Countryside South

Master Development Drainage Plan

Owner/Developer
Challenger Homes
8605 Explorer Drive, Suite 250
Colorado Springs, CO 80920
Contact: Jim Byers
719-963-4095

Engineer
Atwell, LLC
143 Union Blvd., Suite 700
Lakewood, CO 80228
303-825-7100
Contact: Richard Lyon, PE

Atwell Project Number
21003308

Submitted by: Atwell, LLC

September 2021

Approval Blocks

Engineer's Certification Statement:

This report and plan for the preliminary drainage design of Countryside South was prepared by me (or under my direct supervision) in accordance with the provisions of the City of Colorado Springs Drainage Design and Technical Criteria for the owners thereof. I understand that the City of Fountain does not and will not assume liability for drainage facilities designed by others.

Richard D. Lyon, PE 53921 Date Seal:

Developer's Statement:

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

Business Name: Challenger Homes

By:

Title:

Address:

CONTENTS

INTRODUCTION

This Master Development Plan Report has been completed for Challenger Homes in order to present an effective storm water management plan for the Countryside South development, hereinafter referred to as the Site. This report is intended to guide the development of the site and recommend general drainage concepts that can be implemented as development progresses. Included within this report is a proposed drainage plan for the Site along with reference information for drainage basins and storm water conveyance facilities.

The Site was most recently studied in the *Countryside South Master Development Drainage Plan* by Kiowa Engineering Corporation, latest revision January 2015 for the development of the Countryside South Development, however, the Overall Development Plan has changed significantly since the development of the 2015 report. This Master Development Drainage Plan (MDDP) reflects the most recent Overall Development Plan site layout developed by Matrix Design Group for Countryside South.

The Site is approximately 168.75 acres, the majority is sited for single family detached residences and some parcels to the north are reserved for City developments such as a school campus, fire district facility, and space for the electric utility. The drainage exhibits and calculations within the appendix present the Site and other off-site basins consistent with that of previous reports.

Proposed herein is a stormwater management plan for the planning and design of storm water infrastructure, ponds, and channels that will meet the relevant criteria for storm water quality and detention, but also allow for aesthetically pleasing landscape and enjoyable green spaces within the PUD community. It is expected that a Preliminary Drainage Report will follow the Master Development Plan Report and utilize the MDDP for further design of storm water infrastructure and facilities.

The Site currently lies within the El Paso County jurisdiction and is to be annexed into the City of Fountain.

GENERAL LOCATION AND DESCRIPTION

The Site is located within Section 9, Township 15 South, Range 65 West of the Sixth Principal Meridian, County of El Paso, State of Colorado. The Site is bounded to the south, east, and west by undeveloped land and to the north by an existing single-family residential property called Countryside North. The site is located approximately 1.5 miles east of I-25, on the south side of Wilson, within the City of Fountain, Colorado. The overall area consists of approximately 168.75 acres that is proposed to be developed into single-family residential lots, a fire station site and a proposed school site. In addition to the single-family residential units and lots, there is proposed development for open space, and associated roadways and landscaping. There is an existing irrigation ditch called the Chilcott Ditch to the east of the Site, which flows to the southeast.

The Site is located within the Calhan Reservoir Basin Drainage Basin Planning Study which is a DBPS study that is currently being developed by Atwell, LLC. to be reviewed and approved by the City of Fountain and El Paso County, CO.

SOILS AND EXISTING SOIL CONDITIONS

The majority of the Site is currently undeveloped. Of the development within the Site, there are existing dirt roadways. The ALTA survey conducted by Atwell, LLC. shows the existing conditions of the Site and adjacent development of Countryside North. The site is nearly 100 percent existing natural grass vegetation typical of the eastern plains with sparse vegetative cover at its outer limits. The on-site slopes range from 1.5 to 28.9 percent and generally sheet flows from northeast to southwest. A Historic Drainage Map is included in Appendix E showing the delineated drainage basins.

The Site is made up of mostly clay loam soils with 100 percent of the soils being Hydrologic Soil Group C. The on-site soils are specified as Nunn clay loam (59), and Manzanola silty clay loam (MzA) as mapped by the Soil Conservation Service (SCS). The Natural Resources Conservation Service of the United States Department of Agriculture Web Soil Survey has been included in Appendix B for reference. A second soils map is provided for the upstream, off-site area as well.

FLOODPLAIN

According to the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map No. 08041C0966G dated December 7, 2018, the Site lies within Zone X, which is designated as "Area determined to be outside the 0.2% annual chance flood hazard area." The FEMA FIRM, Community Panels No. 08041C0966G (effective December 7, 2018) are included in Appendix C for reference.

El Paso County is involved with the Colorado Hazard Mapping Program (CHAMP) because the CWCB delegates its authority to the County to enforce the regulatory floodplain. El Paso County is part of the NFIP (National Flood Insurance Program) which provides assistance to property owners affected by flooding. Inclusion into this program requires that the County enforce floodplain regulations and any changes made to the regulatory maps. Failure to implement these changes could result in the County losing its NFIP status as such a Preliminary FEMA FIRM panel is also included in Appendix C that was remapped as part of CHAMP.

DRAINAGE DESIGN CRITERIA

The City of Fountain references the City of Colorado Springs Drainage Criteria Manuals Volumes 1-3 for drainage standards. These manuals were used in conjunction with the Mile High Flood District Criteria manuals. The rational method was used for drainage basins with areas less than 100 acres; there are no major basins or sub-basins that exceed 100 acres. The 5-year design

frequency was used for the minor storm and a 100-year design frequency was used for the major storm in calculating anticipated onsite storm facility hydraulics. The one-hour point rainfall depth used for the 5-year storm was 1.5 inches and 2.52 inches for the 100-year event. The City of Fountain utilizes the City of Colorado Springs IDF Curve (Figure 6-5 of the Drainage Criteria Manual Volume 1) used for calculating rainfall intensity.

HISTORIC AND OFFSITE DRAINAGE BASINS

The Site has been assessed previously via *Countryside South Master Development Drainage Plan* developed by Kiowa Engineering Corporation, latest revision January 2015 as well as *Countryside South Subdivision Final Drainage Report for Filing No. 1 Preliminary Drainage Report for Filing No. 2* developed by Engineering and Surveying, Inc., latest revision September 2006. As stated previously, the site layout for these older reports has been altered significantly and this MDDP reflects the most recent Overall Development Plan (2021) developed by Matrix Design Group.

All off-site drainage basin runoff data and calculations have been updated for current codes and standards consistent with City of Fountain and City of Colorado Springs standards. The Site lies within the Calhan Reservoir Basin Drainage Basin.

This site has been broken down into seven off-site sub-basins upstream of the Site. Descriptions of the major basins are provided below. A drainage map is provided in Appendix F.

Off-Site Basins:

The off-site basins associated with Countryside South's existing/historical conditions are tributary areas on the south and west side of the Chilcotte Canal Number 27 which flows north to south near the boundary of the Site. Any upstream areas to the north and east of the drainageway is captured by the canal and does not drain onto the Site. There are two local topographic depressions that currently capture storm water and historically have detained a significant portion of their respective tributary areas. As a measure of conservativism, it is assumed that the storm water flows and volumes that are tributary to the local depressions continue downstream through the Site. The Existing/Historical Drainage Map is provided in Appendix E.

Basin OS-1 (3.1 ac, Q_5 = 1.3 cfs, Q_{100} = 5.1 cfs) is the off-site tributary area upstream of the Chilcotte Canal Number 27. This sub-basin is presented as it technically drains into the Site's northern parcels dedicated to a future fire station and utility site. However, it is assumed that this portion within the site boundary will not be developed or disturbed. The storm water will continue to flow into the irrigation ditch due south as it has historically. This particular tributary area does not enter the existing 48" RCP culvert pipe (DP1).

Basin OS-2 (0.6 ac, Q_5 = 0.3 cfs, Q_{100} = 1.1 cfs) is a relatively small portion of off-site tributary area that flows onto the northern and separate parcels for the future fire station and utility site from the north. Any area on the other side of the drainageway is captured by the canal/irrigation ditch. The storm water from this sub-basin flows to DP2 at the rear of the existing subdivision to the west and into the undeveloped area of future Wilson Road where it continues to flow west.

Basin OS-3 (1.5 ac, Q_5 = 0.5 cfs, Q_{100} = 2.1 cfs) is the relatively small off-site tributary area south of the drainageway that drains onto the northern parcel dedicated to a future fire station and utility site from the east. The storm water flows to DP2 where it enters the undeveloped area for future Wilson Road and continues to flow west.

Basin OS-4 (188.5 ac, Q_5 = 65.2 cfs, Q_{100} = 246.3 cfs) is the large off-site tributary area upstream of the existing 48" RCP culvert pipe under the Chilcotte Canal Number 27 irrigation ditch (DP1). The sub-basin consists of undeveloped pervious area of Hydrologic Soil Type B and C for the majority of the area and is categorized as Historic Flow Analysis – Greenbelts & Agriculture for the runoff calculations which is considered to be 2 percent impervious. The off-site basin has been calculated with an assumed 100 percent Hydrologic Type C soil as a conservative measure and may be further adjusted in the PDR/FDR. The storm water for this tributary area drains to the culvert pipe (DP1) via overland flow and enters the Site after crossing the undeveloped Wilson Road area, ultimately draining to the southwest corner of the Site, DP3.

Basin OS-5 (9.8 ac, Q_5 = 3.4 cfs, Q_{100} = 12.9 cfs) is the off-site tributary area that is on the west side of the drainageway located east of the Site. This sub-basin drains to sub-basin OS-6 / DP5 where there is an existing local topographical depression that historically has detained stormwater for its tributary area. It is assumed that the flow from DP5 continues due southwest through sub-basin A-4 and ultimately DP3, the drainage ditch on the north side of the undeveloped right-of-way dedicated to future Orleans Road roadway extension.

Basin OS-6 (3.8 ac, Q_5 = 1.3 cfs, Q_{100} = 5.2 cfs) is the delineated area of the local topographical depression just east of the Site that historically has detained stormwater for its tributary area including upstream sub-basin OS-5. The storm water from the sub-basin ponds at DP5. It is assumed that the flow from DP5 continues due southwest through sub-basin A-4 and ultimately DP3, the drainage ditch on the north side of the undeveloped right-of-way dedicated to future Orleans Road roadway extension.

Basin OS-7 (17.1 ac, Q_5 = 4.9 cfs, Q_{100} = 18.8 cfs) is the off-site tributary area east of the Site that drains through the site. The storm water continues due southwest through sub-basin A-4 and ultimately DP3, the drainage ditch on the north side of the undeveloped right-of-way dedicated to future Orleans Road roadway extension.

This site consists of one major on-site basin that consists of seven (7) sub-basins within the Site; five for the majority of the Site and two for the northern smaller parcel. A description of the two (2) major basins is provided. A drainage map is provided in Appendix F.

On-Site Basin (Undeveloped):

Basin A (158.0 ac, Q_5 = 21.3 cfs, Q_{100} = 80.4 cfs) is larger portion of the Site that does not include the northern parcel of land for the future fire station and utility site. The basin consists of pervious native grasses and weeds with soils classified as Hydrologic Soils Group C. There is an existing local topographical depression to the northeast of the Site of approximately 3.4 acres that historically has detained its tributary drainage area, DP4. It is assumed that storm water ponding at DP4 continues southwest to DP3. The rest of the major basin generally sheet flows from the northeast to the southwest. The Chilcotte Canal Number 27 is a drainageway in the vicinity of the Site and crosses through the very northeast corner of Basin A. The major basin ultimately flows to the southwest property corner, DP3, where it exits the Site via the drainage ditch on the north side of the undeveloped right-of-way dedicated to future Orleans Road roadway extension. The major basin is broken down into five (5) sub-basins as shown in the drainage map in Appendix F.

Basin Y (9.9 ac, Q_5 = 3.8 cfs, Q_{100} = 14.5 cfs) is the smaller parcel of the Site to the north of Wilson Road for the future fire station and utility site. The basin consists of pervious native grasses and weeds with soils classified as Hydrologic Soils Group C. The Chilcotte Canal Number 27 crosses the basin at the northeast corner, splitting the basin into two sub-basins. Sub-basin Y-1 is located north of the drainageway and drains to DP1 which represents the drainageway at the eastern edge of the property. Y-2 is the majority of the northern parcel where storm water drains to DP2 and continues due west within the undeveloped Wilson Road area.

PROPOSED DRAINAGE BASINS

This report has been prepared in accordance with the City of Fountain which utilizes the City of Colorado Springs Drainage Criteria Manuals Volumes 1-3 and Mile High Flood District manuals. The 5-year storm was used as the minor storm event, while the 100-year storm was used as the major event. The one-hour point rainfall depth used for the 5-year storm was 1.5 inches and 2.52 inches for the 100-year event. The City of Fountain utilizes the City of Colorado Springs IDF Curve (Figure 6-5 of the Drainage Criteria Manual Volume 1) used for calculating rainfall intensity.

The grading design is considered preliminary overlot grading to determine the proposed/developed conditions drainage patterns and preliminary sizing for downstream facilities. As design and development progress, this should be revisited to confirm the proposed drainage patterns used in this analysis are still applicable.

The overarching premise of the drainage design is to route overland flow from residential lots to adjacent rights-of-way where public storm infrastructure will be installed and ultimately convey the storm water to respective ponds to provide water quality treatment as well as flow attenuation and detention. There are some areas within the developed Site that route storm water flow within public rights-of-way to open space areas consisting of a drainage channel. These channels are to be conveyed to the assigned storm water system and ultimately outfall to the respective water quality and detention facility. The analysis within this report provides more defined pond sizing requirements compared to previous reports due to the layout changes as well as preliminary or general locations and sizes for culverts and/or open channels and the public storm system. This idea is intended to be followed for the entirety of the developed site in general terms and to be designed in greater detail via a future Preliminary Drainage Report and Final Drainage Report. Basins which are not along the main drainageways within the proposed developed areas or which are expected to flow offsite have been analyzed.

Preliminary pond sizing and conveyance structures will be analyzed as development progresses to ensure that the final design meets the standards set forward in the City of Colorado Springs Drainage Criteria Manuals as well as the Mile-High Flood Control Criteria Manuals.

Drainage improvements for the Site will include storm sewer infrastructure to capture runoff before street capacities are exceeded and at sump locations as well as channels and swales for potential overflow areas. The existing detention and water quality ponds south of the Site are assessed in this report and are to be constructed according to engineered construction drawings and a Final Drainage Report for the development. More specific details regarding the proposed drainage improvements for the Site are provided in the Detention and Water Quality section of this report.

The Site has been delineated into thirteen major basins based on preliminary grading of the developed conditions for the Site, Basins A through M within the limits of the subdivision. There are no off-site basins that contribute to storm water flow on the site as historical off-site basins will undergo reconstruction for rights-of-way and rear lot development that contains storm water within the off-site areas. Sub-basin analysis within these major basins is provided as a part of the hydrology calculations in order to plan for storm infrastructure and channels on the Site, presented in Appendices C and D. The Developed Conditions Hydrology Map is provided in Appendix E.

Pervious factors for historic flow analysis have been determined to be 2 percent by the MHFD. The rational method was used to estimate runoff rates for the proposed development and are in accordance with the City of Fountain which references the City of Colorado Springs Drainage Criteria Manuals Volumes 1-3. These calculations can be found in Appendix C and D.

Off-Site Basins (Developed):

The historic, undeveloped conditions for off-site tributary areas remain consistent for the developed conditions with the exception of the development of the 120' width right-of-way of Wilson Road for a major arterial roadway and the need for a public 48" RCP culvert pipe with flared end sections and rip-rap at the inlet and outlet to cross under Wilson Road to convey off-site stormwater to the on-site Channel. The development of Wilson Road will contain storm water within the roadway that drains due west and does not drain onto the Site. There is opportunity to grade the east side of the developed site so that off-site tributary areas that historically drained onto the site may be routed due south at the edge of the development by way of positive drainage away from developed lots on the Site by implementing B, Garden, and Walkout lot types. The overlot grading presented in this MDDP assumes the development of A lots for the majority of the eastern boundary of the development and Off-Site drainage basins are considered to be tributary to downstream storm water facilities such as the development's Channel and Pond 2. More detailed design is to be presented in the Preliminary and Final Drainage Report and design plans to determine off-site storm water routing and on-site storm water infrastructure sizing to handle the additional off-site storm water flows. This MDDP does provide preliminary Channel and culvert pipe calculations as a reference for the final design plan.

The major basins for the developed conditions of the Site are described below. The major basins may contain sub-basins within their larger tributary areas. Preliminary roadway and inlet capacities are presented in Appendix E as a reference for further design parameters in order to meet drainage standards. For the purposes of this Master Drainage Design Plan report, only the major basins are described in detail.

On-Site Basins (Developed):

Basin A (13.9 ac, Q_5 = 26.8 cfs, Q_{100} = 57.8 cfs) is the northwestern portion of the Site that its allocated for a school campus in the future. It is proposed that the school site utilize on-site water quality and detention as the drainage pattern is due southwest, making conveyance of the storm water to Pond 1 difficult or infeasible. However, the tributary area and storm water volume from Basin A is included in the water quality and detention volumes for Pond 1 as a conservative measure, in case development of the school site routes to Pond 1 in the future, whether directly or by way of the public storm sewer sump inlets at the low points within the adjacent south roadway.

Basin B (8.1 ac, Q_5 = 20.1 cfs, Q_{100} = 40.8 cfs) is the northern portion of the Site that contains residential lots of 35' by 50' with 30' alleyways within the dense unit blocks. The general drainage pattern is from the northeast to the southwest. The alleys are to consist of inverted crown sections that convey the storm water through the centered flowlines to public on-grade inlets at the roadway intersections at the south border of the basin. The public storm system for Basins B through D outfalls to Pond 1. Emergency overflow conditions for the on-grade inlets dedicated to Basin B result in stormwater flow due west to the low point within the roadway north of Pond 1 where pooling directly flows into Pond 1.

Basin C (12.2 ac, Q_5 = 31.8 cfs, Q_{100} = 63.0 cfs) is the central western portion of the Site located south of Basin A and west of Basin D. The basin contains single-family residential lots, public 55' rights-of-way roadways and is adjacent to Pond 1. The general drainage pattern is from a high point at the southwest of the basin near Basin I, due north and east toward low points in the eastern area of the basin near Pond 1 where public sump inlets are to capture and convey storm water directly to Pond 1. Emergency overflow conditions would result in pooling at the low point where storm water would overtop the curb and flow directly to Pond 1. All foundations in this area are to be set at a minimum elevation higher than the 100-year storm event plus one foot of freeboard in the pooled intersection.

Basin D (15.9 ac, Q_5 = 42.3 cfs, Q_{100} = 85.8 cfs) is located east of Basin C and Pond 1 and contains residential lots, roadways, and some open space. The general drainage pattern is from a high point at the southeast of the basin near Basin G. Storm water flows due north toward the western area of the basin adjacent to Basin C and Pond 1 where public sump inlets are to capture and convey storm water directly to Pond 1. Emergency overflow conditions would result in pooling at the low point where storm water would overtop the curb and flow directly to Pond 1. All foundations in this area are to be set at a minimum elevation higher than the 100-year storm event plus one foot of freeboard in the pooled intersection.

Basin P.1 (4.4 ac, Q_5 = 11.7 cfs, Q_{100} = 18.1 cfs) is the tributary area associated with Detention Pond 1. The basin is to consist of pervious landscaped area with the exception of the concrete storm infrastructure within the pond facility. The basin is a depression for storm water quality and detention from upstream basins. The emergency overflow conditions for Pond 1 are presented in the pond description below.

Pond 1 (Tributary Basins: A, B, C, D, and Pond P.1 Basin) Detention Pond 1 is a 6.3 acre-foot pond that will also act as a water quality basin. At this stage, it is determined that the pond will have an Extended Basin as the water quality feature. A 15' access road will be placed around the top with minimum radii of 30' or a wider 18' access road for radii less than 30'. The pond is to have average side slopes of 4:1. The preliminary outlet structure consisting of an 18" culvert and a 3' x 4' grated inlet box will restrict flows to allowable release rates via an orifice plate and/or outlet pipe restrictor plate. The pond and outlet structure will need to have a more detailed analysis at the time of the Final Drainage Report to demonstrate compliance with drainage standards. The master design intent is to have the outlet pipe connect to public storm sewer in the minor collector road that connects to Pond 2; this system is separate from the public storm sewer dedicated to Basin D which flows into Pond 1. Overflow would be a result of a storm event beyond the 100-year storm and would flow over the sized rip-rap spillway for energy dissipation and would sheet flow into minor collector road east of Pond 1 and would flow south and ultimately into Pond 2. Pond 2's outlet pipe ultimately flows to the north roadside ditch of Orleans road due west toward the southwest corner of the development.

Basin E (21.9 ac, Q_5 = 47.0 cfs, Q_{100} = 104.5 cfs) is the north east portion of the Site adjacent to the Channel (Basin F) and contains residential lots, roadways, and open space. The general drainage pattern is west and south. The residential areas within this basin consists of 55' public rights-of-way for typical street sections. There is a high point located in the northeast corner of the basin and stormwater is to drain southwesterly to local low points at roadway intersections adjacent to the Channel where public sump inlets will collect and convey storm water directly to the Channel where storm water will continue downstream to Pond 2 by way of culvert pipes. Emergency overflow conditions result in surcharging any on-grade inlets within the roadways and pooling at the sump inlets located near the Channel. Surcharging of inlets within the basin would cause storm water to continue downstream toward Basin H and would enter the Channel at the intersection of the minor collector road and the roadway adjacent to the Channel, ultimately flowing to Pond 2. All foundations in the area of the public sump inlets at the interior low points are to be set at a minimum elevation higher than the 100-year storm event plus one foot of freeboard in the pooled intersection.

Basin F (5.9 ac, Q_5 = 12.9 cfs, Q_{100} = 26.8 cfs) is the tributary for the Channel. The Channel flows from the north to the south and culvert pipes with flared end sections are to be installed for roadway crossings. The termination point of the Channel is to contain a rip-rap section of channel with a culvert pipe that flows through Basins H and P.2 to outfall to Pond 2. The Channel is preliminarily sized for the inflow from Basins E, F (itself), G, part of H, and upstream Off-site basins with freeboard and is to be finalized in future drainage studies. The emergency overflow condition would result in overflow into the adjacent residential collector road that has a low point northeast of Pond 2 and would directly flow into Pond 2 after ponding less than one foot. Preliminary channel design calculations are presented in Appendix E.

Basin G (6.1 ac, Q_5 = 5.8 cfs, Q_{100} = 21.0 cfs) is the largest open space portion of the Site, located to the east of Basin J, west of Basins E and H and mostly contains open park space and portions of residential collector roadways. Stormwater sheet flows southwest across the basin and into the adjacent roadways and is to be captured within public sump inlets and is conveyed through the public system that outfalls to Pond 2. The emergency overflow would result in surcharging of the public sump inlets at the roadway intersection and flow due south to the next set of public sump inlets at the roadway's low point. Should this set of inlets surcharge, the storm water would overtop the curb and flow directly into Pond 2.

Basin H (19.4 ac, Q_5 = 36.7 cfs, Q_{100} = 82.8 cfs) is the south eastern most portion of the Site and contains residential lots, 55' public rights-of-way with roadways, and open space. The general drainage path is from the northeast area of the basin where there is a high point to the southwest where a low point drains through a Tract to Pond 2 via public sump inlet(s) at a roadway low point. A portion of Basin H, west of the high point at the northern roadway, drains to the residential collector road adjacent to the Channel. The emergency overflow path of Basin H would result in

overtopping the curb at the southwest low point and would drain directly through the Tract and Pond 2.

Basin I (24.1 ac, Q_5 = 52.3 cfs, Q_{100} = 119.0 cfs) is the south western portion of the Site and contains residential lots, 55' public rights-of-way with roadways, and open space tracts. The general drainage pattern is north to south and west to east to low points where public sump inlets drain directly to Pond 2. The west exterior lots are anticipated to be walkout condition lots with the rear of the lots draining off-site (Basin X). The emergency overflow condition would result in continued flow due south to Basin X and through a dedicated drainage Tract to flow off-site at the southwest corner of the Site. Emergency overflow resulting in pooling at the public sump inlets to the southeast would result in overtopping of the curb and draining directly into Pond 2 through a drainage Tract.

Basin J (12.2 ac, Q_5 = 32.6 cfs, Q_{100} = 66.1 cfs) is located south of Basin C, east of Basin I, and west of Basin G. The residential lots in this basin are higher density, small lots that have public 30' alleyways with inverted crowns that drain north to south and west to east toward the open space. Public sump inlets may be designed at the western termination point of each block within the basin and the captured storm water is to be conveyed directly to Pond 2. The open space west of the Basin is to contain a grasslined swale to convey stormwater due south to a culvert pipe connected to the public storm system that outfalls to Pond 2. The emergency overflow condition of the basin would result in surcharging of the public sump inlets and further pooling within the grasslined swale within the open space and would spill into the roadway north of Pond 2. Excessive pooling within this roadway at the low point at the access road to the residential lots within Basin J would overtop the curb and spill directly into Pond 2.

Basin X (4.4 ac, Q_5 = 3.2 cfs, Q_{100} = 13.0 cfs) is the southwest corner bordering the Site's perimeter and contains residential lots and open space. A relatively small portion of the basin would consist of impervious area which is limited to the rear roof areas of walkout condition lots. The Site will sheet flow off-site west and south. The emergency overflow condition is the same as the normal condition. This basin makes up 1.5 percent of the total Site area and results in 0.52 percent of the total minor storm runoff and 0.98 percent of the total major storm runoff.

Pond 2 (9.2 ac, Q_5 = 8.4 cfs, Q_{100} = 32.9 cfs) is the tributary area of Pond 2 and is a pervious landscaped area dedicated to the depression area for Pond 2 with the exception of impervious storm sewer and pond facility infrastructure. The emergency overflow condition is described in the Pond 2 section.

Pond 2 (Tributary Basins: F-J and Pond 2 Basin) Detention Pond 2 is a 13.23 acre-foot pond that will also act as a water quality basin. For now, it is determined that the pond will have an Extended Basin as the water quality feature. A 15' access road will be placed around the top and radii with a minimum 30'. Radii less than 30' will require wider pathways of 18'. The pond is preliminarily designed for slopes of 4:1. The pond is to have average side slopes of 4:1. The outlet

structure with orifice plate will restrict flows to allowable release rates via an orifice plate and/or outlet pipe restrictor plate. The pond and outlet structure will need to have a more detailed analysis at the time of the Final Drainage Report to demonstrate compliance with drainage standards. The concept presented in this report is to have the outlet pipe daylight along the north drainage ditch of Orleans Road and continue to flow due west. The emergency overflow condition of Pond 2 is a spillway near the outlet structure and pipe that is directed off-site from the southwest corner of the pond. Overflow would be a result of a storm event beyond the 100-year storm and would flow over the sized rip-rap spillway for energy dissipation and would sheet flow off-site toward the north drainage ditch of Orleans Road.

STORM WATER CONVEYANCE AND STORAGE FACILITES

The proposed on-site conveyance facilities will consist of a combination of storm pipe, swales/channels, curb/gutter, and inlets. Proposed drainage patterns will generally follow the historic drainage patterns outlined in the previous sections of this report, including previous master plans and reports for upstream filings. Within the proposed roadway network, stormwater runoff will be conveyed overland via surface flow of streets in the curb and gutter until street capacities have been exceeded or where storm sewer inlets have been designed. At sump locations, inlets will be sized to collect 100-year flows. Runoff entering the inlets will be conveyed within the storm sewer system to detention and water quality ponds.

The proposed pond outfalls will be routed to the Calhan Reservoir Basin. These outfalls have been preliminarily sized based on standard pond release rates required by the MHFD criteria. Release rates will be further evaluated and the design stage for each phase of the development.

Detention and Water Quality Ponds for the Site have been preliminarily designed based on previous MDDP and FDR studies for off-site basins and for the Overall Development Plan for Countryside South with the methods outlined in the MHFD Urban Storm Drainage Criteria Manual Volumes 1, 2 and 3 along with the MHFD MHFD-Detention_v4.00. The ponds are designed to detain the Excess Urban Runoff Volume (EURV) and the 100-year Detention Volume. Excess Runoff from the upstream tributary areas will be conveyed to the pond via storm sewers. The storm sewers will then outlet into the pond in concrete forebays.

The proposed ponds have also included preliminary outlet structures that contain 2.5-ft deep micro-pools. EURV release rates will be controlled by an orifice plate designed to meet the MHFD release rate criteria. The 100-year storage volume will be routed through a grate and restricted by a plate that was sized to limit the release rate to the allowable release rate.

This report provides drainage calculations consistent with the Site's ODP and the resultant grading concept and tributary areas to Ponds A and B. The MHFD UD-Detention calculator was used to determine Pond A and Pond B's required water quality capture volume, excess urban runoff volume, the 100-year detention volume, and the total volume required as a total of each zone.

A summary of the required pond volumes is presented in the table below.

Extended Detention Pond Volumes				
	Zone 1 (WQCV)	**Zone 2 (EURV - Zone 1)**	**Zone 3 (100-Year - Zones 1 & 2)**	**Total Volume Required**
Pond 1	1.253 ac-ft	2.467 ac-ft	2.589 ac-ft	6.309 ac-ft
Pond 2	3.067 ac-ft	2.476 ac-ft	11.080 ac-ft	16.623 ac-ft

Pond 1 was calculated to require 6.309 ac-ft of detention volume and with 1-ft of freeboard within the pond, would yield a volume of approximately 8.641 ac-ft depending on the final shape and size of the pond design. The detailed pond grading and infrastructure design is to be developed as a part of a Preliminary and Final Drainage Report for the subdivision as well as Construction Drawings. Pond features should include any outfalls structures including forebays, any rip-rap design, a concrete trickle channel, micropool, emergency spillway, and outlet structures with an orifice plate and/or restrictor plate designed for the standard release rates for WQCV, EURV, and full spectrum detention. As described previously, initial phases that only require the construction of Pond 1 and its storm infrastructure will have the outlet pipe daylight downstream (south) near future Pond 2.

Pond 2 was calculated to require 16.623 ac-ft of detention volume and with 1-ft of freeboard within the pond, would yield a volume of approximately 21.066 ac-ft depending on the final shape and size of the pond design. Just as with Pond 1, further final reports and plans should be developed for pond grading and storm infrastructure design. Pond 2 is to outlet to the north roadside ditch of Orleans road by daylighting toward the southwest corner of the Site.

The on-site Channel is preliminarily sized for normal and critical depths allowable for storm water conveyance through culvert pipes under the roadway crossings. The channel geometry consists of 2 percent sloped benches of 8.5’ on each side for assumed 6’ width sidewalk and space for landscaping and/or guard rails and signage. The drainageway is preliminarily designed as a trapezoidal channel with 4:1 side slopes a 5’ bottom width. Calculations assume a Manning’s coefficient of 0.40 representing a rough rock channel and may be adjusted for the final design should the channel become grass-lined or naturally vegetated. The PDR/FDR shall consist of more detailed channel calculations taking the turning and velocities into account for shear against the side slopes.

A future Preliminary and Final Drainage Report for Countryside South should utilize the MDDP as a reference document to follow drainage patterns and anticipated tributary areas, storm water flows, and volumes for BMPs in order to provide more detailed storm infrastructure design.

WATER QUALITY ENHANCEMENT BEST MANAGEMENT PRACTICES

The detention ponds discussed in the previous section have been preliminarily designed in accordance with the MHFD Urban Storm Drainage Criteria Manual Volumes 1, 2 and 3 as well as the El Paso County and City of Colorado Springs Drainage Criteria Manuals. The ponds are designed to provide Water Quality Capture Volume and detain the Excess Urban Runoff Volume and the 100-year Detention Volume. Excess Runoff from the upstream tributary areas will be conveyed to the ponds via storm sewer and designed channels as emergency overflow routes directed to the ponds.

Non-structural Best Management Practices that will be incorporated into the project are anticipated to include grass swales.

PHASING OF FULL SPECTRUM DETENTION

The development of Countryside South is to be completed in Phases/Filings in order to maintain water quality capture and full spectrum detention with historical discharge rates through all development. It is anticipated that the development will initially require the construction of Pond 1 and the public storm infrastructure that conveys storm water to Pond 1 in order to develop filings/phases that are tributary to Pond 1. These major basins are A, B, C, D and P.1. An outlet structure with an outlet pipe that flows due south to undeveloped, future site areas may be constructed. It is recommended that this outlet pipe daylight at the approximate location and future invert elevation matching the bottom of Pond 2 to avoid future reconstruction. Future phases for the development are for the areas tributary to Pond 2 and the Channel which are basins E-J and P.2 including public storm infrastructure, the on-site Channel and off-site improvements such as the public 48" RCP culvert pipe within Wilson Road right-of-way.

MAINTENANCE

Maintenance of Detention Ponds 1 and 2 and the Channel shall be by the City of Fountain along with the outlet works for the pond. The proposed storm sewer system in the internal streets will be owned and maintained by the City of Fountain once approved.

DRAINAGE BASIN FEES

The City of Colorado Springs and El Paso County Basin Fees latest revision 2021 lists Calhan Reservoir with a Drainage Fee/Acre of $4,979 and a Bridge Fee/Acre of $290.

The Countryside South property totals 168.75 acres and is to be replatted. According to the 2021 Fee Schedule, a drainage fee of $4,979 per acre * 168.75 acres = $840,206.25 and bridge fee of $290 per acres * 168.75 acres = $48,937.50 is to be paid at the time or recordation.

However, the 2021 fees for the Calhan Reservoir basin are considered outdated by the City of Fountain and as a result the City is requesting that an updated Drainage Basin Plan Study be developed as a part of the requirements for annexation of the Countryside South site. The dollar figures presented above are considered reference information only and are not the final plat and recordation fees. New drainage basin and bridge fees are to be obtained via an updated, City of Fountain approved DBPS (currently in progress).

Any outstanding fees are required to be paid prior to recordation.

CONCLUSION

This Master Development Drainage Plan report covers the conceptual storm water management plan for the development of Countryside South within the City of Fountain. Detailed design will be required to develop filings and/or phases within the site, but this document will provide guidance so that the drainage infrastructure constructed throughout the development will function efficiently and effectively. This report follows all standard criteria set forth by the City of Fountain which utilizes the City of Colorado Springs Drainage Criteria Manuals Volumes 1, 2, and 3, and the Mile High Flood District Urban Storm Drainage Criteria Manual, with no requested variances at this stage. Downstream drainage facilities will not be negatively affected, as historic drainage patterns and allowable release rates are planned to be maintained.

REFERENCES

1) City of Colorado Springs Drainage Criteria Manual, Volumes 1, 2, & 3, latest revision January 2021.

2) Urban Storm Drainage Criteria Manual, Volumes 1, 2, &3, Urban Drainage and Flood Control District, Volumes 1 & 2 – Originally Published September 1969, Updated January 2016; Volume 3 – Originally Published September 1992, Updated November 2010.

3) Flood Insurance Rate Map of El Paso County Colorado; Federal Emergency Management Agency, Map No. 08041C0966G dated December 7, 2018.

4) Hydrologic Soil Group – El Paso County, Colorado, Web Soil Survey, National Cooperative Soils Survey, August 16, 2021

5) *Countryside South Master Development Plan* prepared by Kiowa Engineering Corporation latest revision January 2015.

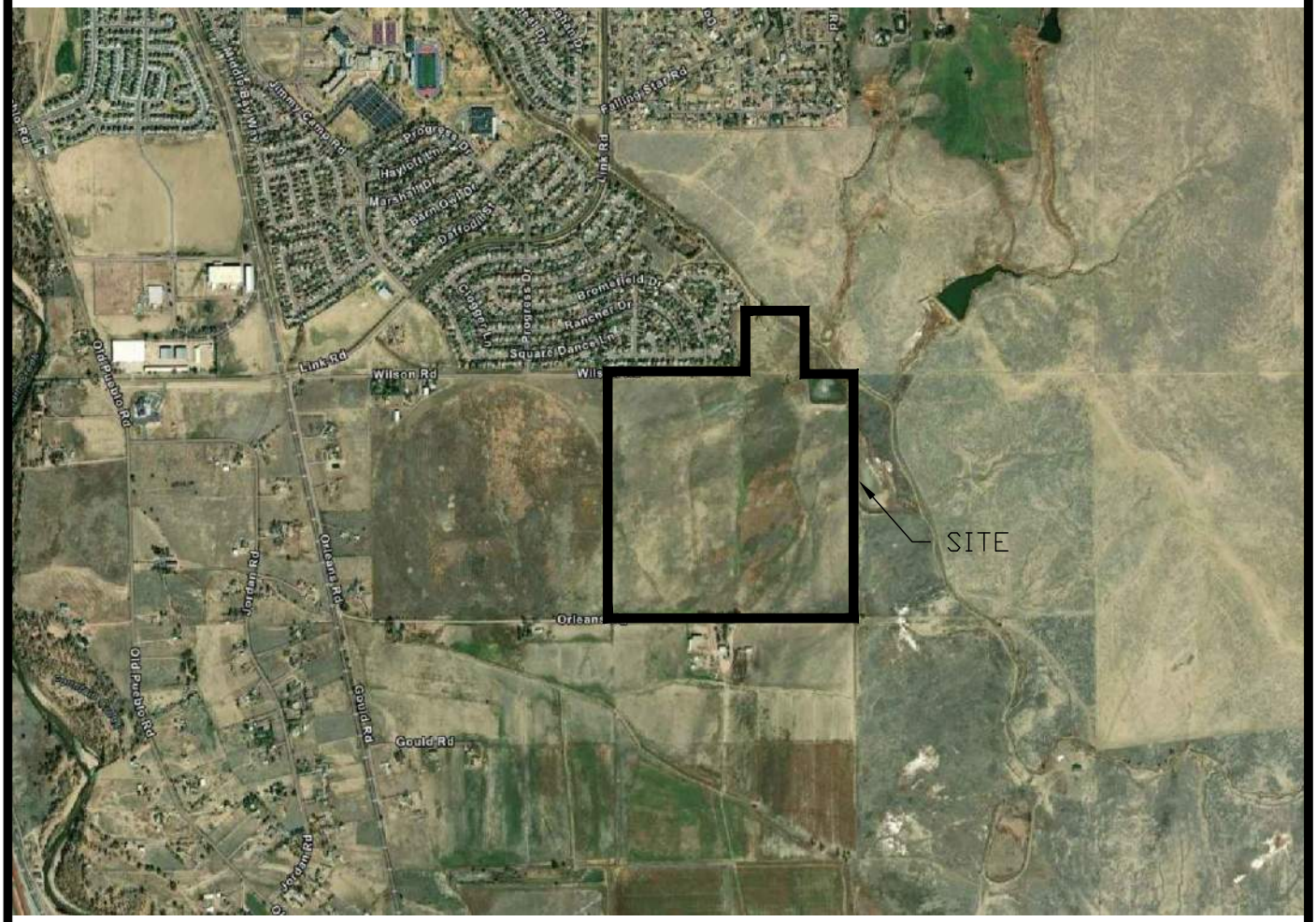
6) *Countryside South Subdivision Final Drainage Report for Filing No. 1 Preliminary Drainage Report for Filing No. 2* prepared by Engineering and Surveying, Inc. latest revision September 2006.

7) [In Progress] *Countryside South Drainage Basin Planning Study* prepared by Atwell, LLC. latest revision.

APPENDIX A – Vicinity Map

Countryside South

A PART OF SECTION 9, TOWNSHIP 15 SOUTH, RANGE 65 WEST
OF THE SIXTH PRINCIPAL MERIDIAN,
COUNTY OF EL PASO,
STATE OF COLORADO



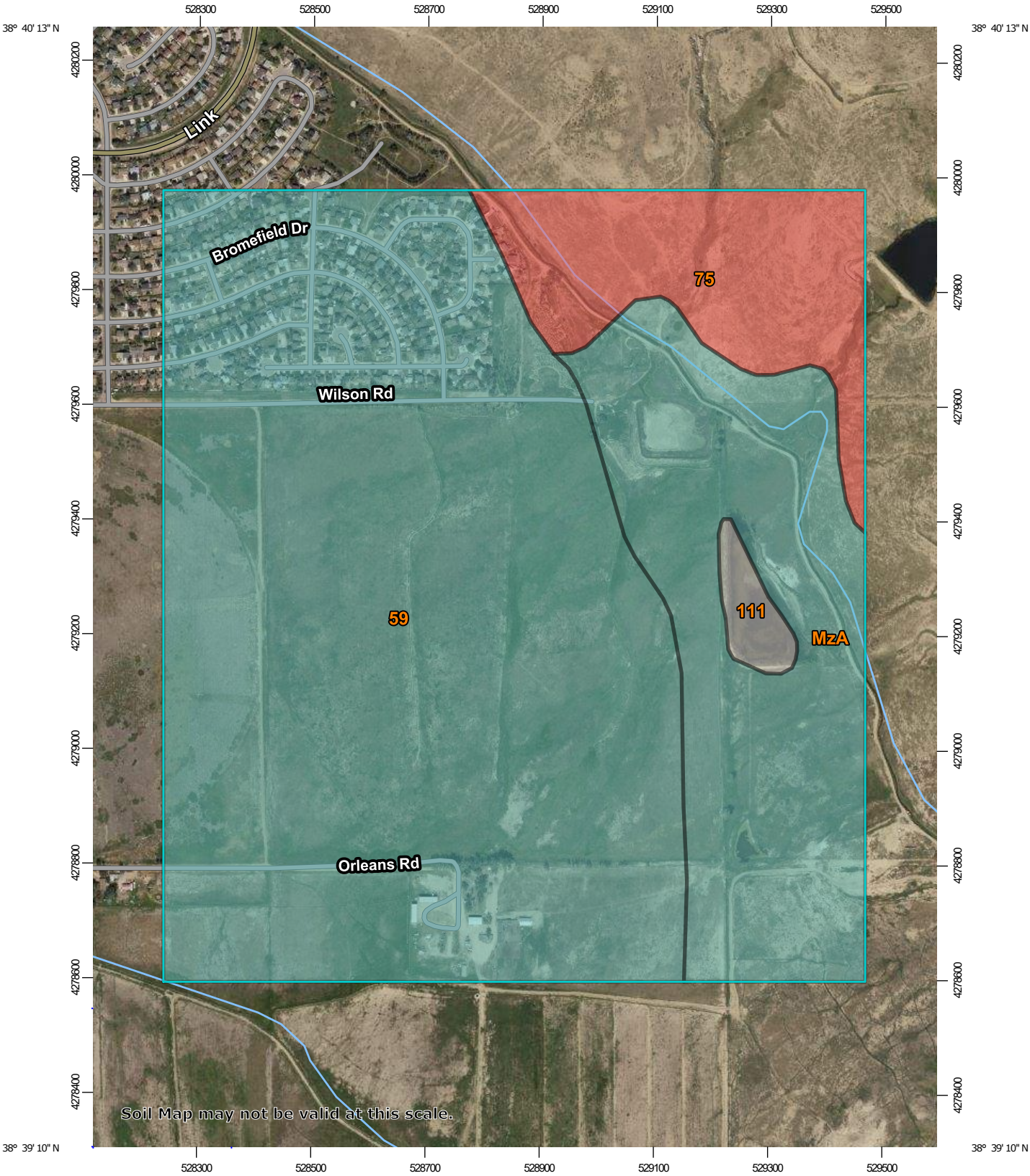
SCALE: 1" = 0.3mi

PROJECT NO.: 21003308
DATE: 9/1/21

ATWELL
866.850.4200 www.atwell-group.com
6200 S. SYRACUSE WAY, SUITE470
GREENWOOD VILLAGE, CO 80111
303.825.7100
CONTACT: DANIEL MADRUGA
DMADRUGA@ATWELL-GROUP.COM

APPENDIX B – Soils Map

Hydrologic Soil Group—El Paso County Area, Colorado
(Countryside South - NRCS Soils Map - Hydrologic Soil Group)



Map Scale: 1:9,520 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 450 900 1800 2700

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 18, Jun 5, 2020

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

Date(s) aerial images were photographed: Aug 14, 2018—Sep 23, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
59	Nunn clay loam, 0 to 3 percent slopes	C	275.9	65.6%
75	Razor-Midway complex	D	45.4	10.8%
111	Water		5.1	1.2%
MzA	Manzanola silty clay loam, saline, 0 to 2 percent slopes	C	94.5	22.4%
Totals for Area of Interest			**420.8**	**100.0%**

Description

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

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

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

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

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

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

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

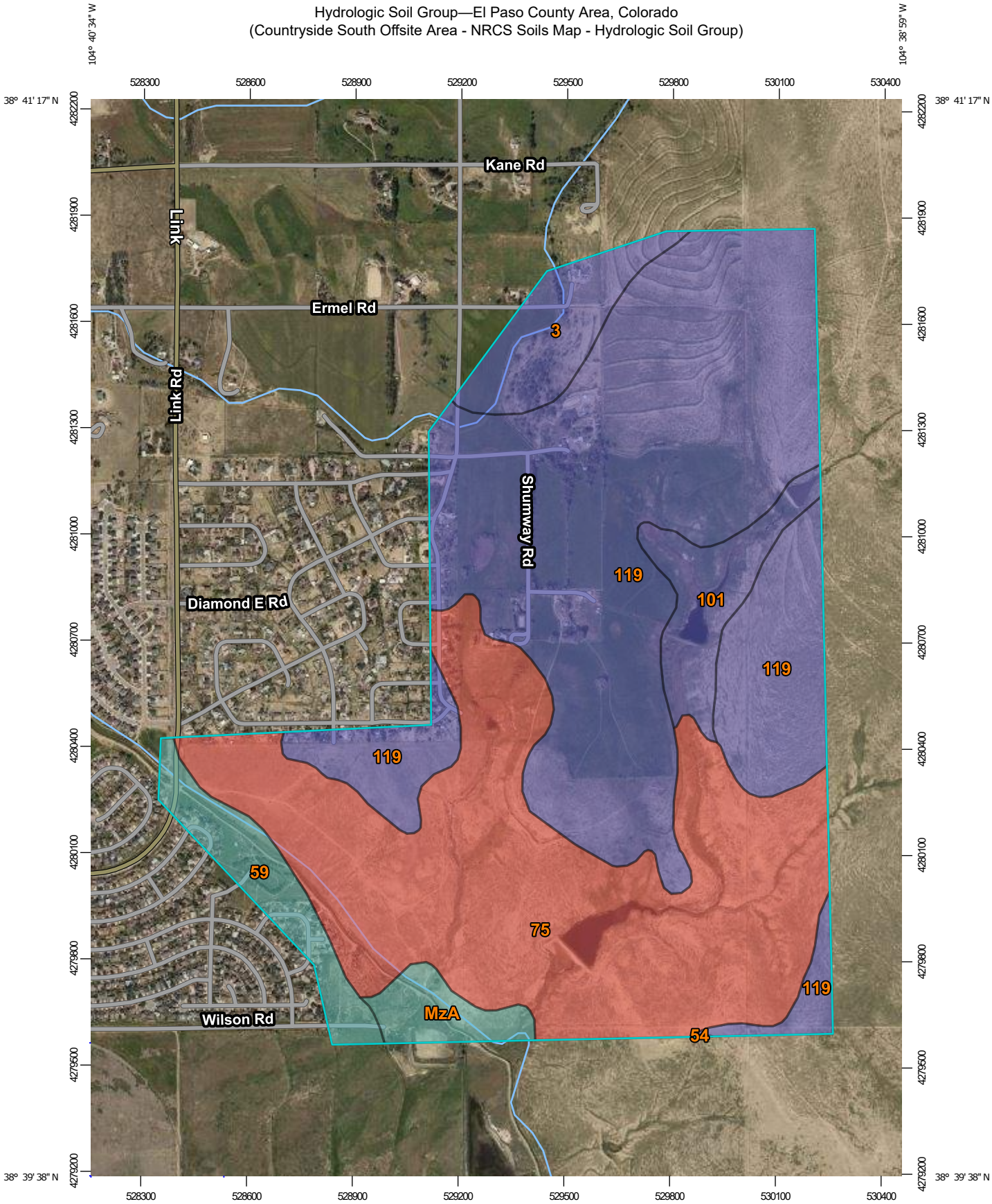
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Hydrologic Soil Group—El Paso County Area, Colorado
(Countryside South Offsite Area - NRCS Soils Map - Hydrologic Soil Group)



Map Scale: 1:14,800 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

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.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

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

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

Date(s) aerial images were photographed: Aug 14, 2018—Sep 23, 2018

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
3	Ascalon sandy loam, 3 to 9 percent slopes	B	32.0	4.5%
54	Midway clay loam, 3 to 25 percent slopes	D	0.1	0.0%
59	Nunn clay loam, 0 to 3 percent slopes	C	29.3	4.1%
75	Razor-Midway complex	D	259.5	36.2%
101	Ustic Torrifluvents, loamy	B	31.4	4.4%
119	Fort sandy loam, 1 to 8 percent slopes, cool	B	348.2	48.6%
MzA	Manzanola silty clay loam, saline, 0 to 2 percent slopes	C	16.2	2.3%
Totals for Area of Interest			**716.6**	**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

APPENDIX C – FEMA FIRM PANEL

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the **North American Vertical Datum of 1988 (NAVD88)**. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242 or visit its website at http://www.ngs.noaa.gov/.

Base Map information shown on this FIRM was provided in digital format by El Paso County, Colorado Springs Utilities, and Anderson Consulting Engineers, Inc. These data are current as of 2008.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. The profile baselines depicted on this map represent the hydraulic modeling baselines that match the flood profiles and Floodway Data Tables if applicable, in the FIS report. As a result, the profile baselines may deviate significantly from the new base map channel representation and may appear outside of the floodplain.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

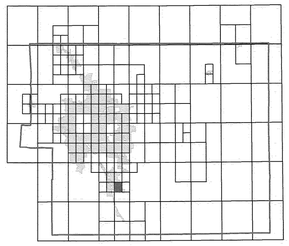
Contact **FEMA Map Service Center** (MSC) via the FEMA Map Information eXchange (FMIX) 1-877-336-2627 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. The MSC may also be reached by Fax at 1-800-358-9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip.

El Paso County Vertical Datum Offset Table

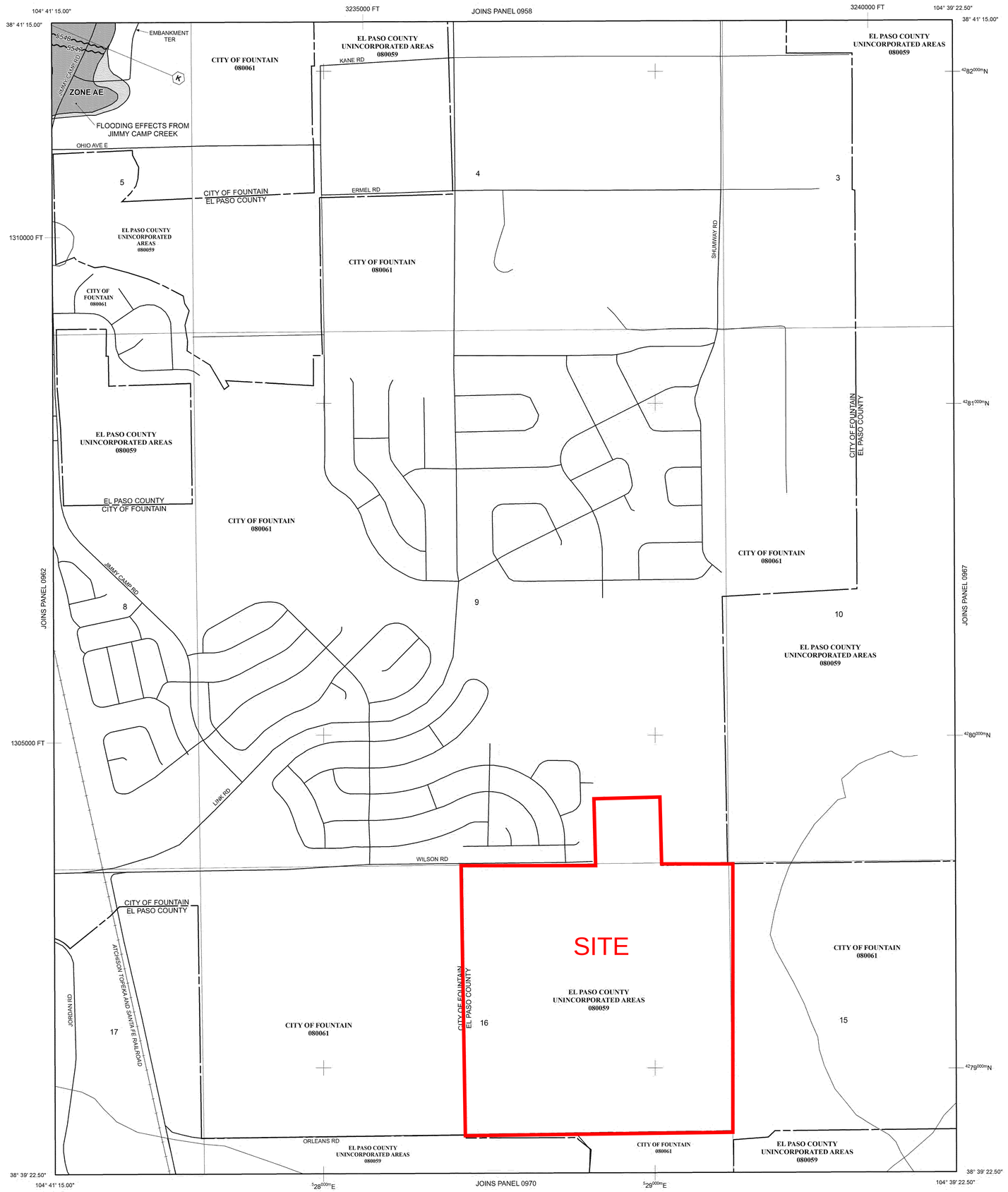
Flooding Source	Vertical Datum Offset (ft)
REFER TO SECTION 3.3 OF THE EL PASO COUNTY FLOOD INSURANCE STUDY FOR STREAM BY STREAM VERTICAL DATUM CONVERSION INFORMATION	

Panel Location Map



This Digital Flood Insurance Rate Map (DFIRM) was produced through a Cooperating Technical Partner (CTP) agreement between the State of Colorado Water Conservation Board (CWCB) and the Federal Emergency Management Agency (FEMA).

Additional Flood Hazard information and resources are available from local communities and the Colorado Water Conservation Board.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 16 SOUTH, RANGE 65 WEST.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area Formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	Floodplain boundary
	Floodway boundary
	Zone D Boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 - - - - 23	Transect line
97° 07' 30.00" 32° 22' 30.00"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN	1000-meter Universal Transverse Mercator grid ticks, zone 13
6000000 FT	5000-foot grid ticks: Colorado State Plane coordinate system, central zone (FIPSZONE 0502), Lambert Conformal Conic Projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
MARCH 17, 1997

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
DECEMBER 7, 2018 - to update corporate limits, to change Base Flood Elevations and Special Flood Hazard Areas, to update map format, to add roads and road names, and to incorporate previously issued Letters of Map Revision.

For community map revision history prior to countywide mapping, refer to the Community Map History Table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0966G

FIRM
FLOOD INSURANCE RATE MAP
EL PASO COUNTY, COLORADO
AND INCORPORATED AREAS

PANEL 966 OF 1300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EL PASO COUNTY	080059	0966	G
FOUNTAIN, CITY OF	080061	0966	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08041C0966G

MAP REVISED
DECMEBER 7, 2018

Federal Emergency Management Agency

APPENDIX D – Hydrologic Computations

Table 6-6. Runoff Coefficients for Rational Method
(Source: UDFCD 2001)

Land Use or Surface Characteristics	Percent Impervious	Runoff Coefficients											
		2-year		5-year		10-year		25-year		50-year		100-year	
		HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D	HSG A&B	HSG C&D
Business													
Commercial Areas	95	0.79	0.80	0.81	0.82	0.83	0.84	0.85	0.87	0.87	0.88	0.88	0.89
Neighborhood Areas	70	0.45	0.49	0.49	0.53	0.53	0.57	0.58	0.62	0.60	0.65	0.62	0.68
Residential													
1/8 Acre or less	65	0.41	0.45	0.45	0.49	0.49	0.54	0.54	0.59	0.57	0.62	0.59	0.65
1/4 Acre	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
1/3 Acre	30	0.18	0.22	0.25	0.30	0.32	0.38	0.39	0.47	0.43	0.52	0.47	0.57
1/2 Acre	25	0.15	0.20	0.22	0.28	0.30	0.36	0.37	0.46	0.41	0.51	0.46	0.56
1 Acre	20	0.12	0.17	0.20	0.26	0.27	0.34	0.35	0.44	0.40	0.50	0.44	0.55
Industrial													
Light Areas	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Heavy Areas	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Parks and Cemeteries	7	0.05	0.09	0.12	0.19	0.20	0.29	0.30	0.40	0.34	0.46	0.39	0.52
Playgrounds	13	0.07	0.13	0.16	0.23	0.24	0.31	0.32	0.42	0.37	0.48	0.41	0.54
Railroad Yard Areas	40	0.23	0.28	0.30	0.35	0.36	0.42	0.42	0.50	0.46	0.54	0.50	0.58
Undeveloped Areas													
Historic Flow Analysis-- Greenbelts, Agriculture	2	0.03	0.05	0.09	0.16	0.17	0.26	0.26	0.38	0.31	0.45	0.36	0.51
Pasture/Meadow	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Forest	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50
Exposed Rock	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Offsite Flow Analysis (when landuse is undefined)	45	0.26	0.31	0.32	0.37	0.38	0.44	0.44	0.51	0.48	0.55	0.51	0.59
Streets													
Paved	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Gravel	80	0.57	0.60	0.59	0.63	0.63	0.66	0.66	0.70	0.68	0.72	0.70	0.74
Drive and Walks	100	0.89	0.89	0.90	0.90	0.92	0.92	0.94	0.94	0.95	0.95	0.96	0.96
Roofs	90	0.71	0.73	0.73	0.75	0.75	0.77	0.78	0.80	0.80	0.82	0.81	0.83
Lawns	0	0.02	0.04	0.08	0.15	0.15	0.25	0.25	0.37	0.30	0.44	0.35	0.50

3.2 Time of Concentration

One of the basic assumptions underlying the Rational Method is that runoff is a function of the average rainfall rate during the time required for water to flow from the hydraulically most remote part of the drainage area under consideration to the design point. However, in practice, the time of concentration can be an empirical value that results in reasonable and acceptable peak flow calculations.

For urban areas, the time of concentration (t_c) consists of an initial time or overland flow time (t_i) plus the travel time (t_t) in the storm sewer, paved gutter, roadside drainage ditch, or drainage channel. For non-urban areas, the time of concentration consists of an overland flow time (t_i) plus the time of travel in a concentrated form, such as a swale or drainageway. The travel portion (t_t) of the time of concentration can be estimated from the hydraulic properties of the storm sewer, gutter, swale, ditch, or drainageway. Initial time, on the other hand, will vary with surface slope, depression storage, surface cover, antecedent rainfall, and infiltration capacity of the soil, as well as distance of surface flow. The time of concentration is represented by Equation 6-7 for both urban and non-urban areas.

RUNOFF COEFFICIENTS AND IMPERVIOUSNESS
Countryside South - Existing Conditions
Colorado
9/9/2021

Basin No	Hydrologic Grouping	Total Area	Paved			Historic Flow Analysis -- Greenbelts, Agriculture			Runoff Coefficient		Imperviousness
				100%			2%				
		(AC)	C5	C100	(AC)	C5	C100	(AC)	5-Year	100-Year	(%)
A-1	C	47.38	0.90	0.96	0.00	0.16	0.36	47.38	0.16	0.36	2.0%
A-2	C	32.91	0.90	0.96	0.00	0.16	0.36	32.91	0.16	0.36	2.0%
A-3	C	32.63	0.90	0.96	0.00	0.16	0.36	32.63	0.16	0.36	2.0%
A-4	C	41.78	0.90	0.96	0.00	0.16	0.36	41.78	0.16	0.36	2.0%
A-5	C	3.45	0.90	0.96	0.00	0.16	0.36	3.45	0.16	0.36	2.0%
Y-1	C	0.72	0.90	0.96	0.00	0.16	0.36	0.72	0.16	0.36	2.0%
Y-2	C	9.22	0.90	0.96	0.00	0.16	0.36	9.22	0.16	0.36	2.0%
OS-1	C	3.18	0.90	0.96	0.00	0.16	0.36	3.18	0.16	0.36	2.0%
OS-2	C	0.69	0.90	0.96	0.00	0.16	0.36	0.69	0.16	0.36	2.0%
OS-3	C	1.56	0.90	0.96	0.00	0.16	0.36	1.56	0.16	0.36	2.0%
OS-4	C	188.59	0.90	0.96	0.00	0.16	0.36	188.59	0.16	0.36	2.0%
OS-5	C	9.84	0.90	0.96	0.00	0.16	0.36	9.84	0.16	0.36	2.0%
OS-6	C	3.89	0.90	0.96	0.00	0.16	0.36	3.89	0.16	0.36	2.0%
OS-7	C	17.12	0.90	0.96	0.00	0.16	0.36	17.12	0.16	0.36	2.0%
TOTAL		**393.0**			**0.0**			**393.0**			**2.0%**

TIME OF CONCENTRATION
Countryside South - Existing Conditions
Colorado

DATE: 9/9/2021
CALCULATED BY: ARP

PROJECT: 21003308
DESIGN STORM: 5 Year

			INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS)			FINAL t_c
TRIBUTARY BASINS	AREA Ac (2)	C5 (3)	LENGTH Ft (4)	SLOPE % (5)	t_i Min. (6)	LENGTH Ft. (7)	SLOPE % (8)	Conveyance Coefficient	VEL fps (9)	t_t Min. (10)	COMP. t_c (11)	TOTAL LENGTH (12)	(L/180)+10 Min. (13)	Min. (14)
A-1	47.38	0.16	2776	1.00	89.42			10	0.00	0.00				89.42
A-2	32.91	0.16	3747	1.40	92.97			10	0.00	0.00				92.97
A-3	32.63	0.16	3535	1.80	83.12			10	0.00	0.00				83.12
A-4	41.78	0.16	3776	1.50	91.23			10	0.00	0.00				91.23
A-5	3.45	0.16	4148	1.50	95.62			10	0.00	0.00				95.62
Y-1	0.72	0.16	326	0.70	34.47			10	0.00	0.00				34.47
Y-2	9.22	0.16	670	2.90	30.92			10	0.00	0.00				30.92
OS-1	3.18	0.16	910	7.20	26.69			10	0.00	0.00				26.69
OS-2	0.69	0.16	384	2.50	24.58			10	0.00	0.00				24.58
OS-3	1.56	0.16	377	0.90	34.12			10	0.00	0.00				34.12
OS-4	188.59	0.16	1900	8.10	37.09			10	0.00	0.00				37.09
OS-5	9.84	0.16	613	1.50	36.76			10	0.00	0.00				36.76
OS-6	3.89	0.16	605	1.60	35.75			10	0.00	0.00				35.75
OS-7	17.12	0.16	1265	2.20	46.53			10	0.00	0.00				46.53

NOTES:

$T_i = [0.395 \times (1.1 - C_2) \times L^{0.5}] / (S^{0.33})$ *S IN %*

$T_t = L / (60 \times V)$

$V = K \times S^{0.5}$

T_C Check = 10 + L/180 (Urbanized Basins Only)

Tc Min = 5 Minutes

Table 6-2. NRCS Conveyance factors, K

Type of Land Surface	Conveyance Factor, K
Heavy meadow	2.5
Tillage/field	5
Short pasture and lawns	7
Nearly bare ground	10
Grassed waterway	15
Paved areas and shallow paved swales	20

5-YEAR RUNOFF CALCULATIONS

Countryside South - Existing Conditions

Colorado

DATE: 9/9/2021
CALCULATED BY: ARP

PROJECT: 21003308
DESIGN STORM: 5-Year

		FLOW TO INLETS								Minimum	Maximum	Under	INLETS								Carry-Over
Sub-Basin	Design Point	Area (acres)	C	C x A	Tc (min)	Intensity (in/hr)	Qd = CIA (cfs)	Qco (cfs)	Qt (cfs)	Street Slope (%)	Street/Paseo Capacity (cfs)	Capacity?	Inlet	Type	Condition	Slope at Inlet (%)	Inlet Capacity (cfs)	R	Intercepted (cfs)	Carry-Over (cfs)	to Sub-basin/ Design Point (DP)
A-1	3	47.38	0.16	7.58	89.42	0.84	**6.39**	0.00	6.39												
-	**3**						6.39	0.00	**6.39**												
A-2	3	32.91	0.16	5.27	92.97	0.78	**4.13**	0.00	4.13												
-	**3**						4.13	0.00	**4.13**												
A-3	3	32.63	0.16	5.22	83.12	0.95	**4.97**	0.00	4.97												
-	**3**						4.97	0.00	**4.97**												
A-4	3	41.78	0.16	6.68	91.23	0.81	**5.43**	0.00	5.43												
-	**3**						5.43	0.00	**5.43**												
A-5	4	3.45	0.16	0.55	95.62	0.74	**0.41**	0.00	0.41												
-	**4**						0.41	0.00	**0.41**												
Y-1	1	0.72	0.16	0.12	34.47	2.27	**0.26**	0.00	0.26												
-	**1**						0.26	0.00	**0.26**												
Y-2	2	9.22	0.16	1.48	30.92	2.44	**3.59**	0.00	3.59												
-	**2**						3.59	0.00	**3.59**												
OS-1	1	3.18	0.16	0.51	26.69	2.66	**1.35**	0.00	1.35												
-	**1**						1.35	0.00	**1.35**												
OS-2	2	0.69	0.16	0.11	24.58	2.78	**0.31**	0.00	0.31												
-	**2**						0.31	0.00	**0.31**												
OS-3	2	1.56	0.16	0.25	34.12	2.29	**0.57**	0.00	0.57												
-	**2**						0.57	0.00	**0.57**												
OS-4	1	188.59	0.16	30.17	37.09	2.16	**65.26**	0.00	65.26												
-	**1**						65.26	0.00	**65.26**												
OS-5	5	9.84	0.16	1.57	36.76	2.18	**3.43**	0.00	3.43												
-	**5**						0.31	0.00	**0.31**												
OS-6	5	3.89	0.16	0.62	35.75	2.22	**1.38**	0.00	1.38												
-	**5**						1.38	0.00	**1.38**												
OS-7	3	17.12	0.16	2.74	46.53	1.82	**4.99**	0.00	4.99												
-	**3**						4.99	0.00	**4.99**												

100-YEAR RUNOFF CALCULATIONS

Countryside South - Existing Conditions

Colorado

DATE: 9/9/2021
CALCULATED BY: ARP

PROJECT: 21003308
DESIGN STORM: 100-Year

		FLOW TO INLETS								Minimum	Maximum	Under	INLETS								Carry-Over
Sub-Basin	Design Point	Area (acres)	C	C x A	Tc (min)	Intensity (in/hr)	Qd = CIA (cfs)	Qco (cfs)	Qt (cfs)	Street Slope (%)	Street/Paseo Capacity (cfs)	Capacity?	Inlet	Type	Condition	Slope at Inlet (%)	Inlet Capacity (cfs)	R	Intercepted (cfs)	Carry-Over (cfs)	to Sub-basin/ Design Point (DP)
Y-1	1	0.72	0.36	0.26	34.47	3.81	**0.99**	0.00	0.99												
-	**1**						0.99	0.00	**0.99**												
Y-2	2	9.22	0.36	3.32	30.92	4.09	**13.57**	0.00	13.57												
-	**2**						13.57	0.00	**13.57**												
A-1	3	47.38	0.36	17.06	89.42	1.41	**24.08**	0.00	24.08												
-	**3**						24.08	0.00	**24.08**												
A-2	3	32.91	0.36	11.85	92.97	1.31	**15.57**	0.00	15.57												
-	**3**						15.57	0.00	**15.57**												
A-3	3	32.63	0.36	11.75	83.12	1.60	**18.75**	0.00	18.75												
-	**3**						18.75	0.00	**18.75**												
A-4	3	41.78	0.36	15.04	91.23	1.36	**20.48**	0.00	20.48												
-	**3**						20.48	0.00	**20.48**												
A-5	4	3.45	0.36	1.24	95.62	1.24	**1.54**	0.00	1.54												
-	**4**						1.54	0.00	**1.54**												
OS-1	1	3.18	0.36	1.14	26.69	4.46	**5.10**	0.00	5.10												
-	**1**						5.10	0.00	**5.10**												
OS-2	2	0.69	0.36	0.25	24.58	4.67	**1.16**	0.00	1.16												
-	**2**						1.16	0.00	**1.16**												
OS-3	2	1.56	0.36	0.56	34.12	3.84	**2.16**	0.00	2.16												
-	**2**						2.16	0.00	**2.16**												
OS-4	1	188.59	0.36	67.89	37.09	3.63	**246.39**	0.00	246.39												
-	**1**						246.39	0.00	**246.39**												
OS-5	5	9.84	0.36	3.54	36.76	3.65	**12.94**	0.00	12.94												
-	**5**						12.94	0.00	**12.94**												
OS-6	5	3.89	0.36	1.40	35.75	3.72	**5.21**	0.00	5.21												
-	**5**						5.21	0.00	**5.21**												
OS-7	3	17.12	0.36	6.16	46.53	3.06	**18.84**	0.00	18.84												
-	**3**						18.84	0.00	**18.84**												

EXISTING CONDITIONS DRAINAGE BASIN SUMMARY

Basin	Design Point	Area (acres)	C_5	C_{100}	Basin Q_5 (cfs)	Basin Q_{100} (cfs)
A-1	3	47.38	0.16	0.36	6.39	24.08
A-2	3	32.91	0.16	0.36	4.13	15.57
A-3	3	32.63	0.16	0.36	4.97	18.75
A-4	3	41.78	0.16	0.36	5.43	20.48
A-5	4	3.45	0.16	0.36	0.41	1.54
Y-1	1	0.72	0.16	0.36	0.26	0.99
Y-2	2	9.22	0.16	0.36	3.59	13.57
OS-1	1	3.18	0.16	0.36	1.35	5.10
OS-2	2	0.69	0.16	0.36	0.31	1.16
OS-3	2	1.56	0.16	0.36	0.57	2.16
OS-4	1	188.59	0.16	0.36	65.26	246.39
OS-5	5	9.84	0.16	0.36	3.43	12.94
OS-6	5	3.89	0.16	0.36	1.38	5.21
OS-7	3	17.12	0.16	0.36	4.99	18.84

EXISTING CONDITIONS DESIGN POINT SUMMARY

Design Point	Basin Q_5 (cfs)	Basin Q_{100} (cfs)
1	66.88	252.49
2	0.88	3.32
3	91.19	344.11
4	0.41	1.54
5	4.81	18.15
CUMMULATIVE FLOW TO DP 3	96.40	363.79

RUNOFF COEFFICIENTS AND IMPERVIOUSNESS
Countryside South - Proposed Conditions
Fountain, Colorado
8/9/2021

Basin No	Hydrologic Grouping	Total Area	Neighborhood Areas			Paved			1/8 Acre or Less			Lawns			Parks and Cemeteries			Commercial Areas			Gravel			Historic Flow Analysis -- Greenbelts, Agriculture			Runoff Coefficient		Imperviousness
			70%			100%			65%			0%			7%			40%			45%			2%					
		(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	C5	C100	(AC)	5-Year	100-Year	(%)
A	C	13.94	0.53	0.68	13.94	0.90	0.96		0.49	0.65		0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.53	0.68	70.0%
B.1	C	4.40	0.53	0.68		0.90	0.96	1.23	0.49	0.65	3.17	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.60	0.74	74.8%
B.2	C	3.74	0.53	0.68		0.90	0.96	1.27	0.49	0.65	2.47	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.63	0.76	76.9%
C.1	C	0.76	0.53	0.68		0.90	0.96	0.33	0.49	0.65	0.43	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.67	0.78	80.2%
C.2	C	1.69	0.53	0.68		0.90	0.96	1.11	0.49	0.65	0.57	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.76	0.85	88.1%
C.3	C	2.31	0.53	0.68		0.90	0.96	0.95	0.49	0.65	1.35	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.66	0.78	79.5%
C.4	C	2.30	0.53	0.68		0.90	0.96	0.72	0.49	0.65	1.58	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.62	0.75	75.9%
C.5	C	3.22	0.53	0.68		0.90	0.96	1.15	0.49	0.65	2.07	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.64	0.76	77.5%
C.6	C	1.94	0.53	0.68		0.90	0.96	0.71	0.49	0.65	1.23	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.64	0.76	77.8%
D.1	C	1.25	0.53	0.68		0.90	0.96	0.74	0.49	0.65	0.17	0.15	0.50	0.34	0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.64	0.79	67.7%
D.2	C	2.42	0.53	0.68		0.90	0.96	1.34	0.49	0.65	1.08	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.72	0.82	84.4%
D.3	C	2.38	0.53	0.68		0.90	0.96	0.79	0.49	0.65	1.58	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.63	0.75	76.7%
D.4	C	2.75	0.53	0.68		0.90	0.96	0.79	0.49	0.65	1.96	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.61	0.74	75.1%
D.5	C	1.27	0.53	0.68		0.90	0.96	0.36	0.49	0.65	0.44	0.15	0.50	0.47	0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.48	0.68	50.7%
D.6	C	0.80	0.53	0.68		0.90	0.96	0.11	0.49	0.65	0.34	0.15	0.50	0.34	0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.40	0.63	42.1%
D.7	C	1.48	0.53	0.68		0.90	0.96	0.53	0.49	0.65	0.94	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.64	0.76	77.7%
D.8	C	1.54	0.53	0.68		0.90	0.96	0.69	0.49	0.65	0.85	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.67	0.79	80.7%
D.9	C	2.10	0.53	0.68		0.90	0.96	1.21	0.49	0.65	0.90	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.73	0.83	85.1%
P.1	C	4.40	0.53	0.68		0.90	0.96		0.49	0.65	0.90	0.15	0.50	3.50	0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.22	0.53	13.2%
E.1	C	4.85	0.53	0.68		0.90	0.96	2.22	0.49	0.65	1.99	0.15	0.50	0.64	0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.63	0.77	72.4%
E.2	C	1.40	0.53	0.68		0.90	0.96	0.22	0.49	0.65	1.18	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.56	0.70	70.6%
E.3	C	3.78	0.53	0.68		0.90	0.96	0.86	0.49	0.65	1.58	0.15	0.50		0.19	0.52	1.34	0.30	0.50		0.63	0.74		0.16	0.36		0.48	0.67	52.4%
E.4	C	3.60	0.53	0.68		0.90	0.96	0.90	0.49	0.65	2.70	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.59	0.73	73.8%
E.5	C	2.85	0.53	0.68		0.90	0.96	0.73	0.49	0.65	2.12	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.60	0.73	74.0%
E.6	C	2.72	0.53	0.68		0.90	0.96	0.56	0.49	0.65	2.16	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.57	0.71	72.2%
E.7	C	2.72	0.53	0.68		0.90	0.96	0.56	0.49	0.65	2.16	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.58	0.71	72.3%
F.1	C	2.02	0.53	0.68		0.90	0.96		0.49	0.65		0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74	2.02	0.16	0.36		0.63	0.74	45.0%
F.2	C	3.95	0.53	0.68		0.90	0.96		0.49	0.65		0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74	3.95	0.16	0.36		0.63	0.74	45.0%
G	C	6.11	0.53	0.68		0.90	0.96	0.64	0.49	0.65		0.15	0.50		0.19	0.52	5.47	0.30	0.50		0.63	0.74		0.16	0.36		0.26	0.57	16.7%
H.1	C	3.75	0.53	0.68		0.90	0.96	0.70	0.49	0.65	0.60	0.15	0.50		0.19	0.52	2.44	0.30	0.50		0.63	0.74		0.16	0.36		0.37	0.62	33.8%
H.2	C	0.93	0.53	0.68		0.90	0.96	0.45	0.49	0.65		0.15	0.50	0.47	0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.52	0.72	48.9%
H.3	C	5.73	0.53	0.68		0.90	0.96	0.16	0.49	0.65	4.98	0.15	0.50	0.60	0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.47	0.64	59.2%
H.4	C	3.78	0.53	0.68		0.90	0.96	1.62	0.49	0.65	2.15	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.67	0.78	80.0%
H.5	C	2.20	0.53	0.68		0.90	0.96	0.81	0.49	0.65	1.15	0.15	0.50		0.19	0.52	0.24	0.30	0.50		0.63	0.74		0.16	0.36		0.61	0.75	71.6%
H.6	C	3.06	0.53	0.68		0.90	0.96	0.06	0.49	0.65	3.00	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.50	0.66	65.7%
I.1	C	1.72	0.53	0.68		0.90	0.96	0.54	0.49	0.65		0.15	0.50	1.18	0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.39	0.64	31.4%
I.2	C	4.40	0.53	0.68		0.90	0.96	1.74	0.49	0.65	2.66	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.65	0.77	78.8%
I.3	C	4.64	0.53	0.68		0.90	0.96	1.21	0.49	0.65	3.43	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.60	0.73	74.1%
I.4	C	4.62	0.53	0.68		0.90	0.96	1.19	0.49	0.65	3.43	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.60	0.73	74.0%
I.5	C	3.20	0.53	0.68		0.90	0.96	0.58	0.49	0.65	1.83	0.15	0.50	0.79	0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.48	0.67	55.3%
I.6	C	1.48	0.53	0.68		0.90	0.96	0.46	0.49	0.65	1.02	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.62	0.75	75.9%
I.7	C	2.54	0.53	0.68		0.90	0.96	0.78	0.49	0.65	1.76	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.62	0.74	75.7%
I.8	C	1.57	0.53	0.68		0.90	0.96	0.75	0.49	0.65	0.83	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.68	0.80	81.6%
J.1	C	1.35	0.53	0.68		0.90	0.96	0.30	0.49	0.65	0.51	0.15	0.50		0.19	0.52	0.54	0.30	0.50		0.63	0.74		0.16	0.36		0.46	0.67	49.6%
J.2	C	1.64	0.53	0.68		0.90	0.96	0.81	0.49	0.65	0.83	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.69	0.80	82.4%
J.3	C	1.63	0.53	0.68		0.90	0.96	0.80	0.49	0.65	0.83	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.69	0.80	82.2%
J.4	C	1.63	0.53	0.68		0.90	0.96	0.80	0.49	0.65	0.83	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.69	0.80	82.2%
J.5	C	1.63	0.53	0.68		0.90	0.96	0.80	0.49	0.65	0.83	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.69	0.80	82.2%
J.6	C	2.23	0.53	0.68		0.90	0.96	0.60	0.49	0.65	0.96	0.15	0.50		0.19	0.52	0.66	0.30	0.50		0.63	0.74		0.16	0.36		0.51	0.70	57.3%
J.7	C	2.16	0.53	0.68		0.90	0.96	1.03	0.49	0.65	1.13	0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.69	0.80	81.7%
P.2	C	9.20	0.53	0.68		0.90	0.96	0.55	0.49	0.65	1.08	0.15	0.50	7.57	0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.23	0.55	13.6%
X.1	C	2.55	0.53	0.68		0.90	0.96		0.49	0.65	0.62	0.15	0.50	1.93	0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.23	0.54	15.8%
X.2	C	1.86	0.53	0.68		0.90	0.96		0.49	0.65	0.30	0.15	0.50	1.56	0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36		0.20	0.52	10.4%
Y.1	C	0.72	0.53	0.68		0.90	0.96		0.49	0.65		0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36	0.72	0.16	0.36	2.0%
Y.2	C	9.22	0.53	0.68		0.90	0.96		0.49	0.65		0.15	0.50	3.67	0.19	0.52		0.30	0.50	5.55	0.63	0.74		0.16	0.36		0.24	0.50	24.1%
OS-1	C	3.18	0.53	0.68		0.90	0.96		0.49	0.65		0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36	3.18	0.16	0.36	2.0%
OS-2	C	0.69	0.53	0.68		0.90	0.96		0.49	0.65		0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36	0.69	0.16	0.36	2.0%
OS-3	C	1.56	0.53	0.68		0.90	0.96		0.49	0.65		0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36	1.56	0.16	0.36	2.0%
OS-4	C	188.59	0.53	0.68		0.90	0.96	0.64	0.49	0.65		0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36	187.95	0.16	0.36	2.3%
OS-5	C	9.84	0.53	0.68		0.90	0.96		0.49	0.65		0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36	9.84	0.16	0.36	2.0%
OS-6	C	3.89	0.53	0.68		0.90	0.96		0.49	0.65		0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36	3.89	0.16	0.36	2.0%
OS-7	C	17.12	0.53	0.68		0.90	0.96		0.49	0.65		0.15	0.50		0.19	0.52		0.30	0.50		0.63	0.74		0.16	0.36	17.12	0.16	0.36	2.0%
TOTAL		**393.0**			**13.9**			**38.1**			**70.7**			**23.1**			**10.7**			**5.5**			**6.0**			**224.9**			**25.3%**

TIME OF CONCENTRATION
Countryside South - Proposed Conditions
Fountain, Colorado

DATE: 8/10/2021
CALCULATED BY: AMC

PROJECT: 21003262
DESIGN STORM: 5 Year

			INITIAL/OVERLAND TIME (t_i)			TRAVEL TIME (t_t)					t_c CHECK (URBANIZED BASINS)			FINAL t_c
TRIBUTARY BASINS	AREA Ac (2)	C5 (3)	LENGTH Ft (4)	SLOPE % (5)	t_i Min. (6)	LENGTH Ft. (7)	SLOPE % (8)	Conveyance Coefficient	VEL fps (9)	t_t Min. (10)	COMP. t_c (11)	TOTAL LENGTH (12)	(L/180)+10 Min. (13)	Min. (14)
A	13.94	0.53	600	2.00	20.05	100	1.00	20	2.00	0.83	20.89	700	13.89	13.89
B.1	4.40	0.60	100	2.00	7.11	700	2.00	20	2.83	4.12	11.24	800	14.44	11.24
B.2	3.74	0.63	100	2.00	6.76	615	2.00	20	2.83	3.62	10.38	715	13.97	10.38
C.1	0.76	0.67	85	2.00	5.71	100	1.00	20	2.00	0.83	6.55	185	11.03	6.55
C.2	1.69	0.76	85	2.00	4.49	500	1.00	20	2.00	4.17	8.66	585	13.25	8.66
C.3	2.31	0.66	80	2.00	5.66	850	1.00	20	2.00	7.08	12.74	930	15.17	12.74
C.4	2.30	0.62	85	2.00	6.39	610	1.00	20	2.00	5.08	11.47	695	13.86	11.47
C.5	3.22	0.64	100	2.00	6.66	685	1.00	20	2.00	5.71	12.37	785	14.36	12.37
C.6	1.94	0.64	50	2.00	4.67	930	1.00	20	2.00	7.75	12.42	980	15.44	12.42
D.1	1.25	0.64	175	2.00	8.78	85	1.00	20	2.00	0.71	9.49	260	11.44	9.49
D.2	2.42	0.72	85	2.00	5.07	805	1.00	20	2.00	6.71	11.78	890	14.94	11.78
D.3	2.38	0.63	85	2.00	6.27	615	2.00	20	2.83	3.62	9.89	700	13.89	9.89
D.4	2.75	0.61	130	2.00	8.06	400	1.00	20	2.00	3.33	11.39	530	12.94	11.39
D.5	1.27	0.48	180	2.00	11.97	120	1.00	20	2.00	1.00	12.97	300	11.67	11.67
D.6	0.80	0.40	160	2.00	12.67	175	1.00	20	2.00	1.46	14.12	335	11.86	11.86
D.7	1.48	0.64	85	2.00	6.11	440	1.00	20	2.00	3.67	9.78	525	12.92	9.78
D.8	1.54	0.67	85	2.00	5.65	130	1.00	20	2.00	1.08	6.73	215	11.19	6.73
D.9	2.10	0.73	100	2.00	5.38	300	2.00	20	2.83	1.77	7.15	400	12.22	7.15
P.1	4.40	0.22	150	5.00	11.45	0	1.00	20	2.00	0.00	11.45	150	10.83	10.83
E.1	4.85	0.63	65	2.00	5.42	1100	1.00	20	2.00	9.17	14.58	1165	16.47	14.58
E.2	1.40	0.56	160	2.00	9.89	345	2.00	20	2.83	2.03	11.92	505	12.81	11.92
E.3	3.78	0.48	450	2.00	18.99	275	2.00	20	2.83	1.62	20.61	725	14.03	14.03
E.4	3.60	0.59	110	2.00	7.64	475	2.00	20	2.83	2.80	10.44	585	13.25	10.44
E.5	2.85	0.60	110	2.00	7.60	500	2.00	20	2.83	2.95	10.55	610	13.39	10.55
E.6	2.72	0.57	175	2.00	9.98	285	2.00	20	2.83	1.68	11.66	460	12.56	11.66
E.7	2.72	0.58	190	2.00	10.39	285	2.00	20	2.83	1.68	12.07	475	12.64	12.07
F.1	2.02	0.63	35	2.00	3.99	710	1.00	15	1.50	7.89	11.88	745	14.14	11.88
F.2	3.95	0.63	35	2.00	3.99	1600	1.50	15	1.84	14.52	18.51	1635	19.08	18.51
G	6.11	0.26	685	2.00	31.42	25	2.00	15	2.12	0.20	31.61	710	13.94	13.94
H.1	7.80	0.37	250	2.00	16.54	250	2.00	20	2.83	1.47	18.02	500	12.78	12.78
H.2	0.93	0.52	85	2.00	7.73	320	2.00	20	2.83	1.89	9.61	405	12.25	9.61
H.3	5.73	0.47	85	2.00	8.40	830	1.00	20	2.00	6.92	15.32	915	15.08	15.08
H.4	3.78	0.67	85	2.00	5.74	780	1.00	20	2.00	6.50	12.24	865	14.81	12.24
H.5	2.20	0.61	55	2.00	5.24	1000	1.50	20	2.45	6.80	12.04	1055	15.86	12.04
H.6	3.06	0.50	120	2.00	9.47	850	1.00	20	2.00	7.08	16.55	970	15.39	15.39
I.1	1.72	0.39	90	5.00	7.20	530	1.00	20	2.00	4.42	11.61	620	13.44	11.61
I.2	4.40	0.65	55	2.00	4.77	1750	1.00	20	2.00	14.58	19.36	1805	20.03	19.36
I.3	4.64	0.60	110	2.00	7.58	675	1.00	20	2.00	5.63	13.20	785	14.36	13.20
I.4	4.62	0.60	110	2.00	7.59	675	1.00	20	2.00	5.63	13.22	785	14.36	13.22
I.5	3.20	0.48	50	2.00	6.29	690	1.00	15	1.50	7.67	13.96	740	14.11	13.96
I.6	1.48	0.62	110	2.00	7.27	445	1.00	20	2.00	3.71	10.98	555	13.08	10.98
I.7	2.54	0.62	110	2.00	7.30	335	1.00	20	2.00	2.79	10.10	445	12.47	10.10
I.8	1.57	0.68	55	2.00	4.43	580	1.00	20	2.00	4.83	9.26	635	13.53	9.26
J.1	1.35	0.46	130	2.00	10.46	450	1.00	20	2.00	3.75	14.21	580	13.22	13.22
J.2	1.64	0.69	60	2.00	4.52	420	1.00	15	1.50	4.67	9.19	480	12.67	9.19
J.3	1.63	0.69	60	2.00	4.54	420	1.00	20	2.00	3.50	8.04	480	12.67	8.04
J.4	1.63	0.69	60	2.00	4.54	420	1.00	20	2.00	3.50	8.04	480	12.67	8.04
J.5	1.63	0.69	60	2.00	4.54	420	1.00	20	2.00	3.50	8.04	480	12.67	8.04
J.6	2.23	0.51	90	2.00	8.01	680	1.00	20	2.00	5.67	13.67	770	14.28	13.67
J.7	2.16	0.69	25	2.00	2.98	750	1.00	20	2.00	6.25	9.23	775	14.31	9.23
P.2	9.20	0.23	285	5.00	15.51	0	0.00	15	0.00	0.00	15.51	285	11.58	11.58
X.1	2.55	0.23	65	2.00	10.04	1725	1.00	15	1.50	19.17	29.21	1790	19.94	19.94
X.2	1.86	0.20	40	2.00	8.13	660	1.00	15	1.50	7.33	15.47	700	13.89	13.89
Y.1	0.72	0.16	326	0.70	34.47			15	0.00	0.00	34.47	326	11.81	11.81
Y.2	9.22	0.24	670	2.90	28.28			15	0.00	0.00	28.28	670	13.72	13.72
OS-1	3.18	0.16	910	7.20	26.69			15	0.00	0.00				26.69
OS-2	0.69	0.16	384	2.50	24.58			15	0.00	0.00				24.58
OS-3	1.56	0.16	377	0.90	34.12			15	0.00	0.00				34.12
OS-4	188.59	0.16	1900	8.10	36.99	400	1.00	20	2.00	3.33				40.33
OS-5	9.84	0.16	613	1.50	36.76			15	0.00	0.00				36.76
OS-6	3.89	0.16	605	1.60	35.75			15	0.00	0.00				35.75
OS-7	17.12	0.16	1265	2.20	46.53			15	0.00	0.00				46.53

5-YEAR RUNOFF CALCULATIONS
Countryside South - Proposed Conditions
Fountain, Colorado

DATE: 8/10/2021
CALCULATED BY: AMC

PROJECT: 21002163
DESIGN STORM: 5-Year

		FLOW TO INLETS								Minimum	Maximum	Under	INLETS								Carry-Over
Sub-Basin	Design Point	Area (acres)	C	C x A	Tc (min)	Intensity (in/hr)	Qd = CIA (cfs)	Qco (cfs)	Qt (cfs)	Street Slope (%)	Street/Paseo Capacity (cfs)	Capacity?	Inlet	Type	Condition	Slope at Inlet (%)	Inlet Capacity (cfs)	R	Intercepted (cfs)	Carry-Over (cfs)	to Sub-basin/ Design Point (DP)
A	A1	13.94	0.53	7.39	13.89	3.64	**26.87**	0.00	26.87												
-	**A1**						26.87	0.00	**26.87**	-											
B.1	POND 1	4.40	0.60	2.66	11.24	3.95	**10.52**	0.00	10.52	1.50	11.00	OK									
-	**POND 1**						10.52	0.00	**10.52**	-			INL-B1	15' TYPE R	SUMP	0.0%	14.50	1.00	10.52	0.00	C.2
B.2	POND 1	3.74	0.63	2.35	10.38	4.07	**9.59**	0.00	9.59	1.50	11.00	OK									
-	**POND 1**						9.59	0.00	**9.59**	-			INL-B2	15' TYPE R	ON-GRADE	1.5%	11.00	1.00	9.59	0.00	B.1
C.1	POND 1	0.76	0.67	0.51	6.55	4.76	**2.43**	0.00	2.43	1.00	9.00	OK									
-	**POND 1**						2.43	0.00	**2.43**	-			INL-C1	5' TYPE R	SUMP	0.0%	6.50	1.00	2.43	0.00	C.2
C.2	POND 1	1.69	0.76	1.28	8.66	4.34	**5.58**	0.00	5.58	1.00	9.00	OK									
-	**POND 1**						5.58	0.00	**5.58**	-			INL-C2	10' TYPE R	SUMP	0.0%	10.50	1.00	5.58	0.00	P.1
C.3	POND 1	2.31	0.66	1.52	12.74	3.77	**5.73**	0.00	5.73	1.00	9.00	OK									
-	**POND 1**						5.73	0.00	**5.73**	-			INL-C3	15' TYPE R	SUMP	0.0%	14.50	1.00	5.73	0.00	C.4
C.4	POND 1	2.30	0.62	1.42	11.47	3.92	**5.58**	0.00	5.58	1.00	9.00	OK									
-	**POND 1**						5.58	0.00	**5.58**	-			INL-C4	15' TYPE R	SUMP	0.0%	14.50	1.00	5.58	0.00	P.1
C.5	POND 1	3.22	0.64	2.05	12.37	3.81	**7.80**	0.00	7.80	1.00	9.00	OK									
-	**POND 1**						7.80	0.00	**7.80**	-			INL-C5	10' TYPE R	SUMP	0.0%	10.50	1.00	7.80	0.00	C.4
C.6	POND 1	1.94	0.64	1.24	12.42	3.80	**4.72**	0.00	4.72	1.00	9.00	OK									
-	**POND 1**						4.72	0.00	**4.72**	-			INL-C6	5' TYPE R	SUMP	0.0%	6.50	1.00	4.72	0.00	C.4
D.1	POND 1	1.25	0.64	0.80	9.49	4.21	**3.36**	0.00	3.36	1.00	9.00	OK									
-	**POND 1**						3.36	0.00	**3.36**	-	-	-	INL-D1	5' TYPE R	SUMP	0.0%	6.50	1.00	3.36	0.00	D.9
D.2	POND 1	2.42	0.72	1.73	11.78	3.88	**6.73**	0.00	6.73	1.00	9.00	OK									
-	**POND 1**						6.73	0.00	**6.73**	-	-	-	INL-D2	10' TYPE R	SUMP	0.0%	10.50	1.00	6.73	0.00	D.1
D.3	POND 1	2.38	0.63	1.49	9.89	4.15	**6.17**	0.00	6.17	2.00	13.00	OK									
-	**POND 1**						6.17	0.00	**6.17**	-	-	-	INL-D3	10' TYPE R	SUMP	0.0%	10.50	1.00	6.17	0.00	D.1
D.4	POND 1	2.75	0.61	1.67	11.39	3.93	**6.59**	0.00	6.59	1.00	9.00	OK									
-	**POND 1**						6.59	0.00	**6.59**	-	-	-	INL-D4	10' TYPE R	SUMP	0.0%	10.50	1.00	6.59	0.00	D.1
D.5	POND 1	1.27	0.48	0.61	11.67	3.90	**2.37**	0.00	2.37	1.00	9.00	OK									
	POND 1						2.37	0.00	**2.37**	-	-	-	INL-D5	5' TYPE R	SUMP	0.0%	6.50	1.00	2.37	0.00	D.1
D.6	POND 1	0.80	0.40	0.32	11.86	3.87	**1.25**	0.00	1.25	1.00	9.00	OK									
	POND 1						1.25	0.00	**1.25**	-	-	-	INL-D6	5' TYPE R	SUMP	0.0%	6.50	1.00	1.25	0.00	B.1
D.7	POND 1	1.48	0.64	0.94	9.78	4.16	**3.92**	0.00	3.92	1.00	9.00	OK									
	POND 1						3.92	0.00	**3.92**	-	-	-	INL-D7	5' TYPE R	SUMP	0.0%	6.50	1.00	3.92	0.00	B.1
D.8	POND 1	1.54	0.67	1.04	6.73	4.72	**4.89**	0.00	4.89	1.00	9.00	OK									
	POND 1						4.89	0.00	**4.89**	-	-	-	INL-D8	5' TYPE R	SUMP	0.0%	6.50	1.00	4.89	0.00	D.1
D.9	POND 1	2.10	0.73	1.52	7.15	4.63	**7.06**	0.00	7.06	2.00	13.00	OK									
	POND 1						7.06	0.00	**7.06**	-	-	-	INL-D9	10' TYPE R	SUMP	0.0%	10.50	1.00	7.06	0.00	P.1
P.1	POND 1	4.40	0.57	2.53	7.15	4.63	**11.70**	0.00	11.70	-	-	-									
-	**POND 1**						11.70	0.00	**11.70**	-											
E.1	POND 2	4.85	0.63	3.06	14.58	3.56	**10.89**	0.00	10.89	2.00	13.00	OK									
-	**POND 2**						10.89	0.00	**10.89**	-	-	-	INL-E1	15' TYPE R	SUMP	0.0%	14.50	1.00	10.89	0.00	F.1
E.2	POND 2	1.40	0.37	0.52	11.92	3.87	**2.01**	0.00	2.01	2.00	13.00	OK									
-	**POND 2**						2.01	0.00	**2.01**	-	-	-	INL-E2	5' TYPE R	ON-GRADE	2.0%	4.50	1.00	2.01	0.00	E.3
E.3	POND 2	3.78	0.48	1.80	14.03	3.62	**6.53**	0.00	6.53	2.00	13.00	OK									
-	**POND 2**						6.53	0.00	**6.53**	-	-	-	INL-E3	10' TYPE R	ON-GRADE	2.0%	8.80	1.00	6.53	0.00	E.1
E.4	POND 2	3.60	0.59	2.13	10.44	4.07	**8.68**	0.00	8.68	2.00	13.00	OK									
-	**POND 2**						8.68	0.00	**8.68**	-	-	-	INL-E4	15' TYPE R	SUMP	0.0%	14.50	1.00	8.68	0.00	E.5
E.5	POND 2	2.85	0.60	1.70	10.55	4.05	**6.87**	0.00	6.87	2.00	13.00	OK									
-	**POND 2**						6.87	0.00	**6.87**	-	-	-	INL-E5	15' TYPE R	ON-GRADE	1.0%	9.60	1.00	6.87	0.00	E.6
E.6	POND 2	2.72	0.57	1.56	11.66	3.90	**6.09**	0.00	6.09	2.00	13.00	OK									
-	**POND 2**						6.09	0.00	**6.09**	-	-	-	INL-E6	10' TYPE R	ON-GRADE	1.0%	6.80	1.00	6.09	0.00	E.7
E.7	POND 2	2.72	0.58	1.56	12.07	3.85	**6.02**	0.00	6.02	2.00	13.00	OK									
-	**POND 2**						6.02	0.00	**6.02**	-	-	-	INL-E7	10' TYPE R	ON-GRADE	1.0%	6.80	1.00	6.02	0.00	H.1
F.1	POND 2	2.02	0.63	1.27	11.88	3.87	**4.93**	0.00	4.93												
-	**POND 2**						4.93	0.00	**4.93**												F.2

5-YEAR RUNOFF CALCULATIONS

Countryside South - Proposed Conditions

Fountain, Colorado

DATE: 8/10/2021
CALCULATED BY: AMC

PROJECT: 21002163
DESIGN STORM: 5-Year

		FLOW TO INLETS								Minimum	Maximum	Under	INLETS								Carry-Over
Sub-Basin	Design Point	Area (acres)	C	C x A	Tc (min)	Intensity (in/hr)	Qd = CIA (cfs)	Qco (cfs)	Qt (cfs)	Street Slope (%)	Street/Paseo Capacity (cfs)	Capacity?	Inlet	Type	Condition	Slope at Inlet (%)	Inlet Capacity (cfs)	R	Intercepted (cfs)	Carry-Over (cfs)	to Sub-basin/ Design Point (DP)
F.2	POND 2	3.95	0.63	2.49	18.51	3.21	**7.98**	0.00	7.98												
-	**POND 2**						7.98	0.00	**7.98**												
G	POND 2	6.11	0.26	1.61	13.94	3.63	**5.86**	0.00	5.86	2.00	13.00	OK									
-	**POND 2**						5.86	0.00	**5.86**	-	-	-	INL-G	15' TYPE R	SUMP	0.0%	14.50	1.00	5.86	0.00	F.2
H.1	POND 2	3.75	0.37	1.39	12.78	3.76	**5.25**	0.00	5.25	2.00	13.00	OK									
-	**POND 2**						5.25	0.00	**5.25**	-	-	-	INL-H1	15' TYPE R	ON-GRADE	2.0%	12.00	1.00	5.25	0.00	H.2
H.2	POND 2	0.93	0.52	0.48	9.61	4.19	**2.00**	0.00	2.00	2.00	13.00	OK									
-	**POND 2**						2.00	0.00	**2.00**	-	-	-	INL-H2	5' TYPE R	SUMP	0.0%	6.50	1.00	2.00	0.00	F.2
H.3	POND 2	5.73	0.47	2.67	15.08	3.51	**9.37**	0.03	9.40	1.25	10.00	OK									
-	**POND 2**						9.37	0.03	**9.40**	-	-	-	INL-H3	15' TYPE R	SUMP	0.0%	14.50	1.00	9.40	0.00	P.2
H.4	POND 2	3.78	0.67	2.52	12.24	3.83	**9.63**	0.00	9.63	2.00	13.00	OK									
-	**POND 2**						9.63	0.00	**9.63**	-	-	-	INL-H4	15' TYPE R	ON-GRADE	1.0%	9.60	1.00	9.60	0.03	H.3
H.5	POND 2	2.20	0.61	1.34	12.04	3.85	**5.16**	0.00	5.16	1.00	9.00	OK									
-	**POND 2**						5.16	0.00	**5.16**	-	-	-	INL-H5	10' TYPE R	ON-GRADE	1.0%	6.80	1.00	5.16	0.00	H.4
H.6	POND 2	3.06	0.50	1.52	15.39	3.48	**5.30**	0.00	5.30	1.00	9.00	OK									
-	**POND 2**						5.30	0.00	**5.30**	-	-	-	INL-H6	10' TYPE R	ON-GRADE	1.0%	6.80	1.00	5.30	0.00	H.5
I.1	POND 2	1.72	0.39	0.66	11.61	3.90	**2.58**	0.00	2.58	1.00	9.00	OK									
-	**POND 2**						2.58	0.00	**2.58**	-	-	-						0.00	0.00	2.58	I.5
I.2	POND 2	4.40	0.65	2.87	19.36	3.14	**9.01**	0.00	9.01	1.50	11.00	OK									
-	**POND 2**						9.01	0.00	**9.01**	-	-	-	INL-I2	15' TYPE R	SUMP	0.0%	14.50	1.00	9.01	0.00	P.2
I.3	POND 2	4.64	0.60	2.77	13.20	3.71	**10.28**	0.00	10.28	1.50	11.00	OK									
-	**POND 2**						10.28	0.00	**10.28**	-	-	-	INL-I3	15' TYPE R	ON-GRADE	1.5%	11.00	1.00	10.28	0.00	I.2
I.4	POND 2	4.62	0.60	2.75	13.22	3.71	**10.21**	0.00	10.21	1.50	11.00	OK									
-	**POND 2**						10.21	0.00	**10.21**	-		-	INL-I4	15' TYPE R	ON-GRADE	1.0%	9.60	0.94	9.60	0.61	I.2
I.5	POND 2	3.20	0.48	1.54	13.96	3.63	**5.58**	2.58	8.16	1.00	9.00	OK									
-	**POND 2**						5.58	2.58	**8.16**	-	-	-	INL-I5	15' TYPE R	ON-GRADE	1.0%	9.60	1.00	8.16	0.00	I.8
I.6	POND 2	1.48	0.62	0.91	10.98	3.99	**3.65**	0.00	3.65	1.00	9.00	OK									
-	**POND 2**						3.65	0.00	**3.65**	-	-	-	INL-I6	10' TYPE R	ON-GRADE	1.0%	6.80	1.00	3.65	0.00	I.2
I.7	POND 2	2.54	0.62	1.56	10.10	4.11	**6.43**	0.00	6.43	1.00	9.00	OK									
-	**POND 2**						6.43	0.00	**6.43**	-	-	-	INL-I7	10' TYPE R	ON-GRADE	1.0%	6.80	1.00	6.43	0.00	I.2
I.8	POND 2	1.57	0.68	1.08	9.26	4.24	**4.57**	0.00	4.57	1.00	9.00	OK									
-	**POND 2**						4.57	0.00	**4.57**	-	-	-	INL-I7	15' TYPE R	SUMP	0.0%	14.50	1.00	4.57	0.00	P.2
J.1	POND 2	1.35	0.46	0.62	13.22	3.71	**2.32**	0.00	2.32	1.00	9.00	OK									
-	**POND 2**						2.32	0.00	**2.32**	-	-	-	INL-J1	5' TYPE R	SUMP	0.0%	6.50	1.00	2.32	0.00	J.2
J.2	POND 2	1.64	0.69	1.14	9.19	4.26	**4.85**	0.00	4.85	1.00	9.00	OK									
-	**POND 2**						4.85	0.00	**4.85**	-	-	-	INL-J2	5' TYPE R	SUMP	0.0%	6.50	1.00	4.85	0.00	J.3
J.3	POND 2	1.63	0.69	1.12	8.04	4.46	**5.01**	0.00	5.01	1.00	9.00	OK									
-	**POND 2**						5.01	0.00	**5.01**	-	-	-	INL-J3	5' TYPE R	SUMP	0.0%	6.50	1.00	5.01	0.00	J.4
J.4	POND 2	1.63	0.69	1.12	8.04	4.46	**5.01**	0.00	5.01	1.00	9.00	OK									
-	**POND 2**						5.01	0.00	**5.01**	-	-	-	INL-J4	5' TYPE R	SUMP	0.0%	6.50	1.00	5.01	0.00	J.5
J.5	POND 2	1.63	0.69	1.12	8.04	4.46	**5.01**	0.00	5.01	1.00	9.00	OK									
-	**POND 2**						5.01	0.00	**5.01**	-	-	-	INL-J5	5' TYPE R	SUMP	0.0%	6.50	1.00	5.01	0.00	J.6
J.6	POND 2	2.23	0.51	1.14	13.67	3.66	**4.18**	0.00	4.18	1.00	9.00	OK									
-	**POND 2**						4.18	0.00	**4.18**	-	-	-	INL-J6	5' TYPE R	SUMP	0.0%	6.50	1.00	4.18	0.00	I.8
J.7	POND 2	2.16	0.69	1.48	9.23	4.25	**6.29**	0.00	6.29	1.00	9.00	OK									
-	**POND 2**						6.29	0.00	**6.29**				INL-J7	10 TYPE R	SUMP	0.0%	10..5	1.00	6.29	0.00	F.2
P.2	POND 2	9.20	0.23	2.16	11.58	3.91	**8.44**	0.00	8.44												
-	**POND 2**						8.44	0.00	**8.44**												
X.1	OFFSITE	2.55	0.23	0.59	19.94	3.09	**1.84**	0.00	1.84												
-	**OFFSITE**						1.84	0.00	**1.84**												
X.2	OFFSITE	1.86	0.20	0.38	13.89	3.64	**1.38**	0.00	1.38												
-	**OFFSITE**						1.38	0.00	**1.38**												
Y.1	OFFSITE	0.72	0.16	0.12	11.81	3.88	**0.45**	0.00	0.45												
-	**OFFSITE**						0.45	0.00	**0.45**												

5-YEAR RUNOFF CALCULATIONS
Countryside South - Proposed Conditions
Fountain, Colorado

DATE: 8/10/2021
CALCULATED BY: AMC

PROJECT: 21002163
DESIGN STORM: 5-Year

		FLOW TO INLETS								Minimum	Maximum	Under	INLETS								Carry-Over
Sub-Basin	Design Point	Area (acres)	C	C x A	Tc (min)	Intensity (in/hr)	Qd = CIA (cfs)	Qco (cfs)	Qt (cfs)	Street Slope (%)	Street/Paseo Capacity (cfs)	Capacity?	Inlet	Type	Condition	Slope at Inlet (%)	Inlet Capacity (cfs)	R	Intercepted (cfs)	Carry-Over (cfs)	to Sub-basin/ Design Point (DP)
Y.2	OFFSITE	9.22	0.24	2.22	13.72	3.65	**8.09**	0.00	8.09												
-	**OFFSITE**						8.09	0.00	**8.09**												
OS-1	OFFSITE	3.18	0.16	0.51	26.69	2.66	**1.35**	0.00	1.35												
-	**OFFSITE**						1.35	0.00	**1.35**												
OS-2	OFFSITE	0.69	0.16	0.11	24.58	2.78	**0.31**	0.00	0.31												
-	**OFFSITE**						0.31	0.00	**0.31**												
OS-3	OFFSITE	1.56	0.16	0.25	34.12	2.29	**0.57**	0.00	0.57												
-	**OFFSITE**						0.57	0.00	**0.57**												
OS-4	POND 2	188.59	0.16	30.65	40.33	2.04	**62.45**	0.00	62.45												
-	**POND 2**						62.45	0.00	**62.45**												
OS-5	POND 2	9.84	0.16	1.57	36.76	2.18	**3.43**	0.00	3.43												
-	**POND 2**						3.43	0.00	**3.43**												
OS-6	POND 2	3.89	0.16	0.62	35.75	2.22	**1.38**	0.00	1.38												
-	**POND 2**						1.38	0.00	**1.38**												
OS-7	POND 2	17.12	0.16	2.74	46.53	1.82	**4.99**	0.00	4.99												
-	**POND 2**						4.99	0.00	**4.99**												

100-YEAR RUNOFF CALCULATIONS
Countryside South - Proposed Conditions
Fountain, Colorado

DATE: 8/10/2021
CALCULATED BY: RDL

PROJECT: 21002163
DESIGN STORM: 100-Year

		FLOW TO INLETS								Minimum	Maximum	Under	INLETS								Carry-Over
Sub-Basin	Design Point	Area (acres)	C	C x A	Tc (min)	Intensity (in/hr)	Qd = CIA (cfs)	Qco (cfs)	Qt (cfs)	Street Slope (%)	Street/Paseo Capacity (cfs)	Capacity?	Inlet	Type	Condition	Slope at Inlet (%)	Inlet Capacity (cfs)	R	Intercepted (cfs)	Carry-Over (cfs)	to Sub-basin/ Design Point (DP)
A	A1	13.94	0.68	9.48	13.89	6.10	57.87	0.00	57.87												
	A1						57.87	0.00	**57.87**												
B.1	POND 1	4.40	0.74	3.24	11.24	6.64	21.52	0.00	21.52	1.50	60.00	OK									
	POND 1						21.52	0.00	**21.52**				INL-B1	15' TYPE R	SUMP	0.0%	22.50	1.00	21.52	0.00	C.2
B.2	POND 1	3.74	0.76	2.83	10.38	6.84	19.32	0.00	19.32	1.50	60.00	OK									
	POND 1						19.32	0.00	**19.32**				INL-B2	15' TYPE R	ON-GRADE	1.5%	20.80	1.00	19.32	0.00	B.1
C.1	POND 1	0.76	0.78	0.60	6.55	8.00	4.79	0.00	4.79	1.00	51.00	OK									
	POND 1						4.79	0.00	**4.79**				INL-C1	5' TYPE R	SUMP	0.0%	10.20	1.00	4.79	0.00	C.2
C.2	POND 1	1.69	0.85	1.44	8.66	7.29	10.52	0.00	10.52	1.00	51.00	OK									
	POND 1						10.52	0.00	**10.52**				INL-C2	10' TYPE R	SUMP	0.0%	16.00	1.00	10.52	0.00	P.1
C.3	POND 1	2.31	0.78	1.79	12.74	6.32	11.35	0.00	11.35	1.00	51.00	OK									
	POND 1						11.35	0.00	**11.35**				INL-C3	15' TYPE R	SUMP	0.0%	14.50	1.00	11.35	0.00	C.4
C.4	POND 1	2.30	0.75	1.72	11.47	6.59	11.32	0.00	11.32	1.00	51.00	OK									
	POND 1						11.32	0.00	**11.32**				INL-C4	15' TYPE R	SUMP	0.0%	22.50	1.00	11.32	0.00	P.1
C.5	POND 1	3.22	0.76	2.45	12.37	6.40	15.65	0.00	15.65	1.00	51.00	OK									
	POND 1						15.65	0.00	**15.65**				INL-C5	10' TYPE R	SUMP	0.0%	16.00	1.00	15.65	0.00	C.4
C.6	POND 1	1.94	0.76	1.48	12.42	6.39	9.45	0.00	9.45	1.00	51.00	OK									
	POND 1						9.45	0.00	**9.45**				INL-C6	5' TYPE R	SUMP	0.0%	10.20	1.00	9.45	0.00	C.4
D.1	POND 1	1.25	0.79	0.99	9.49	7.06	6.99	0.00	6.99	1.00	51.00	OK									
	POND 1						6.99	0.00	**6.99**				INL-D1	5' TYPE R	SUMP	0.0%	10.20	1.00	6.99	0.00	D.9
D.2	POND 1	2.42	0.82	1.99	11.78	6.52	12.94	0.00	12.94	1.00	51.00	OK									
	POND 1						12.94	0.00	**12.94**				INL-D2	10' TYPE R	SUMP	0.0%	16.00	1.00	12.94	0.00	D.1
D.3	POND 1	2.38	0.75	1.79	9.89	6.96	12.46	0.00	12.46	2.00	60.00	OK									
	POND 1						12.46	0.00	**12.46**				INL-D3	10' TYPE R	SUMP	0.0%	16.00	1.00	12.46	0.00	D.1
D.4	POND 1	2.75	0.74	2.04	11.39	6.60	13.45	0.00	13.45	1.00	51.00	OK									
	POND 1						13.45	0.00	**13.45**				INL-D4	10' TYPE R	SUMP	0.0%	16.00	1.00	13.45	0.00	D.1
D.5	POND 1	1.27	0.68	0.87	11.67	6.54	5.67	0.00	5.67	1.00	51.00	OK									
	POND 1						5.67	0.00	**5.67**				INL-D5	5' TYPE R	SUMP	0.0%	10.20	1.00	5.67	0.00	D.1
D.6	POND 1	0.80	0.63	0.51	11.86	6.50	3.29	0.00	3.29	1.00	51.00	OK									
	POND 1						3.29	0.00	**3.29**				INL-D6	5' TYPE R	SUMP	0.0%	10.20	1.00	3.29	0.00	B.1
D.7	POND 1	1.48	0.76	1.13	9.78	6.99	7.87	0.00	7.87	1.00	51.00	OK									
	POND 1						7.87	0.00	**7.87**				INL-D7	5' TYPE R	SUMP	0.0%	10.20	1.00	7.87	0.00	B.1
D.8	POND 1	1.54	0.79	1.21	6.73	7.93	9.62	0.00	9.62	1.00	51.00	OK									
	POND 1						9.62	0.00	**9.62**				INL-D8	5' TYPE R	SUMP	0.0%	10.20	1.00	9.62	0.00	D.1
D.9	POND 1	2.10	0.83	1.74	7.15	7.78	13.53	0.00	13.53	2.00	60.00	OK									
	POND 1						13.53	0.00	**13.53**				INL-D9	10' TYPE R	SUMP	0.0%	16.00	1.00	13.53	0.00	P.1
P.1	POND 1	4.40	0.53	2.33	7.15	7.78	18.14	0.00	18.14												
	POND 1						18.14	0.00	**18.14**												
E.1	POND 2	4.85	0.77	3.74	14.58	5.98	22.39	1.50	23.89	2.00	60.00	OK									
	POND 2						22.39	1.50	**23.89**				INL-E1	15' TYPE R	SUMP	0.0%	22.50	0.94	22.50	1.39	F.1
E.2	POND 2	1.40	0.70	0.98	11.92	6.49	6.36	1.50	7.86	2.00	60.00	OK									
	POND 2						6.36	1.50	**7.86**				INL-E2	5' TYPE R	ON-GRADE	2.0%	5.90	0.75	5.90	1.96	E.3
E.3	POND 2	3.78	0.67	2.55	14.03	6.08	15.50	1.96	17.45	2.00	60.00	OK									
	POND 2						15.50	0.00	**15.50**				INL-E3	10' TYPE R	ON-GRADE	2.0%	14.00	0.90	14.00	1.50	E.1
E.4	POND 2	3.60	0.73	2.62	10.44	6.82	17.88	0.00	17.88	2.00	60.00	OK									
	POND 2						17.88	0.00	**17.88**				INL-E4	15' TYPE R	SUMP	0.0%	22.50	1.00	17.88	0.00	E.5
E.5	POND 2	2.85	0.73	2.08	10.55	6.80	14.14	0.00	14.14	2.00	60.00	OK									
	POND 2						14.14	0.00	**14.14**				INL-E5	15' TYPE R	ON-GRADE	1.0%	18.80	1.00	14.14	0.00	E.6
E.6	POND 2	2.72	0.71	1.94	11.66	6.54	12.71	0.00	12.71	2.00	60.00	OK									
	POND 2						12.71	0.00	**12.71**				INL-E6	10' TYPE R	ON-GRADE	1.0%	12.80	1.00	12.71	0.00	E.7
E.7	POND 2	2.72	0.71	1.94	12.07	6.46	12.55	0.00	12.55	2.00	60.00	OK									
	POND 2						12.55	0.00	**12.55**				INL-E7	10' TYPE R	ON-GRADE	1.0%	12.80	1.00	12.55	0.00	H.1
F.1	POND 2	2.02	0.74	1.49	11.88	6.50	9.71	1.39	11.10												

100-YEAR RUNOFF CALCULATIONS
Countryside South - Proposed Conditions
Fountain, Colorado

DATE: 8/10/2021
CALCULATED BY: RDL

PROJECT: 21002163
DESIGN STORM: 100-Year

		FLOW TO INLETS								Minimum	Maximum	Under	INLETS								Carry-Over
Sub-Basin	Design Point	Area (acres)	C	C x A	Tc (min)	Intensity (in/hr)	Qd = CIA (cfs)	Qco (cfs)	Qt (cfs)	Street Slope (%)	Street/Paseo Capacity (cfs)	Capacity?	Inlet	Type	Condition	Slope at Inlet (%)	Inlet Capacity (cfs)	R	Intercepted (cfs)	Carry-Over (cfs)	to Sub-basin/ Design Point (DP)
	POND 2						9.71	1.39	**11.10**												F.2
F.2	POND 2	3.95	0.74	2.92	18.51	5.38	15.73	0.00	15.73												
	POND 2						15.73	0.00	**15.73**												
G	POND 2	6.11	0.57	3.46	13.94	6.09	21.08	0.00	21.08	2.00	60.00	OK									
	POND 2						21.08	0.00	**21.08**				INL-G	15' TYPE R	SUMP	0.0%	22.50	1.00	21.08	0.00	F.2
H.1	POND 2	3.75	0.62	2.34	12.78	6.31	14.78	0.00	14.78	2.00	60.00	OK									
	POND 2						14.78	0.00	**14.78**				INL-H1	15' TYPE R	ON-GRADE	2.0%	20.50	1.00	14.78	0.00	H.2
H.2	POND 2	0.93	0.72	0.67	9.61	7.03	4.72	0.00	4.72	2.00	60.00	OK									
	POND 2						4.72	0.00	**4.72**				INL-H2	5' TYPE R	SUMP	0.0%	10.20	1.00	4.72	0.00	F.2
H.3	POND 2	5.73	0.64	3.68	15.08	5.90	21.72	0.20	21.92	1.25	51.00	OK									
	POND 2						21.72	0.20	**21.92**				INL-H3	15' TYPE R	SUMP	0.0%	22.50	1.00	21.92	0.00	P.2
H.4	POND 2	3.78	0.78	2.96	12.24	6.42	19.00	0.00	19.00	2.00	60.00	OK									
	POND 2						19.00	0.00	**19.00**				INL-H4	15' TYPE R	ON-GRADE	1.0%	18.80	0.99	18.80	0.20	H.3
H.5	POND 2	2.20	0.75	1.65	12.04	6.46	10.69	0.00	10.69	1.00	51.00	OK									
	POND 2						10.69	0.00	**10.69**				INL-H5	10' TYPE R	ON-GRADE	1.0%	12.80	1.00	10.69	0.00	H.4
H.6	POND 2	3.06	0.66	2.01	15.39	5.85	11.73	0.00	11.73	1.00	51.00	OK									
	POND 2						11.73	0.00	**11.73**				INL-H6	10' TYPE R	ON-GRADE	1.0%	12.80	1.00	11.73	0.00	H.5
I.1	POND 2	1.72	0.64	1.11	11.61	6.56	7.25	0.00	7.25	1.00	51.00	OK									
	POND 2						7.25	0.00	**7.25**									0.00	0.00	7.25	I.5
I.2	POND 2	4.40	0.77	3.40	19.36	5.27	17.92	0.60	18.52	1.50	55.00	OK									
	POND 2						17.92	0.60	**18.52**				INL-I2	15' TYPE R	SUMP	0.0%	22.50	1.00	18.52	0.00	P.2
I.3	POND 2	4.64	0.73	3.39	13.20	6.23	21.13	0.00	21.13	1.50	56.00	OK									
	POND 2						21.13	0.00	**21.13**				INL-I3	15' TYPE R	ON-GRADE	1.5%	20.80	0.98	20.80	0.33	I.2
I.4	POND 2	4.62	0.73	3.37	13.22	6.23	21.01	0.00	21.01	1.50	56.00	OK									
	POND 2						21.01	0.00	**21.01**				INL-I4	15' TYPE R	ON-GRADE	1.0%	18.80	0.89	18.80	2.21	I.2
I.5	POND 2	3.20	0.67	2.14	13.96	6.09	13.05	7.25	20.29	1.00	51.00	OK									
	POND 2						13.05	7.25	**20.29**				INL-I5	15' TYPE R	ON-GRADE	1.0%	18.80	0.93	18.80	1.49	I.8
I.6	POND 2	1.48	0.75	1.10	10.98	6.70	7.40	0.00	7.40	1.00	51.00	OK									
	POND 2						7.40	0.00	**7.40**				INL-I6	10' TYPE R	ON-GRADE	1.0%	12.80	1.00	7.40	0.00	I.2
I.7	POND 2	2.54	0.74	1.89	10.10	6.91	13.07	0.00	13.07	1.00	51.00	OK									
	POND 2						13.07	0.00	**13.07**				INL-I7	10' TYPE R	ON-GRADE	1.0%	12.80	0.98	12.80	0.27	I.2
I.8	POND 2	1.57	0.80	1.25	9.26	7.13	8.93	1.49	10.43	1.00	51.00	OK									
	POND 2						8.93	1.49	**10.43**				INL-I7	15' TYPE R	SUMP	0.0%	22.50	1.00	10.43	0.00	P.2
J.1	POND 2	1.35	0.67	0.90	13.22	6.23	5.62	0.00	5.62	1.00	51.00	OK									
	POND 2						5.62	0.00	**5.62**				INL-J1	5' TYPE R	SUMP	0.0%	10.20	1.00	5.62	0.00	J.2
J.2	POND 2	1.64	0.80	1.32	9.19	7.15	9.43	0.00	9.43	1.00	51.00	OK									
	POND 2						9.43	0.00	**9.43**				INL-J2	5' TYPE R	SUMP	0.0%	10.20	1.00	9.43	0.00	J.3
J.3	POND 2	1.63	0.80	1.30	8.04	7.48	9.76	0.00	9.76	1.00	51.00	OK									
	POND 2						9.76	0.00	**9.76**				INL-J3	5' TYPE R	SUMP	0.0%	10.20	1.00	9.76	0.00	J.4
J.4	POND 2	1.63	0.80	1.30	8.04	7.48	9.76	0.00	9.76	1.00	51.00	OK									
	POND 2						9.76	0.00	**9.76**				INL-J4	5' TYPE R	SUMP	0.0%	10.20	1.00	9.76	0.00	J.5
J.5	POND 2	1.63	0.80	1.30	8.04	7.48	9.76	0.00	9.76	1.00	51.00	OK									
	POND 2						9.76	0.00	**9.76**				INL-J5	5' TYPE R	SUMP	0.0%	10.20	1.00	9.76	0.00	J.6
J.6	POND 2	2.23	0.70	1.55	13.67	6.14	9.52	0.00	9.52	1.00	51.00	OK									
	POND 2						9.52	0.00	**9.52**				INL-J6	5' TYPE R	SUMP	0.0%	10.20	1.00	9.52	0.00	I.8
J.7	POND 2	2.16	0.80	1.72	9.23	7.14	12.28	0.00	12.28	1.00	51.00	OK									
	POND 2						12.28	0.00	**12.28**				INL-J7	10 TYPE R	SUMP	0.0%	16.00	1.00	12.28	0.00	F.2
P.2	POND 2	9.20	0.55	5.02	11.58	6.56	32.91	0.00	32.91												
	POND 2						32.91	0.00	**32.91**												
X.1	OFFSITE	2.55	0.54	1.37	19.94	5.19	7.10	0.00	7.10												

100-YEAR RUNOFF CALCULATIONS
Countryside South - Proposed Conditions
Fountain, Colorado

DATE: 8/10/2021
CALCULATED BY: RDL

PROJECT: 21002163
DESIGN STORM: 100-Year

		FLOW TO INLETS								Minimum	Maximum	Under	INLETS								Carry-Over
Sub-Basin	Design Point	Area (acres)	C	C x A	Tc (min)	Intensity (in/hr)	Qd = CIA (cfs)	Qco (cfs)	Qt (cfs)	Street Slope (%)	Street/Paseo Capacity (cfs)	Capacity?	Inlet	Type	Condition	Slope at Inlet (%)	Inlet Capacity (cfs)	R	Intercepted (cfs)	Carry-Over (cfs)	to Sub-basin/ Design Point (DP)
	OFFSITE						7.10	0.00	**7.10**												
X.2	OFFSITE	1.86	0.52	0.97	13.89	6.10	5.95	0.00	5.95												
	OFFSITE						5.95	0.00	**5.95**												
Y.1	OFFSITE	0.72	0.36	0.26	11.81	6.51	1.69	0.00	1.69												
	OFFSITE						1.69	0.00	**1.69**												
Y.2	OFFSITE	9.22	0.50	4.61	13.72	6.14	28.28	0.00	28.28												
	OFFSITE						28.28	0.00	**28.28**												
OS-1	OFFSITE	3.18	0.36	1.14	26.69	4.46	5.10	0.00	5.10												
	OFFSITE						5.10	0.00	**5.10**												
OS-2	OFFSITE	0.69	0.36	0.25	24.58	4.67	1.16	0.00	1.16												
	OFFSITE						1.16	0.00	**1.16**												
OS-3	OFFSITE	1.56	0.36	0.56	34.12	3.84	2.16	0.00	2.16												
	OFFSITE						2.16	0.00	**2.16**												
OS-4	POND 2	188.59	0.36	68.28	40.33	3.42	233.41	0.00	233.41												
	POND 2						233.41	0.00	**233.41**												
OS-5	POND 2	9.84	0.36	3.54	36.76	3.65	12.94	0.00	12.94												
	POND 2						12.94	0.00	**12.94**												
OS-6	POND 2	3.89	0.36	1.40	35.75	3.72	5.21	0.00	5.21												
	POND 2						5.21	0.00	**5.21**												
OS-7	POND 2	17.12	0.36	6.16	46.53	3.06	18.84	0.00	18.84												
	POND 2						18.84	0.00	**18.84**												

PROPOSED CONDITIONS DRAINAGE BASIN SUMMARY

Basin	Design Point	Area (acres)	C_5	C_{100}	Basin Q_5 (cfs)	Basin Q_{100} (cfs)
A	A	13.94	0.53	0.68	26.87	57.87
B.1	POND 1	4.40	0.60	0.74	10.52	21.52
B.2	POND 1	3.74	0.63	0.76	9.59	19.32
C.1	POND 1	0.76	0.67	0.78	2.43	4.79
C.2	POND 1	1.69	0.76	0.85	5.58	10.52
C.3	POND 1	2.31	0.66	0.78	5.73	11.35
C.4	POND 1	2.30	0.62	0.75	5.58	11.32
C.5	POND 1	3.22	0.64	0.76	7.80	15.65
C.6	POND 1	1.94	0.64	0.76	4.72	9.45
D.1	POND 1	1.25	0.64	0.79	3.36	6.99
D.2	POND 1	2.42	0.72	0.82	6.73	12.94
D.3	POND 1	2.38	0.63	0.75	6.17	12.46
D.4	POND 1	2.75	0.61	0.74	6.59	13.45
D.5	POND 1	1.27	0.48	0.68	2.37	5.67
D.6	POND 1	0.80	0.40	0.63	1.25	3.29
D.7	POND 1	1.48	0.64	0.76	3.92	7.87
D.8	POND 1	1.54	0.67	0.79	4.89	9.62
D.9	POND 1	2.10	0.73	0.83	7.06	13.53
P.1	POND 1	4.40	0.22	0.53	11.70	18.14
E.1	POND 2	4.85	0.63	0.77	10.89	23.89
E.2	POND 2	1.40	0.56	0.70	2.01	7.86
E.3	POND 2	3.78	0.48	0.67	6.53	15.50
E.4	POND 2	3.60	0.59	0.73	8.68	17.88
E.5	POND 2	2.85	0.60	0.73	6.87	14.14
E.6	POND 2	2.72	0.57	0.71	6.09	12.71
E.7	POND 2	2.72	0.58	0.71	6.02	12.55
F.1	POND 2	2.02	0.63	0.74	4.93	11.10
F.2	POND 2	3.95	0.63	0.74	7.98	15.73
G	POND 2	6.11	0.26	0.57	5.86	21.08
H.1	POND 2	3.75	0.37	0.62	5.25	14.78
H.2	POND 2	0.93	0.52	0.72	2.00	4.72
H.3	POND 2	5.73	0.47	0.64	9.37	21.92
H.4	POND 2	3.78	0.67	0.78	9.63	19.00
H.5	POND 2	2.20	0.61	0.75	5.16	10.69
H.6	POND 2	3.06	0.50	0.66	5.30	11.73
I.1	POND 2	1.72	0.39	0.64	2.58	7.25
I.2	POND 2	4.40	0.65	0.77	9.01	18.52
I.3	POND 2	4.64	0.60	0.73	10.28	21.13
I.4	POND 2	4.62	0.60	0.73	10.21	21.01
I.5	POND 2	3.20	0.48	0.67	5.58	20.29
I.6	POND 2	1.48	0.62	0.75	3.65	7.40
I.7	POND 2	2.54	0.62	0.74	6.43	13.07
I.8	POND 2	1.57	0.68	0.80	4.57	10.43
J.1	POND 2	1.35	0.46	0.67	2.32	5.62
J.2	POND 2	1.64	0.69	0.80	4.85	9.43
J.3	POND 2	1.63	0.69	0.80	5.01	9.76
J.4	POND 2	1.63	0.69	0.80	5.01	9.76
J.5	POND 2	1.63	0.69	0.80	5.01	9.76
J.6	POND 2	2.23	0.51	0.70	4.18	9.52
J.7	POND 2	2.16	0.69	0.80	6.29	12.28
P.2	POND 2	9.20	0.23	0.55	8.44	32.91
X.1	OFFSITE	2.55	0.23	0.54	1.84	7.10
X.2	OFFSITE	1.86	0.20	0.52	1.38	5.95
Y.1	OFFSITE	0.72	0.16	0.36	0.45	1.69
Y.2	OFFSITE	9.22	0.24	0.50	8.09	28.28
OS-1	OFFSITE	3.18	0.16	0.36	1.35	5.10
OS-2	OFFSITE	0.69	0.16	0.36	0.31	1.16
OS-3	OFFSITE	1.56	0.16	0.36	0.57	2.16
OS-4	OFFSITE	188.59	0.16	0.36	62.45	233.41
OS-5	OFFSITE	9.84	0.16	0.36	3.43	12.94
OS-6	OFFSITE	3.89	0.16	0.36	1.38	5.21
OS-7	OFFSITE	17.12	0.16	0.36	4.99	18.84
ONSITE TOTAL		**168.1**			**340.6**	**762.1**
OFFSITE TOTAL		**224.9**			**74.5**	**278.8**

PROPOSED CONDITIONS DRAINAGE BASIN SUMMARY

Basin	Design Point	Area (acres)	C_5	C_{100}	Basin Q_5 (cfs)	Basin Q_{100} (cfs)
A	A	13.94	0.53	0.68	26.87	57.87
B	POND 1	8.14	0.62	0.75	20.11	40.84
C	POND 1	12.21	0.66	0.78	31.83	63.07
D	POND 1	15.99	0.63	0.77	42.35	85.82
P.1	POND 1	4.40	0.22	0.53	11.70	18.14
E	POND 2	21.92	0.58	0.72	47.08	104.52
F	POND 2	5.97	0.89	1.31	12.90	26.83
G	POND 2	6.11	0.26	0.57	5.86	21.08
H	POND 2	19.45	0.51	0.68	36.72	82.83
I	POND 2	24.17	0.59	0.73	52.31	119.09
J	POND 2	12.25	0.63	0.77	32.65	66.11
P.2	POND 2	9.20	0.23	0.55	8.44	32.91
X	OFFSITE	4.41	0.22	0.53	3.22	13.05
Y	OFFSITE	9.94	0.23	0.49	8.54	29.97
OS	POND 2	224.87	0.16	0.36	74.48	278.82
ONSITE TOTAL		**168.1**			**340.6**	**762.1**
OFFSITE TOTAL		**224.9**			**74.5**	**278.8**

POND 1 TRIBUTARY AREA AND IMPERVIOUSNESS

Countryside South - Proposed Conditions
Fountain, Colorado
8/10/2021

Major Basin	Total Area (AC)	Effective Imperviousness (%)
A	13.94	70.0%
B	8.14	75.8%
C	12.21	79.3%
D	15.99	74.6%
POND 1	4.40	13.2%
TOTAL	**54.68**	**69.7%**

POND 2 TRIBUTARY AREA AND IMPERVIOUSNESS

Countryside South - Proposed Conditions
Fountain, Colorado
8/10/2021

Basin No	Total Area (AC)	Effective Imperviousness (%)
E	21.92	69.2%
F	5.97	45.0%
G	6.11	16.7%
H	19.45	60.3%
I	24.17	70.2%
J	12.25	74.0%
OS-4 - OS-7	224.87	2.3%
POND 2	9.20	13.6%
TOTAL	**323.94**	**19.5%**

Channel Tributary Basins and Total Flows

Countryside South - Proposed Conditions
Fountain, Colorado
8/10/2021

North Channel (Basin F.1)			
Sub-Basin ID	Total Area (AC)	5-Year Flow (cfs)	100-Year Flow (cfs)
E.1	4.85	10.89	23.89
E.2	1.40	2.01	7.86
E.3	3.78	6.53	15.50
F.1	2.02	4.93	11.10
OS-4	188.59	62.45	233.41
TOTAL	**200.64**	**86.80**	**291.75**

South Channel (Basin F.2)			
Sub-Basin ID	Total Area (AC)	5-Year Flow (cfs)	100-Year Flow (cfs)
E.4	3.60	8.68	17.88
E.5	2.85	6.87	14.14
E.6	2.72	6.09	12.71
E.7	2.72	6.02	12.55
F.2	3.95	7.98	15.73
G	6.11	5.25	14.78
H.1	3.75	5.25	14.78
OS-5	9.84	3.43	12.94
OS-6	3.89	1.38	5.21
TOTAL	**39.43**	**50.93**	**120.71**
North Channel	200.64	86.80	291.75
CUMULATIVE TOTAL	**240.07**	**137.73**	**412.46**

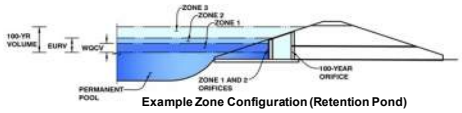
APPENDIX E – Hydraulic Computations

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: **Countryside South - Pond 1 (North)**

Basin ID: **A - D + Pond 1**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**		**Note: L / W Ratio < 1**
Watershed Area =	54.68	acres	**L / W Ratio = 0.6**
Watershed Length =	1,200	ft	
Watershed Length to Centroid =	600	ft	
Watershed Slope =	0.020	ft/ft	
Watershed Imperviousness =	70.00%	percent	
Percentage Hydrologic Soil Group A =	0.0%	percent	
Percentage Hydrologic Soil Group B =	0.0%	percent	
Percentage Hydrologic Soil Groups C/D =	100.0%	percent	
Target WQCV Drain Time =	40.0	hours	
Location for 1-hr Rainfall Depths =	User Input		

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

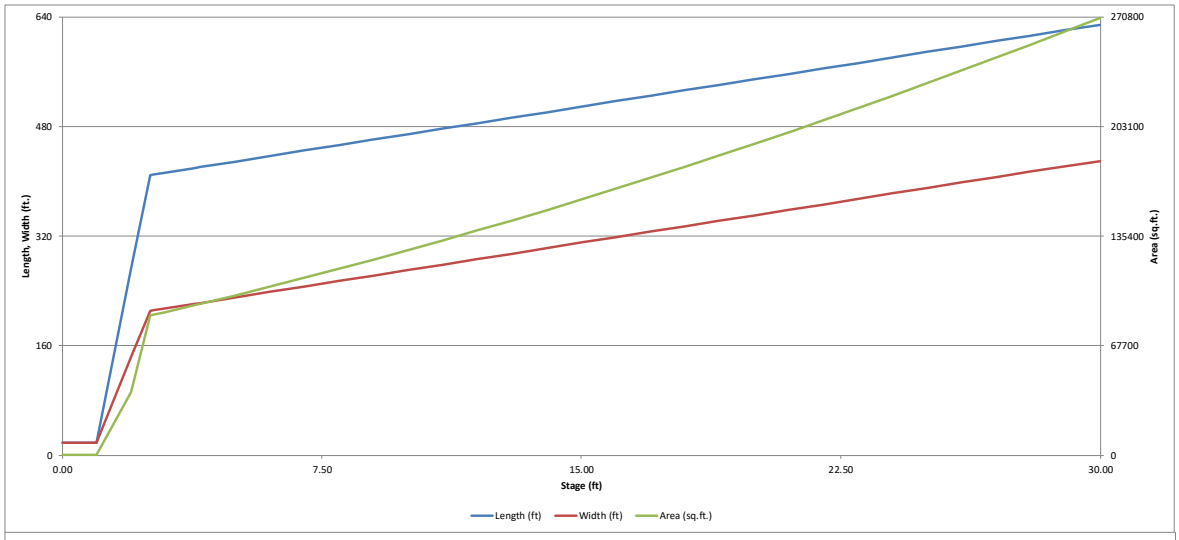
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	1.253	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	3.720	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	3.873	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	5.247	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	6.389	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	7.632	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	8.806	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	10.166	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	13.099	acre-feet	3.14	inches
Approximate 2-yr Detention Volume =	3.344	acre-feet		
Approximate 5-yr Detention Volume =	4.665	acre-feet		
Approximate 10-yr Detention Volume =	5.346	acre-feet		
Approximate 25-yr Detention Volume =	5.688	acre-feet		
Approximate 50-yr Detention Volume =	5.843	acre-feet		
Approximate 100-yr Detention Volume =	6.309	acre-feet		

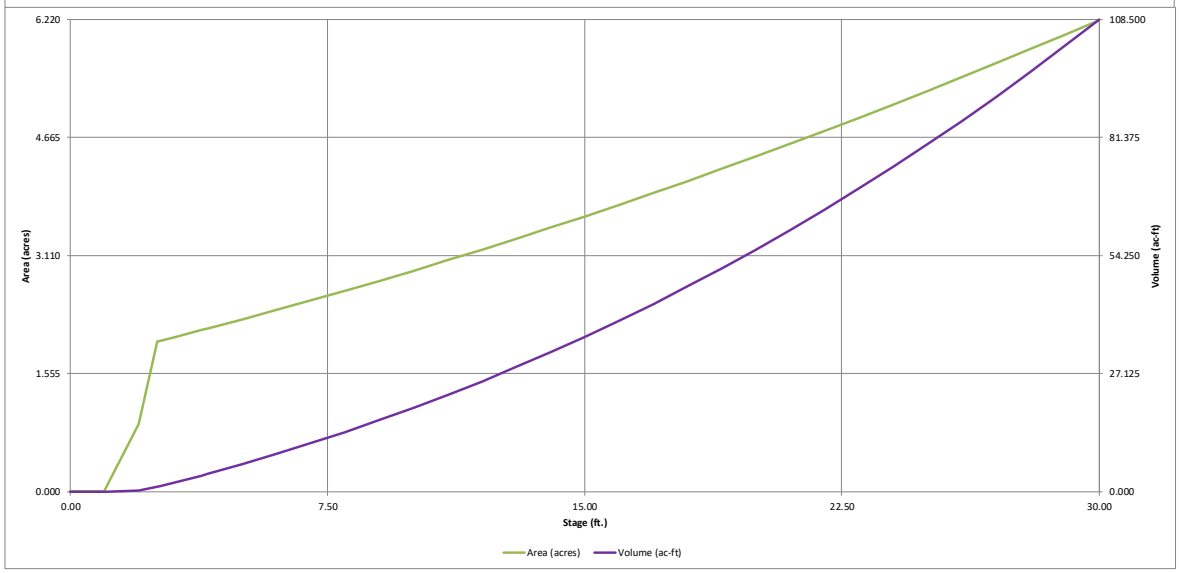
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	1.253	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.467	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	2.589	acre-feet
Total Detention Basin Volume =	6.309	acre-feet
Initial Surcharge Volume (ISV) =	164	ft^3
Initial Surcharge Depth (ISD) =	0.50	ft
Total Available Detention Depth (H_{total}) =	5.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.004	ft/ft
Slopes of Main Basin Sides (S_{main}) =	4	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	328	ft^2
Surcharge Volume Length (L_{ISV}) =	18.1	ft
Surcharge Volume Width (W_{ISV}) =	18.1	ft
Depth of Basin Floor (H_{FLOOR}) =	1.54	ft
Length of Basin Floor (L_{FLOOR}) =	409.3	ft
Width of Basin Floor (W_{FLOOR}) =	210.6	ft
Area of Basin Floor (A_{FLOOR}) =	86,189	ft^2
Volume of Basin Floor (V_{FLOOR}) =	47,139	ft^3
Depth of Main Basin (H_{MAIN}) =	2.46	ft
Length of Main Basin (L_{MAIN}) =	428.9	ft
Width of Main Basin (W_{MAIN}) =	230.3	ft
Area of Main Basin (A_{MAIN}) =	98,775	ft^2
Volume of Main Basin (V_{MAIN}) =	227,330	ft^3
Calculated Total Basin Volume (V_{total}) =	**6.308**	acre-feet

Depth Increment = 1.00 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		18.1	18.1	328		0.008		
ISV	0.50		18.1	18.1	328		0.008	164	0.004
	1.00		18.1	18.1	328		0.008	328	0.008
	2.00		272.1	143.1	38,937		0.894	14,668	0.337
Floor	2.54		409.3	210.6	86,189		1.979	47,619	1.093
Zone 1 (WQCV)	2.63		410.0	211.3	86,636		1.989	55,396	1.272
	3.00		412.9	214.3	88,484		2.031	87,792	2.015
Zone 2 (EURV)	3.82		419.5	220.8	92,641		2.127	162,048	3.720
	4.00		420.9	222.3	93,565		2.148	178,806	4.105
Zone 3 (100-year)	5.00		428.9	230.3	98,775		2.268	274,966	6.312
FREEBOARD	6.00		436.9	238.3	104,113		2.390	376,399	8.641
	7.00		444.9	246.3	109,579		2.516	483,234	11.094
	8.00		452.9	254.3	115,172		2.644	595,599	13.673
	9.00		460.9	262.3	120,894		2.775	713,621	16.382
	10.00		468.9	270.3	126,744		2.910	837,429	19.225
	11.00		476.9	278.3	132,721		3.047	967,151	22.203
	12.00		484.9	286.3	138,827		3.187	1,102,915	25.319
	13.00		492.9	294.3	145,061		3.330	1,244,848	28.578
	14.00		500.9	302.3	151,423		3.476	1,393,079	31.981
	15.00		508.9	310.3	157,912		3.625	1,547,736	35.531
	16.00		516.9	318.3	164,530		3.777	1,708,947	39.232
	17.00		524.9	326.3	171,276		3.932	1,876,839	43.086
	18.00		532.9	334.3	178,150		4.090	2,051,541	47.097
	19.00		540.9	342.3	185,151		4.250	2,233,181	51.267
	20.00		548.9	350.3	192,281		4.414	2,421,886	55.599
	21.00		556.9	358.3	199,539		4.581	2,617,785	60.096
	22.00		564.9	366.3	206,924		4.750	2,821,006	64.761
	23.00		572.9	374.3	214,438		4.923	3,031,677	69.598
	24.00		580.9	382.3	222,080		5.098	3,249,925	74.608
	25.00		588.9	390.3	229,850		5.277	3,475,879	79.795
	26.00		596.9	398.3	237,747		5.458	3,709,667	85.162
	27.00		604.9	406.3	245,773		5.642	3,951,417	90.712
	28.00		612.9	414.3	253,927		5.829	4,201,256	96.448
	29.00		620.9	422.3	262,209		6.019	4,459,313	102.372
	30.00		628.9	430.3	270,618		6.213	4,725,716	108.488


640
480
320
160
0
Length, Width (ft.)
270800
203100
135400
67700
0
Area (sq.ft.)
0.00
7.50
15.00
22.50
30.00
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)

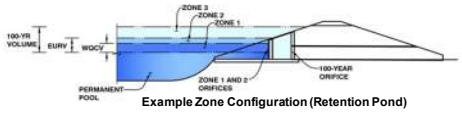

6.220
4.665
3.110
1.555
0.000
Area (acres)
108.500
81.375
54.250
27.125
0.000
Volume (ac-ft)
0.00
7.50
15.00
22.50
30.00
Stage (ft.)
Area (acres)
Volume (ac-ft)

DETENTION BASIN STAGE-STORAGE TABLE BUILDER

MHFD-Detention, Version 4.04 (February 2021)

Project: **Countryside South - Pond 2 (South)**

Basin ID: **E - J + Pond 2 + Offsite**



Example Zone Configuration (Retention Pond)

Watershed Information

Selected BMP Type =	**EDB**	
Watershed Area =	323.94	acres
Watershed Length =	4,400	ft
Watershed Length to Centroid =	1,200	ft
Watershed Slope =	0.020	ft/ft
Watershed Imperviousness =	19.50%	percent
Percentage Hydrologic Soil Group A =	0.0%	percent
Percentage Hydrologic Soil Group B =	0.0%	percent
Percentage Hydrologic Soil Groups C/D =	100.0%	percent
Target WQCV Drain Time =	40.0	hours
Location for 1-hr Rainfall Depths =	User Input	

After providing required inputs above including 1-hour rainfall depths, click 'Run CUHP' to generate runoff hydrographs using the embedded Colorado Urban Hydrograph Procedure.

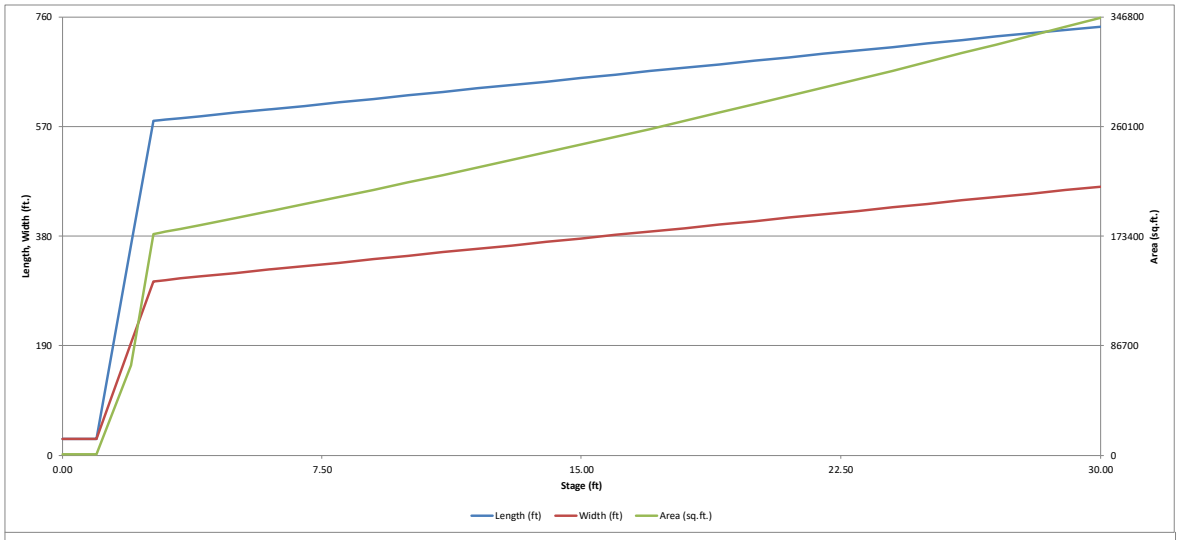
			Optional User Overrides	
Water Quality Capture Volume (WQCV) =	3.067	acre-feet		acre-feet
Excess Urban Runoff Volume (EURV) =	5.542	acre-feet		acre-feet
2-yr Runoff Volume (P1 = 1.19 in.) =	9.222	acre-feet	1.19	inches
5-yr Runoff Volume (P1 = 1.5 in.) =	16.171	acre-feet	1.50	inches
10-yr Runoff Volume (P1 = 1.75 in.) =	22.509	acre-feet	1.75	inches
25-yr Runoff Volume (P1 = 2 in.) =	30.738	acre-feet	2.00	inches
50-yr Runoff Volume (P1 = 2.25 in.) =	37.529	acre-feet	2.25	inches
100-yr Runoff Volume (P1 = 2.52 in.) =	46.586	acre-feet	2.52	inches
500-yr Runoff Volume (P1 = 3.14 in.) =	63.827	acre-feet	3.14	inches
Approximate 2-yr Detention Volume =	4.649	acre-feet		
Approximate 5-yr Detention Volume =	8.739	acre-feet		
Approximate 10-yr Detention Volume =	10.551	acre-feet		
Approximate 25-yr Detention Volume =	12.269	acre-feet		
Approximate 50-yr Detention Volume =	12.850	acre-feet		
Approximate 100-yr Detention Volume =	16.623	acre-feet		

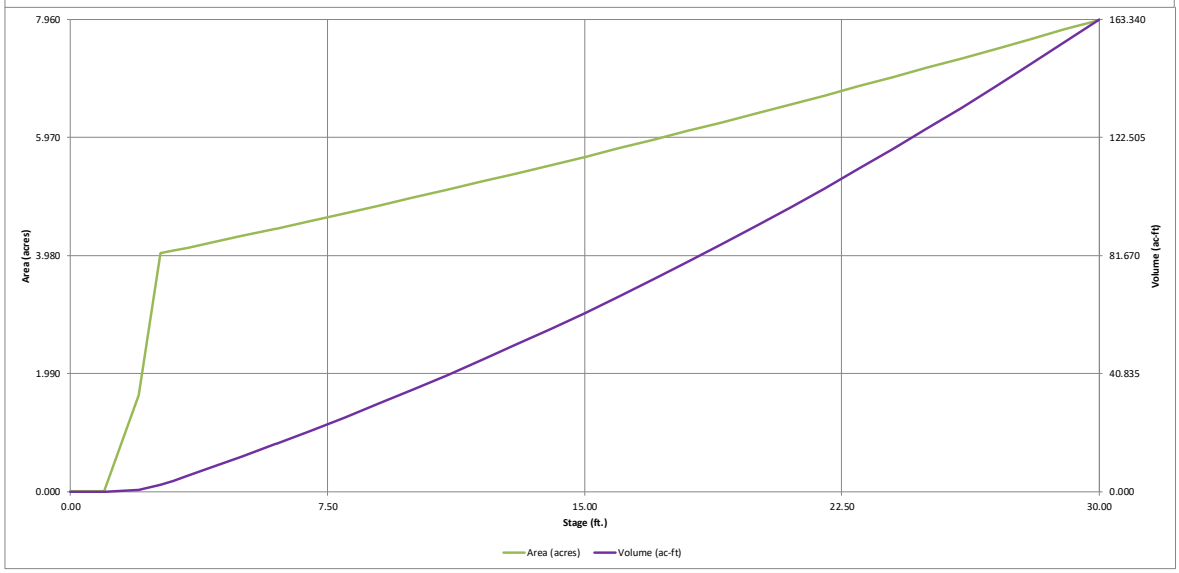
Define Zones and Basin Geometry

Zone 1 Volume (WQCV) =	3.067	acre-feet
Zone 2 Volume (EURV - Zone 1) =	2.476	acre-feet
Zone 3 Volume (100-year - Zones 1 & 2) =	11.080	acre-feet
Total Detention Basin Volume =	16.623	acre-feet
Initial Surcharge Volume (ISV) =	401	ft^3
Initial Surcharge Depth (ISD) =	0.50	ft
Total Available Detention Depth (H_{total}) =	6.00	ft
Depth of Trickle Channel (H_{TC}) =	0.50	ft
Slope of Trickle Channel (S_{TC}) =	0.003	ft/ft
Slopes of Main Basin Sides (S_{main}) =	3	H:V
Basin Length-to-Width Ratio ($R_{L/W}$) =	2	
Initial Surcharge Area (A_{ISV}) =	801	ft^2
Surcharge Volume Length (L_{ISV}) =	28.3	ft
Surcharge Volume Width (W_{ISV}) =	28.3	ft
Depth of Basin Floor (H_{FLOOR}) =	1.64	ft
Length of Basin Floor (L_{FLOOR}) =	579.9	ft
Width of Basin Floor (W_{FLOOR}) =	301.6	ft
Area of Basin Floor (A_{FLOOR}) =	174,922	ft^2
Volume of Basin Floor (V_{FLOOR}) =	102,535	ft^3
Depth of Main Basin (H_{MAIN}) =	3.36	ft
Length of Main Basin (L_{MAIN}) =	600.1	ft
Width of Main Basin (W_{MAIN}) =	321.8	ft
Area of Main Basin (A_{MAIN}) =	193,101	ft^2
Volume of Main Basin (V_{MAIN}) =	618,027	ft^3
Calculated Total Basin Volume (V_{total}) =	**16.560**	acre-feet

Depth Increment = 1.00 ft

Stage - Storage Description	Stage (ft)	Optional Override Stage (ft)	Length (ft)	Width (ft)	Area (ft^2)	Optional Override Area (ft^2)	Area (acre)	Volume (ft^3)	Volume (ac-ft)
Top of Micropool	0.00		28.3	28.3	801		0.018		
ISV	0.50		28.3	28.3	801		0.018	401	0.009
	1.00		28.3	28.3	801		0.018	801	0.018
	2.00		364.6	195.0	71,097		1.632	27,408	0.629
Floor	2.64		579.9	301.6	174,922		4.016	103,685	2.380
Zone 1 (WQCV)	2.82		581.0	302.7	175,876		4.038	135,257	3.105
	3.00		582.1	303.8	176,831		4.059	167,001	3.834
Zone 2 (EURV)	3.42		584.6	306.3	179,070		4.111	241,739	5.550
	4.00		588.1	309.8	182,182		4.182	346,501	7.955
	5.00		594.1	315.8	187,605		4.307	531,389	12.199
	6.00		600.1	321.8	193,101		4.433	721,736	16.569
Zone 3 (100-year)	6.02		600.2	321.9	193,211		4.436	725,599	16.657
FREEBOARD	7.00		606.1	327.8	198,668		4.561	917,614	21.066
	8.00		612.1	333.8	204,307		4.690	1,119,096	25.691
	9.00		618.1	339.8	210,018		4.821	1,326,252	30.447
	10.00		624.1	345.8	215,801		4.954	1,539,156	35.334
	11.00		630.1	351.8	221,656		5.089	1,757,879	40.355
	12.00		636.1	357.8	227,584		5.225	1,982,493	45.512
	13.00		642.1	363.8	233,583		5.362	2,213,070	50.805
	14.00		648.1	369.8	239,654		5.502	2,449,682	56.237
	15.00		654.1	375.8	245,797		5.643	2,692,402	61.809
	16.00		660.1	381.8	252,012		5.785	2,941,301	67.523
	17.00		666.1	387.8	258,299		5.930	3,196,450	73.380
	18.00		672.1	393.8	264,659		6.076	3,457,924	79.383
	19.00		678.1	399.8	271,090		6.223	3,725,792	85.532
	20.00		684.1	405.8	277,593		6.373	4,000,127	91.830
	21.00		690.1	411.8	284,168		6.524	4,281,002	98.278
	22.00		696.1	417.8	290,815		6.676	4,568,487	104.878
	23.00		702.1	423.8	297,534		6.830	4,862,656	111.631
	24.00		708.1	429.8	304,326		6.986	5,163,580	118.539
	25.00		714.1	435.8	311,189		7.144	5,471,331	125.604
	26.00		720.1	441.8	318,124		7.303	5,785,982	132.828
	27.00		726.1	447.8	325,131		7.464	6,107,603	140.211
	28.00		732.1	453.8	332,210		7.626	6,436,268	147.756
	29.00		738.1	459.8	339,361		7.791	6,772,048	155.465
	30.00		744.1	465.8	346,585		7.956	7,115,014	163.338


760
570
380
190
0
346800
260100
173400
86700
0
Length, Width (ft.)
Area (sq.ft.)
0.00
7.50
15.00
22.50
30.00
Stage (ft)
Length (ft)
Width (ft)
Area (sq.ft.)


7.960
5.970
3.980
1.990
0.000
163.340
122.505
81.670
40.835
0.000
Area (acres)
Volume (ac-ft)
0.00
7.50
15.00
22.50
30.00
Stage (ft.)
Area (acres)
Volume (ac-ft)

North Channel Detailed Report

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.040
Channel Slope	0.015
Left Side Slope	4.000
Right Side Slope	4.000
Bottom Width	5.00
Discharge	291.75

Results	
Normal Depth	34.0
Flow Area	46.3
Wetted Perimeter	28.4
Hydraulic Radius	19.6
Top Width	27.66
Critical Depth	31.7
Critical Slope	0.021
Velocity	6.31
Velocity Head	0.62
Specific Energy	3.45
Froude Number	0.860
Flow Type	Subcritical

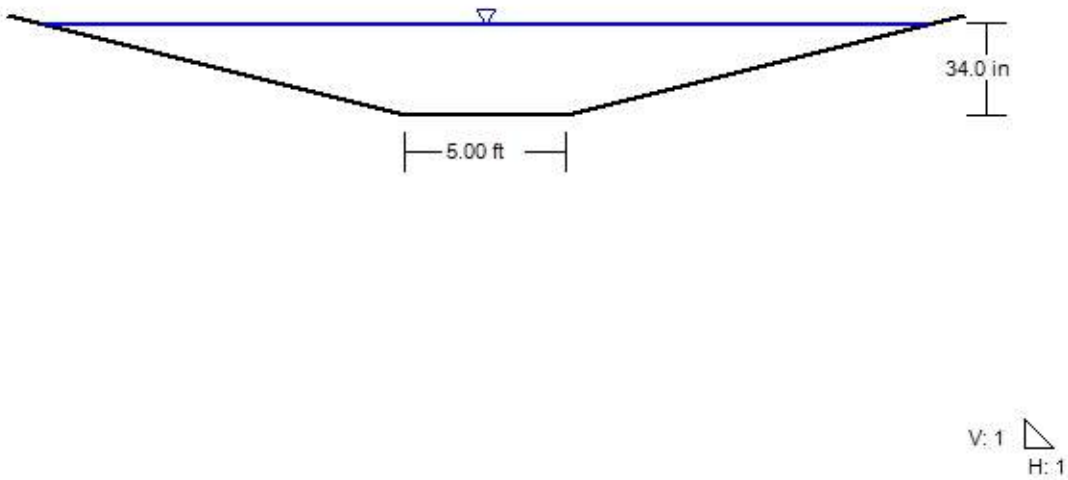
GVF Input Data	
Downstream Depth	0.0
Length	0.0
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0
Profile Description	N/A
Profile Headloss	0.00
Downstream Velocity	Infinity
Upstream Velocity	Infinity
Normal Depth	34.0
Critical Depth	31.7
Channel Slope	0.015
Critical Slope	0.021

North Channel Cross Section

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.040
Channel Slope	0.015
Normal Depth	34.0
Left Side Slope	4.000
Right Side Slope	4.000
Bottom Width	5.00
Discharge	291.75



South Channel Detailed Report

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.040
Channel Slope	0.015
Left Side Slope	4.000
Right Side Slope	4.000
Bottom Width	5.00
Discharge	412.46

Results	
Normal Depth	39.5
Flow Area	59.9
Wetted Perimeter	32.2
Hydraulic Radius	22.3
Top Width	31.36
Critical Depth	37.2
Critical Slope	0.020
Velocity	6.89
Velocity Head	0.74
Specific Energy	4.03
Froude Number	0.878
Flow Type	Subcritical

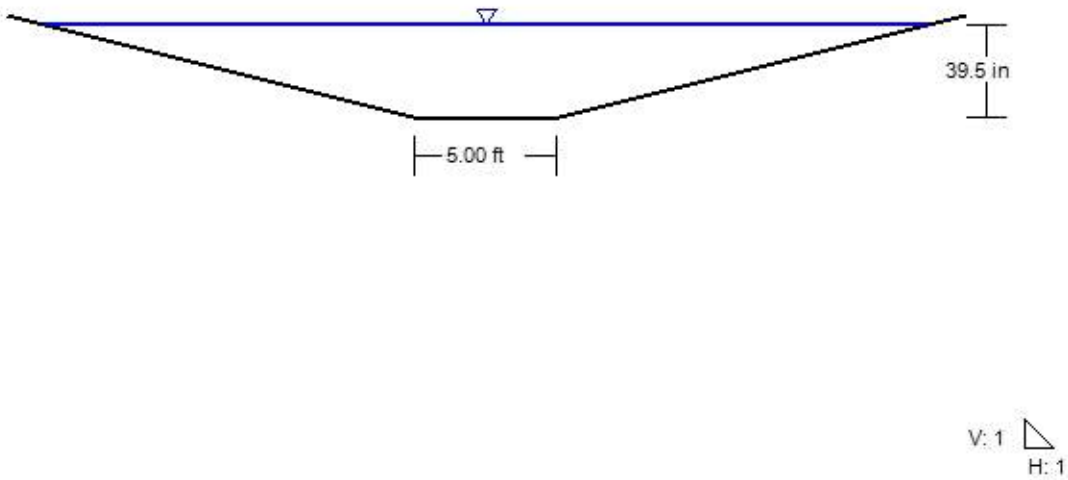
GVF Input Data	
Downstream Depth	0.0
Length	0.0
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0
Profile Description	N/A
Profile Headloss	0.00
Downstream Velocity	Infinity
Upstream Velocity	Infinity
Normal Depth	39.5
Critical Depth	37.2
Channel Slope	0.015
Critical Slope	0.020

South Channel Cross Section

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

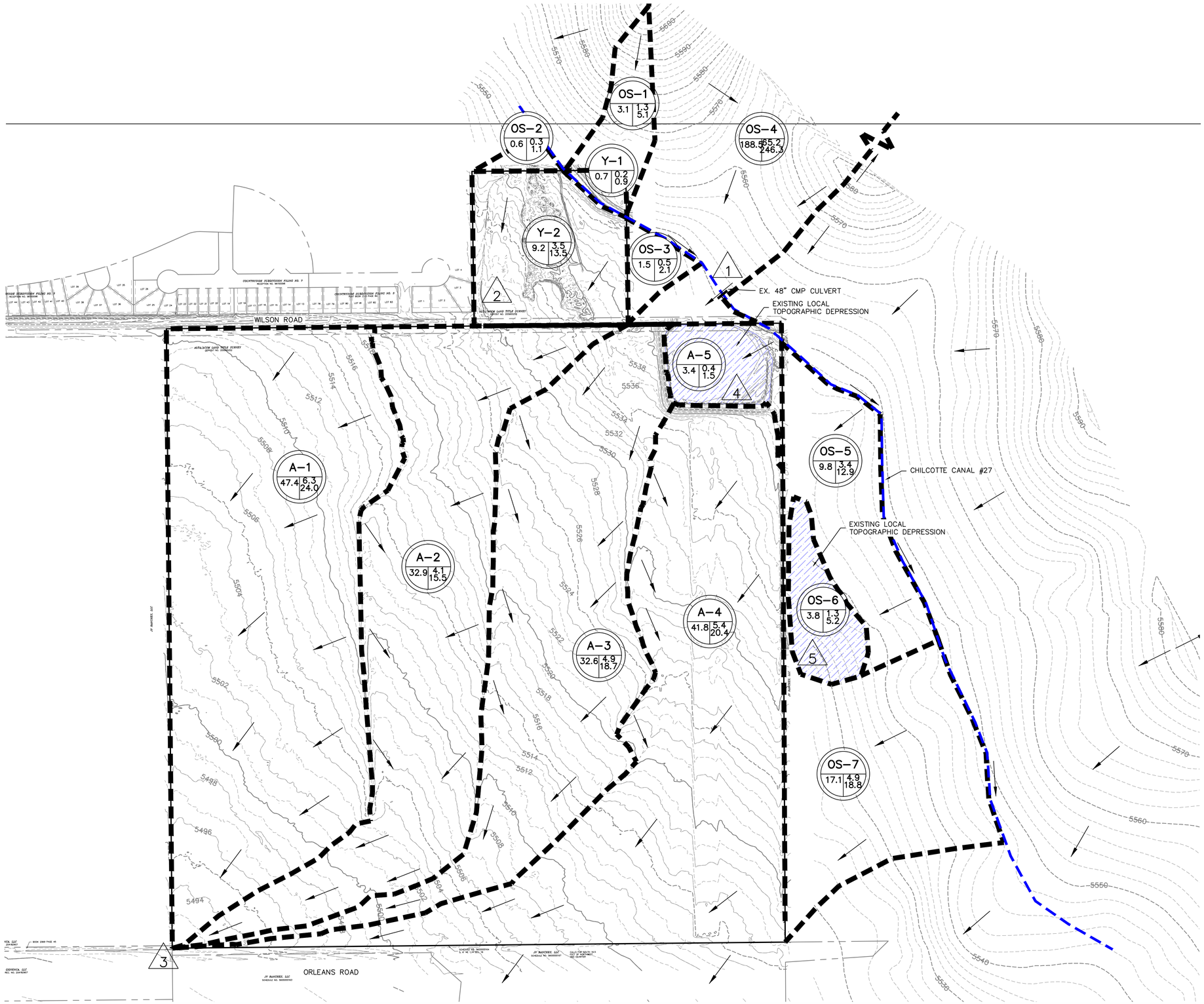
Input Data	
Roughness Coefficient	0.040
Channel Slope	0.015
Normal Depth	39.5
Left Side Slope	4.000
Right Side Slope	4.000
Bottom Width	5.00
Discharge	412.46



APPENDIX F – Drainage Maps

COUNTRYSIDE SOUTH

EXISTING SUB-BASIN ANALYSIS



EXISTING CONDITIONS DRAINAGE BASIN SUMMARY						
Basin	Design Point	Area (acres)	C_5	C_{100}	Basin Q_5 (cfs)	Basin Q_{100} (cfs)
A-1	3	47.38	0.16	0.36	6.39	24.08
A-2	3	32.91	0.16	0.36	4.13	15.57
A-3	3	32.63	0.16	0.36	4.97	18.75
A-4	3	41.78	0.16	0.36	5.43	20.48
A-5	4	3.45	0.16	0.36	0.41	1.54
Y-1	1	0.72	0.16	0.36	0.26	0.99
Y-2	2	9.22	0.16	0.36	3.59	13.57
OS-1	1	3.18	0.16	0.36	1.35	5.10
OS-2	2	0.69	0.16	0.36	0.31	1.16
OS-3	2	1.56	0.16	0.36	0.57	2.16
OS-4	1	188.59	0.16	0.36	65.26	246.39
OS-5	5	9.84	0.16	0.36	3.43	12.94
OS-6	5	3.89	0.16	0.36	1.38	5.21
OS-7	3	17.12	0.16	0.36	4.99	18.84

EXISTING CONDITIONS DESIGN POINT SUMMARY		
Design Point	Basin Q_5 (cfs)	Basin Q_{100} (cfs)
1	66.88	252.49
2	0.88	3.32
3	91.19	344.11
4	0.41	1.54
5	4.81	18.15
CUMMULATIVE FLOW TO DP 3	96.40	363.79

LEGEND

- PROPERTY BOUNDARY
- EXISTING RIGHT-OF-WAY
- PROPOSED LOT LINE
- EXISTING LOT LINE
- EXISTING SECTION LINE
- PROPOSED EASEMENT
- EXISTING EASEMENT
- PROPOSED CONTOURS
- EXISTING CONTOURS
- BASIN (AREA / 5YR / 100YR) — BASIN ID
- X — DESIGN POINT ID
- MAJOR BASIN BOUNDARY
- MINOR BASIN BOUNDARY

200 0 200 400

(IN FEET)
1 inch = 200 ft.

PROJECT NO.: 20003262
DATE: 9/15/2021

ATWELL
866.850.4200 www.atwell-group.com
143 UNION BOULEVARD, SUITE 700
LAKEWOOD, CO 80228
303.462.1100
CONTACT: JEFF FRENCH
JFRENCH@ATWELL-GROUP.COM

CAD FILE: 20003308-EX SUB-BASIN ANALYSIS.DWG

COUNTRYSIDE SOUTH

PRELIMINARY DRAINAGE MAP

PROPOSED CONDITIONS DRAINAGE BASIN SUMMARY

Basin	Design Point	Area (acres)	C_5	C_{100}	Basin Q_5 (cfs)	Basin Q_{100} (cfs)
A	A	13.94	0.53	0.68	26.87	57.87
B	POND 1	8.14	0.62	0.75	20.11	40.84
C	POND 1	12.21	0.66	0.78	31.83	63.07
D	POND 1	15.99	0.63	0.77	42.35	85.82
P.1	POND 1	4.40	0.22	0.53	11.70	18.14
E	POND 2	21.92	0.58	0.72	47.08	104.52
F	POND 2	5.97	0.89	1.31	12.90	26.83
G	POND 2	6.11	0.26	0.57	5.86	21.08
H	POND 2	19.45	0.51	0.68	36.72	82.83
I	POND 2	24.17	0.59	0.73	52.31	119.09
J	POND 2	12.25	0.63	0.77	32.65	66.11
P.2	POND 2	9.20	0.23	0.55	8.44	32.91
X	OFFSITE	4.41	0.22	0.53	3.22	13.05
Y	OFFSITE	9.94	0.23	0.49	8.54	29.97
OS	POND 2	224.87	0.16	0.36	74.48	278.82
ONSITE TOTAL		**168.1**			**340.6**	**762.1**
OFFSITE TOTAL		**224.9**			**74.5**	**278.8**

PROPOSED CONDITIONS DRAINAGE BASIN SUMMARY

Basin	Design Point	Area (acres)	C_5	C_{100}	Basin Q_5 (cfs)	Basin Q_{100} (cfs)
A	A	13.94	0.53	0.68	26.87	57.87
B.1	POND 1	4.40	0.60	0.74	10.52	21.52
B.2	POND 1	3.74	0.63	0.76	9.59	19.32
C.1	POND 1	0.76	0.67	0.78	2.43	4.79
C.2	POND 1	1.69	0.76	0.85	5.58	10.52
C.3	POND 1	2.31	0.66	0.78	5.73	11.35
C.4	POND 1	2.30	0.62	0.75	5.58	11.32
C.5	POND 1	3.22	0.64	0.76	7.80	15.65
C.6	POND 1	1.94	0.64	0.76	4.72	9.45
D.1	POND 1	1.25	0.64	0.79	3.36	6.99
D.2	POND 1	2.42	0.72	0.82	6.73	12.94
D.3	POND 1	2.38	0.63	0.75	6.17	12.46
D.4	POND 1	2.75	0.61	0.74	6.59	13.45
D.5	POND 1	1.27	0.48	0.68	2.37	5.67
D.6	POND 1	0.80	0.40	0.63	1.25	3.29
D.7	POND 1	1.48	0.64	0.76	3.92	7.87
D.8	POND 1	1.54	0.67	0.79	4.89	9.62
D.9	POND 1	2.10	0.73	0.83	7.06	13.53
P.1	POND 1	4.40	0.22	0.53	11.70	18.14
E.1	POND 2	4.85	0.63	0.77	10.89	23.89
E.2	POND 2	1.40	0.56	0.70	2.01	7.86
E.3	POND 2	3.78	0.48	0.67	6.53	15.50
E.4	POND 2	3.60	0.59	0.73	8.68	17.88
E.5	POND 2	2.85	0.60	0.73	6.87	14.14
E.6	POND 2	2.72	0.57	0.71	6.09	12.71
E.7	POND 2	2.72	0.58	0.71	6.02	12.55
F.1	POND 2	2.02	0.63	0.74	4.93	11.10
F.2	POND 2	3.95	0.63	0.74	7.98	15.73
G	POND 2	6.11	0.26	0.57	5.86	21.08
H.1	POND 2	3.75	0.37	0.62	5.25	14.78
H.2	POND 2	0.93	0.52	0.72	2.00	4.72
H.3	POND 2	5.73	0.47	0.64	9.37	21.92
H.4	POND 2	3.78	0.67	0.78	9.63	19.00
H.5	POND 2	2.20	0.61	0.75	5.16	10.69
H.6	POND 2	3.06	0.50	0.66	5.30	11.73
I.1	POND 2	1.72	0.39	0.64	2.58	7.25
I.2	POND 2	4.40	0.65	0.77	9.01	18.52
I.3	POND 2	4.64	0.60	0.73	10.28	21.13
I.4	POND 2	4.62	0.60	0.73	10.21	21.01
I.5	POND 2	3.20	0.48	0.67	5.58	20.29
I.6	POND 2	1.48	0.62	0.75	3.65	7.40
I.7	POND 2	2.54	0.62	0.74	6.43	13.07
I.8	POND 2	1.57	0.68	0.80	4.57	10.43
J.1	POND 2	1.35	0.46	0.67	2.32	5.62
J.2	POND 2	1.64	0.69	0.80	4.85	9.43
J.3	POND 2	1.63	0.69	0.80	5.01	9.76
J.4	POND 2	1.63	0.69	0.80	5.01	9.76
J.5	POND 2	1.63	0.69	0.80	5.01	9.76
J.6	POND 2	2.23	0.51	0.70	4.18	9.52
J.7	POND 2	2.16	0.69	0.80	6.29	12.28
P.2	POND 2	9.20	0.23	0.55	8.44	32.91
X.1	OFFSITE	2.55	0.23	0.54	1.84	7.10
X.2	OFFSITE	1.86	0.20	0.52	1.38	5.95
Y.1	OFFSITE	0.72	0.16	0.36	0.45	1.69
Y.2	OFFSITE	9.22	0.24	0.50	8.09	28.28
OS-1	OFFSITE	3.18	0.16	0.36	1.35	5.10
OS-2	OFFSITE	0.69	0.16	0.36	0.31	1.16
OS-3	OFFSITE	1.56	0.16	0.36	0.57	2.16
OS-4	OFFSITE	188.59	0.16	0.36	62.45	233.41
OS-5	OFFSITE	9.84	0.16	0.36	3.43	12.94
OS-6	OFFSITE	3.89	0.16	0.36	1.38	5.21
OS-7	OFFSITE	17.12	0.16	0.36	4.99	18.84
ONSITE TOTAL		**168.1**			**340.6**	**762.1**
OFFSITE TOTAL		**224.9**			**74.5**	**278.8**

LEGEND

- PROPERTY BOUNDARY
- EXISTING RIGHT-OF-WAY
- PROPOSED LOT LINE
- EXISTING LOT LINE
- EXISTING SECTION LINE
- PROPOSED EASEMENT
- EXISTING EASEMENT
- PROPOSED CONTOURS
- EXISTING CONTOURS
- BASIN / AREA / 5YR / 100YR — BASIN ID
- X — DESIGN POINT ID
- MAJOR BASIN BOUNDARY
- MINOR BASIN BOUNDARY

PROJECT NO.: 20003262
DATE: 9/15/2021

ATWELL
866.850.4200 www.atwell-group.com
143 UNION BOULEVARD, SUITE 700
LAKEWOOD, CO 80228
303.462.1100
CONTACT: JEFF FRENCH
JFRENCH@ATWELL-GROUP.COM

CAD FILE: 20003308-DRAINAGE MAP-DEVELOPED CONDITIONS.DWG