Top Width...	8.41 ft
Wetted Perimeter.	8.43 ft
Critical Depth...	0.31 ft
Critical Slope...	0.0332 ft/ft
Froude Number....	1.32 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 3 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	15.00:1 (H:V)
Right Side Slope.	15.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0600 ft/ft
Discharge.....	6.40 cfs

Computed Results:

Depth.....	0.36 ft
Velocity.....	3.31 fps
Flow Area.....	1.94 sf
Flow Top Width...	10.78 ft
Wetted Perimeter.	10.80 ft
Critical Depth...	0.41 ft
Critical Slope...	0.0304 ft/ft
Froude Number....	1.37 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 3 - 100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	15.00:1 (H:V)
Right Side Slope.	15.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0600 ft/ft
Discharge.....	15.20 cfs

Computed Results:

Depth.....	0.50 ft
Velocity.....	4.10 fps
Flow Area.....	3.70 sf
Flow Top Width...	14.91 ft
Wetted Perimeter.	14.94 ft
Critical Depth...	0.58 ft
Critical Slope...	0.0271 ft/ft
Froude Number....	1.45 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 4 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	10.00 ft
Left Side Slope..	6.00:1 (H:V)
Right Side Slope.	6.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0600 ft/ft
Discharge.....	7.30 cfs

Computed Results:

Depth.....	0.20 ft
Velocity.....	3.30 fps
Flow Area.....	2.21 sf
Flow Top Width...	12.38 ft
Wetted Perimeter.	12.41 ft
Critical Depth...	0.24 ft
Critical Slope...	0.0299 ft/ft
Froude Number....	1.37 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 4 - 100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	10.00 ft
Left Side Slope..	6.00:1 (H:V)
Right Side Slope.	6.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0600 ft/ft
Discharge.....	17.40 cfs

Computed Results:

Depth.....	0.33 ft
Velocity.....	4.45 fps
Flow Area.....	3.91 sf
Flow Top Width...	13.92 ft
Wetted Perimeter.	13.98 ft
Critical Depth...	0.42 ft
Critical Slope...	0.0256 ft/ft
Froude Number....	1.48 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 5 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	10.00:1 (H:V)
Right Side Slope.	10.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0600 ft/ft
Discharge.....	3.80 cfs

Computed Results:

Depth.....	0.34 ft
Velocity.....	3.21 fps
Flow Area.....	1.18 sf
Flow Top Width...	6.88 ft
Wetted Perimeter.	6.92 ft
Critical Depth...	0.39 ft
Critical Slope...	0.0310 ft/ft
Froude Number....	1.36 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 5 - 100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	10.00:1 (H:V)
Right Side Slope.	10.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0600 ft/ft
Discharge.....	9.00 cfs

Computed Results:

Depth.....	0.48 ft
Velocity.....	3.98 fps
Flow Area.....	2.26 sf
Flow Top Width...	9.51 ft
Wetted Perimeter.	9.56 ft
Critical Depth...	0.55 ft
Critical Slope...	0.0277 ft/ft
Froude Number....	1.44 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 7 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	6.00:1 (H:V)
Right Side Slope.	6.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0600 ft/ft
Discharge.....	4.20 cfs

Computed Results:

Depth.....	0.43 ft
Velocity.....	3.72 fps
Flow Area.....	1.13 sf
Flow Top Width...	5.21 ft
Wetted Perimeter.	5.28 ft
Critical Depth...	0.50 ft
Critical Slope...	0.0289 ft/ft
Froude Number....	1.41 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 7 - 100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	6.00:1 (H:V)
Right Side Slope.	6.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0600 ft/ft
Discharge.....	10.20 cfs

Computed Results:

Depth.....	0.61 ft
Velocity.....	4.64 fps
Flow Area.....	2.20 sf
Flow Top Width...	7.26 ft
Wetted Perimeter.	7.36 ft
Critical Depth...	0.71 ft
Critical Slope...	0.0257 ft/ft
Froude Number....	1.49 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 8 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	10.00:1 (H:V)
Right Side Slope.	10.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0500 ft/ft
Discharge.....	22.80 cfs

Computed Results:

Depth.....	0.70 ft
Velocity.....	4.69 fps
Flow Area.....	4.86 sf
Flow Top Width...	13.95 ft
Wetted Perimeter.	14.02 ft
Critical Depth...	0.80 ft
Critical Slope...	0.0244 ft/ft
Froude Number....	1.40 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 8 - 100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	10.00:1 (H:V)
Right Side Slope.	10.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0500 ft/ft
Discharge.....	55.40 cfs

Computed Results:

Depth.....	0.97 ft
Velocity.....	5.85 fps
Flow Area.....	9.47 sf
Flow Top Width...	19.46 ft
Wetted Perimeter.	19.56 ft
Critical Depth...	1.14 ft
Critical Slope...	0.0217 ft/ft
Froude Number....	1.48 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 9 - 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	10.00:1 (H:V)
Right Side Slope.	10.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0500 ft/ft
Discharge.....	22.80 cfs

Computed Results:

Depth.....	0.70 ft
Velocity.....	4.69 fps
Flow Area.....	4.86 sf
Flow Top Width...	13.95 ft
Wetted Perimeter.	14.02 ft
Critical Depth...	0.80 ft
Critical Slope...	0.0244 ft/ft
Froude Number....	1.40 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 9 - 100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	0.00 ft
Left Side Slope..	10.00:1 (H:V)
Right Side Slope.	10.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0500 ft/ft
Discharge.....	55.40 cfs

Computed Results:

Depth.....	0.97 ft
Velocity.....	5.85 fps
Flow Area.....	9.47 sf
Flow Top Width...	19.46 ft
Wetted Perimeter.	19.56 ft
Critical Depth...	1.14 ft
Critical Slope...	0.0217 ft/ft
Froude Number....	1.48 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 10- 5 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	10.00 ft
Left Side Slope..	10.00:1 (H:V)
Right Side Slope.	10.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0270 ft/ft
Discharge.....	29.90 cfs

Computed Results:

Depth.....	0.53 ft
Velocity.....	3.73 fps
Flow Area.....	8.03 sf
Flow Top Width...	20.52 ft
Wetted Perimeter.	20.57 ft
Critical Depth...	0.54 ft
Critical Slope...	0.0243 ft/ft
Froude Number....	1.05 (flow is Supercritical)

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: COUNTRY VIEW EST

Comment: SWALE CAPACITY - EXISTING SWALE 10- 100 YEAR

Solve For Depth

Given Input Data:

Bottom Width.....	10.00 ft
Left Side Slope..	10.00:1 (H:V)
Right Side Slope.	10.00:1 (H:V)
Manning's n.....	0.035
Channel Slope....	0.0270 ft/ft
Discharge.....	71.90 cfs

Computed Results:

Depth.....	0.82 ft
Velocity.....	4.78 fps
Flow Area.....	15.06 sf
Flow Top Width...	26.50 ft
Wetted Perimeter.	26.58 ft
Critical Depth...	0.87 ft
Critical Slope...	0.0213 ft/ft
Froude Number....	1.12 (flow is Supercritical)

Appendix D

Design Charts

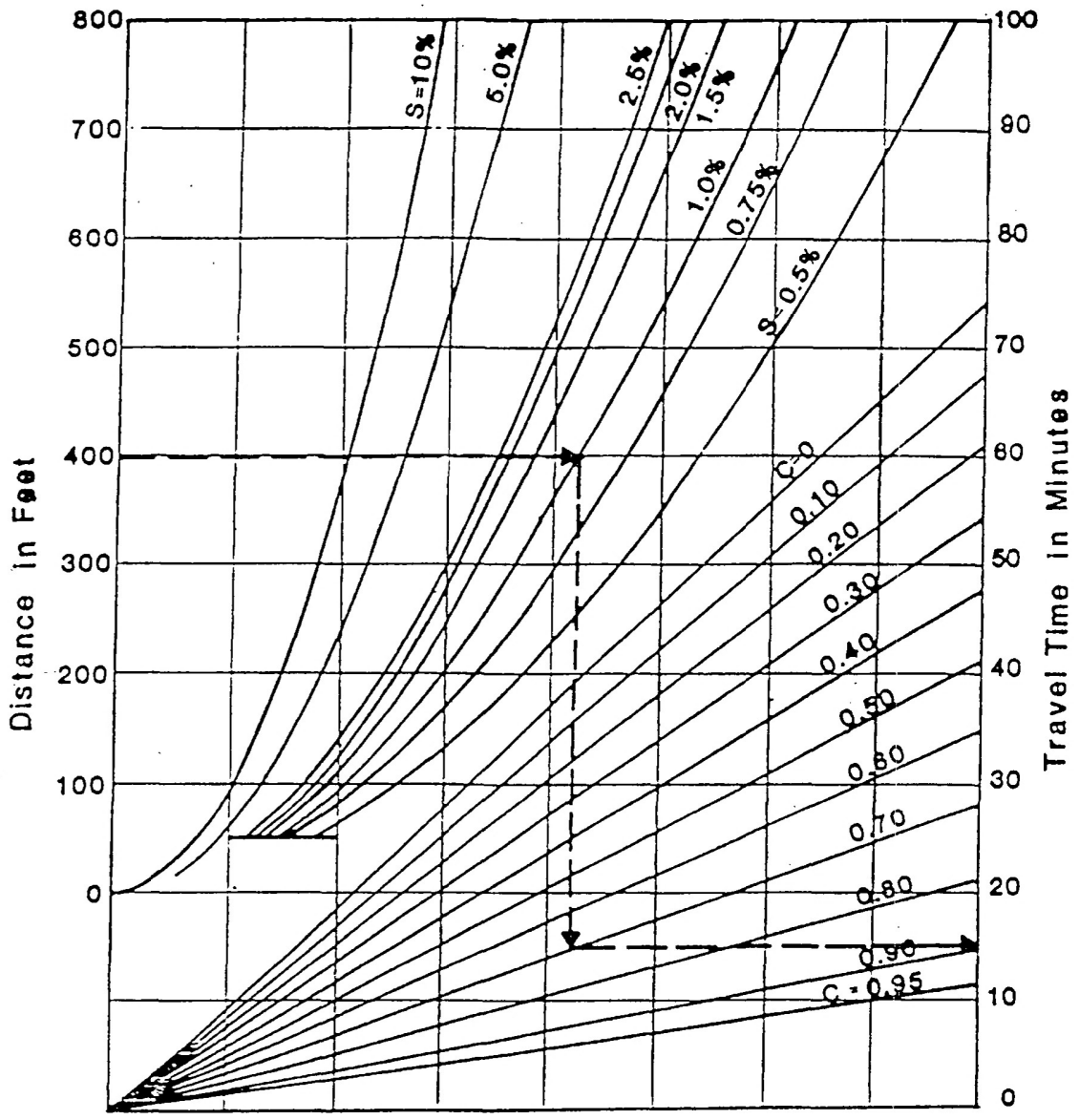
TABLE 5-1

RECOMMENDED AVERAGE RUNOFF COEFFICIENTS AND PERCENT IMPERVIOUS

LAND USE OR SURFACE CHARACTERISTICS	PERCENT IMPERVIOUS	"C" FREQUENCY 10 A&B*	"C" FREQUENCY 10 C&D*	"C" FREQUENCY 100 A&B*	"C" FREQUENCY 100 C&D*
Business					
Commercial Areas	95	0.90	0.90	0.90	0.90
Neighborhood Areas	70	0.75	0.75	0.80	0.80
Residential					
1/8 Acre or less	65	0.60	0.70	0.70	0.80
1/4 Acre	40	0.50	0.60	0.60	0.70
1/3 Acre	30	0.40	0.50	0.55	0.60
1/2 Acre	25	0.35	0.45	0.45	0.55
1 Acre	20	0.30	0.40	0.40	0.50
Industrial					
Light Areas	80	0.70	0.70	0.80	0.80
Heavy Areas	90	0.80	0.80	0.90	0.90
Parks and Cemeteries	7	0.30	0.35	0.55	0.60
Playgrounds	13	0.30	0.35	0.60	0.65
Railroad Yard Areas	40	0.50	0.55	0.60	0.65
Undeveloped Areas					
Historic Flow Analysis- Greenbelts, Agricultural	2	0.15	0.25	0.20	0.30
Pasture/Meadow	0	0.25	0.30	0.35	0.45
Forest	0	0.10	0.15	0.15	0.20
Exposed Rock	100	0.90	0.90	0.95	0.95
Offsite Flow Analysis (when land use not defined)	45	0.55	0.60	0.65	0.70
Streets					
Paved	100	0.90	0.90	0.95	0.95
Gravel	80	0.80	0.80	0.85	0.85
Drive and Walks	100	0.90	0.90	0.95	0.95
Roofs	90	0.90	0.90	0.95	0.95
Lawns	0	0.25	0.30	0.35	0.45

* Hydrologic Soil Group

9/30/90



REFERENCE : Wright – McLaughlin Engineers, Urban Storm Drainage Criteria Manual, Vol. 1, Denver Regional Council of Governments, Denver, Co. 1977

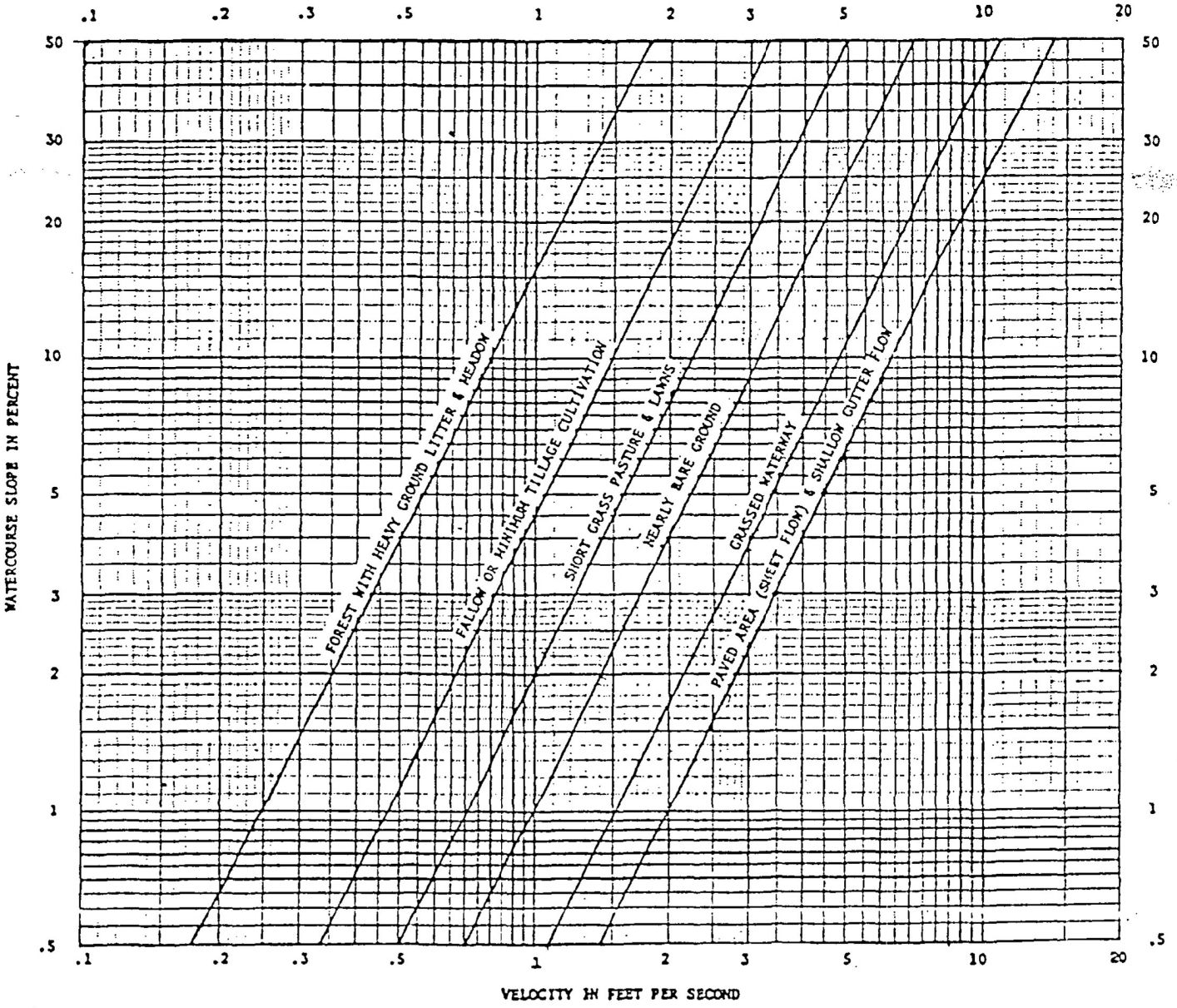
HDR Infrastructure, Inc.
A Centerra Company

The City of Colorado Springs / El Paso County
Drainage Criteria Manual

Overland Flow Curves

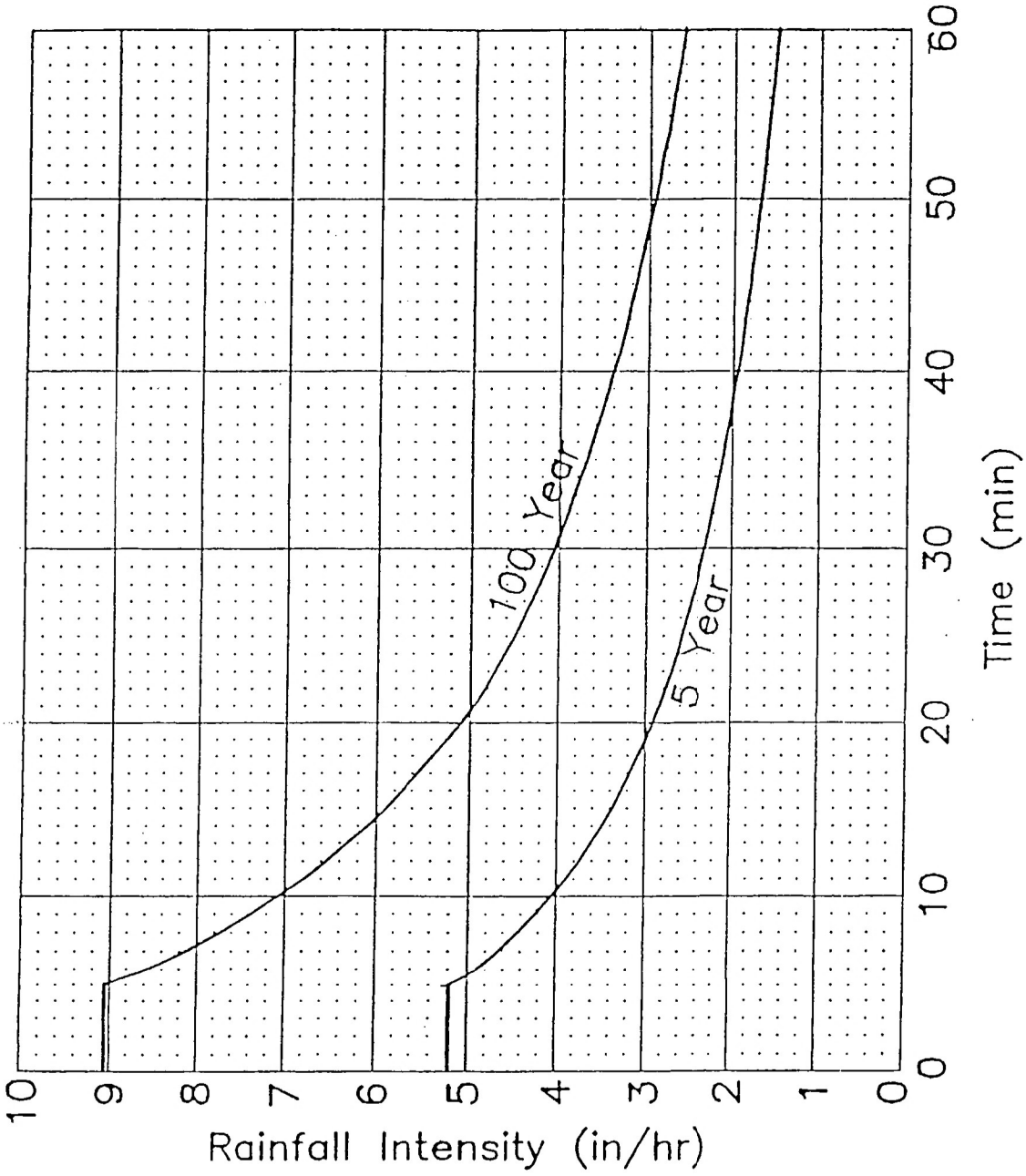
Date
OCT. 1987

Figure
5-2



--Average velocities for estimating travel time for overland flow.

FIGURE 4

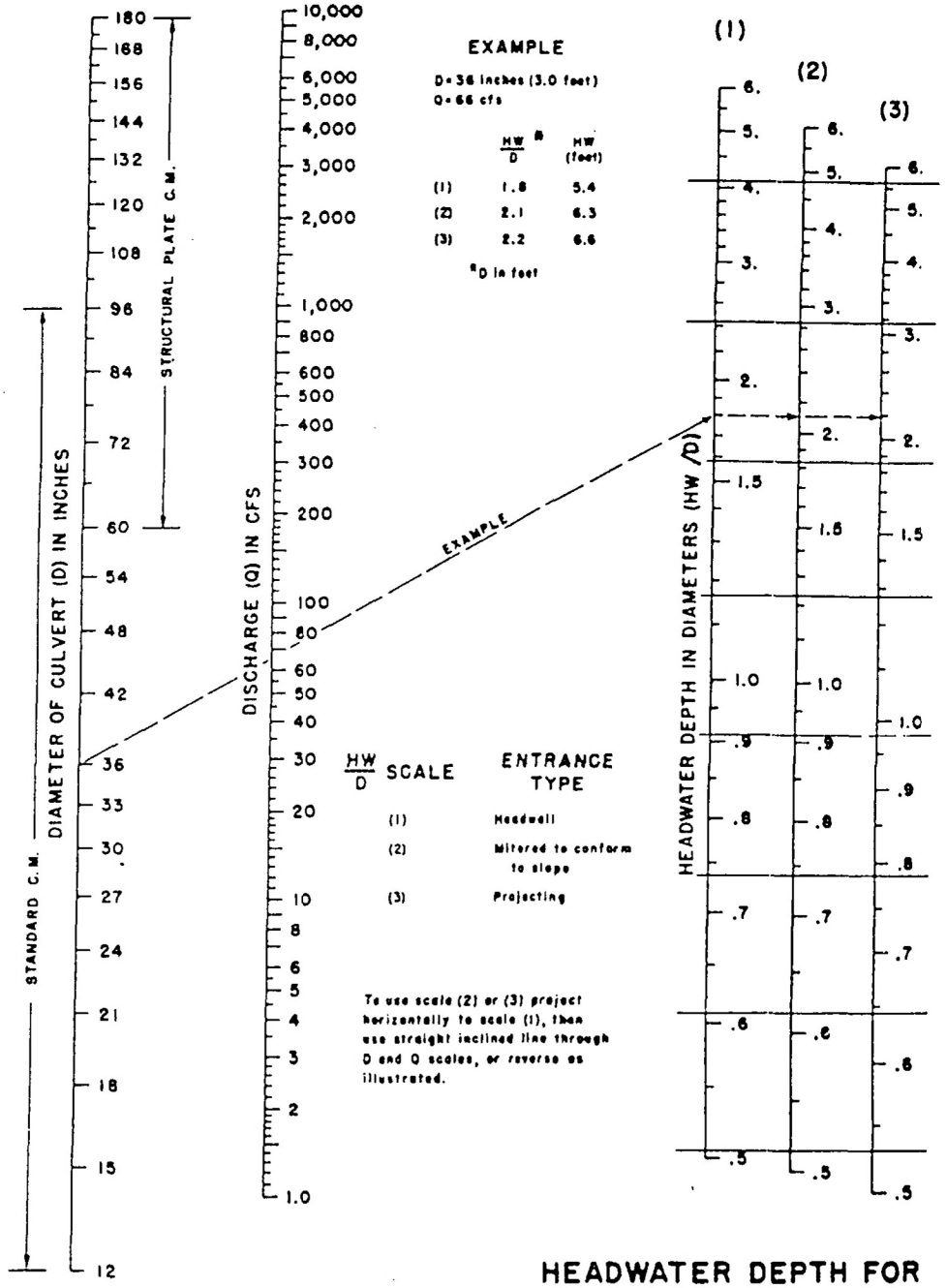


$$I_t = \frac{36.4 * I_{60}}{t_c^{0.83} + 6.72}$$

5 Year: I_{60}= 1.50
100 Year: I_{60}= 2.62

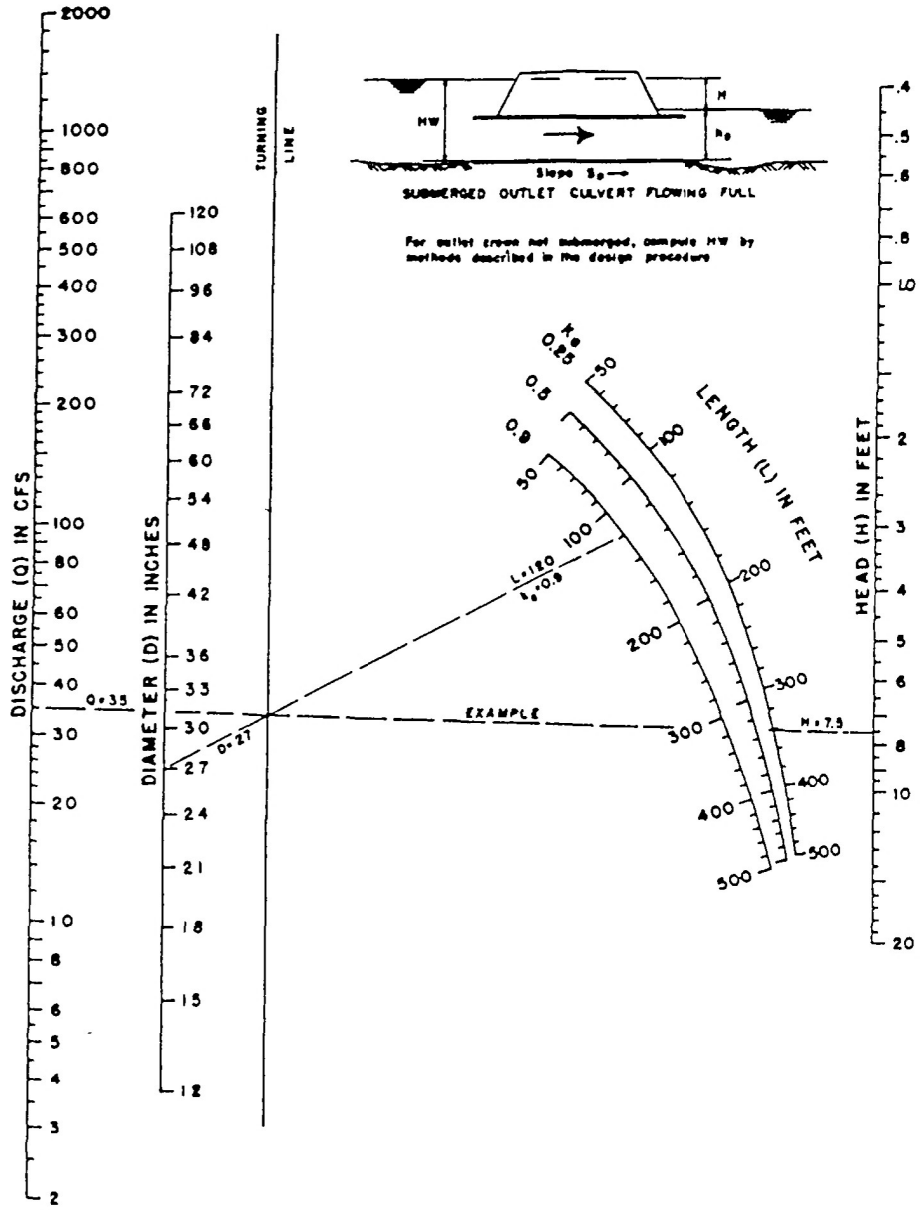
RE: Based upon Pikes Peak Area Council of Governments Areawide Urban Runoff Control Manual.

The City of Colorado Springs / El Paso County Drainage Criteria Manual Storm Rainfall Time Intensity – Frequency Curves	Date: MAR. 1995 Figure: 5 – 1



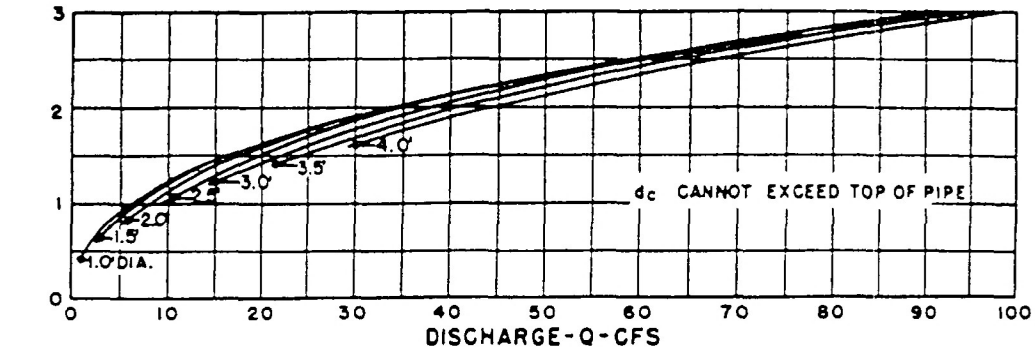
BUREAU OF PUBLIC ROADS JAN. 1963

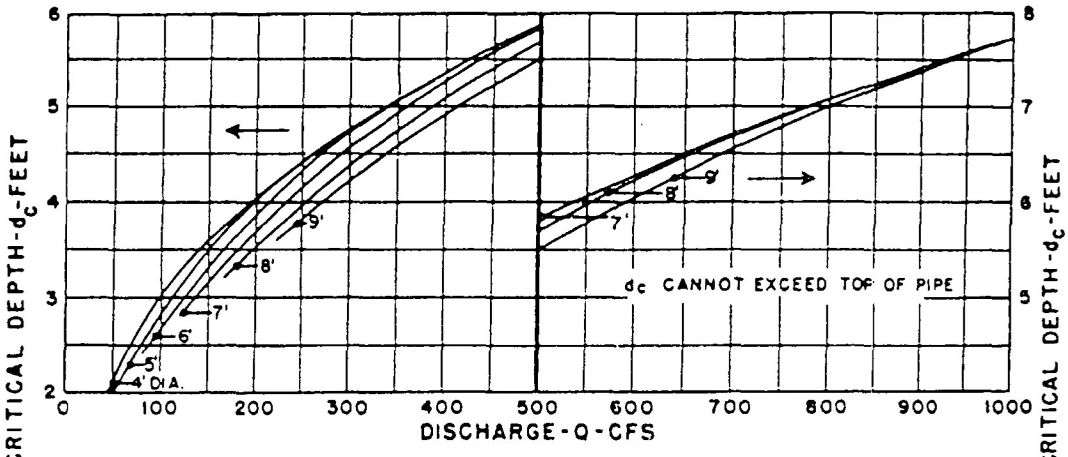
HEADWATER DEPTH FOR C. M. PIPE CULVERTS WITH INLET CONTROL

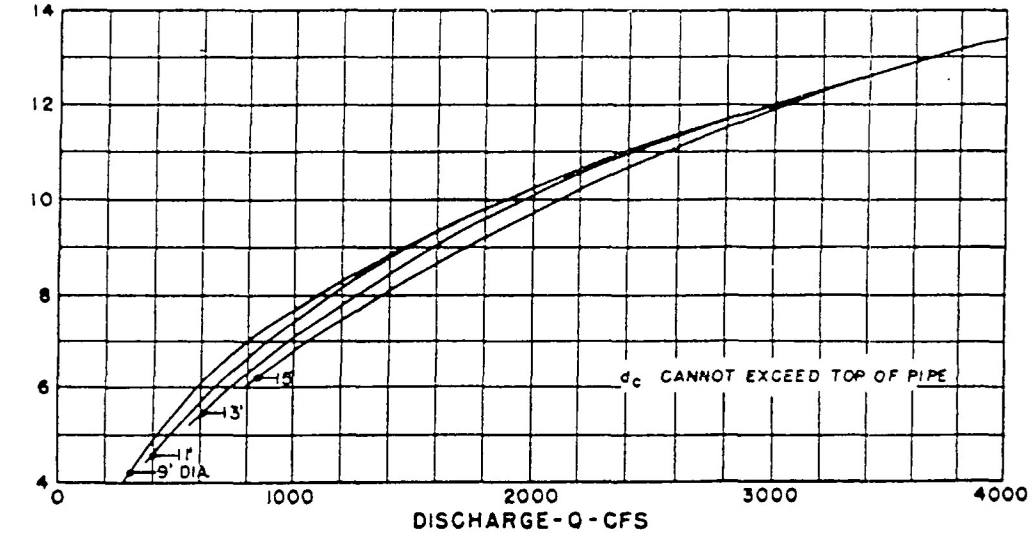


BUREAU OF PUBLIC ROADS JAN. 1963

HEAD FOR
STANDARD
C. M. PIPE CULVERTS
FLOWING FULL
$n = 0.024$







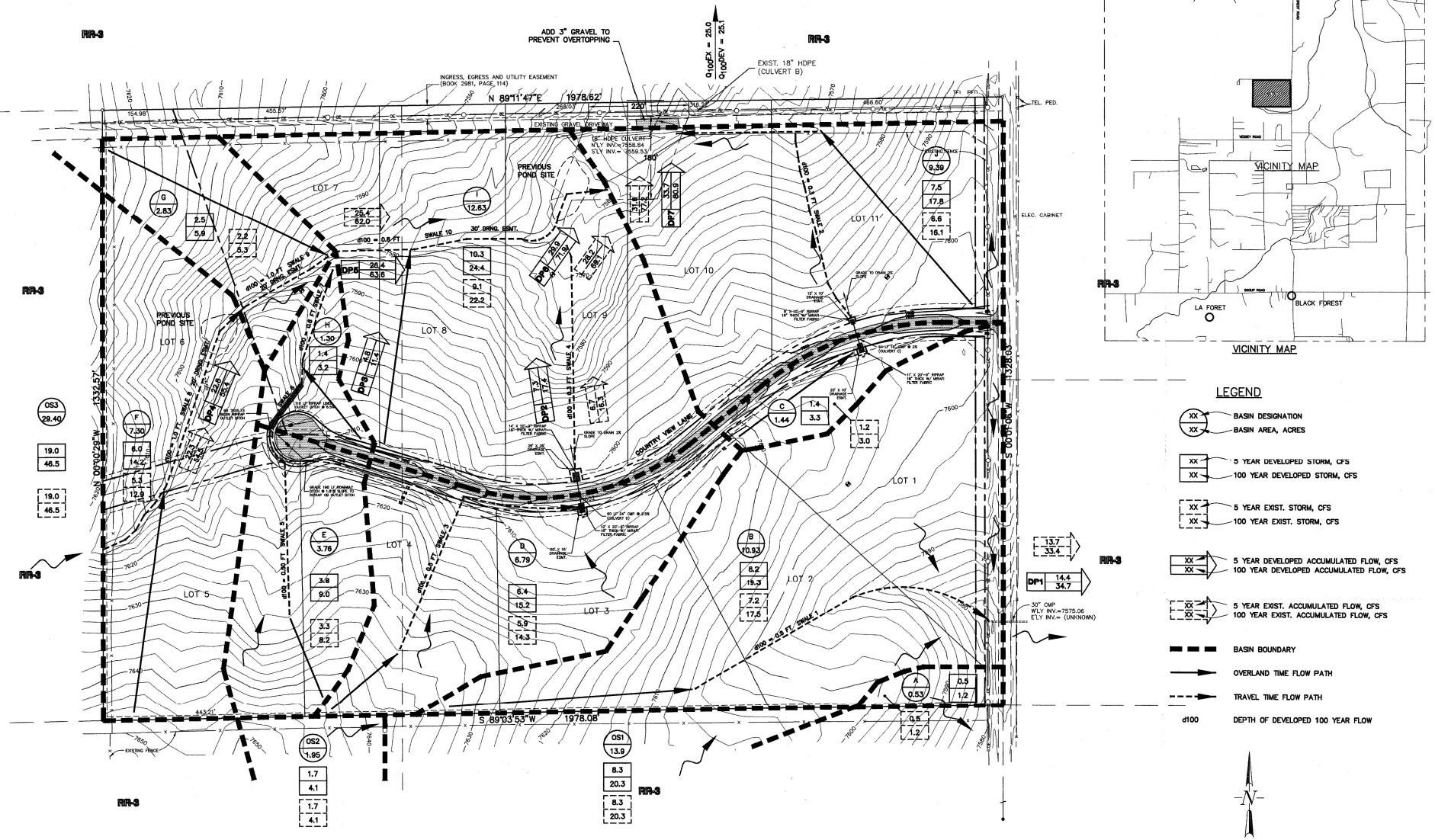
BUREAU OF PUBLIC ROADS

JAN. 1964

CRITICAL DEPTH
CIRCULAR PIPE

COUNTRY VIEW ESTATES

A SUBDIVISION OF A PORTION OF THE SOUTHEAST QUARTER OF SECTION 31,
TOWNSHIP 11 SOUTH, RANGE 65 WEST OF THE 6TH P.M.,
EL PASO COUNTY, COLORADO



LEGEND

- XX / XX — BASIN DESIGNATION / BASIN AREA, ACRES
- XX / XX — 5 YEAR DEVELOPED STORM, CFS / 100 YEAR DEVELOPED STORM, CFS
- XX / XX — 5 YEAR EXIST. STORM, CFS / 100 YEAR EXIST. STORM, CFS
- XX / XX — 5 YEAR DEVELOPED ACCUMULATED FLOW, CFS / 100 YEAR DEVELOPED ACCUMULATED FLOW, CFS
- XX / XX — 5 YEAR EXIST. ACCUMULATED FLOW, CFS / 100 YEAR EXIST. ACCUMULATED FLOW, CFS
- BASIN BOUNDARY
- OVERLAND TIME FLOW PATH
- TRAVEL TIME FLOW PATH
- d100 — DEPTH OF DEVELOPED 100 YEAR FLOW

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

DESIGNED BY MAB
DATE: 6/25/98
JOB NO. 98018
CAD FILE NO. PND_D3R.DWG
PROJECT ENGINEER MAB
PROJECT MANAGER MAB
DRAWN BY MSP/JJH
SCALE: HORZ: 1"=100' VERT: ---

PREPARED BY:

ADP

1861 Austin Bluffs Parkway
Suite 101
Colorado Springs, CO 80918
(719) 268-5212
fax: (719) 268-5341

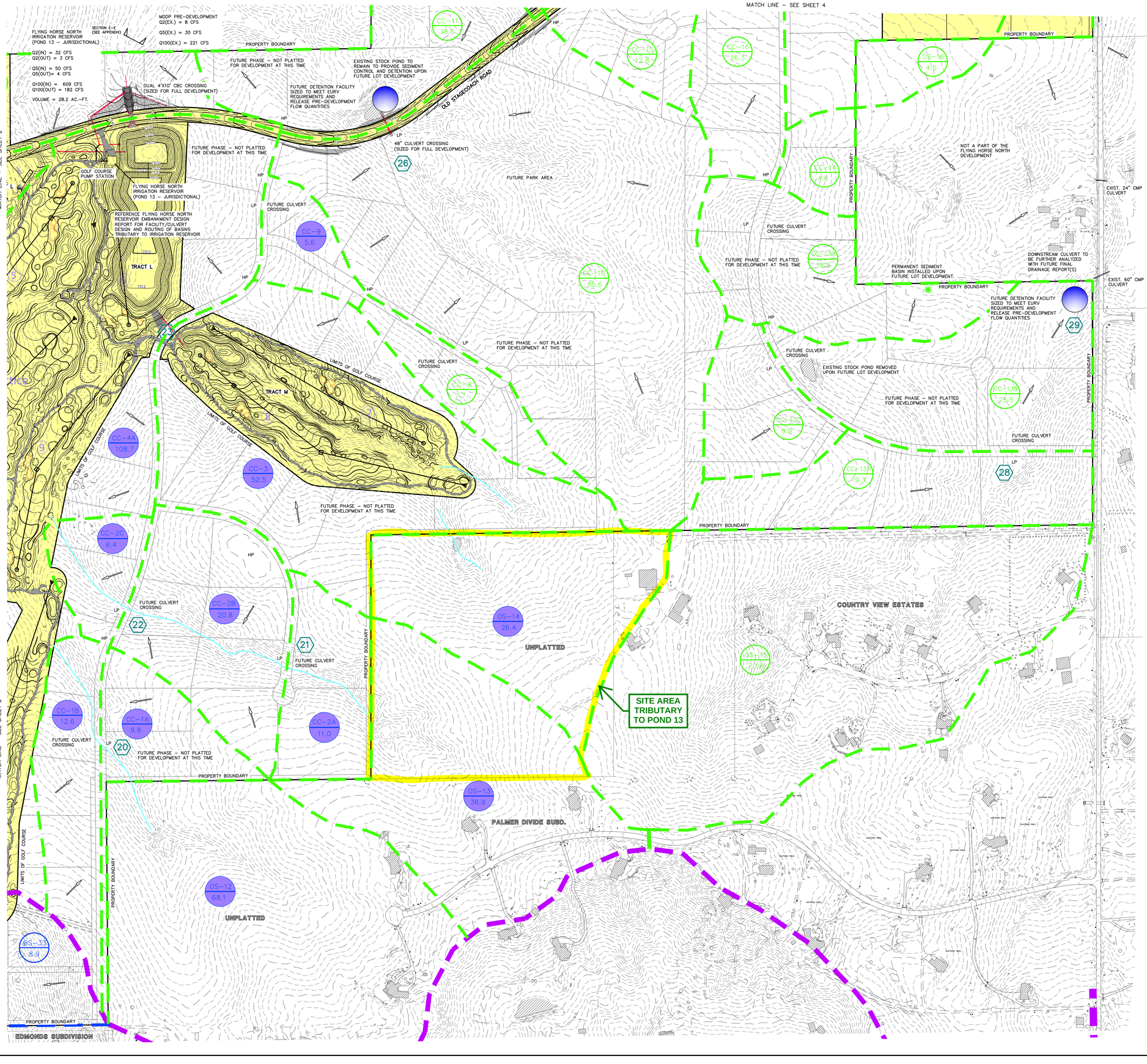
NO.	DATE	REVISION	BY
1	10/14/98	AS PER COUNTY COMMENTS	JMM

COUNTRY VIEW ESTATES

EL PASO COUNTY, COLORADO

DRAINAGE PLAN

SHEET
1 of 1



BASIN SUMMARY - DEVELOPED CONDITIONS

BASIN (label)	AREA (acres)	COMPOSITE CN	TOTAL LAG TIME (hours)	Q 2 Yr. (cfs)	Q 5 Yr. (cfs)	Q 100 Yr. (cfs)
OS-8	14.20	65.0	0.27	2.1	6.2	24.7
OS-9	9.80	60.0	0.37	0.1	1.0	9.1
OS-10	4.10	65.0	0.17	0.7	2.1	8.2
OS-11	28.00	65.0	0.35	2.4	8.2	38.7
OS-12	68.10	62.7	0.37	2.2	11.9	75.8
OS-13	36.90	63.0	0.33	1.4	7.4	45.0
OS-14	26.40	62.0	0.31	0.7	4.6	31.0
OS-15	70.80	63.9	0.38	3.3	14.8	84.2
OS-16	4.50	65.0	0.24	0.4	1.5	7.2
OS-17	15.80	65.0	0.19	1.6	5.9	27.7
OS-18	13.00	65.0	0.20	1.3	4.7	22.6
CC-1A	9.80	65.0	0.23	0.8	3.3	16.0
CC-1B	12.60	64.8	0.25	1.0	4.0	19.4
CC-2A	11.00	65.0	0.22	1.0	3.8	18.3
CC-2B	20.80	65.0	0.22	1.9	7.1	34.6
CC-2C	6.40	65.0	0.18	0.7	2.5	11.5
CC-3	52.50	63.1	0.43	1.8	8.8	54.5
CC-4A	108.70	62.6	0.44	15.4	39.0	156.0
CC-4B	8.10	76.1	0.26	4.0	7.3	20.6
CC-4C (Pre-Dev.)	7.40	61.0	0.13	0.2	1.8	11.2
CC-5	22.40	65.0	0.26	1.8	7.1	34.3
CC-6	27.80	65.0	0.25	2.3	9.1	43.2
CC-7	18.40	65.0	0.29	1.4	5.4	27.0
CC-8	7.70	65.0	0.25	0.6	2.5	12.0
CC-9	5.60	65.0	0.19	0.6	2.1	9.8
CC-10	85.60	62.6	0.39	2.6	14.1	91.9
CC-11	18.60	63.1	0.21	0.9	5.0	28.1
CC-12	12.20	65.0	0.26	1.0	3.9	18.7
CC-13A	19.30	65.0	0.31	1.4	5.4	27.3
CC-13B	25.50	65.0	0.31	1.8	7.2	36.1
CC-13C	9.90	65.0	0.22	0.9	3.4	16.5
CC-13D	18.80	65.0	0.25	1.5	6.2	29.2
CC-14	4.60	65.0	0.21	0.4	1.6	7.8
CC-15	12.80	65.0	0.24	1.1	4.3	20.4
CC-16	16.30	65.0	0.30	1.2	4.6	23.6
CC-17	25.00	65.0	0.35	1.7	6.5	32.8
CC-18	6.20	66.5	0.30	0.7	2.2	9.7
CC-19	3.70	65.0	0.25	0.3	1.2	5.8
CC-20	39.30	65.0	0.25	3.2	12.9	61.0
CC-21	6.20	61.0	0.20	0.1	1.2	8.5
CC-22	13.80	65.0	0.25	1.1	4.5	21.4
CC-23	5.70	64.7	0.33	0.4	1.5	7.7
CC-24	39.60	65.0	0.25	3.3	13.0	61.5
CC-25	3.50	65.0	0.23	0.3	1.2	5.7
CC-26	16.70	65.0	0.29	1.4	5.3	25.6
CC-27	18.90	64.4	0.31	1.2	4.9	25.8
CC-28	154.80	64.4	0.63	6.5	24.7	136.3

DESIGN POINTS SURFACE ROUTING SUMMARY - DEVELOPED CONDITIONS

Design Point (label)	Contributing Basins	Q 2 Yr. Q (cfs)	Q 5 Yr. Q (cfs)	Q 100 Yr. Q (cfs)
DP-20 DEV	CC-1A, OS-12	3.2	14.3	88
DP-21 DEV	CC-2A, OS-13	2.1	10.5	62
DP-22 DEV	CC-2B, Release from DP-21	3.7	16.6	92
DP-23 DEV	CC-3, OS-14	2.5	13.0	84
DP-24 DEV	CC-4C (Pre-Dev.), CC-5	1.9	8.4	45
TOTAL INFLOW TO POND 12 (UD Detention hydrograph)	**CC-4C, CC-5, CC-6**	**6**	**9**	**85**
DP-25 DEV	**Release from FHN Pond 12**	**0.2**	**0.3**	**45**
DP-26 DEV	CC-8, CC-10	3.0	15.9	102
DP-27 DEV	CC-15, CC-20	4.3	17.2	81
DP-28 DEV	CC-13A, OS-15	4.6	19.8	110
DP-29 DEV	CC-13B, CC-13C, Release from DP-28	5.8	26.6	155
DP-30 DEV	CC-18	0.7	2.2	10
DP-31 DEV	CC-19, Release from DP-30	0.9	3.2	15
DP-32 DEV	CC-17, OS-16	2.0	7.8	40
DP-33 DEV	CC-23, CC-24	3.6	14.4	69
DP-34 DEV	CC-26, CC-27, CC-28 and Release from CC-16 & DP-32	6.0	23.5	168

LEGEND

DESCRIPTION	SYMBOL
EXISTING GROUND CONTOUR	6910
PROPOSED FINISHED CONTOUR	6910
BASIN BOUNDARY EAST CHERRY CREEK	
MAJOR BASIN BOUNDARY	
DESIGN POINT	3
BASIN IDENTIFIER / AREA IN ACRES	BB 10.0
EXISTING DIRECTION OF FLOW	
PROPOSED DIRECTION OF FLOW	
STORM SEWER	
FILING NO. 1 PLAT AREA	

N

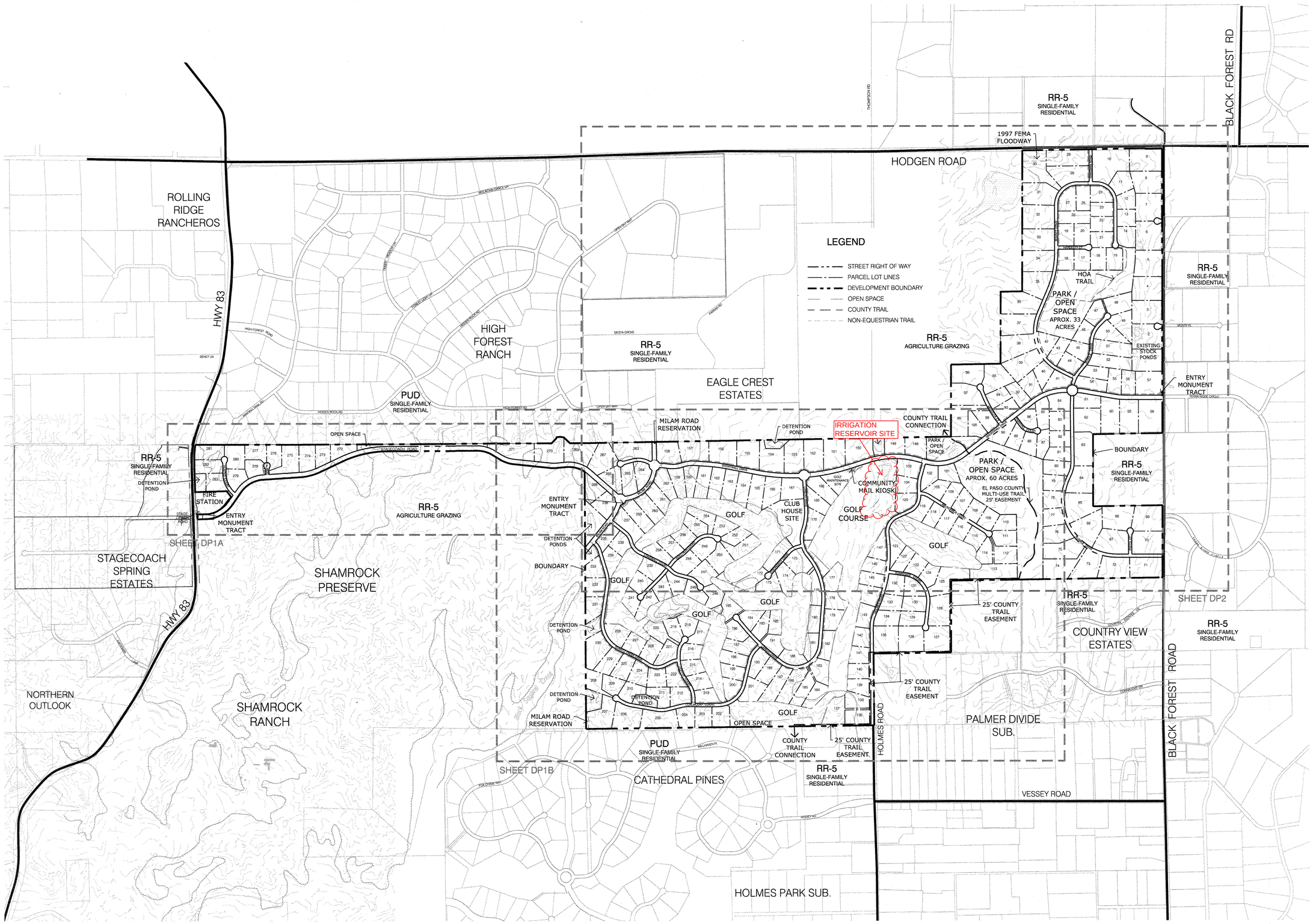
200 100 0 200 400

SCALE: 1" = 200'

CLASSIC CONSULTING ENGINEERS & SURVEYORS SM
619 N. Cascade Avenue, Suite 200
Colorado Springs, Colorado 80903
(719)785-0790
(719)785-0799 (Fax)

FLYING HORSE NORTH
PRELIMINARY/FINAL DRAINAGE REPORT
FILING NO. 1 AND
PRELIMINARY PLAN DRAINAGE MAP

DESIGNED BY	MAW	SCALE		DATE	10-25-17
DRAWN BY	MAW	(H) 1"= 200'		SHEET	3 OF 4
CHECKED BY		(V) 1"= N/A		JOB NO.	1096.11



Land Planning
Landscape Architecture
Urban Design

NES

N.E.S. Inc.
619 N. Cascade Avenue, Suite 200
Colorado Springs, CO 80903

Tel. 719.471.0073
Fax 719.471.0267

www.nescolorado.com

PLANNER / LANDSCAPE ARCHITECT

IN ASSOCIATION WITH

FLYING HORSE NORTH

PLANNED UNIT DEVELOPMENT

PROJECT INFO

DATE:	04-18-2016
PROJECT MGR:	J. MAYNARD
PREPARED BY:	K. MARSHALL

SEAL

ISSUE INFO

DATE:	BY:	DESCRIPTION:
07-25-16	KMM	Per review comments
09-07-16	KMM	Per 2nd review comments
11-28-16	KMM	Milam Revisions

ISSUE / REVISION

SHEET TITLE

DEVELOPMENT PLAN OVERALL SITE

SHEET NUMBER

DP

2 OF 6

PLAN FILE #

FIGURE 1.2

P:\Classic2\Shamrock Ranch\Drawings\Planning\Develop\Dp-layout\Flying_Horse_North-DP.dwg [FXLPLAN] 2/8/2017 4:06:11 PM kmarshall

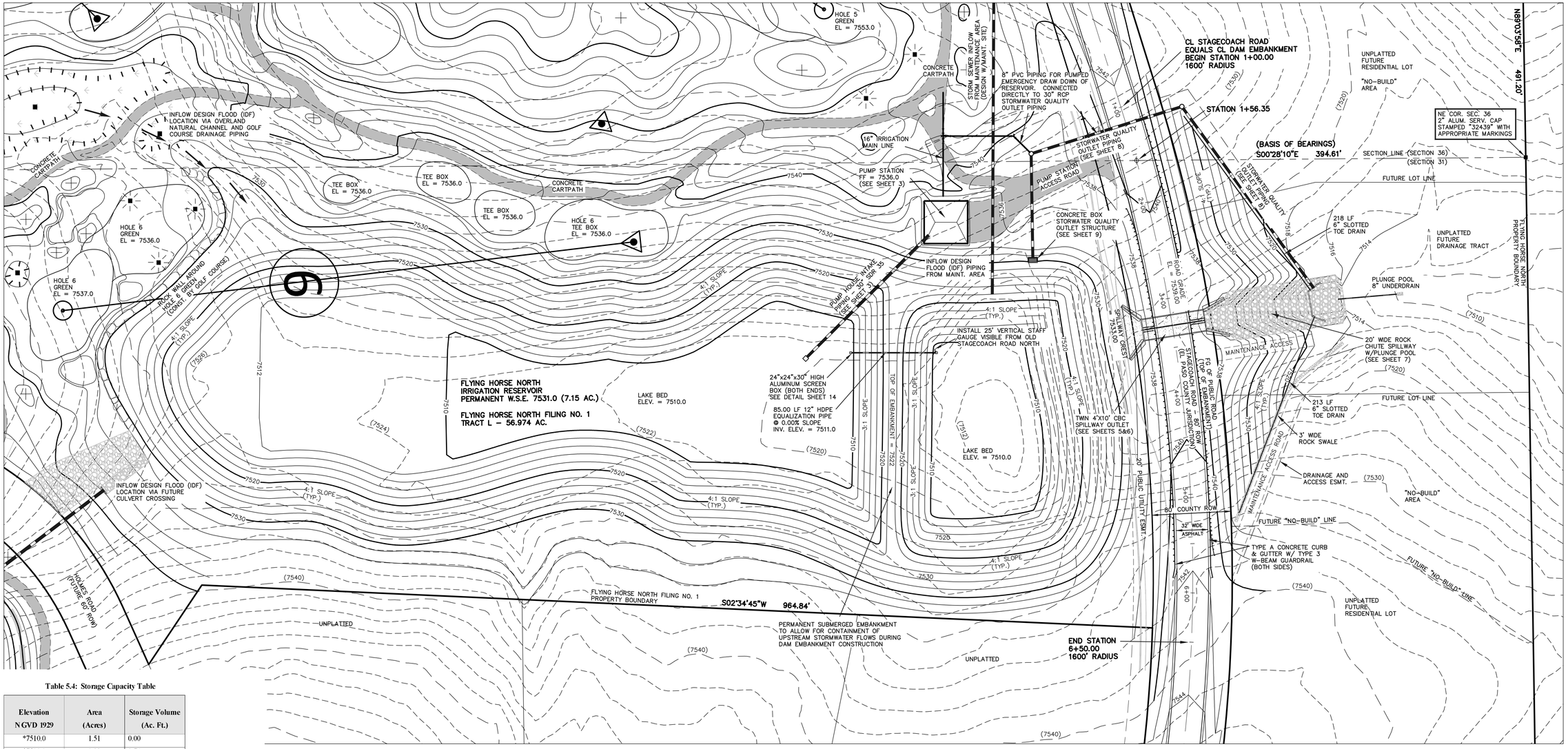


Table 5.4: Storage Capacity Table

Elevation NGVD 1929	Area (Acres)	Storage Volume (Ac. Ft.)
*7510.0	1.51	0.00
*7511.0	1.99	1.74
*7512.0	2.52	3.99
*7513.0	2.85	6.68
*7514.0	3.05	9.63
*7515.0	3.26	12.78
7516.0	3.48	16.15
7517.0	3.70	19.74
7518.0	3.93	23.56
7519.0	4.16	27.60
7520.0	4.40	31.88
7521.0	4.64	36.40
7522.0	4.88	41.16
7523.0	5.14	46.17
7524.0	5.36	51.42
7525.0	5.59	56.89
7526.0	5.84	62.61
7527.0	6.08	68.57
7528.0	6.33	74.77
7529.0	6.57	81.22
7530.0	6.81	87.91
7531.0	7.15	94.89
7532.0	7.52	102.22
7533.0	7.83	109.90
7534.0	8.37	118.00
7535.0	8.77	126.57
7536.0	9.17	135.53

*Indicates dead storage below pumping ability

Table 5.5: Reservoir Discharge Table

Elevation	Discharge (cfs) (SWQ Outlet Box)	Discharge (cfs) (Twin CBC Spillway)	Discharge (cfs) (Total)
7531.0	0.0	0.0	0.0
7532.0	13.89	0.0	13.89
7533.0	27.77	0.0	27.77
7534.0	51.31	49.05	100.36
7535.0	69.52	138.56	208.08
7536.0	74.61	254.72	329.33

Permanent WSE = 7531.0

Top of SWQ Outlet box = 7533.0

Spillway elevation = 7533.0

NOTES:

1. TOPOGRAPHIC BASE MAPPING PRODUCED FROM AERIAL PHOTOGRAPHY PROVIDED BY NORTH AMERICAN MAPPING IN 2009. HORIZONTAL CONTROL IS BASED ON LOCAL CALIBRATION TIED TO SECTION CORNER AND VERTICAL CONTROL IS BASED ON NGVD 1929 DATUM.
2. PERMANENT WSE = 7531.0
3. RESERVOIR LINER INSTALLED UP TO ELEVATION 7534.0

STAFF GAUGE DETAILS:

1. 12"X25"X1/2" PVC
2. LASER CUT ACRYLIC NUMBERS AND HATCH MARKS LIQUID WELDED TO PVC ON 1 FT. INCREMENTS
3. MOUNTED ON ALUMINUM FRAME WITH CROSS BRACKETS ANCHORED INTO SLOPE
4. BASE FASTENED TO 12" PIPE
5. ELEVATION DISPLAY RANGE: 7512–7535

50 25 0 50 100

SCALE: 1" = 50'

FIGURE 1.3

STATE ENGINEER'S CONSTRUCTION FILE NUMBER: C–2085

48 HOURS BEFORE YOU DIG, CALL UTILITY LOCATORS
811
UTILITY NOTIFICATION CENTER OF COLORADO
IT'S THE LAW

THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE CAUSED BY HIS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NO.	REVISION	DATE
1	REVISED PER STATE COMMENTS	5–14–18
2	REVISED PER COUNTY COMMENTS	7–31–18

REVIEW:

PREPARED UNDER MY DIRECT SUPERVISION FOR AND ON BEHALF OF CLASSIC CONSULTING ENGINEERS AND SURVEYORS, LLC

MARC A. WHORTON, COLORADO P.E. #37155 DATE

CLASSIC CONSULTING ENGINEERS & SURVEYORS
619 N. Cascade Avenue, Suite 200 (719)785–0790
Colorado Springs, Colorado 80903 (719)785–0799(Fax)

FLYING HORSE NORTH
IRRIGATION RESERVOIR EMBANKMENT
SITE LAYOUT WITH GRADING
DAM ID – 080459

DESIGNED BY	MAW	SCALE		DATE	1–4–18
DRAWN BY	MAW	(H) 1"=	50'	SHEET	4 OF 14
CHECKED BY		(V) 1"=	N/A	JOB NO.	1096.11

N:\1096\1\DRAWINGS\CONSTRUCTION\Jurisdictional Plans\4-0_POND - Site Grading.dwg, 8/21/2018 3:14:51 PM, 1:1

5.3 WATERSHED CHARACTERISTICS

The watershed of the irrigation reservoir includes a total area of 366.8 acres within the East Cherry Creek drainage basin and just north of the Palmer Divide. A portion of this area is outside the Flying Horse North development as shown in basins OS-12, OS-13 and OS-14. These basins are both currently undeveloped and developed as County zoned RR-5 (5 ac. rural residential). All the on-site basins are zoned PUD for either 2.5 ac. rural residential or golf course/open space. (See Tables 5.2 and 5.3 for sub-basin CN values and associated Tc times) Nearly the entire watershed is outside of the black forest tree line and mainly consists of prairie grasses with grades ranging from 2%-20% with three major natural ravines that drain in a northwesterly direction directly towards the planned irrigation reservoir. The golf course layout aides in the natural conveyance of the majority of the stormwater flows to the reservoir. The storage capacity table for the reservoir is listed in Table 5.4.

Table 5.2: Sub-basin CN Values

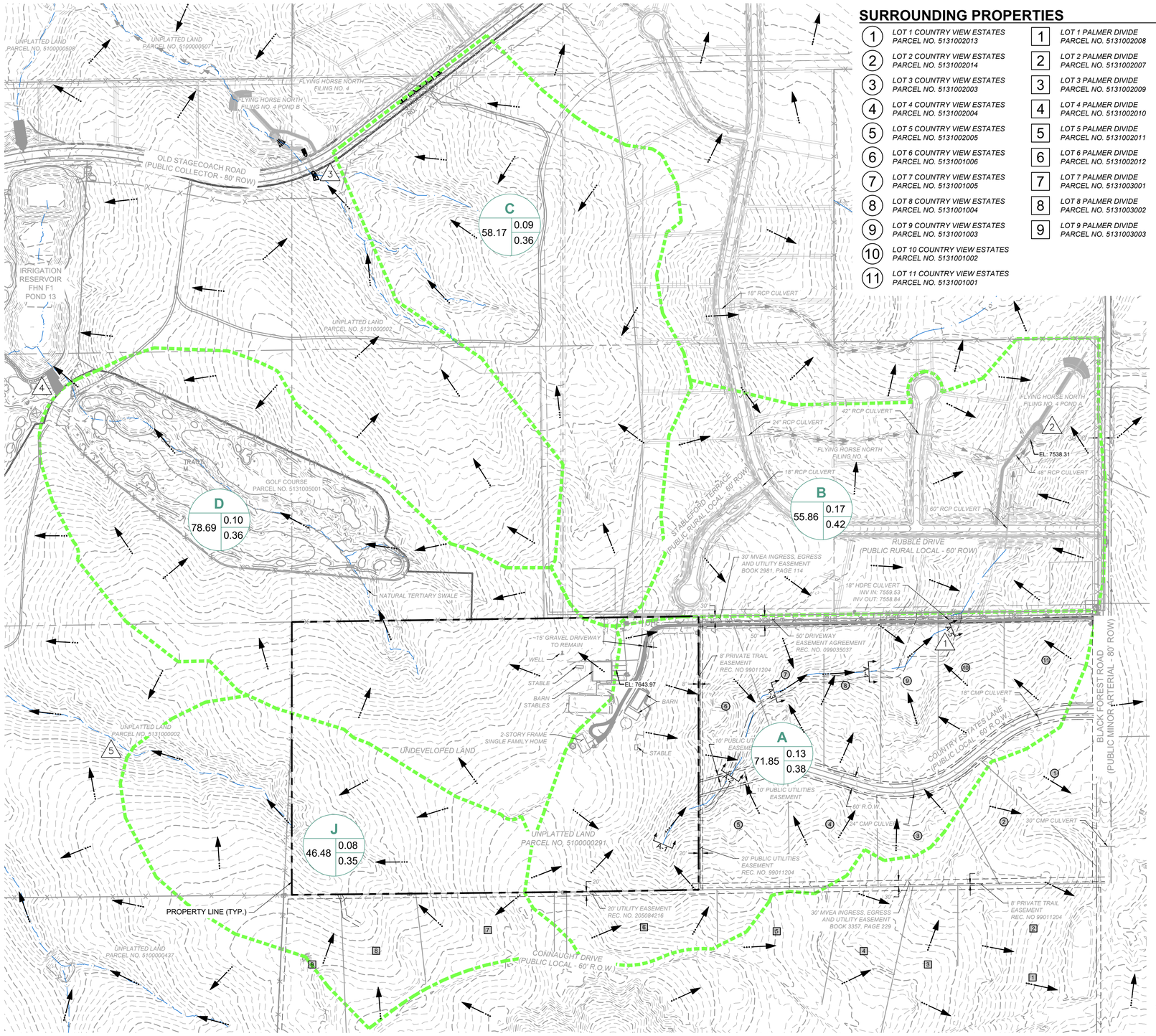
ALL LAND ASSUMED 2 ACRE RESIDENTIAL LOTS OR
GOOD CONDITION OPEN SPACE (LAWNS, PARKS GOLF COURSES, CEMETARIES ETC.)

C_N VALUES - DEVELOPED CONDITIONS

BASIN (label)	BASIN AREA (Ac)	GOLF COURSE (B)		2 AC. RESIDENTIAL (B)		COMPOSITE C_N
		CN	AREA (Ac.)	CN	AREA (Ac.)	
CC-1	22.3	61	0.0	65	22.3	**65.0**
CC-2	36.4	61	0.0	65	36.4	**65.0**
CC-3	51.9	61	19.1	65	32.8	**63.5**
CC-4A	108.2	61	63.2	65	45.0	**62.7**
CC-4B	17.0	61	5.5	65	11.5	**63.7**
OS-12	67.7	61	0.0	65	67.7	**65.0**
OS-13	36.9	61	0.0	65	36.9	**65.0**
OS-14	26.4	61	0.0	65	26.4	**65.0**

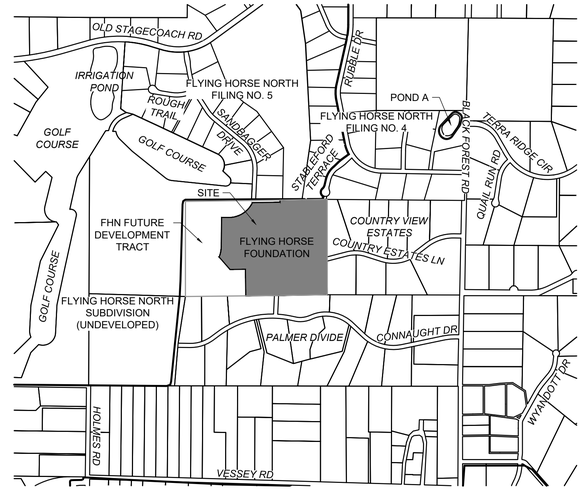
CLASSIC CONSULTING ENGINEERS & SURVEYORS

APPENDIX E – DRAINAGE MAPS



SURROUNDING PROPERTIES

1	LOT 1 COUNTRY VIEW ESTATES PARCEL NO. 5131002013	1 LOT 1 PALMER DIVIDE PARCEL NO. 5131002008
2	LOT 2 COUNTRY VIEW ESTATES PARCEL NO. 5131002014	2 LOT 2 PALMER DIVIDE PARCEL NO. 5131002007
3	LOT 3 COUNTRY VIEW ESTATES PARCEL NO. 5131002003	3 LOT 3 PALMER DIVIDE PARCEL NO. 5131002009
4	LOT 4 COUNTRY VIEW ESTATES PARCEL NO. 5131002004	4 LOT 4 PALMER DIVIDE PARCEL NO. 5131002010
5	LOT 5 COUNTRY VIEW ESTATES PARCEL NO. 5131002005	5 LOT 5 PALMER DIVIDE PARCEL NO. 5131002011
6	LOT 6 COUNTRY VIEW ESTATES PARCEL NO. 5131001006	6 LOT 6 PALMER DIVIDE PARCEL NO. 5131002012
7	LOT 7 COUNTRY VIEW ESTATES PARCEL NO. 5131001005	7 LOT 7 PALMER DIVIDE PARCEL NO. 5131003001
8	LOT 8 COUNTRY VIEW ESTATES PARCEL NO. 5131001004	8 LOT 8 PALMER DIVIDE PARCEL NO. 5131003002
9	LOT 9 COUNTRY VIEW ESTATES PARCEL NO. 5131001003	9 LOT 9 PALMER DIVIDE PARCEL NO. 5131003003
10	LOT 10 COUNTRY VIEW ESTATES PARCEL NO. 5131001002	
11	LOT 11 COUNTRY VIEW ESTATES PARCEL NO. 5131001001	



VICINITY MAP
SCALE: 1" = 1000'

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		
EASEMENT LINE		
RIGHT OF WAY		
CENTERLINE		
CURB & GUTTER		
DRAINAGE BASIN		
DRAINAGE SWALE		
TERTIARY DRAINAGE WAY		
MAJOR CONTOUR	5900	5900
MINOR CONTOUR	5902	5902
STORM SEWER		
ADA ROUTE		
RETAINING WALL		
FLOW DIRECTION		
DESIGN POINT		
SWALE CROSS SECTION		
BASIN LABEL		

BASIN DESIGNATION: A1
AREA (AC.): 1.00 | 0.40 MINOR 5-YR RUNOFF COEF. | 0.60 MAJOR 100-YR RUNOFF COEF.

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
A	71.85	6.40	0.13	0.38	24.92	126.51
B	55.86	10.99	0.17	0.42	24.59	101.18
C	58.17	3.42	0.09	0.36	15.09	96.97
D	78.69	3.79	0.10	0.36	21.18	132.40
J	46.48	2.00	0.08	0.35	10.22	75.05
ONSITE TOTAL	40.04	3.3%	0.09	0.36	13.89	70.50
OFFSITE TOTAL	224.53	6.4%	0.13	0.38	82.11	461.59
GRAND TOTAL	311.04	5.9%	0.12	0.38	96.00	532.10

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	A	24.92	126.51	71.85	4.60
2	A, B	49.48	227.55	127.71	5.27
3	C	15.09	96.97	58.17	1.99
4	D	21.18	132.40	78.69	2.98
5	J	10.22	75.05	46.48	0.93

DRAWN BY: CMD JOB DATE: 9/26/2025
APPROVED: RDL JOB NUMBER: 2502010
CAD DATE: 1/23/2025
CAD FILE: J:\2025\2502010\CAD\Dwgs\C\Drainage\Existing_Conditions

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1" IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

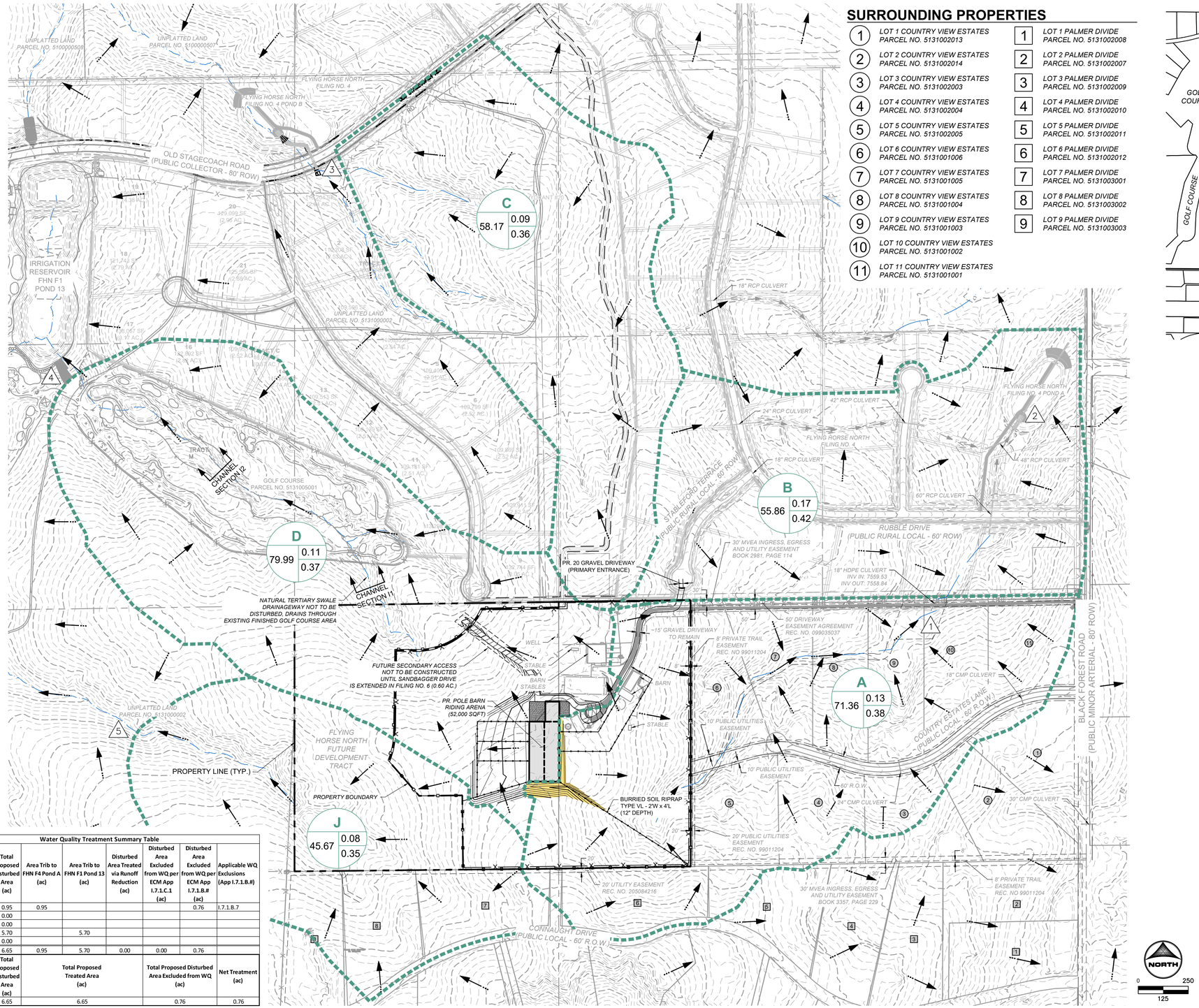
NO.	DATE	BY	REVISION DESCRIPTION

HRGreen
HR GREEN - COLORADO SPRINGS
1975 RESEARCH PARKWAY SUITE 160
COLORADO SPRINGS, CO 80920
PHONE: 719.300.4140
FAX: 713.965.0044

FLYING HORSE FOUNDATION
JEFFREY B. SMITH
EL PASO COUNTY, COLORADO

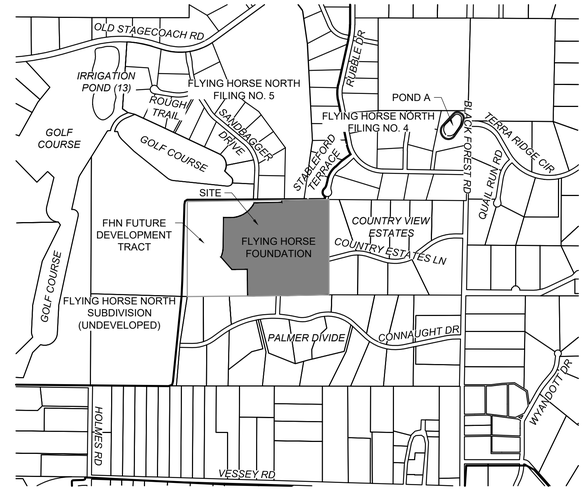
HYDROLOGY MAPS
EXISTING CONDITIONS

SHEET DR 1



SURROUNDING PROPERTIES

1	LOT 1 COUNTRY VIEW ESTATES PARCEL NO. 5131002013	1 LOT 1 PALMER DIVIDE PARCEL NO. 5131002008
2	LOT 2 COUNTRY VIEW ESTATES PARCEL NO. 5131002014	2 LOT 2 PALMER DIVIDE PARCEL NO. 5131002007
3	LOT 3 COUNTRY VIEW ESTATES PARCEL NO. 5131002003	3 LOT 3 PALMER DIVIDE PARCEL NO. 5131002009
4	LOT 4 COUNTRY VIEW ESTATES PARCEL NO. 5131002004	4 LOT 4 PALMER DIVIDE PARCEL NO. 5131002010
5	LOT 5 COUNTRY VIEW ESTATES PARCEL NO. 5131002005	5 LOT 5 PALMER DIVIDE PARCEL NO. 5131002011
6	LOT 6 COUNTRY VIEW ESTATES PARCEL NO. 5131001006	6 LOT 6 PALMER DIVIDE PARCEL NO. 5131002012
7	LOT 7 COUNTRY VIEW ESTATES PARCEL NO. 5131001005	7 LOT 7 PALMER DIVIDE PARCEL NO. 5131003001
8	LOT 8 COUNTRY VIEW ESTATES PARCEL NO. 5131001004	8 LOT 8 PALMER DIVIDE PARCEL NO. 5131003002
9	LOT 9 COUNTRY VIEW ESTATES PARCEL NO. 5131001003	9 LOT 9 PALMER DIVIDE PARCEL NO. 5131003003
10	LOT 10 COUNTRY VIEW ESTATES PARCEL NO. 5131001002	
11	LOT 11 COUNTRY VIEW ESTATES PARCEL NO. 5131001001	



VICINITY MAP
SCALE: 1" = 1000'

LEGEND

	EXISTING	PROPOSED
PROPERTY LINE		
EASEMENT LINE		
RIGHT OF WAY		
CENTERLINE		
CURB & GUTTER		
DRAINAGE BASIN		
DRAINAGE SWALE		
TERTIARY DRAINAGE WAY		
MAJOR CONTOUR	5900	5900
MINOR CONTOUR	5902	5902
STORM SEWER		
ADA ROUTE		
RETAINING WALL		

AREA EXCLUDED FROM WQ TREATMENT PER ECM APP I.7.1.B.7
TOTAL AREA = 0.76 ACRES

FLOW DIRECTION

DESIGN POINT

SWALE CROSS SECTION

BASIN LABEL

BASIN DESIGNATION
A1
1.00 (AREA (AC.)) 0.40 (MINOR 5-YR RUNOFF COEF.) 0.60 (MAJOR 100-YR RUNOFF COEF.)

Water Quality Treatment Summary Table

Basin ID	Total Area (ac)	Total Proposed Disturbed Area (ac)	Area Trib to FHN F4 Pond A (ac)	Area Trib to FHN F1 Pond 13 (ac)	Disturbed Area Treated via Runoff Reduction (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.C.1 (ac)	Disturbed Area Excluded from WQ per ECM App I.7.1.B.# (ac)	Applicable WQ Exclusions (App I.7.1.B.#)
A	71.36	0.95	0.95				0.76	I.7.1.B.7
B	55.86	0.00						
C	58.17	0.00						
D	79.87	5.70		5.70				
J	45.67	0.00						
Total	310.93	6.65	0.95	5.70	0.00	0.00	0.76	

Min Required Area to Receive WQ (ac)	Total Proposed Disturbed Area (ac)	Total Proposed Treated Area (ac)	Total Proposed Disturbed Area Excluded from WQ (ac)	Net Treatment (ac)
5.89	6.65	6.65	0.76	0.76

SUMMARY RUNOFF TABLE

BASIN	AREA (ac)	% IMP.	C_5	C_{100}	Q_5 (cfs)	Q_{100} (cfs)
A	71.36	6.22	0.13	0.38	24.52	125.39
B	55.86	10.99	0.17	0.42	24.59	101.18
C	58.17	3.42	0.09	0.36	15.09	96.97
D	79.99	5.99	0.11	0.37	24.81	138.23
J	45.67	2.00	0.08	0.35	10.04	73.74
ONSITE TOTAL	40.04	2.9%	0.09	0.35	13.76	70.35
OFFSITE TOTAL	271.00	6.3%	0.12	0.38	85.31	465.14
GRAND TOTAL	311.04	5.9%	0.12	0.38	99.07	535.49

CUMULATIVE DESIGN POINT SUMMARY TABLE

DESIGN POINT	CONTRIBUTING BASINS	ΣQ_5 (cfs)	ΣQ_{100} (cfs)	Tributary Area (ac.)	Weighted % Impervious
1	A	24.52	125.39	71.36	4.44
2	A, B	49.09	226.43	127.22	5.19
3	C	15.09	96.97	58.17	1.99
4	D	24.81	138.23	79.99	4.79
5	J	10.04	73.74	45.67	0.91

DRAWN BY: CMD JOB DATE: 10/28/2025
APPROVED: RDL JOB NUMBER: 2502010
CAD DATE: 1/23/2025
CAD FILE: J:\2025\2502010\CAD\Dwgs\C\Drainage\Proposed_Conditions

BAR IS ONE INCH ON OFFICIAL DRAWINGS. 0 1"
IF NOT ONE INCH, ADJUST SCALE ACCORDINGLY.

NO.	DATE	BY	REVISION DESCRIPTION

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FLYING HORSE FOUNDATION
JEFFREY B. SMITH
EL PASO COUNTY, COLORADO

HYDROLOGY MAPS
PROPOSED CONDITIONS

SHEET DR 2