May 1, 2025

David Van Dellen, P.E., CFM
Sr. Plan Review Engineer
Castle Rock Water
100 N. Wilcox St.
Castle Rock, CO 80104

Re : Canyons South Phase I Drainage Amendment Letter

Mr. Van Dellen,
The purpose of this drainage letter is to amend the previously approved Canyons South Phase I Drainage Report to reflect the proposed amendments to the Preliminary Development Plan.

The amended planning area boundaries will reduce the development area by approximately 2.2 acres. Based on the new planning area boundaries, the planned detention areas will not be adversely affected by this change. Existing drainage patterns will be maintained with the revised planning area boundaries.

While final grading for the site is not yet complete, it is understood that the runoff generated by the improved areas of the site must be routed to full spectrum detention ponds. Concentrated surface flow will be routed to discharge points via swales, improved as necessary to prevent erosion.

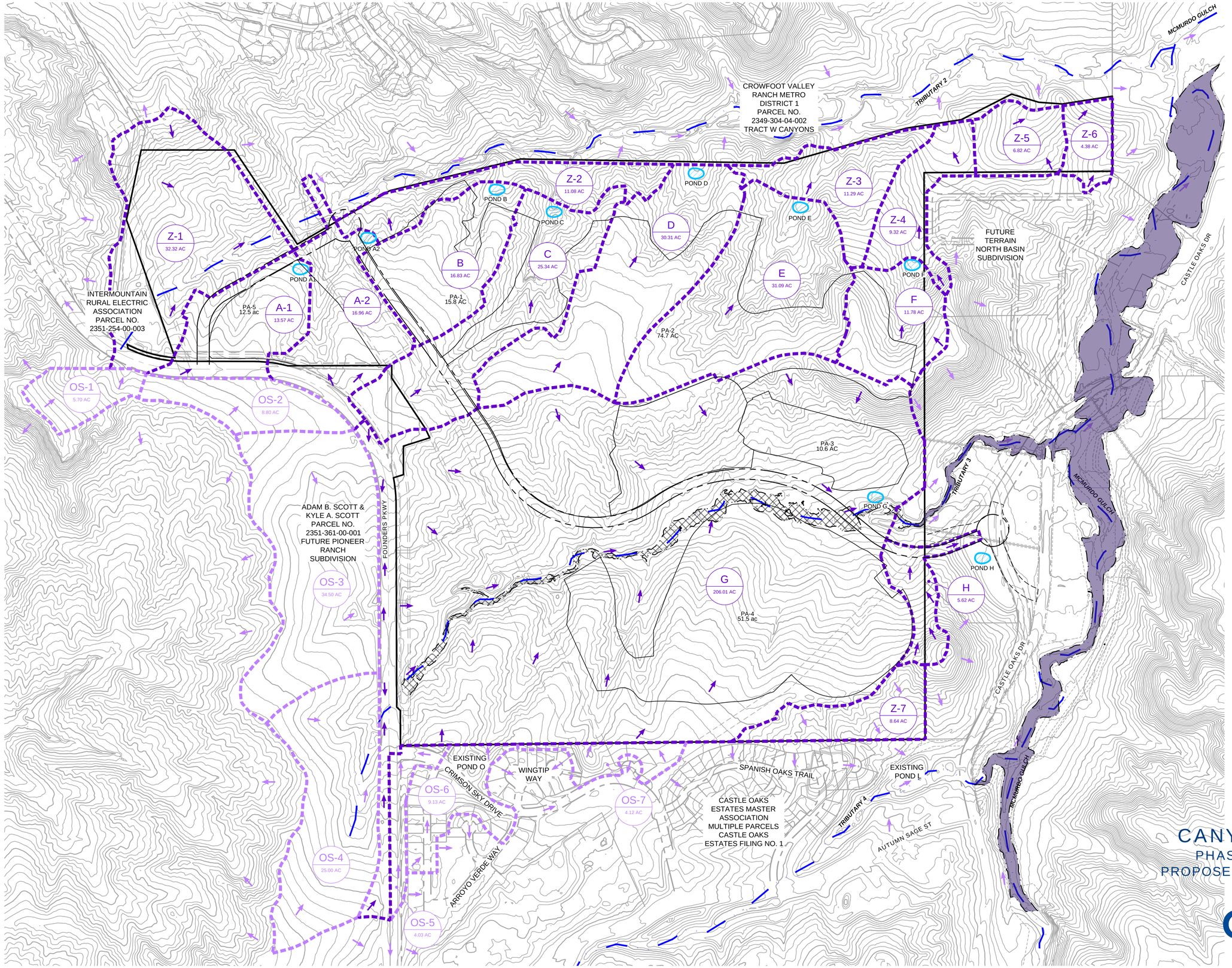
In conclusion, Cover 3 believes that the proposed amended planning area boundaries are well within the parameters assumed for the Phase I Drainage Report for Canyons South. No further detention or water quality ponds are required for this development.

If you have questions or need additional information, please feel free to call me at 303-587-6260.

Sincerely,

FOR AND ON BEHALF OF
COVER 3 ENGINEERING
Brian K. Moss, P.E.
State of Colorado No. 37702

CC: Richard Cross, Hines
Enclosures:
1. Revised Phase I Drainage Maps
2. Phase I Drainage Report – Canyons South, CORE Consultants, Inc., April 2022



LEGEND

- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPERTY BOUNDARY
- EXISTING EASEMENT
- PROPOSED BASIN LINE
- EXISTING BASIN LINE
- PROPOSED PLANNING AREA
- DRAINAGEWAY
- 100–YR FLOODPLAIN
- EX 100–YR FLOODPLAIN FEMA
- EX 100–YR FLOODPLAIN TOWN
- APPROXIMATE LOCATION OF PROPOSED DETENTION POND

PROPOSED	EXISTING
X / XX.XX	X / XX.XX

DIRECTIONAL FLOW ARROW

0 150 300 600

1 inch = 300 ft.

811 UNCC CALL BEFORE YOU DIG 811 OR 1-800-922-1987 Utility Notification Center of Colorado

CANYONS FAR SOUTH
PHASE I DRAINAGE REPORT
PROPOSED OVERALL DRAINAGE MAP

COVER engineering

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KEYMAP
1"=2000'

LEGEND

- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
- PROPERTY BOUNDARY
- EXISTING EASEMENT
- PROPOSED BASIN LINE
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- PROPOSED PLANNING AREA
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- 100–YR FLOODPLAIN
- EX 100–YR FLOODPLAIN FEMA
- EX 100–YR FLOODPLAIN TOWN
- APPROXIMATE LOCATION OF PROPOSED DETENTION POND

PROPOSED X / XX.XX — EXISTING X / XX.XX

DIRECTIONAL FLOW ARROW

Z-1
32.32 AC

POND A2

POND A1

INTERMOUNTAIN RURAL ELECTRIC ASSOCIATION PARCEL NO. 2351-254-00-003

PA-5
12.5 ac

A-1
13.57 AC

A-2
16.96 AC

PA-1
17.3 AC

B
16.83 AC

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1 inch = 300 ft.

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CROWFOOT VALLEY
RANCH METRO
DISTRICT 1
PARCEL NO.
2349-304-04-002
TRACT W CANYONS

POND B

POND C

POND D

POND E

Z-2
11.08 AC

Z-3
11.29 AC

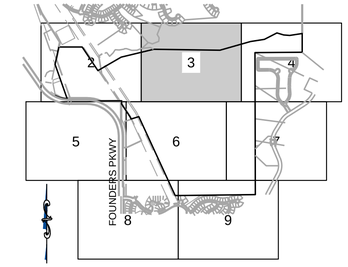
PA-1
17.3 AC

C
25.34 AC

D
30.31 AC

E
31.09 AC

PA-2
71.3 AC



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EXISTING BASIN LINE
PROPOSED PLANNING AREA
DRAINAGEWAY
100–YR FLOODPLAIN
EX 100–YR FLOODPLAIN FEMA
EX 100–YR FLOODPLAIN TOWN
APPROXIMATE LOCATION OF PROPOSED DETENTION POND

PROPOSED	EXISTING
X / XX.XX	X / XX.XX

DIRECTIONAL FLOW ARROW

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TRIBUTARY 2

Z-5
6.82 AC

Z-6
4.38 AC

Z-4
9.32 AC

F
11.78 AC

POND F

FUTURE
TERRAIN NORTH
BASIN SUBDIVISION

PA-2
71.3 AC

MCMURDO GULCH

CASTLE OAKS DR

FOUNDERS PKWY

KEYMAP
1"=2000'

LEGEND

- EXISTING MAJOR CONTOUR — 5250
- EXISTING MINOR CONTOUR
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- EX 100–YR FLOODPLAIN TOWN
- APPROXIMATE LOCATION OF PROPOSED DETENTION POND

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EXISTING: X / XX.XX

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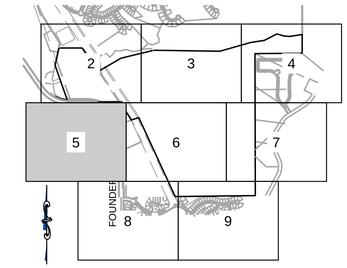
OS-1
5.70 AC

OS-2
8.80 AC

OS-3
34.50 AC

ADAM B. SCOTT &
KYLE A. SCOTT
PARCEL NO.
2351-361-00-001
FUTURE PIONEER
RANCH
SUBDIVISION

FOUNDERS PKWY



KEYMAP
1"=2000'

LEGEND

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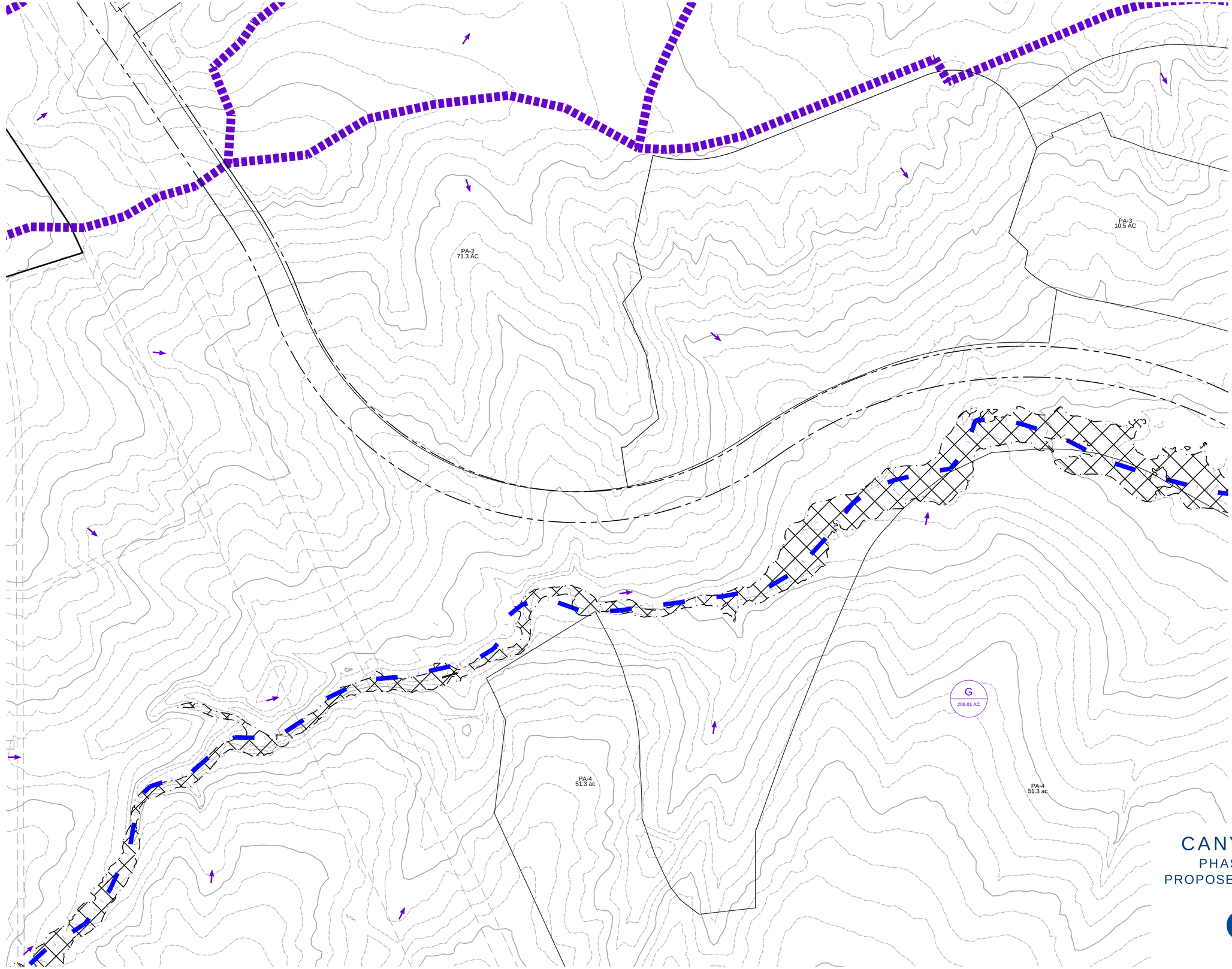
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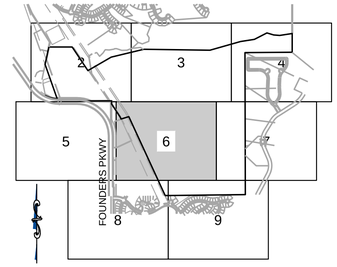
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EX 100–YR FLOODPLAIN TOWN
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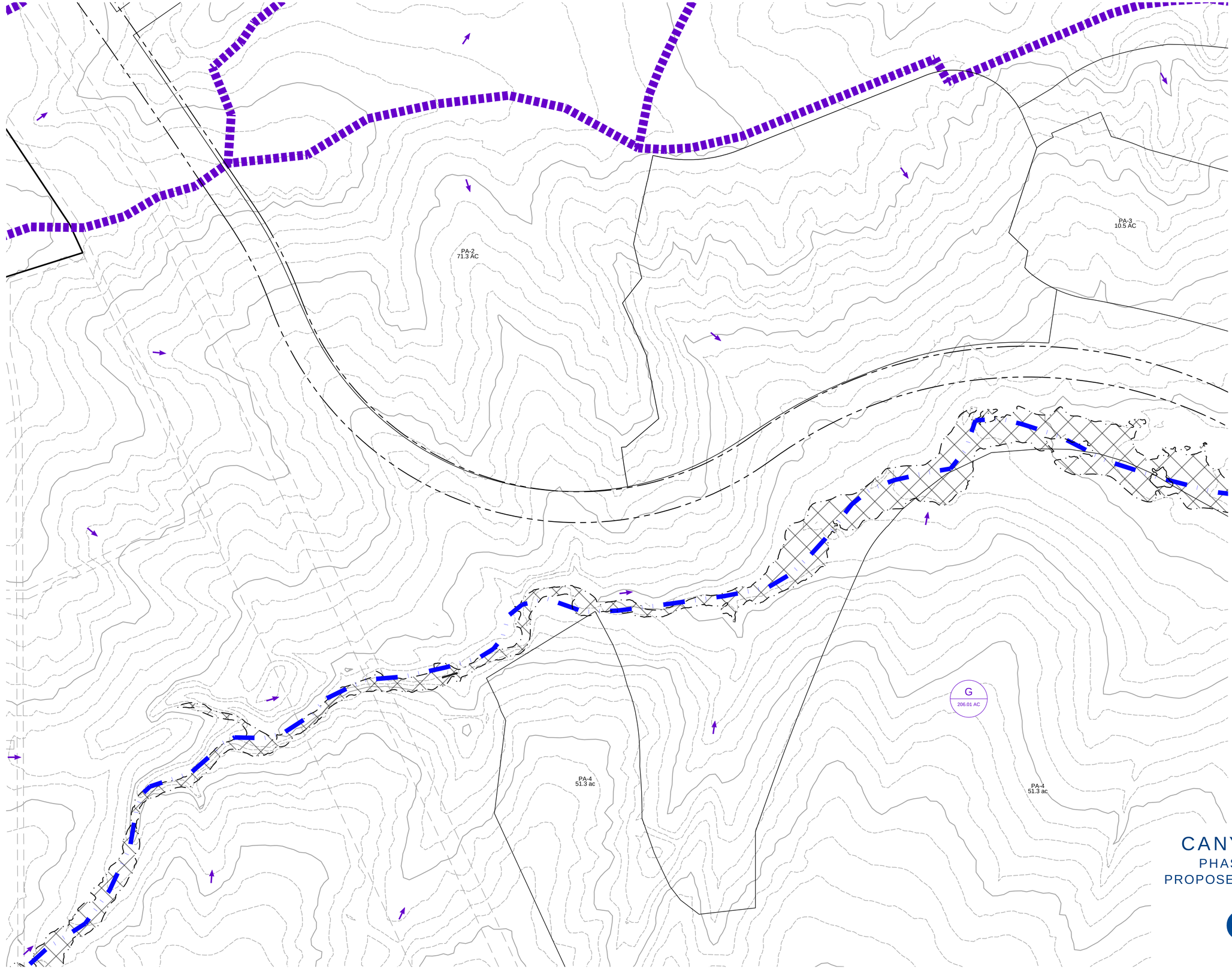
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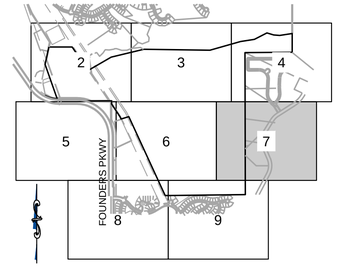
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- EX 100–YR FLOODPLAIN TOWN
- APPROXIMATE LOCATION OF PROPOSED DETENTION POND

PROPOSED	EXISTING
X / XX.XX	X / XX.XX

- DIRECTIONAL FLOW ARROW

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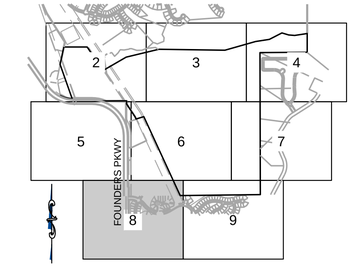
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KEYMAP
1"=2000'

EXISTING POND O

WINGTIP WAY

OS-6
9.13 AC

CRIMSON SKY DRIVE

FOUNDERS PKWY

OS-4
25.00 AC

OS-5
4.03 AC

ARROYO VERDE WAY

LEGEND

- EXISTING MAJOR CONTOUR — 5250
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PA-4
51.3 ac

Z-7
8.64 AC

OS-7
4.12 AC

SPANISH OAKS TRAIL

CASTLE OAKS
ESTATES MASTER
ASSOCIATION
MULTIPLE PARCELS
CASTLE OAKS
ESTATES FILING NO. 1

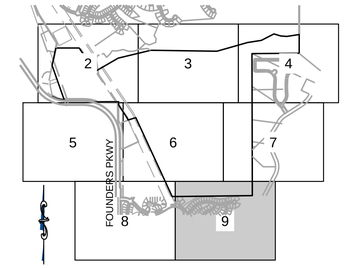
EXISTING
POND L

CASTLE OAKS DR

TRIBUTARY 4

AUTUMN SAGE ST

MCINROG GULCH



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LEGEND

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- PROPOSED: X / XX.XX
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PHASE I DRAINAGE REPORT

FOR

CANYONS SOUTH
TOWN OF CASTE ROCK, COLORADO
CASE NO. PDP21-0003

Prepared for:

LOWE Enterprises
5299 DTC Blvd, Suite 1260
Greenwood Village, CO 80111
Contact: Erik Clore
Phone: 303-850-2406

Prepared by:

CORE Consultants, Inc.
3473 South Broadway
Englewood, CO 80113
Contact: Kevin Rohrbough, PE
Phone: 303-703-4444
CORE Project Number: 20-245

August 2022

Table of Contents

I. GENERAL LOCATION AND DESCRIPTION 3
Site Location 3
Description of Property 3

II. DRAINAGE BASINS AND SUB-BASINS 4
Major Drainage Basins 4
Minor Drainage Basins 4

III. EXISTING STORMWATER CONVEYANCE OR STORAGE FACILITIES 7
Existing Stormwater Conveyance Facilities 7
Existing Stormwater Storage Facilities 8

IV. PROPOSED STORMWATER CONVEYANCE OR STORAGE FACILITIES 8
Proposed Stormwater Conveyance Facilities 8
Proposed Stormwater Storage Facilities 8

V. WATER QUALITY ENHANCEMENT CONTROL MEASURES 9

VI. FLOODPLAIN MODIFICATION 9

VII. POTENTIAL PERMITTING REQUIREMENTS 10

REFERENCES 11

APPENDIX A
Vicinity Map
Hydrologic Soil Group Map
Floodplain Maps
Tributary 3 – Floodplain Mapping Extension Memorandum
Hydraulic Model Map
Permanent Water Quality Worksheet
MS4 Compliance Summary Form

APPENDIX B
Reference Excerpts

APPENDIX C
Drainage Maps
Major Drainageway Delineation Exhibit

I. GENERAL LOCATION AND DESCRIPTION

This Phase I Drainage Report is prepared for Canyons South Planned Development, herein referred to as the "Site," and provides a preliminary analysis of the drainage patterns and detention pond locations associated with the development.

Site Location

The Site is described as portions of the North Half of Section 31, the south half of Section 30, and the Southeast Quarter of Section 25, Township 7 South, Range 67 West of The Sixth Principal Meridian, Town of Castle Rock, County of Douglas, State of Colorado. The Site is bounded by Founders Parkway to the west, Crowfoot Valley Ranch to the north, Terrain North Basin to the east, and Castle Oaks estates Filing No. 1 to the south. A Vicinity Map is included in Appendix A.

Description of Property

The 409 ± acre Site is comprised of undeveloped rolling hills and valleys historically used for livestock grazing. Naturally occurring slopes range from 2 to 50 percent with elevations ranging from 6254 to 6554 feet MSL. Existing vegetation cover is approximately 75 percent native grasses and 25 percent scrub oak (based on available topographic information).

A ridgeline runs west to east centrally through the Site, dividing Tributaries 2 and 3 of McMurdo Gulch. The McMurdo Gulch tributaries are defined by the *2016 McMurdo Gulch Reach Assessment* report prepared by Muller for the Town of Castle Rock. A second ridgeline runs northwest, generally south of the Site that divides Tributaries 3 and 4. Tributary 4 runs west to east and is located south of the Site. The portion of the Site north of the central ridgeline drains northeast, through a series of small valleys, off-site into Tributary 2 of McMurdo Gulch. Tributary 2 runs west to east along the north property boundary. The portion of the Site south of the central ridgeline drains generally east through a series of small valleys into Tributary 3 of McMurdo Gulch. Tributary 3 runs west to east through the Site and lies between the two ridgelines. The tributaries converge with McMurdo Gulch that runs south to north, approximately 1,000 feet east of the Site. McMurdo Gulch drains to Cherry Creek and ultimately to the South Platte River.

Soils contained on-site include Fondis clay loam (FoD), Fondis-Kurch association (Fu), Peyton-Pring-Crowfoot sandy loams (PpE). These soils are classified as hydrologic soil group Type C, having slow infiltration rates with high surface runoff. A small portion of Hilly gravelly land (Hg) exists on-site. This soil type is classified as hydrologic soil group Type D, having a very slow infiltration rates and a very slow rate of water transmission. A Hydrologic Soil Group Map is included in Appendix A.

A small portion of the 100-year floodplain associated with McMurdo Gulch Tributary 3 lies within the Site as delineated by FEMA Flood Insurance Rate Maps (FIRM) No. 08035C0187G and No. 08035C0189G. No work is proposed within the effective floodplain, however, FIRM Maps are included in Appendix A.

As requested by the Town of Castle Rock (Town), CORE Consultants (CORE) has conducted a supplementary hydraulic analysis to extend the effective 100-year floodplain upstream along Tributary 3 to the crossing at Founders Parkway. By extending the floodplain delineation upstream of the current effective extents, the Town can holistically manage the hydraulic impacts of the proposed development as the design progresses. Additional detail regarding this

study can be found in the Floodplain Modification of this report. Additionally, a summary memorandum is included in Appendix A.

There are no irrigation canals or geologic features located on-site; however, numerous agricultural ponds and a few historic grade control structures exist within the valleys and drainageways.

The Panned Development proposes single-family homes, multi-family homes, commercial space, parks, open space, and associated roadway and utility infrastructure.

II. DRAINAGE BASINS AND SUB-BASINS

Major Drainage Basins

The Site lies within the McMurdo Gulch Major Drainage Basin, between Tributary 2 and Tributary 4. Virtually all flows from the Site are conveyed to McMurdo Gulch through Tributaries 2, 3, and 4. McMurdo Gulch is a tributary of Cherry Creek, which ultimately drains into the South Platte River. Portions of the Site drain to all three tributaries and McMurdo Gulch. An Existing Overall Drainage Map is included in Appendix C.

The existing Major Drainage Basins patterns associated with the Site are described below:

Tributary 2 (231.60 acres)
The portion of the Site north of the central ridgeline drains northeast, through a series of small valleys, off-site into Tributary 2 of McMurdo Gulch. Tributary 2 runs west to east along the north property boundary and converges with McMurdo Gulch to the east.

Tributary 3 (288.05 acres)
The portion of the Site south of the central ridgeline drains generally east through a series of small valleys into Tributary 3 of McMurdo Gulch. Tributary 3 runs west to east through the Site and converges with McMurdo Gulch to the east. A portion of Tributary 3 is designated as a major drainageway, defined as having 130 acres or more of tributary area. A Major Drainageway Delineation Map is provided in Appendix C. A small portion of the FEMA 100-year floodplain associated with McMurdo Gulch Tributary 3 lies within the Site; however, no work is proposed within the FEMA floodplain. Floodplain Maps are included in Appendix A.

Tributary 4 (10.00 acres)
The portion of the Site south of the southern ridgeline drains southeast, through the adjacent Castle Oaks Estates Filing No. 1 development, into off-site Existing Pond L. The pond is online with Tributary 4, which converges with McMurdo Gulch to the east.

McMurdo Gulch (4.38 acres)
A portion of the Site located at the northeast corner drains directly into McMurdo Gulch that runs south to north, approximately 1,000 feet east of the Site. McMurdo Gulch drains to Cherry Creek and ultimately to the South Platte River.

Minor Drainage Basins

The proposed drainage basins delineated within this report generally reflect the historical drainage patterns described above, with minor rerouting for roadway and development boundaries. Off-site flows will most likely need to be captured and conveyed through the

proposed drainage improvements; however, attempts to route them around will be made where feasible.

The existing major basins discussed above have been divided into minor basins, or sub-basins, and are described below:

Basin A1 (13.57 acres)
Consists of commercial space, associated roadway infrastructure, and open space. Undeveloped and developed flows will be captured by proposed stormwater conveyance infrastructure and routed to the northeast to proposed Pond A1. Pond A will outfall into Tributary 2 at or below historic rates. Stormwater facility design to be provided in the future Phase III Drainage Report.

Basin A2 (16.96 acres)
Consists of commercial space, associated roadway infrastructure, and open space. Undeveloped and developed flows will be captured by proposed stormwater conveyance infrastructure and routed to the north and south to proposed Pond A2. Pond A will outfall into Tributary 2 at or below historic rates. Stormwater facility design to be provided in the future Phase III Drainage Report.

Basin B (16.83 acres)
Consists of residential lots, associated roadway infrastructure, and open space. Undeveloped and developed flows will be captured by proposed stormwater conveyance infrastructure and routed to the northeast to proposed Pond B. Pond B will outfall into Tributary 2 at or below historic rates. Stormwater facility design to be provided in the future Phase III Drainage Report.

Basin C (25.34 acres)
Consists of residential lots, associated roadway infrastructure, and open space. Undeveloped and developed flows will be captured by proposed stormwater conveyance infrastructure and routed to the northeast to proposed Pond C. Pond C will outfall into Tributary 2 at or below historic rates. Stormwater facility design to be provided in the future Phase III Drainage Report.

Basin D (30.31 acres)
Consists of residential lots, associated roadway infrastructure, and open space. Undeveloped and developed flows will be captured by proposed stormwater conveyance infrastructure and routed to the northeast to proposed Pond D. Pond D will outfall into Tributary 2 at or below historic rates. Stormwater facility design to be provided in the future Phase III Drainage Report.

Basin E (31.09 acres)
Consists of residential lots, associated roadway infrastructure, and open space. Undeveloped and developed flows will be captured by proposed stormwater conveyance infrastructure and routed to the northeast to proposed Pond E. Pond E will outfall into Tributary 2 at or below historic rates. Stormwater facility design to be provided in the future Phase III Drainage Report.

Basin F (11.78 acres)
Consists of residential lots, associated roadway infrastructure, and open space. Undeveloped and developed flows will be captured by proposed stormwater conveyance infrastructure and routed to the northeast to proposed Pond F. Pond F will outfall into Tributary 2 at or below historic rates. Stormwater facility design to be provided in the future Phase III Drainage Report.

Basin G (206.01acres)

Consists of residential lots, associated roadway infrastructure, and open space. Undeveloped and developed flows will be captured by proposed stormwater conveyance infrastructure and routed to the east to proposed Pond G. Pond G is located online with Tributary 3 and will outfall into the downstream reach of the tributary at or below historic rates. Stormwater facility design to be provided in the future Phase III Drainage Report.

Basin H (5.62 acres)
Consists of roadway section and open space. A portion of the proposed roadway lies outside of the property boundary and will connect to the future alignment of Castle Oaks Drive (currently in the design phase). Since the topography slopes away from the site, the storage facility for this portion of the road cannot be located within the property boundary. Undeveloped and developed flows may be captured by storm sewer within the future Castle Oaks Drive and routed to a storage facility associated with the adjacent development or captured by storm sewer within the proposed roadway and routed to Pond H, which is preliminarily located on Town of Castle Rock Open Space for purposes of this report. At the time of Phase III design, coordination will be required with the Town's Parks Department and the adjacent developer to determine how these flows will be detained and treated. Stormwater facility design to be provided in the future Phase III Drainage Report.

Basin Z-1 (32.32 acres)
Consists of open space. Undeveloped flows will surface flow east to a proposed culvert crossing on Tributary 2 and off-site. Stormwater facility design to be provided in the future Phase III Drainage Report.

Basin Z-2 (11.089 acres)
Consists of open space. Undeveloped flows will surface flow north, off-site, to Tributary 2.

Basin Z-3 (11.29 acres)
Consists of open space. A minor portion of this basin is off-site within the future Terrain North Basin development. Undeveloped flows will surface flow north, off-site, to Tributary 2.

Basin Z-4 (9.32 acres)
Consists of open space. A minor portion of this basin is off-site within the future Terrain North Basin development. Undeveloped flows will surface flow north, off-site, to Tributary 2.

Basin Z-5 (6.82 acres)
Consists of open space. Undeveloped flows will surface flow north, off-site, to Tributary 2.

Basin Z-6 (4.38 acres)
Consists of open space. Undeveloped flows will surface flow northeast, off-site, to McMurdo Gulch.

Basin Z-7 (8.64 acres)
Consists of open space. Undeveloped flows will surface flow southeast, off-site, through the adjacent Castle Oaks Estates Filing No. 1 development, into off-site Existing Pond L. The pond is online with Tributary 4, which converges with McMurdo Gulch to the east.

Basin OS-1 (5.70 acres)
An off-site tributary basin defined in the Pioneer Ranch Phase I Drainage Report as Basin D. Runoff from the residential development will be detained in Pond D proposed with the future

Pioneer Ranch Development, which will discharge to a culvert crossing Founders Parkway and enter the Site from the west into Basin Z1-1.

Basin OS-2 (8.80 acres)
An off-site tributary basin defined in the Pioneer Ranch Phase I Drainage Report as Basin C. Runoff from the residential development will be detained in Pond C proposed with the future Pioneer Ranch Development, which will discharge to a culvert crossing Founders Parkway and enter the Site from the west into Basin A.

Basin OS-3 (34.50 acres)
An off-site tributary basin defined in the Pioneer Ranch Phase I Drainage Report as Basin B. Runoff from the residential development will be detained in Pond B proposed with the future Pioneer Ranch Development, which will discharge to a culvert crossing Founders Parkway and enter the Site from the west into Basin G.

Basin OS-4 (25.00 acres)
An off-site tributary basin defined in the Pioneer Ranch Phase I Drainage Report as Basins A and OS-1. Runoff from the mixed-use development will be detained in Pond A proposed with the future Pioneer Ranch Development, which will discharge to a culvert crossing Founders Parkway and enter the Site from the west into Basin G.

Basin OS-5 (4.03 acres)
An off-site tributary basin defined in the Castle Oaks Estates Filing No. 1 Phase III Drainage Report as Basins O-1 and O-2. Runoff from the residential development and Founders Parkway will enter the Site from the south through a culvert crossing Crimson Sky Drive into Basin G.

Basin OS-6 (9.13 acres)
An off-site tributary basin defined in the Castle Oaks Estates Filing No. 1 Phase III Drainage Report as Basins O-3 through O-7. Runoff from the residential development will be detained in existing Pond O proposed with the existing Castle Oaks Estates Filing No. 1 Development, which discharges onto the Site from the south into Basin G.

Basin OS-7 (4.12 acres)
An off-site tributary basin defined in the Castle Oaks Estates Filing No. 1 Phase III Drainage Report as Basins O-8 through O-9. Runoff from the residential development will surface flow onto the Site from the south into Basin G.

III. EXISTING STORMWATER CONVEYANCE OR STORAGE FACILITIES

Existing Stormwater Conveyance Facilities

McMurdo Gulch and Tributaries 2, 3, and 4 are the four (4) Major Drainageways that collect stormwater from the Site. The tributaries convey flows under Founders Parkway from the west via various culverts, through the Site, to McMurdo Gulch. Flows are then naturally routed to Cherry Creek, and ultimately drain to the South Platte River. Proposed on-site drainage facilities are anticipated to utilize the Tributary 2 and Tributary 3 Major Drainageways as outfalls.

Existing Stormwater Storage Facilities

There are no irrigation canals located on-site; however, numerous agricultural ponds and a few historic grade control structures exist within the valleys and drainageways. If these facilities are within the areas of proposed development, they will be removed; otherwise, they will be left undisturbed. There are no existing detention ponds on-site. A portion of the site contains rock outcroppings that will be preserved within open space and utilized as an amenity of the development.

IV. PROPOSED STORMWATER CONVEYANCE OR STORAGE FACILITIES

Proposed Stormwater Conveyance Facilities

The Site will generally follow the historic drainage patterns with some minor rerouting due to site grading within the Planning Areas of the proposed development. Runoff from the upstream off-site tributary areas will be routed through the Site to generally maintain the historical drainage patterns. No drainage conveyance problems are anticipated with this project, as developed flows will generally be conveyed to proposed storm sewer infrastructure and detention ponds that ultimately release to the existing Major Drainageways.

The drainage conveyance facilities will be designed to the Town of Castle Rock's current standards and the guidelines set forth by the Mile High Flood District and will include access for maintenance as required by the Town. It is anticipated that Major Drainageways will be maintained by the Town of Castle Rock.

Proposed Stormwater Storage Facilities

Proposed EDBs may be utilized, generally located on the Proposed Detailed Drainage Maps included in Appendix C. Effort will be made to limit the number of these storage facilities. The pond locations shown within this report are conceptual in nature and are subject to change as the Site develops. Both local and regional ponds will be utilized where applicable and feasible. The Site will generally utilize Extended Detention Basins (EDB) for water quality and storage. The EDBs and their outlet structures will be designed to provide full-spectrum detention that includes Water Quality Capture Volume (WQCV), Excess Urban Runoff Volume (EURV), and the 100-year storm event plus an additional one half of the WQCV (discussed herein as the 100-year volume for clarity) that will release at the 90% or less requirements. The stormwater runoff generated by the development may be captured on-site and utilized as reuse water. In the potential water reuse system, the stormwater runoff rate will be reduced as required, and the volume of storm water runoff will be maintained at historical rates as required by state water rights laws.

Detention pond volumes for each basin will be calculated using the Mile High Flood District spreadsheet for full-spectrum detention. A maintenance access road, per Town of Castle Rock design criteria, shall be provided for access to each outlet structure. The final design for all aspects of the detention ponds must conform to Town of Castle Rock requirements. The final configurations and locations of the proposed ponds is subject to change and will be detailed in future Phase III Drainage Reports.

It is anticipated that the Metro District and/or the Homeowners Association (HOA) will operate and maintain all stormwater storage facilities.

V. WATER QUALITY ENHANCEMENT CONTROL MEASURES

Water quality measures will be included in the design of the proposed full-spectrum EDBs. These facilities are designed to provide treatment for the WQCV and EURV while providing storage for the 100-year storm event. The Site will utilize Low Impact Development (LID) concepts, where applicable, to reduce the volume of runoff from the various developed parcels such as: minimize site grading, minimize impacts to existing vegetation, grass buffers, and grass swales. LID design measures will help minimize the adverse effects of increased runoff volume, due to the addition of impervious area, to downstream stormwater facilities and drainageways. Steps will be taken to mitigate the impacts of proposed development by providing water quality control and enhancement measures as required by the Town of Castle Rock.

It is anticipated that the Town will maintain the Major Drainageways and the Metro District and/or the Homeowners Association (HOA) will operate and maintain the water quality control and enhancement measures.

VI. FLOODPLAIN MODIFICATION

Major Drainageway – Undesignated Floodplain

McMurdo Gulch Tributary 3 runs west to east through the Site and is considered an undesignated floodplain. Preliminary floodplain mapping has been extended upstream from the FEMA effective floodplain. The extension of the floodplain upstream was completed via a one-dimensional steady-state HEC-RAS version 6.2.0 model, which was utilized to calculate the existing condition water surface elevation (WSEL) profile along the tributary. To ensure that the extended floodplain successfully ties to the FEMA effective floodplain, the effective 100-year peak flow rate was adopted as the steady-state flow rate along the entire length of Tributary 3 considered for this study and the effective upstream-most WSEL was adopted as the downstream boundary condition as a known WSEL. All cross-section geometries, as well as the extension of the Tributary 3 streamline, were extracted from the 2020 DRCOG LiDAR, which is the latest available topographic data for the reach. The resulting WSEL profile from this study was then mapped to the DRCOG LiDAR, and is presented in the Hydraulic Map included with the floodplain memorandum, which can be found in Appendix A.

This preliminary mapping will be utilized by the design team and the Town to inform the Canyons South development as the design progresses. Efforts will be made to stabilize, protect, and preserve the natural drainageways that traverse the site. Impacts will be limited to improvements in the areas of discharges from the proposed detention facilities or adjacent to development. The improvements will conform to the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual (SDDTC). These improvements will be designed to mitigate erosion and preserve the natural character and historical drainage patterns to the greatest extent feasible.

As much of the floodplain as possible will be preserved as open space. Developable areas have been placed outside the 100-year floodplain. Two roadway crossings are anticipated to access PA4 and are identified on the Planned Development Plan (PDP). Multiple trail crossings are also

anticipated, also conceptual shown on the PDP. These crossing will be designed in accordance with the SDDTC. Other than for road and trail crossing no piping of the floodplain within the major drainageways will be allowed.

Any crossings or encroachments to Tributary 3 will be evaluated by a Floodplain Modification Study (FMS). A preliminary FMS will accompany the Site Development Plan submittal and a final FMS will accompany any construction documents submittals.

Major Drainageway – Designated Floodplain

No modifications are proposed within the Special Flood Hazard Area (SFHA) within the Site as delineated by FEMA Flood Insurance Rate Maps (FIRM) No. 08035C0187G and No. 08035C0189G, revised March 16, 2016, included in Appendix A. The SFHA area will be preserved as open space.

VII. POTENTIAL PERMITTING REQUIREMENTS

Other than permitting through the Town of Castle Rock it is anticipated that there is no other potential permitting required for the developments located within the Site.

REFERENCES

TOCR (Town of Castle Rock). June 2019. *Storm Drainage Design and Technical Criteria Manual*.

MHFD (Mile High Flood District). Revised August 2018. *Urban Storm Drainage Criteria Manual. Volume 1*.

MHFD (Mile High Flood District). Revised September 2017. *Urban Storm Drainage Criteria Manual. Volume II*.

MHFD (Mile High Flood District). Revised October 2019. *Urban Storm Drainage Criteria Manual. Volume III*.

NRCS Soil Survey Staff. (Natural Resources Conservation Service). United States Department of Agriculture. Web Soil Survey. Available online at the following link: https://websoilsurvey.sc.egov.usda.gov/. Accessed June 30, 2021.

FEMA (Federal Emergency Management Agency). Flood Insurance Rate Maps (FIRM) No. 08035C0187G and 08035C0189G. Available online at the following link: https://msc.fema.gov/portal/home. Accessed June 30, 2021.

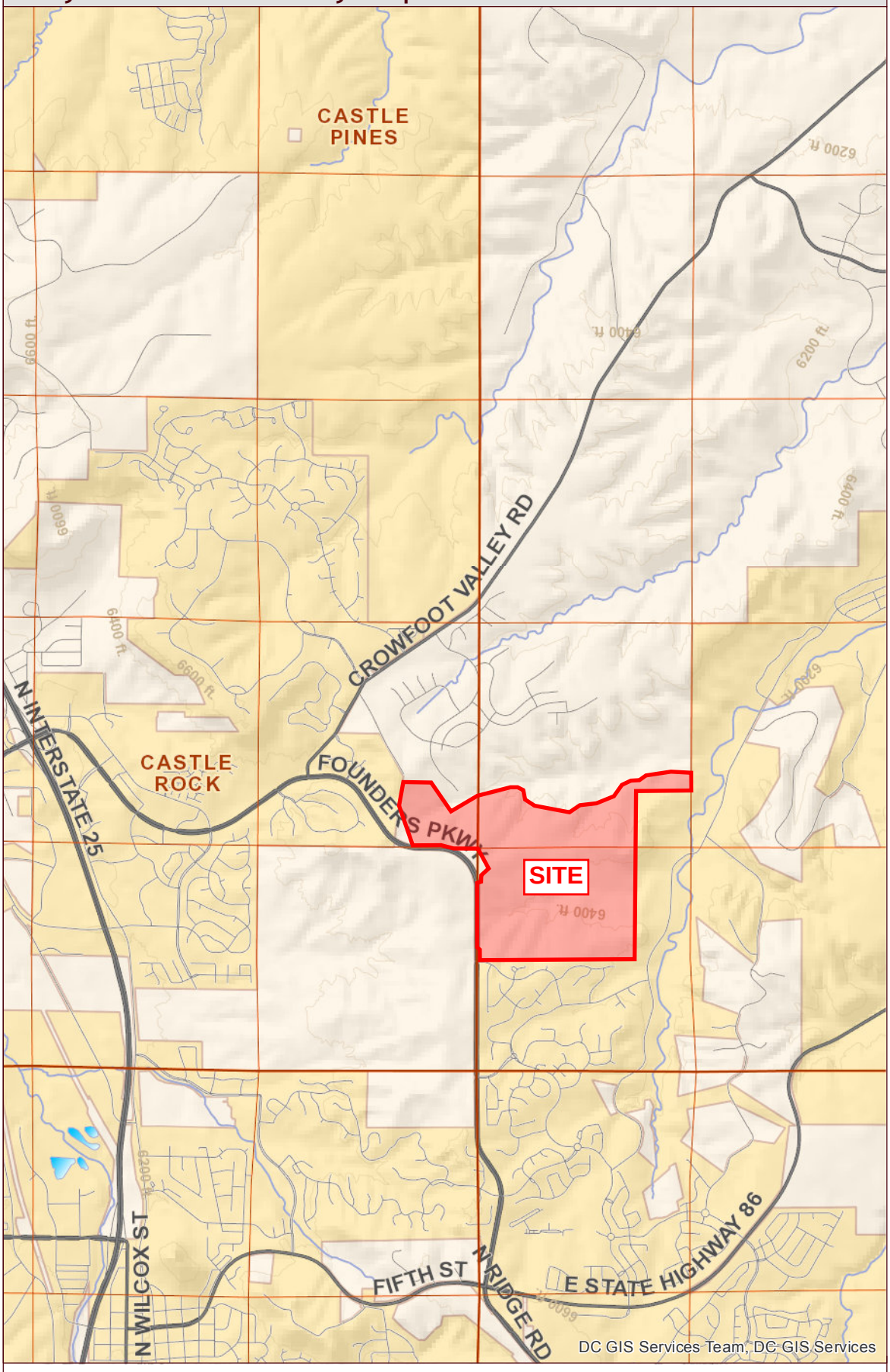
Muller. January 31, 2017. *2016 McMurdo Gulch Reach Assessment*.

Nolte (Nolte Associates, Inc.). September 25, 2003. *Castle Oaks Filing No. 1 Phase III Drainage Report*.

Atwell. October 2015. *Phase I Drainage Report for Pioneer Ranch.*

Appendix A
Map Attachments

Canyons South Vicinity Map



Real Property

- Parcel

Public Land Survey System

- Township
- Section

General Features

- School
- Private Road
- Railroad

0 0.45 0.9

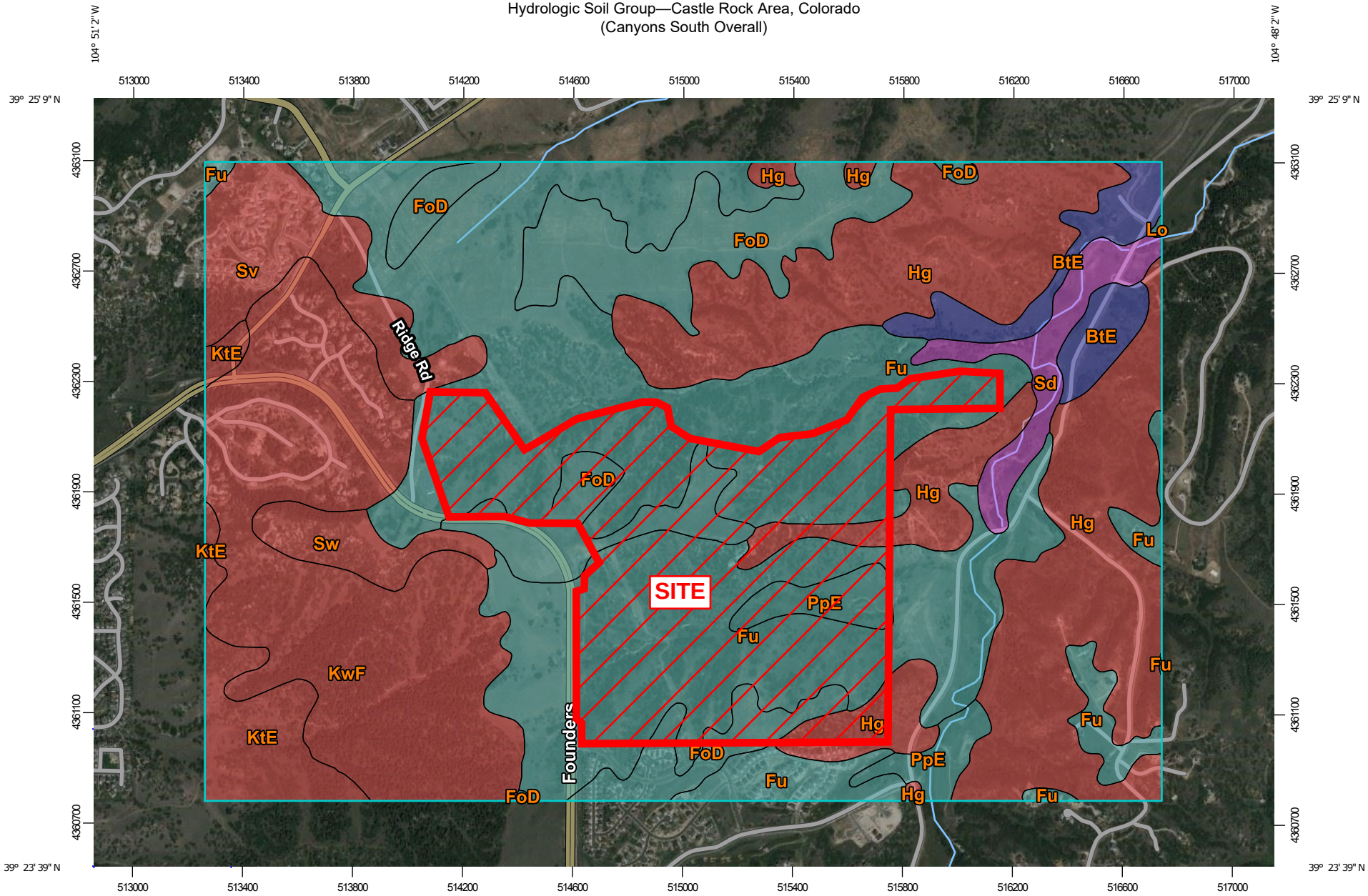
Miles

DISCLAIMER:

All data and information ("Products") contained herein are for informational purposes only. Although such Products are believed to be accurate at the time of printing, Douglas County does not warrant that such Products are error free. Douglas County provides these Products on an "as is" basis without warranties of any kind, either express or implied, including, but not limited to, warranties of title or implied warranties of merchantability or fitness for a particular purpose. Douglas County shall not be liable for any direct, indirect, incidental, special or consequential damages arising out of the use of such Products, or the inability to use such Products or out of any breach of any warranty. The user acknowledges and agrees that the use of such Products is at the sole risk of the user. General questions about this or any other Douglas County GIS products, including errors, omissions, corrections and/or updates should be directed to the Douglas County GIS Division at (303) 660-7416.

Douglas County GIS Division
Philip S. Miller Bldg., 100 Third St.
Castle Rock, Colorado 80104

Hydrologic Soil Group—Castle Rock Area, Colorado
(Canyons South Overall)



Map Scale: 1:19,600 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 250 500 1000 1500

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 1:20,000.

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: Castle Rock Area, Colorado
Survey Area Data: Version 13, 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: Jul 24, 2018—Nov 19, 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
BtE	Bresser-Truckton sandy loams, 5 to 25 percent slopes	B	54.0	2.7%
FoD	Fondis clay loam, 3 to 9 percent slopes	C	194.2	9.7%
Fu	Fondis-Kutch association	C	749.7	37.5%
Hg	Hilly gravelly land	D	438.5	21.9%
KtE	Kutch sandy loam, 5 to 20 percent slopes	D	60.0	3.0%
KwF	Kutch-Newlin-Stapleton complex, 8 to 40 percent slopes	D	306.6	15.3%
Lo	Loamy alluvial land	C	0.5	0.0%
PpE	Peyton-Pring-Crowfoot sandy loams, 5 to 25 percent slopes	C	37.8	1.9%
Sd	Sandy alluvial land	A	43.5	2.2%
Sv	Stony steep land	D	81.3	4.1%
Sw	Stony steep land, cold	D	32.8	1.6%
Totals for Area of Interest			**1,999.2**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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 shown on 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 Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

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 Floodway Data table shown on this FIRM.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM 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. 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, Maryland 20910-3282
(301) 713-3242

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 by the Douglas County GIS Department and the Town of Castle Rock GIS Department. Additional input was provided by the City of Lone Tree and Town of Parker. These data are current as of 2010.

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 **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

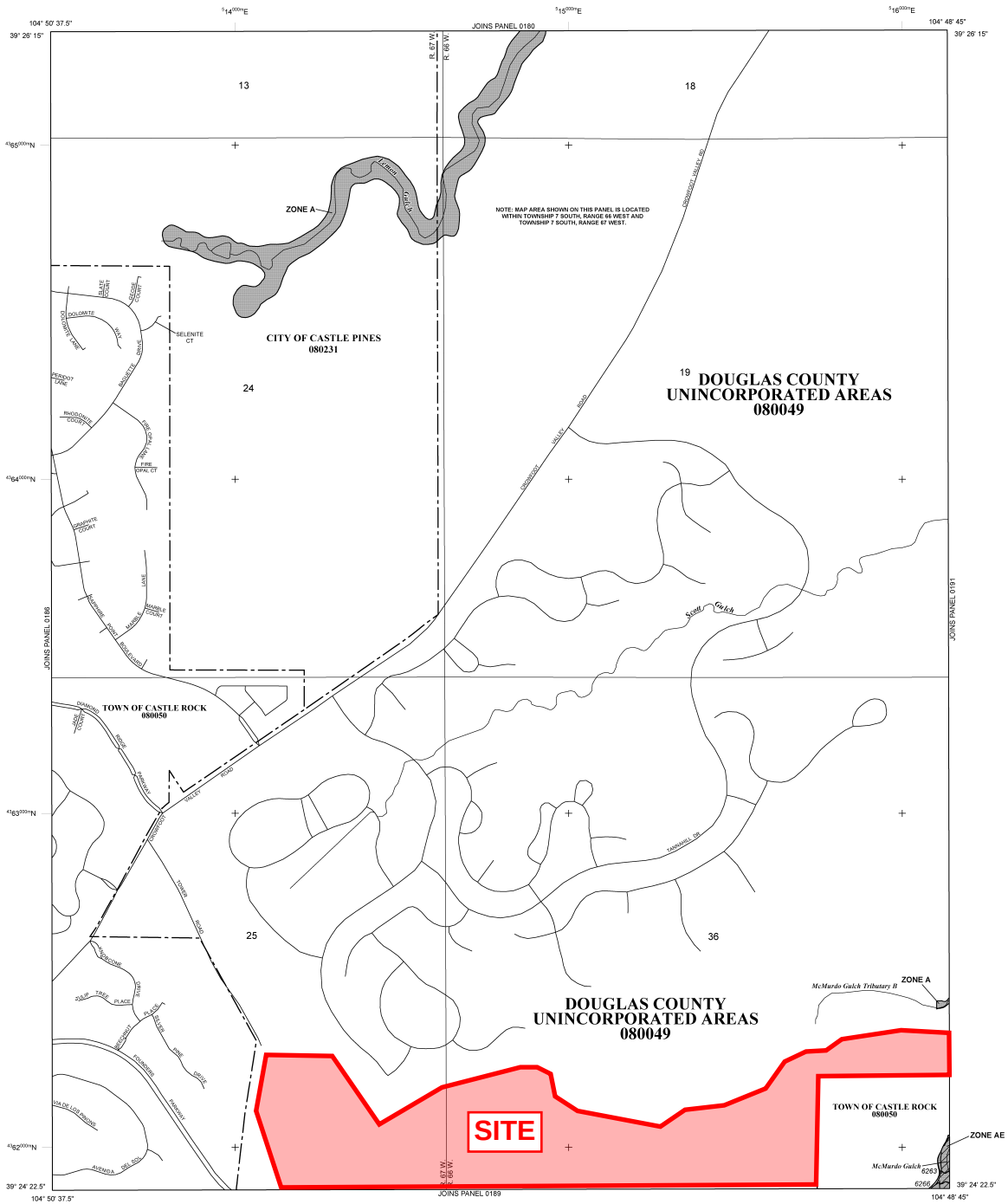
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

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.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

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



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 Areas 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.

1% Annual Chance Floodplain Boundary

0.2% Annual Chance Floodplain Boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and 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

A — A — Cross section line

23 — 23 — Transect line

45° 02' 08", 93° 02' 12" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere

4989000 N — 1000-meter Universal Transverse Mercator grid values, zone 13

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

SEPTEMBER 30, 2005

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

MARCH 16, 2016: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to update map format, to add roads and road names, to reflect updated topographic information, 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 0187G

FIRM

FLOOD INSURANCE RATE MAP

DOUGLAS COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 187 OF 495

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CASTLE ROCK, TOWN OF	080050	0187	G
DOUGLAS COUNTY	080049	0187	G
CASTLE PINES, CITY OF	080231	0187	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
08035C0187G
MAP REVISED
MARCH 16, 2016

Federal Emergency Management Agency

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The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

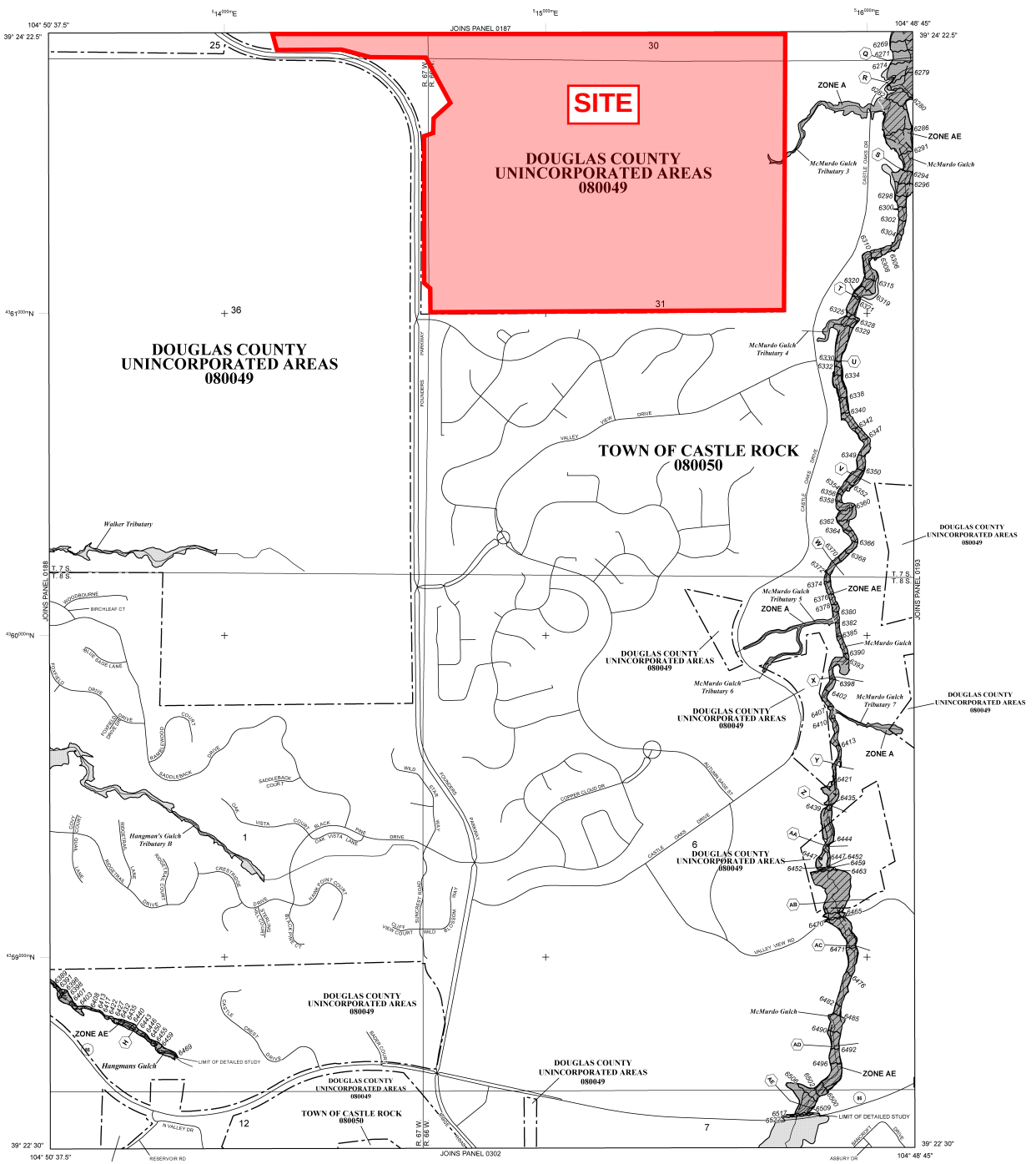
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

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.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at http://msc.fema.gov. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

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



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 Areas 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.

	1% Annual Chance Floodplain Boundary
	0.2% Annual Chance Floodplain Boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
513 (EL 987)	Base Flood Elevation line and value; elevation in feet* / Base Flood Elevation value where uniform within zone; elevation in feet*

*Referenced to the North American Vertical Datum of 1988

A A	Cross section line
23 23	Transect line
45° 02' 08", 93° 02' 12"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
4989000 N	1000-meter Universal Transverse Mercator grid values, zone 13
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

SEPTEMBER 30, 2005

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

MARCH 16, 2016: to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to update map format, to add roads and road names, to reflect updated topographic information, 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

PANEL 0189G

FIRM

FLOOD INSURANCE RATE MAP

DOUGLAS COUNTY, COLORADO AND INCORPORATED AREAS

PANEL 189 OF 495

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CASTLE ROCK, TOWN OF	080050	0189	G
DOUGLAS COUNTY	080049	0189	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
08035C0189G
MAP REVISED
MARCH 16, 2016

Federal Emergency Management Agency

NATIONAL FLOOD INSURANCE PROGRAM

To: David Van Dellen

From: Caitlin Soley, P.E., CFM

cc: Erik Clare (LOWE Enterprises)

Date: March 22, 2022

Re: McMurdo Gulch Tributary 3 – Floodplain Mapping Extension

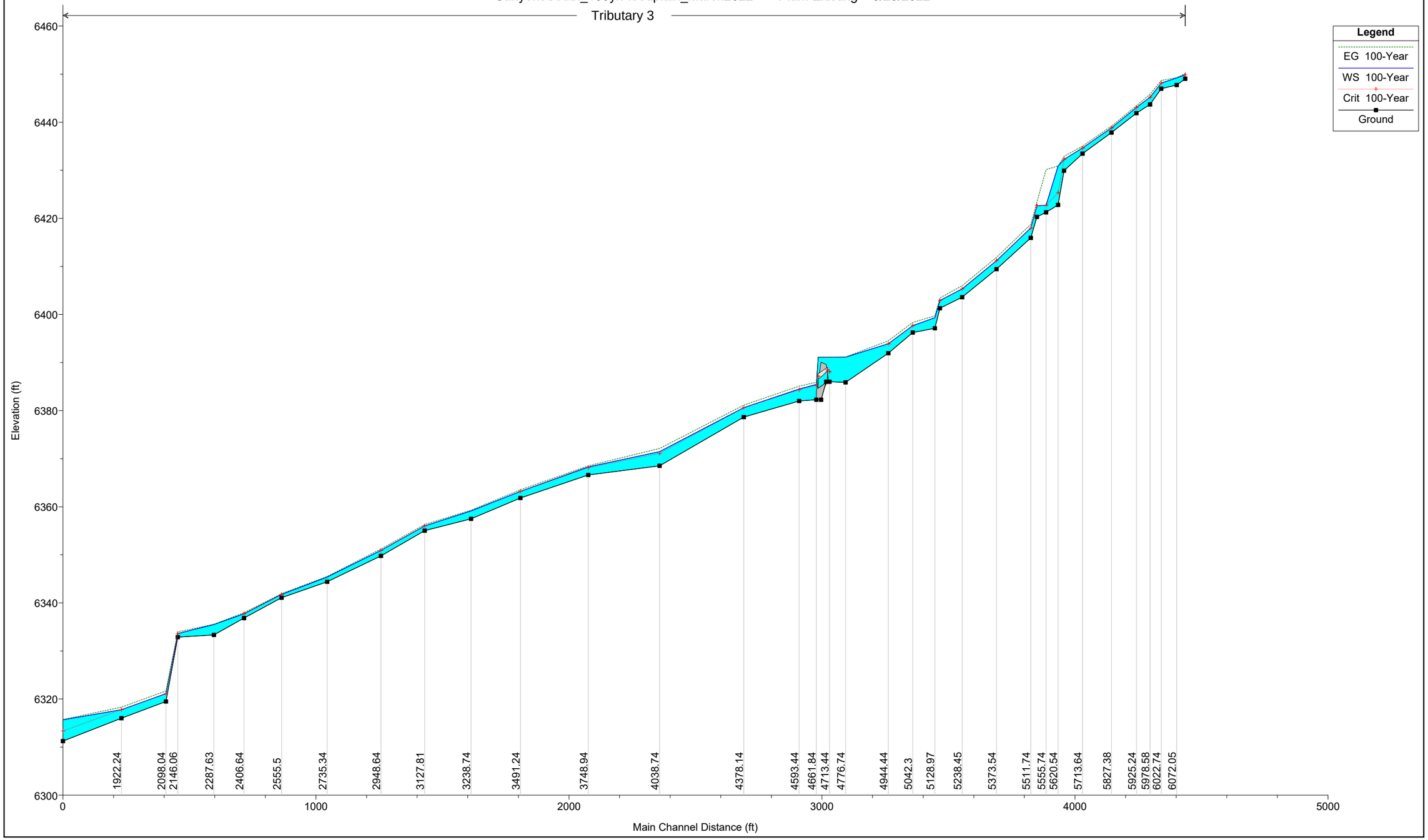
As a part of the Canyons South Phase I Drainage Report, the Town of Castle Rock has (Town) requested that CORE Consultants, Inc. (CORE) extend the effective 100-year floodplain delineation along Tributary 3 of McMurdo Gulch upstream to the crossing at Founders Parkway. By extending the mapping further upstream along the reach, the Town can effectively manage the Tributary 3 floodplain holistically as the proposed design progresses.

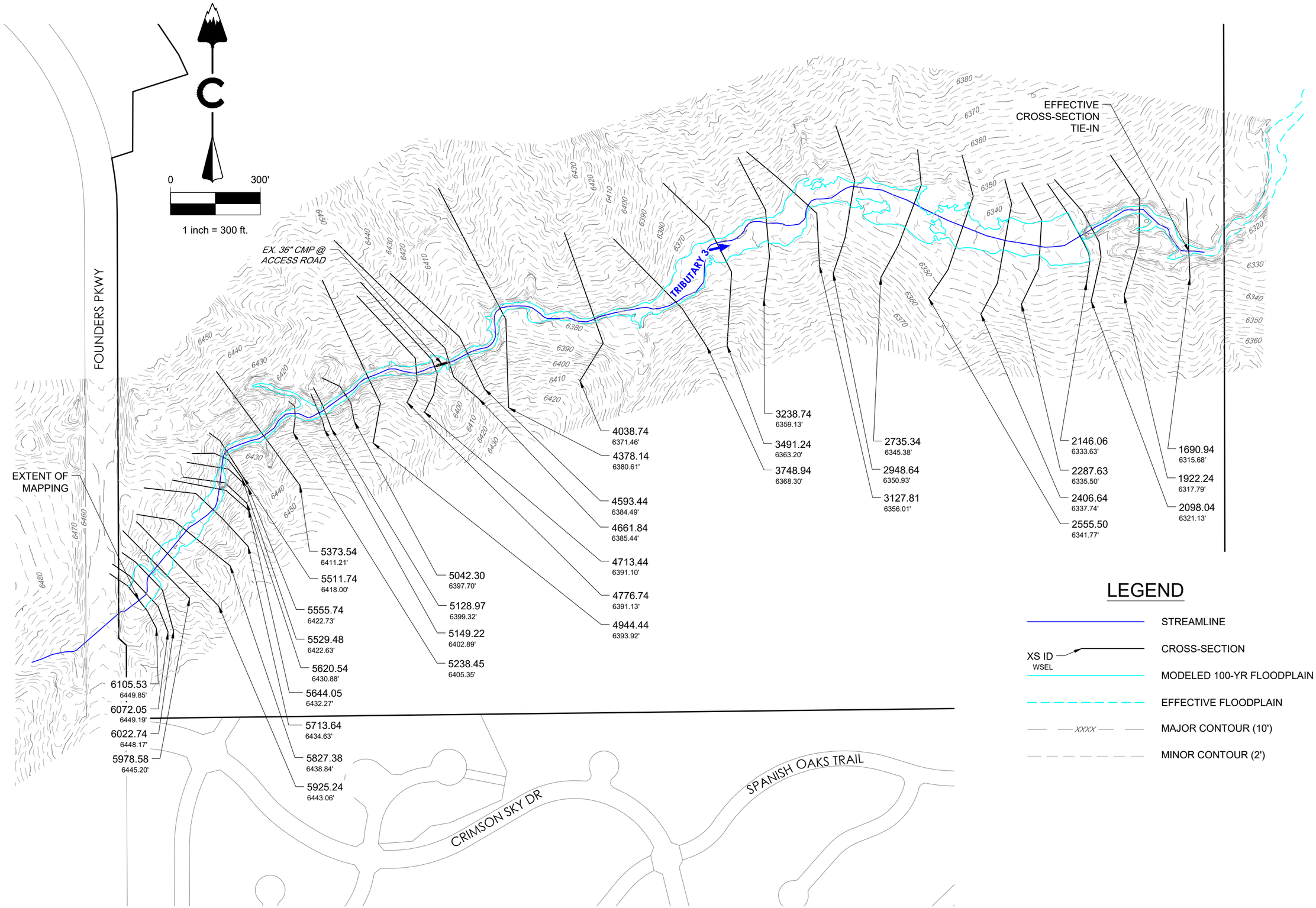
A one-dimensional (1-D) steady-state hydraulic model was developed utilizing HEC-RAS version 6.2.0, which was released by the United States Army Corps of Engineers in March of 2022, to calculate the existing condition water surface elevation profile along the unmapped portion of Tributary 3. For the purpose of this mapping effort, the effective flow rate of 187.67 cfs was adopted for the entire length of the reach to ensure a reasonably conservative floodplain delineation. Similarly, to ensure continuity with the effective hydraulic model, the downstream boundary condition was set to the 100-year effective water surface elevation (WSEL) at cross-section 1690.94, which was determined to be 6315.63 feet. All cross-section geometries, as well as the Tributary 3 streamline, were extracted from the 2020 DRCOG LiDAR, which is the latest available topography for the reach and is shown as 2-foot contours on the Hydraulic Model Map included with this memorandum. Only one culvert, a 36-inch corrugated metal pipe for a local access crossing, is present within the study extents and is therefore incorporated into the model.

A Hydraulic Model Map, which details the model cross-section layout and computed floodplain extents, and the HEC-RAS WSEL profile plot are included with this memorandum as computational support for this mapping extension. These preliminary deliverables will be utilized by CORE and the Town to inform the Canyons South development as the design progresses.

CanyonsSouth_100yrFloodplain_March2022 Plan: Existing 3/23/2022

Tributary 3





LEGEND

- STREAMLINE
- XS ID / WSEL — CROSS-SECTION
- MODELED 100-YR FLOODPLAIN
- EFFECTIVE FLOODPLAIN
- XXXX — MAJOR CONTOUR (10')
- MINOR CONTOUR (2')

LAND DEVELOPMENT | ENERGY | PUBLIC INFRASTUCTURE

CORE CONSULTANTS. INC.
3473 S. BROADWAY
ENGLEWOOD, CO 80113
303.703.4444
LIVEYOURCORE.COM

HYDRAULIC MODEL MAP

CANYONS SOUTH

DATE: 3/23/2022
CREATED: CGV
JOB NO. 20-245
SHEET 1

2022-03-23 (1:41 PM) Caroline Van Horn X:\20-245 Canyons South\Civil\CAD\Exhibits\Preliminary\2022-03-23 - Floodplain Map\Floodplain Map.dwg

Permanent Water Quality Determination Worksheet (Taken from 2019 SDDTCM Sections 13.1.4 and 13.1.5)

Project:	Canyons South Planned Development	**Project#**	PDP21-0003	**Applicant:**	LOWE Enterprises
Section	**Questions**	**Response**	**Check those that apply**		**Instructions**
1	**Non-applicable Sites**				
1.1	Will the project result in a temporary disturbance of greater than one acre?	No	☐		Proceed to section 1.2.
		Yes	☑		Proceed to section 2.
1.2	Is the project part of a larger common plan of development or sale where multiple separate and distinct construction activities may be taking place at different times on different schedules, but remain related and are within 1/4 mile of each other? (A common plan of development will generally be documented on a site development plan, master plan, or equivalent, for the property/project)	No	☐		Proceed to section 1.3.
		Yes	☐		Proceed to section 2.
1.3	Is the project within the Cherry Creek Watershed?	Yes	☐		Permanent water quality control measures may be required. Refer to Water Qualtiy Control Regulation 72.7 for details and allowable exclusions.
		No	☐		Permanent water quality control measures are not required.
2	**Applicable Site Types and Exclusions by Variance**				
2.1	Does the project have more than 35% impervious area on the existing site?	No	☑		Project is an applicable Development Site. Proceed to section 3.
		Yes	☐		Proceed to 2.2.
2.2	Does the project have greater than 75% impervious area on the existing site?	No	☐		Project is an applicable Redevelopment Site. Proceed to section 3.
		Yes	☐		Project is an applicable Constrainted Redevelopment Site. Proceed to 2.3.
2.3	Will 100% of the runoff from the existing and proposed site be captured and treated using one or more of the allowable design standards for permanent water quality?	Yes	☐		No further action required.
		No	☐		Proceed to 2.4.
2.4	Do any other water quality exclusions apply to the site?	No	☐		Portions of the project are excluded. Proceed with design in accordance with Constrained Redevelopment standards and apply for **variance** for Constrained Redevelopment Sites.
		Yes	☐		Proceed to section 3. Following approval of other exclusions, design remaining site in accordance with Constrained Redevelopment standards and apply for **variance** for Constrained Redevelopment Sites.
3	**Applicable Sites with Other Exclusions by Variance**				
3.1	**Category 1: Roadways, bridges and trails only**				
3.1.1	Is the project a bike or pedestrian trail?	Yes	☐		Proceed to next line.
		No	☐		Proceed to 3.1.2.
	Is the trail for a roadway?	Yes	☐		Proceed to 3.1.2.
		No	☐		Project is excluded. Submit **variance** for Trails Excluded from Permanent Water Quality Requirements.
3.1.2	Is the project primarily used for parking or access to parking?	Yes	☐		This exclusion does not apply. Permanent water quality is required.
		No	☐		Proceed to 3.1.3.
3.1.3	Does the project add impervious area?	No	☐		Project is excluded. Submit **variance** for Pavement Management Sites Excluded from Permanent Water Quality Requirements.
		Yes	☐		Proceed to 3.1.4.

Section	Questions	Response	Check those that apply	Instructions
3.1.4	Does the project add more than 8.25 feet of paved width at any location to the existing roadway?	No	☐	Project is excluded. Submit **variance** for Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements.
		Yes	☐	Proceed to next line.
	Does the project add more than one acre of paved area per mile to an existing roadway?	No	☐	Project is excluded. Submit **variance** for Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements.
		Yes	☐	Proceed to next line.
	Does the project increase the width by two times or more, on average, of the original roadway area?	No	☐	Existing areas of site are excluded only. Submit **variance** for Existing Roadway Surfaces Only Excluded from Permanent Water Quality Requirements.
		Yes	☐	This exclusion does not apply. Permanent water quality is required.
3.2	**Category 2: Non-residential and non-commercial projects only**			
3.2.1	Is the project associated with oil and gas exploration, production, processing, or treatment operations or transmission facilities, including activities necessary to prepare a site for drilling and the movement and placement of drilling equipment?	Yes	☐	Project is excluded. Submit **variance** for Oil and Gas Exploration Sites Excluded from Permanent Water Quality Requirements.
		No	☐	Proceed to 3.2.2.
3.2.2	Is the project for stream stabilization?	Yes	☐	Project is excluded. Submit **variance** for Stream Stabilization Sites Excluded from Permanent Water Quality Requirements.
		No	☐	Proceed to 3.2.3.
3.2.3	Is the project for installation or maintenance of aboveground or underground utilities or infrastructure that does not permanently alter the terrain, ground cover, or drainage patterns from those present prior to the construction activity including activities to install, replace or maintain utilities under roadways or other paved areas that return the surface to the same condition?	Yes	☐	Project is excluded. Submit **variance** for Aboveground and Underground Utilities Excluded from Permanent Water Quality Requirements.
		No	☐	Proceed to 3.2.4.
3.2.4	Is the project on undeveloped land (land with no human-made structures such as buildings or pavement) that will remain undeveloped after the project?	Yes	☐	Project is excluded. Submit **variance** for Sites with Land Disturbances to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements.
		No	☐	Proceed to 3.2.5.
3.2.5	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No	☐	Project is excluded. Submit **study** along with **variance** for Non-residential and Non-commercial Infiltration Conditions Excluded from Permanent Water Quality Requirements.
		Yes	☐	This exclusion does not apply. Permanent water quality is required.
3.3	**Category 3: Residential, Agricultural and Commercial projects**			
3.3.1	Is the project a single-family residential lot, or agricultural zoned lands, greater than or equal to 2.5 acres in size per dwelling unit?	Yes	☐	Proceed to next line.
		No	☑	Proceed to 3.3.2.
	Is the project site greater than 10% impervious?	No	☐	Project is excluded. Submit **variance** for Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements.
		Yes	☑	Proceed to next line.
	Is the project site greater than 20% impervious?	Yes	☑	This exclusion does not apply. Permanent water quality is required.
		No	☐	Proceed to next line.
	Will the post-project condition result in surface water discharge during the 80th percentile storm runoff event?	No	☐	Project is excluded. Submit **study** along with **variance** for Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements.
		Yes	☐	This exclusion does not apply. Permanent water quality is required.

Section	Questions	Response	Check those that apply	Instructions
3.3.2	Will 100% of the runoff from the residential or commercial site be captured?	Yes	□	This exclusion does not apply. Permanent water quality is required.
		No	□	Proceed to next line.
	Is all or a portion of the site undeveloped or will it remain undeveloped after construction?	Yes	□	This portion of the project is excluded. Submit **variance** for Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements. Proceed to next line.
		No	□	Proceed to next line.
	Is the remaining untreated impervious area greater than 20% of the site?	Yes	□	This exclusion does not apply. Permanent water quality is required.
		No	□	Proceed to next line.
	Is the remaining untreated impervious area greater than one acre?	Yes	□	This exclusion does not apply. Permanent water quality is required.
		No	□	Proceed to next line.
	Is it practicable to capture runoff from portions of the site that will not drain to a control measure?	No	□	Document justification demonstrating that it is not practicable to capture runoff from this portion of the site in the **drainage report**. No further action is needed.
		Yes	□	This exclusion does not apply. Permanent water quality is required.

Summary of Water Quality Conformance to MS4 Permit

The purpose of this worksheet is to document conformance with the Town of Castle Rock's MS4 permit with regard to permanent water quality on land disturbance projects.

Project Name Canyons South Planned Development

Project Owner LOWE Enterprises

Project Location Between Founders Pkwy & Castle Oaks Dr north of Castle Oaks Estates

ToCR Project Number PDP21-0003

Total Site Area 409 **acres**

Total Size of Common Plan of Development 409 **acres**

Check all that apply:

- ☐ **Project within Plum Creek Basin**
- ☑ **Project within Cherry Creek Basin**

Estimated construction completion date 1/1/2025 (multiple filings anticipated)

---

1. The water quality control measure(s) for applicable development sites shall meet one of the following base design standards as per the SDDTCM Section 14.4. Please select all design standards that were applied to meet conformance with the MS4 on this site.

   - ☑ WQCV standard
   - ❒ Pollutant removal standard
   - ❒ Runoff reduction standard
   - ❒ Applicable site draining to regional WQVC control measure (accepts drainage prior to discharging to WOTS)
   - ❒ Applicable site draining to regional WQVC control facility (with receiving pervious area control measure upstream of WOTS)
   - ❒ Constrained redevelopment sites standard
     - Imperviousness of existing site _____/_____(Imp. Ac/Site Ac) =____%
     - Variance required TCV No. _____
   - ❒ Existing control measure with WQCV per previous criteria standards
     - Reference Construction Permit No. _____
   - ❒ Cherry Creek Basin only, choose one: ☐ Tier 1 ☐ Tier 2 ☐ Tier 3
   - ❒ No control measures provided (See Permanent WQ Worksheet for applicability)

Summary of Water Quality Conformance to MS4 Permit

2. Was an exclusion to water quality applied as per SDDTCM Section 13.1.5? ☐ Yes ☐ No

   i. If yes, please select all that apply, provide total excluded impervious area(s) and submit variance, as applicable: TCV No. _____

   ❒ Pavement management site

   Excluded impervious area: _____ acres

   ❒ Excluded roadway redevelopment

   Excluded impervious area: _____ acres

   ❒ Excluded existing roadway areas

   Excluded impervious area: _____ acres

   ❒ Above ground and below ground utilities

   ❒ Large lot single family home

   ❒ Non-residential and non-commercial infiltration

   Excluded impervious area: _____ acres

   ❒ Land disturbance for land to remain undeveloped

   Excluded impervious area: _____ acres

   ❒ Stream Stabilization Sites

   Excluded impervious area: _____ acres

   ❒ Trails

   Excluded impervious area: _____ acres

   ❒ Oil and Gas Exploration

3. For Development and Redevelopment sites, following any exclusions claimed above, was any portion of the site excluded up to 20% of the site and not to exceed one acre? ☐ Yes ☐ No

   If yes, complete the following:

   Excluded area: _____ acres

   Total Site area: _____ acres, _____ % site excluded

4. For Constrained sites, was any portion of the site excluded up to 50% of the site and not to exceed 50% of the impervious area? ☐ Yes ☐ No

   If yes, complete the following:

   Excluded area: _____ acres

   Excluded impervious area: _____ acres

   Total Site area: _____ acres, _____ % site excluded

   Total Impervious area: _____ acres, _____ % impervious excluded

Appendix B
Reference Excerpts

CASTLE OAKS ESTATES FILING NO. 1
PHASE III DRAINAGE REPORT

For

Castle Oaks Estates, LLC

2 North Cascade Ave.
Colorado Springs, CO 80903

By

Nolte Associates, Inc.
7000 S. Yosemite Street, Suite 200
Englewood, Colorado 80112
(303) 220-1001

September 25, 2003

RECEIVED
OCT 30 2003
TOWN OF CASTLE ROCK
DEVELOPMENT SERVICES

drainage basin is smaller in size than its historic counterpart. Therefore, developed runoff is less than historic and no improvements are required with the development of Filing No. 1. Table 3 compares the historical and developed flows for this basin.

Table 3, Basin N Comparison

BASIN DESIGNATION	AREA	PERCENT IMPERVIOUS	TIME OF CONCENTRATION	RUNOFF COEFFICIENT	CUHP SUB-BASIN OUTPUT	
					5-YEAR FLOW	100-YEAR FLOW
	(ACRES)	(%)	(MIN)		(CFS)	(CFS)
380	35.1	2	26	0.16	19	84
470	32.2	6	27	0.19	18	77

Major Basin O

Basin O is made up of single-family sites and open space on 21 acres. The minor basins within Major Basin O are described as follows:

Basin O-1

This basin is made up of roadway and open space on 3.5 acres. The storm flows produced by Basin O-1 will follow historic drainage patterns to the north and travel via roadside ditch northward until reaching the intersection of Founders Parkway with Crimson Sky Drive. At this location a culvert will allow runoff to continue north and pass under Crimson Sky Drive.

Basin O-2

This basin is made up of roadway and open space on 0.6 acres. The storm flows in Basin O-2 will be conveyed to the low point at the west end of the basin via curb and gutter. At this point an inlet will be provided to pass the flows into the roadside ditch draining north along Founders Parkway.

Basin O-3

Basin O-3 is 2.5 acres in size and is composed of single-family homes and open space. Runoff created by this basin travels by way of curb and gutter to the low end of Basin O-3. This is just to the south of the intersection of Arroyo Verde Court with Crimson Sky Drive, on the west side of Arroyo Verde Court. An on-grade inlet, designed for the minor storm event, is located here. This inlet will intercept the entire runoff generated by the 5-year storm event. A portion of the storm flow generated by the 100-year event may carryover into Basin O-1. All runoff collected by this inlet will then be piped to Basin O-7.

Basin O-4

Basin O-4 is comprised of open space and roadway on 1.8 acres. An on-grade inlet is located at the low end of this basin to collect storm runoff traveling within the curb and gutter. This inlet has been designed for the minor storm event and is near the northwestern corner of the basin along the west side of Arroyo Verde Court, south of the intersection with Crimson Sky Drive. It will collect all storm flows produced by the minor storm event whereas a portion of the runoff generated by the major storm event may carryover into Basin O-5. Runoff captured by this inlet travels within the storm sewer system to an outfall point within Basin O-7.

Basin O-5

Basin O-5 is 2.4 acres and is made up of single family homes, street and open space. Runoff in this basin travels overland north to Crimson Sky Drive where it is collected in the curb and gutter. Street flows then travel west to the sump inlet at the low point of the basin. This storm system discharges in to basin O-7 where it will be detained.

Basin O-6

Basin O-6 is 0.7 acres in size is made up of street and open space. Runoff produced by this basin travels within the curb and gutter and is intercepted by an inlet located along the north side of Crimson Sky Drive, opposite the inlet within Basin O-5. This inlet has been designed for the major storm event and is in a sump condition. It will intercept all flows generated by both the 5-year storm event and the 100-year storm event. As with the previous basin, collected runoff will outfall to the north to Basin O-7.

Basin O-7

1.8 acres of open space and single-family homes are contained within Basin O-6. Storm flow from this basin is combined with that from Basins O-3, O-4, O-5 and O-6. This basin contains detention pond 301 which is being designed by Water & Waste Engineering. See Appendix A.

Basin O-8

This basin is comprised of predominantly open space but includes some areas of single-family homes on 2.5 acres. Runoff generated by this basin follows historic drainage patterns and flows to the north and off-site below historic levels.

Basin O-9

Basin O-9 contains 1.7 acres of single family homes and open space. Runoff generated by this basin follows historic drainage patterns and flows to the north and off-site below historic levels due to the decrease in size compared to existing.

Castle Oaks Estates Filing No. 1

Phase III Drainage Report

Rational Method Calculations

DV138300
6/3/2003
KLD

Castle Oaks
Runoff Calculations
Time of Concentration

REFERENCE DOUGLAS CNTY. SG-2 OR UDFCD FIGURE 6-1

Watercourse Coefficient

Forest & Meadow	0.40	Short Grass Pasture & Lawns	0.85	Grassed Waterway 1.18
Fallow or Cultivation	0.65	Nearly Bare Ground	1.00	Paved Area & Shallow Gutter 1.30

	SUB-BASIN DATA			INITIAL / OVERLAND TIME			TRAVEL TIME T(t)					T(c) CHECK (URBANIZED BASINS)			FINAL T(c)
DESIGN POINT	DRAIN BASIN	AREA ac.	C(5)	Length ft.	Slope %	T(i) min	Length ft.	Slope %	Coeff.	Velocity fps	T(t) min.	COMP. T(c)	TOTAL LENGTH	L/180+10	min.
99	O-1	3.47	0.57	50	6.0	3.7	967	3.8	1.18	3.0	5.4	9.1	1017	15.7	9.1
100	O-2	0.56	0.41	50	6.0	4.8	340	4.0	1.30	4.0	1.4	6.2	390	12.2	6.2
101	O-3	2.47	0.36	100	0.4	18.1	744	5.7	1.30	4.8	2.6	20.7	844	14.7	14.7
102	O-4	1.84	0.36	50	0.9	9.8	727	5.7	1.30	4.8	2.5	12.3	777	14.3	12.3
103	O-5	2.37	0.34	100	0.4	18.6	702	4.7	1.30	4.3	2.7	21.3	802	14.5	14.5
104	O-6	0.68	0.49	19	2.0	3.8	442	5.0	1.30	4.5	1.6	5.4	461	12.6	5.4
105	O-7	1.77	0.19	50	6.0	6.4	377	5.4	1.18	3.5	1.8	8.2	427	12.4	8.2
106	O-8	2.46	0.26	50	6.0	5.9	277	5.3	1.18	3.5	1.3	7.2	327	11.8	7.2
107	O-9	1.66	0.24	50	3.0	7.6	329	4.3	1.18	3.1	1.8	9.4	379	12.1	9.4

Castle Oaks Estates Filing No. 1

Phase III Drainage Report

Rational Method Calculations

Castle Oaks

Runoff Calculations

(Rational Method Procedure) *REFERENCE DOUGLAS CNTY. SF. 3 OR UDFCD FIGURE 6-1*

Design Storm 5 Year

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
99	O-1	3.47	0.57	9.1	1.98	4.03	8.0					
100	O-2	0.56	0.41	6.2	0.23	4.66	1.1					
101	O-3	2.47	0.36	14.7	0.89	3.31	2.9					
102	O-4	1.84	0.36	12.3	0.66	3.58	2.4					
103	O-5	2.37	0.34	14.5	0.81	3.34	2.7					
104	O-6	0.68	0.49	5.4	0.33	4.83	1.6	14.7	2.69	3.31	8.9	O-3 + O-4 + O-5 + O-6
105	O-7	1.77	0.19	8.2	0.34	4.23	1.4					
106	O-8	2.46	0.26	7.2	0.64	4.44	2.8					
107	O-9	1.66	0.24	9.4	0.40	3.97	1.6					

Castle Oaks Estates Filing No. 1

Phase III Drainage Report

Rational Method Calculations

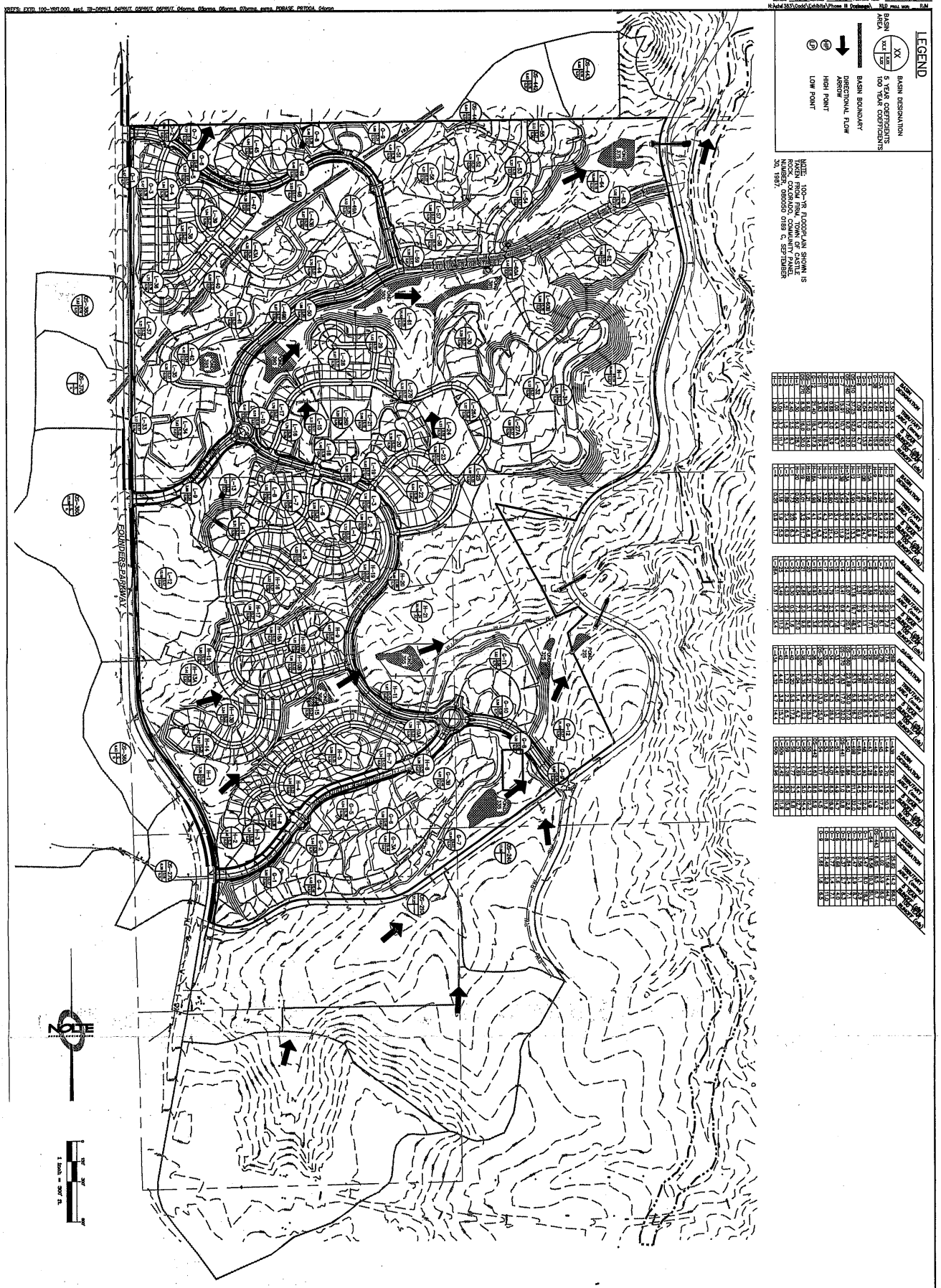
Castle Oaks

Runoff Calculations

(Rational Method Procedure) *REFERENCE DOUGLAS CNTY. SF. 3 OR UDFCD FIGURE 6-1*

Design Storm 100 Year

BASIN INFORMATON				DIRECT RUNOFF				TOTAL RUNOFF				
DESIGN POINT	DRAIN BASIN	AREA ac.	RUNOFF COEFF	T(c) min	C x A	I in/hr	Q cfs	T(c) min	SUM C x A	I in/hr	Q cfs	REMARKS
99	O-1	3.47	0.71	9.1	2.46	7.39	18.2					
100	O-2	0.56	0.61	6.2	0.34	8.56	2.9					
101	O-3	2.47	0.59	14.7	1.46	6.00	8.7					
102	O-4	1.84	0.59	12.3	1.09	6.52	7.1					
103	O-5	2.37	0.58	14.5	1.37	6.04	8.3					
104	O-6	0.68	0.66	5.4	0.45	8.89	4.0	14.7	4.37	6.00	26.2	O-3 + O-4 + O-5 + O-6
105	O-7	1.77	0.52	8.2	0.92	7.75	7.1					
106	O-8	2.46	0.55	7.2	1.35	8.16	11.0					
107	O-9	1.66	0.54	9.4	0.90	7.26	6.5					



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908.220.9001 TEL 908.220.8001 FAX WWW.NOLTE.COM

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT V

DEVELOPED DRAINAGE - OVERALL RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: JUNE 2003

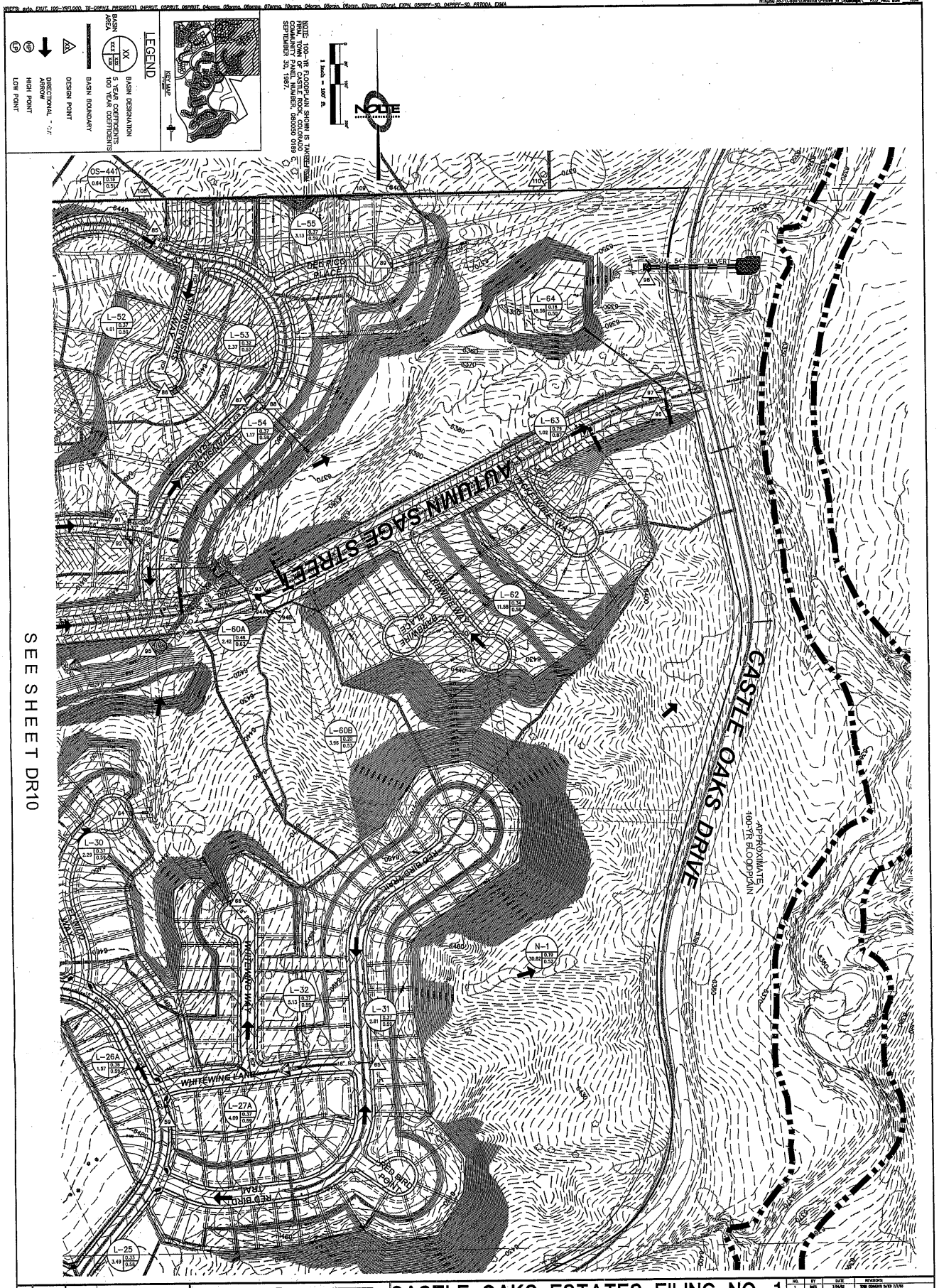
NO.	BY	DATE	REVISIONS
1	BKS	7/14/03	TOWN COMMENTS DATED 7/7/03

CAUTION: The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

JOB NUMBER: DV1383

SHEET NUMBER: V OF 10 SHEETS

SCALE: VERTICAL: 1"=N/A HORIZONTAL: 1"=300'



SEE SHEET DR10

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CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT VI-D
DEVELOPED DRAINAGE - RATIONAL METHOD

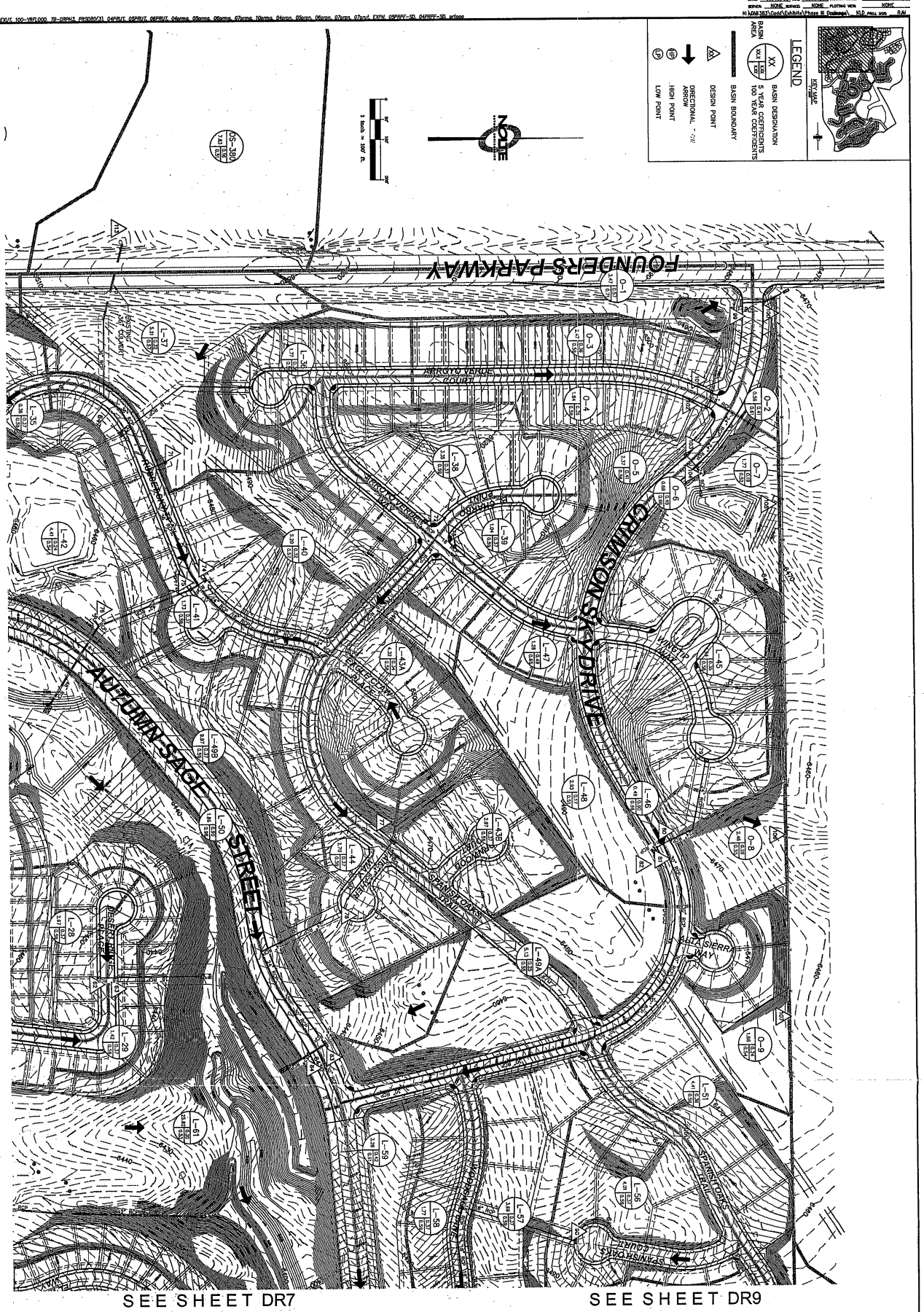
PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: JUNE 2003

NO.	BY	DATE	REVISIONS
1	BKS	7/29/03	TOWN COMMENTS DATED 7/7/03

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JOB NUMBER DV3383
SHEET NUMBER DR9
OF 10 SHEETS
SCALE VERTICAL: 1"=N/A HORIZONTAL: 1"=100'



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CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT VI-E

DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: JUNE 2003

NO.	BY	DATE	REVISIONS
1	BMS	1/26/03	100K COMMENTS DATED 1/7/03

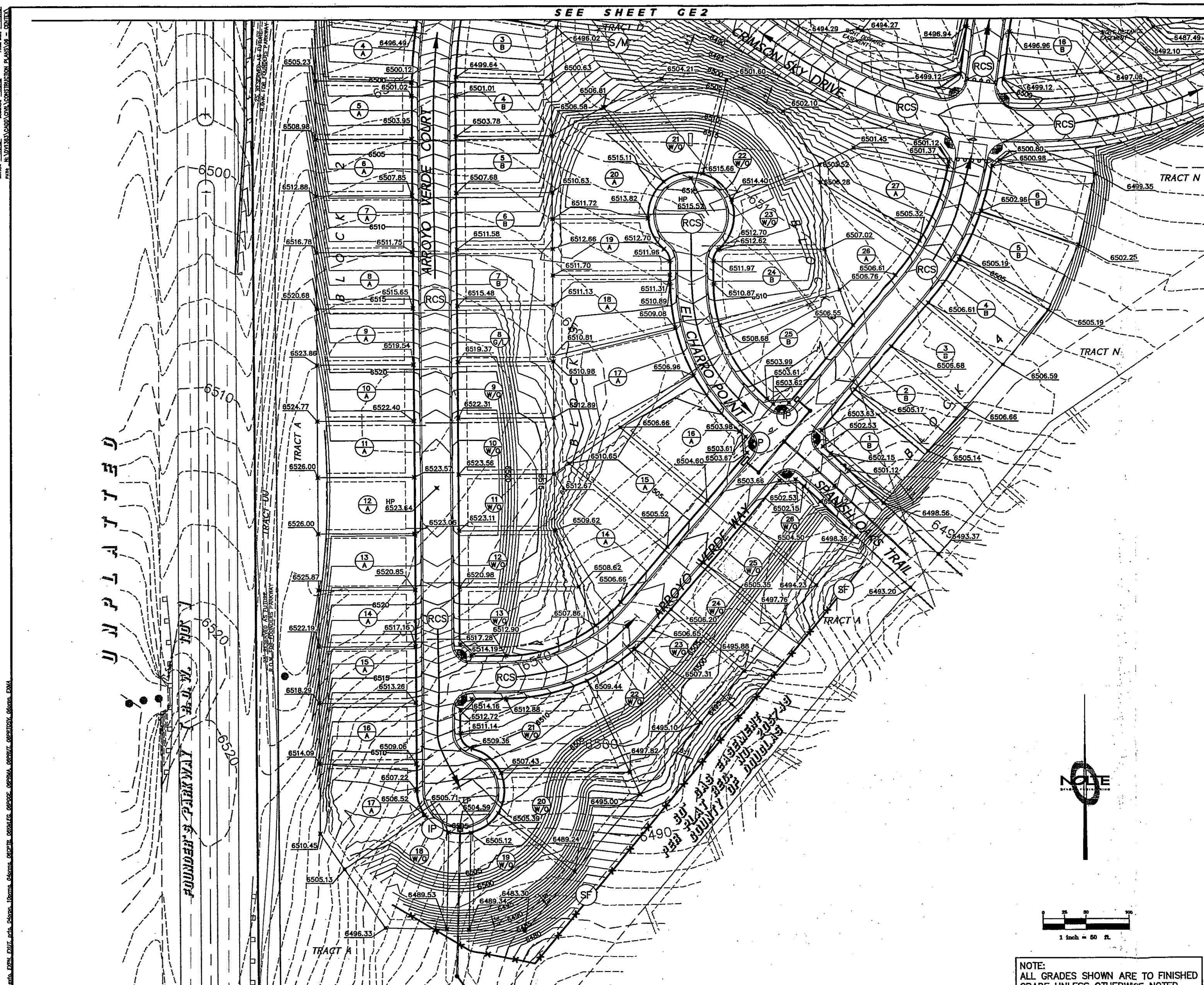
The engineer preparing these plans will not be responsible for, or liable for, unauthorized changes to or uses of these plans. All changes to the plans must be in writing and must be approved by the preparer of these plans.

JOB NUMBER DVR383

SHEET NUMBER DR10 OF 10 SHEETS

SCALE HORIZONTAL 1"=N/A VERTICAL 1"=100'

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PATH: N:\DV1383\CADD\CIVIL\CONSTRUCTION PLANS\08 - CENTEX





KEY MAP
NOT TO SCALE

LEGEND

SANITARY SEWER
- GRAVITY SEWER PIPE with MANHOLE
- PIPE with PLUG

WATER
- TRANSMISSION MAIN
- IRRIGATION LINE
- PIPE with PLUG
- WATER VALVE
- FIRE HYDRANT
- BEND and THRUST BLOCK
- BLOW-OFF ASSEMBLY
- AIR/VACUUM RELEASE VALVE
- WATERLINE LOWERING
- UTILITY CROSSING

STORM DRAIN
- MANHOLE and PIPE
- INLET
- FLARED END SECTION
- EASEMENT
- CENTER LINE
- BOUNDARY LINE
- 6360 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 6340 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- HANDICAPPED RAMP
- 6398.11 SPOT ELEVATION
- PROPOSED STREET LAMP
- SF SILT FENCE
- RCS ROUGH CUT STREET CONTROL
- S/M SEEDING AND MULCHING
- STB STRAW BALE
- IP INLET PROTECTION
- VTC VEHICLE TRACKING CONTROL

1 inch = 50 ft.

NOTE:
ALL GRADES SHOWN ARE TO FINISHED GRADE UNLESS OTHERWISE NOTED

I HEREBY AFFIRM THAT THESE FINAL CONSTRUCTION PLANS WERE PREPARED UNDER MY DIRECT SUPERVISION, IN ACCORDANCE WITH ALL APPLICABLE TOWN OF CASTLE ROCK AND STATE OF COLORADO STANDARDS AND STATUTES, RESPECTIVELY; AND THAT I AM FULLY RESPONSIBLE FOR ALL DESIGN AND REVISIONS RELATIVE TO SAID PLANS.

RICKY J. MOORE, P.E. DATE
STATE OF COLORADO NO. 30877

TOWN OF CASTLE ROCK APPROVALS

THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM THE APPROVAL DATE OF THE PUBLIC WORKS DIRECTOR.
RECOMMENDED APPROVAL:

ENGINEERING DIVISION DATE
APPROVED BY:

PUBLIC WORKS DIRECTOR DATE

NO.	BY	DATE	REVISIONS
1	RAES	7/24/03	TOWN COMMENTS DATED 7/7/03

CAUTION
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CASTLE OAKS FILING NO. 1
PHASE 1 - CENTEX HOMES
GRADING AND EROSION CONTROL PLAN

PREPARED FOR: CASTLE OAKS ESTATES LLC

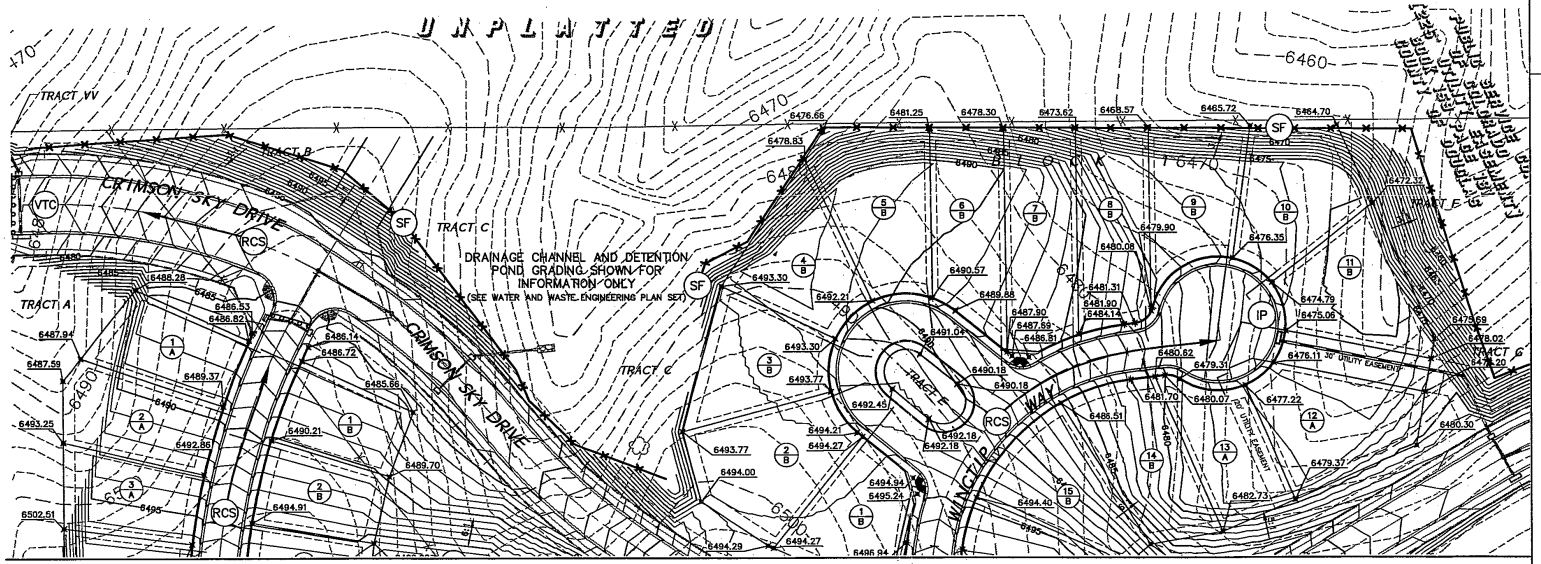
DATE SUBMITTED: 6/9/03

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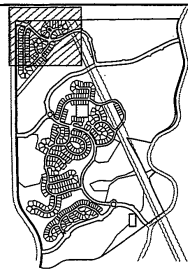
SHEET NUMBER
GE1
OF 3 SHEETS

SCALE
VERTICAL: 1"=
HORIZONTAL: 1"=50

JOB NUMBER
DV138306



SEE SHEET GE1



KEY MAP
NOT TO SCALE

LEGEND

- SANITARY SEWER
- GRAVITY SEWER PIPE with MANHOLE
- PIPE with PLUG
- WATER
- TRANSMISSION MAIN
- IRRIGATION LINE
- PIPE with PLUG
- WATER VALVE
- FIRE HYDRANT
- BEND and THRUST BLOCK
- BLOW-OFF ASSEMBLY
- AIR/VACUUM RELEASE VALVE
- WATERLINE LOWERING
- UTILITY CROSSING
- STORM DRAIN
- MANHOLE and PIPE
- INLET
- FLARED END SECTION
- EASEMENT
- CENTER LINE
- BOUNDARY LINE
- 6360 PROPOSED MAJOR CONTOUR
- PROPOSED MINOR CONTOUR
- 6340 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- HANDICAPPED RAMP
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- PROPOSED STREET LAMP
- SF SILT FENCE
- RCS ROUGH CUT STREET CONTROL
- S/M SEEDING AND MULCHING
- STB STRAW BALE
- IP INLET PROTECTION
- VTC VEHICLE TRACKING CONTROL

NOTE:
ALL GRADES SHOWN ARE TO FINISHED GRADE UNLESS OTHERWISE NOTED

0 25 50 100
1 inch = 50 ft.

I HEREBY AFFIRM THAT THESE FINAL CONSTRUCTION PLANS WERE PREPARED UNDER MY DIRECT SUPERVISION, IN ACCORDANCE WITH ALL APPLICABLE TOWN OF CASTLE ROCK AND STATE OF COLORADO STANDARDS AND STATUTES, RESPECTIVELY; AND THAT I AM FULLY RESPONSIBLE FOR ALL DESIGN AND REVISIONS RELATIVE TO SAID PLANS.

RICKY J. MOORE, P.E. DATE
STATE OF COLORADO NO. 30877

TOWN OF CASTLE ROCK APPROVALS

THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM THE APPROVAL DATE OF THE PUBLIC WORKS DIRECTOR.
RECOMMENDED APPROVAL:

ENGINEERING DIVISION DATE
APPROVED BY:

PUBLIC WORKS DIRECTOR DATE

NO.	BY	DATE	REVISIONS
1	MJES	7/24/03	TOWN COMMENTS DATED 7/7/03

CAUTION
The contractor preparing these plans will not be responsible for any deviation, changes to or uses of these plans without written approval of NOLTE and will be approved by the preparer of these plans.

CASTLE OAKS FILING NO. 1
PHASE 1 - CENTEX HOMES
GRADING AND EROSION CONTROL PLAN

PREPARED FOR: CASTLE OAKS ESTATES LLC
DATE SUBMITTED: 8/8/03

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7000 SOUTH YOSEMITE ST., SUITE 200, ENGLEWOOD, CO. 80112
WWW.NOLTE.COM

SHEET NUMBER
GE2
OF 3 SHEETS

SCALE
VERTICAL: 1"=
HORIZONTAL: 1"= 50

JOB NUMBER
DV138306

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PLOTS: ALWAYS PLOT ON CONSTRUCTION PLANSTYLE: CENTER
XREFS: ADDL ENGR_EXHT_ADDL Adams_Blanca_Eagle_BOUNDARY_GEORGE_ORIGINAL_GRADING_CONTROL_DETAILS_Sheet

Phase I Drainage Report
For
Pioneer Ranch

Castle Rock, Colorado

Owner / Developer:
Scott Land Development, LLC
5299 DTC Parkway, Suite 130
Greenwood Village, CO 80111
303-588-6005
Contact: Ed Scott

Prepared By:
ATWELL, LLC
143 Union Blvd., Suite 700
Lakewood, Colorado 80228
303-462-1100
Contact: Byron Glenn, P.E.

Project Number 15001404
October 2015

DRAINAGE BASINS AND SUB-BASINS

Portions of the site have been analyzed as part of other adjacent drainage studies to accommodate offsite drainage. The reports and approximate areas are listed below:

1) Metzler Ranch Filing No. 1 (Reference 4). Northwest area.
2) Hazen-Moore Filing 2 (Reference 5). Northwest area
3) Castle Oaks Estates Filing No. 1 (References 6-7). East area.
4) Tributary C and D Master Plan (Reference 8).

The site is split by the Castle Rock Ridgeline located approximately 800' west of Founders Parkway. The area west of the ridgeline transitions from rock outcroppings and pine trees to scrub oak and meadow areas. Runoff from this basin generally flows to the west within natural drainage channels to either an existing abutting subdivision's drainage system or to Front Street and I-25. Ultimately, all flows are conveyed underneath the interstate within existing culverts to the west and into East Plum Creek. Three undeveloped offsite basins south of the site impact the property and provide additional flows onto the site.

The area east of the ridgeline is within the Cherry Creek drainage basin and generally consists of meadow areas and scrub oak. Runoff is conveyed overland to the east to three existing culverts underneath Founders Parkway and discharged offsite. No offsite basins impact the areas east of the ridgeline.

The site has been broken into multiple basins following the historic drainage patterns for analysis within this report. Proposed basins after development will generally follow these historic basin outlines. Refer to the Conceptual Zoning Map for proposed land uses within the basins. The basins are described below:

Basin A is within the Cherry Creek basin and consists of runoff in the southeast corner of the site as well as offsite basin OS-1 to the south that historically drain to the existing culvert underneath Founders Parkway that is located to the east. Basin A will conceptually consist of runoff from mixed-use areas within PA-10. Proposed Detention/Water Quality Pond A will detain and treat stormwater prior to discharge to the existing Founders Parkway roadside ditch. Developed runoff discharges to existing ditches will be verified as stable within subsequent drainage studies, per Town criteria.

Basin B is within the Cherry Creek basin and consists of runoff in the east portion of the site that historically drains to an existing culvert underneath Founders Parkway. Basin B will conceptually consist of runoff from public land area PL-2 and mixed use area PA-10. Proposed Detention/Water Quality Pond B will detain and treat stormwater prior to discharge to the existing Founders Parkway culvert.

Basin C is within the Cherry Creek basin and consists of runoff in the northeast portion of the site that historically drains to the roadside ditch along Founders Parkway. Basin C will conceptually consist of runoff from public land area PL-2 and off site area OS-3. Proposed Detention/Water Quality Pond C will detain and treat stormwater prior to discharge to the existing Founders Parkway roadside ditch.

Basin D is within the Cherry Creek basin and consists of runoff in the northern portion of the site that historically drains to the roadside ditch along Founders Parkway. Basin D will conceptually

consist of runoff from residential area PA-7. Proposed Detention/Water Quality Pond D will detain and treat stormwater prior to discharge to the existing Founders Parkway roadside ditch.

Basin E is within the EPC basin and is tributary to Hangmans Gulch. The basin consists of runoff in the central portion of the site as well as offsite basin OS-2 to the south that historically drains into the Scott Tributary. Basin E will conceptually consist of runoff from residential areas PA-3 through PA-6. Proposed Detention/Water Quality Pond E will detain and treat stormwater prior to discharge to the existing 60" CMP pipe located at the west end of the Scott Tributary as it enters Metzler Ranch F1.

Basin F is within the EPC basin and is tributary to Hangmans Gulch. The basin consists of runoff in the northwest portion of the site that historically drains into onsite smaller drainageways in Metzler Ranch F1. Basin F will conceptually consist of runoff from residential area PA-5. Proposed Detention/Water Quality Pond F will detain and treat stormwater prior to discharge to the existing Metzler Ranch F1 drainageway.

Basin G is within the EPC basin and is tributary to Hangmans Gulch. The basin consists of runoff in the northwest portion of the site that historically drains into onsite smaller drainageways in Metzler Ranch F1. Basin G will conceptually consist of runoff from residential area PA-5. Proposed Detention/Water Quality Pond G will detain and treat stormwater prior to discharge to the existing Metzler Ranch F1 drainageway.

Basin H is within the EPC basin and is tributary to the Walker Tributary #1. The basin consists of runoff in the west portion of the site as well as offsite basin OS-3 to the south that historically drains into the drainageway and eventually to the existing Front Street storm sewer and culvert underneath I-25. Basin H will conceptually consist of runoff from mixed use area PA-1 and residential areas PA-2 through PA-4. Proposed offsite Detention/Water Quality Pond H will detain and treat stormwater prior to discharge to the existing Front Street and I-25 storm sewer.

Preliminary runoff calculations for the developed basins are included within the Appendix of this report. These calculations are intended to be informational only and are based upon the conceptual Planning Areas and land uses proposed for the site. Land uses and densities are conceptual at this stage and have been conservatively incorporated within the drainage calculations.

EXISTING STORMWATER CONVEYANCE OR STORAGE FACILITIES

There are several existing stormwater conveyance facilities that will be incorporated into the overall PR stormwater design:

1) The existing culverts along Founders Parkway will remain and convey pond release flows to the east.
2) The existing Walker Tributary #1 drainageway may be re-routed or replaced by storm sewer as applicable for the final land plan within Basin H. Other smaller natural drainageways onsite will remain or may be converted to storm sewer depending on the final land plan. Natural drainageways are preferred and may require stabilization; however this will be determined on a case by case basis in subsequent drainage reports.
3) The offsite existing drainageway along the west side of the site and downstream existing 60" RCP through Metzler Ranch Filing No. 1 will convey flows downstream from Basin E.

4) The existing storm sewer and culverts underneath Front Street and I-25 will convey flows to the west.

No other existing stormwater storage facilities are located on the site or will be incorporated into the stormwater plan for the PR project.

PROPOSED STORM WATER CONVEYANCE OR STORAGE FACILITIES

The proposed on-site conveyance facilities will consist of a combination of storm pipe, swales/channels, curb/gutter, and inlets. Offsite runoff will be accommodated in the drainage plan. Proposed conveyance details are highly dependent on the final land use plan. Therefore, it is assumed with this report that the proposed drainage patterns will generally follow the historic drainage patterns.

Additional information regarding the specific proposed conveyance element details will be provided in subsequent studies. Public conveyance elements will be owned and maintained by the Town of Castle Rock; private conveyance elements will be owned and maintained by the Metropolitan District, HOA, or private entity.

Following historic drainage patterns, there are eight stormwater storage facilities being proposed on the PR site:

1) Pond A will collect runoff from Basin A and Basin OS-1 and provide detention and water quality for the developed flows. Release from this pond will be into the existing roadside ditch and culvert underneath Founders Parkway, located to the east.
2) Pond B will collect runoff from Basin B and provide detention and water quality for the developed flows. Release from this pond will be into the existing culvert underneath Founders Parkway.
3) Pond C will collect runoff from Basin C and provide detention and water quality for the developed flows. Release from this pond will be into the existing Founders Parkway roadside ditch.
4) Pond D will collect runoff from Basin D and provide detention and water quality for the developed flows. Release from this pond will be into the existing Founders Parkway roadside ditch.
5) Pond E will collect runoff from Basin E and Basin OS-2 and provide detention and water quality for the developed flows. Release from this pond will be into the existing 60" CMP pipe in Metzler Ranch F1.
6) Pond F will collect runoff from Basin F and provide detention and water quality for the developed flows. Release from this pond will be into the existing Metzler Ranch F1 drainageways.
7) Pond G will collect runoff from Basin G and provide detention and water quality for the developed flows. Release from this pond will be into the existing Metzler Ranch F1 drainageways.
8) Pond H will collect runoff from Basin H and Basin OS-3 and provide detention and water quality for the developed flows. Release from this pond will be into the existing Front Street storm sewer and I-25 culvert system.

All the ponds have been preliminarily located based on the historic flow paths (Refer to the Phase 1 Drainage Plan). Ponds may also be split into multiple smaller ponds in development pods as necessary, depending on development needs. Final locations, sizes, and other pond details will be presented in subsequent drainage reports.

Maintenance access will be provided to all the ponds. Maintenance of the ponds will be provided by the Metropolitan District or HOA. Maintenance of the on-site public storm pipes will be the responsibility of the Town. Additional pond details will be presented in subsequent Drainage Reports.

WATER QUALITY ENHANCEMENT BEST MANAGEMENT PRACTICES

Non-structural Best Management Practices that will be incorporated into the project include minimizing disturbed area. The intent of the land plan is to retain as much natural open space as possible and therefore reducing the disturbed area and total developed runoff.

Structural Best Management Practices that will be incorporated in the site design are in the process of being evaluated and will be presented in subsequent drainage reports. Structural BMPs may include the following:

- Grass Swales
- Extended Detention Basins
- Retention Ponds

Final Best Management Practices will be selected with subsequent phases of the project and details will be provided for each BMP chosen.

POTENTIAL PERMITTING REQUIREMENTS

No special permitting requirements are anticipated at this time.

CONCLUSION

This Phase I Drainage Report outlines the basic storm water management plan for the proposed development. This report follows all standard criteria with no requested variances. Downstream drainage facilities will not be negatively affected, as historic drainage patterns and allowable release rates are planned to be maintained. Additional drainage details will be presented in subsequent drainage studies for this project.

COMPOSITE C-FACTOR & WEIGHTED PERCENT IMPERVIOUSNESS ANALYSIS

Pioneer Ranch

ATWELL
GB
Date: 10/23/15

All soils Type C or D

BASIN	Total Area (AC)	Land Use	Soil Type (AC)	Comp. C2	Comp. C5	Comp. C10	Comp. C100	Comp. I (%)
A	7.00	Assumed 15 DU/AC Mixed Use	C Soil Type	0.60	0.63	0.66	0.74	80.0%
B1	20.30	Assumed 15 DU/AC Mixed Use	C Soil Type	0.60	0.63	0.66	0.74	80.0%
B2	14.20	Assumed Park	C Soil Type	0.08	0.18	0.28	0.52	5.0%
B	34.50	Weighted Average	C Soil Type	0.39	0.44	0.50	0.65	49.1%
C	8.80	Assumed Park	C Soil Type	0.08	0.18	0.28	0.52	5.0%
D	5.70	Assumed 2 DU/AC SFD Residential	C Soil Type	0.28	0.35	0.42	0.58	40.0%
E1	82.70	Assumed 2 DU/AC SFD Residential	D Soil Type	0.28	0.35	0.42	0.58	40.0%
E2	51.30	Assumed 5 DU/AC SFD Residential	D Soil Type	0.34	0.40	0.46	0.60	50.0%
E3	24.00	Assumed Park	D Soil Type	0.08	0.18	0.28	0.52	5.0%
E4	83.40	Assumed OS	D Soil Type	0.06	0.16	0.26	0.51	2.0%
E	241.40	Weighted Average	D Soil Type	0.20	0.28	0.36	0.55	25.5%
F1	5.60	Assumed 5 DU/AC SFD Residential	D Soil Type	0.34	0.40	0.46	0.60	50.0%
F2	7.90	Assumed OS	D Soil Type	0.06	0.16	0.26	0.51	2.0%
F	13.50	Weighted Average	D Soil Type	0.18	0.26	0.34	0.55	21.9%
G	16.90	Assumed 5 DU/AC SFD Residential	D Soil Type	0.34	0.40	0.46	0.60	50.0%
H1	17.70	Assumed 15 DU/AC Mixed Use	D Soil Type	0.60	0.63	0.66	0.74	80.0%
H2	30.50	Assumed 5 DU/AC SFD Residential	D Soil Type	0.34	0.40	0.46	0.60	50.0%
H3	7.60	Assumed OS	D Soil Type	0.06	0.16	0.26	0.51	2.0%
H	55.80	Weighted Average	D Soil Type	0.38	0.44	0.50	0.63	53.0%
OS-1	18.00	Assumed OS	C Soil Type	0.06	0.16	0.26	0.51	2.0%
OS-2	106.10	Assumed OS	D Soil Type	0.06	0.16	0.26	0.51	2.0%
OS-3	32.80	Assumed OS	D Soil Type	0.06	0.16	0.26	0.51	2.0%
E	241.40	Weighted Average	D Soil Type	0.20	0.28	0.36	0.55	25.5%
OS-2	106.10	Assumed OS	D Soil Type	0.06	0.16	0.26	0.51	2.0%
CUHP Basin	347.50	Weighted Average	D Soil Type	0.16	0.24	0.33	0.54	18.3%

STANDARD FORM SF-2
TIME OF CONCENTRATION - DEVELOPED

SUBDIVISION: Pioneer Ranch

CALCULATED BY: GB DATE: Oct-15

SUB-BASIN DATA			INITIAL/OVERLAND TIME (Tc)			TRAVEL TIME (Tt)				Tc CHECK (Urbanized Basins)			FINAL Tc	REMARKS
DESIG:	AREA (acres)	C_5	LENGTH (ft)	AVG. SLOPE (%)	Ti (min)	LENGTH (ft)	AVG. SLOPE (%)	VEL (fps)	Tt (min)	COMP Tc	TOTAL LENGTH (ft)	Tc=(L/180)+10 (min)	(min)	
A	7.00	0.63	300	5.0	8.6	450	5.0%	4.5	1.7	**10.3**	750	14.2	**10.3**	Street
B	34.50	0.44	300	5.0	12.0	1400	5.0%	4.5	5.2	**17.2**	1700	19.4	**17.2**	Street
C	8.80	0.18	300	10.0	13.5	1200	5.0%	4.5	4.4	**17.9**	1500	18.3	**17.9**	Street
D	5.70	0.35	300	5.0	13.8	600	5.0%	4.5	2.2	**16.0**	900	15.0	**15.0**	Street
E	241.40	0.28	300	4.0	16.3	5800	4.0%	4.0	24.2	**40.4**	6100	43.9	**40.4**	Street
F	13.50	0.26	300	20.0	9.8	1300	5.0%	4.5	4.8	**14.6**	1600	18.9	**14.6**	Street
G	16.90	0.40	300	5.0	12.9	700	5.0%	4.5	2.6	**15.5**	1000	15.6	**15.5**	Street
H	55.80	0.44	300	5.0	12.1	3800	4.5%	4.2	15.1	**27.2**	4100	32.8	**27.2**	Street
OS-1	18.00	0.16	300	6.5	15.8	1300	6.0%	5.0	4.3	**20.2**		Undeveloped	**20.2**	Undeveloped
OS-2	106.10	0.16	300	20.0	10.9	2400	7.0%	5.5	7.3	**18.2**		Undeveloped	**18.2**	Undeveloped
OS-3	32.80	0.16	300	16.0	11.8	3000	5.0%	4.5	11.1	**22.9**		Undeveloped	**22.9**	Undeveloped

STANDARD FORM SF-3
STORM DRAINAGE SYSTEM DESIGN
(RATIONAL METHOD PROCEDURE)
DEVELOPED

CALCULATED BY: GB
DATE: Oct-15
CHECKED BY:

JOB NO: 1404
PROJECT: Pioneer Ranch
DESIGN STORM: 100-year

		DIRECT RUNOFF							TOTAL RUNOFF				STREET			PIPE		TRAVEL TIME			
DESCRIPTION	DESIGN POINT	AREA DESIG.	AREA (Acres)	RUNOFF COEFF	Tc (min)	C A (Acres)	I (in/hour)	Q (cfs)	Tc (min)	(C A) (Acres)	I (in/hour)	Q (cfs)	SLOPE (%)	STREET FLOW (cfs)	DESIGN FLOW (cfs)	SLOPE (%)	PIPE SIZE (in.)	LENGTH (ft)	VELOCITY (fps)	Tt (min)	REMARKS
	1	A	7.00	0.74	10.3	5.18	6.95	36.0													
	1.1	OS-1	18.00	0.51	20.2	9.18	5.09	46.7													
	1	A	25.00									82.7									
	2	B	34.50	0.65	17.2	22.41	5.52	123.7													
	3	C	8.80	0.52	17.9	4.58	5.41	24.8													
	4	D	5.70	0.58	15.0	3.31	5.90	19.5													
	6	F	13.50	0.55	14.6	7.39	5.98	44.2													
	7	G	16.90	0.60	15.5	10.14	5.82	59.0													
	8	H	55.80	0.63	27.2	35.27	4.32	152.3													
	8.1	OS-3	32.80	0.51	22.9	16.73	4.76	79.6													
	8	H	88.60									231.9									

100-year P1 = 2.6 inches (UDFCD, Fig. RA-6) I = 28.5(P1)/(10+Tc)0.786 (Ref. 2, Eq RA-3)

DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project: Pioneer Ranch

Basin ID: A

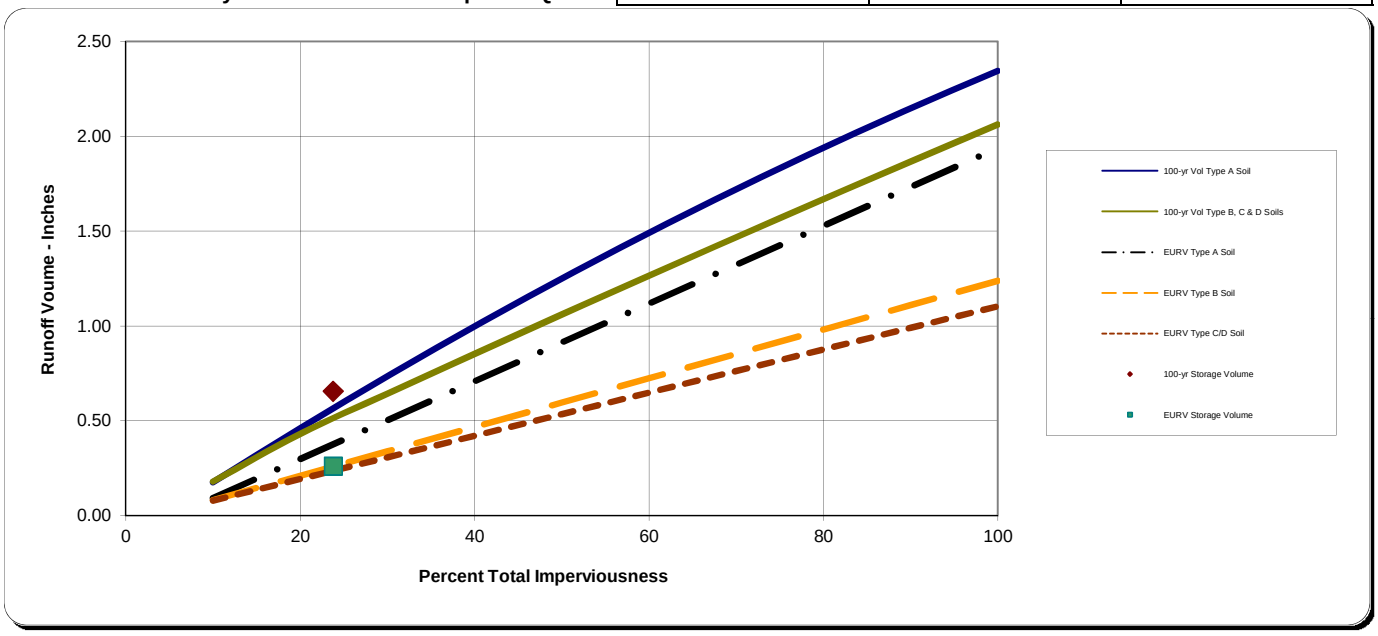
* User input data shown in blue.

Area of Watershed (acres)	25.00	
Subwatershed Imperviousness	23.8%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	23.8%	

Hydrologic Soil Type	**Percentage of Area**	**Area (acres)**
Type A		0.0
Type B		0.0
Type C or D	100.0%	25.0

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		**Decay Coefficient--α**
Initial--f_i	**Final--fo**	
3	0.5	0.0018

	Detention Volumes [2,5]		
	(watershed inches)	**(acre-feet)**	**Maximum Allowable Release Rate, cfs[3]**
Excess Urban Runoff Volume[4]	0.26	0.54	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume plus WQCV [5]	0.66	1.37	25.00



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) User has opted to add the WQCV to the 100-year detention volume to satisfy local regulations. This is not required per the USDCM.

DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project: Pioneer Ranch

Basin ID: B

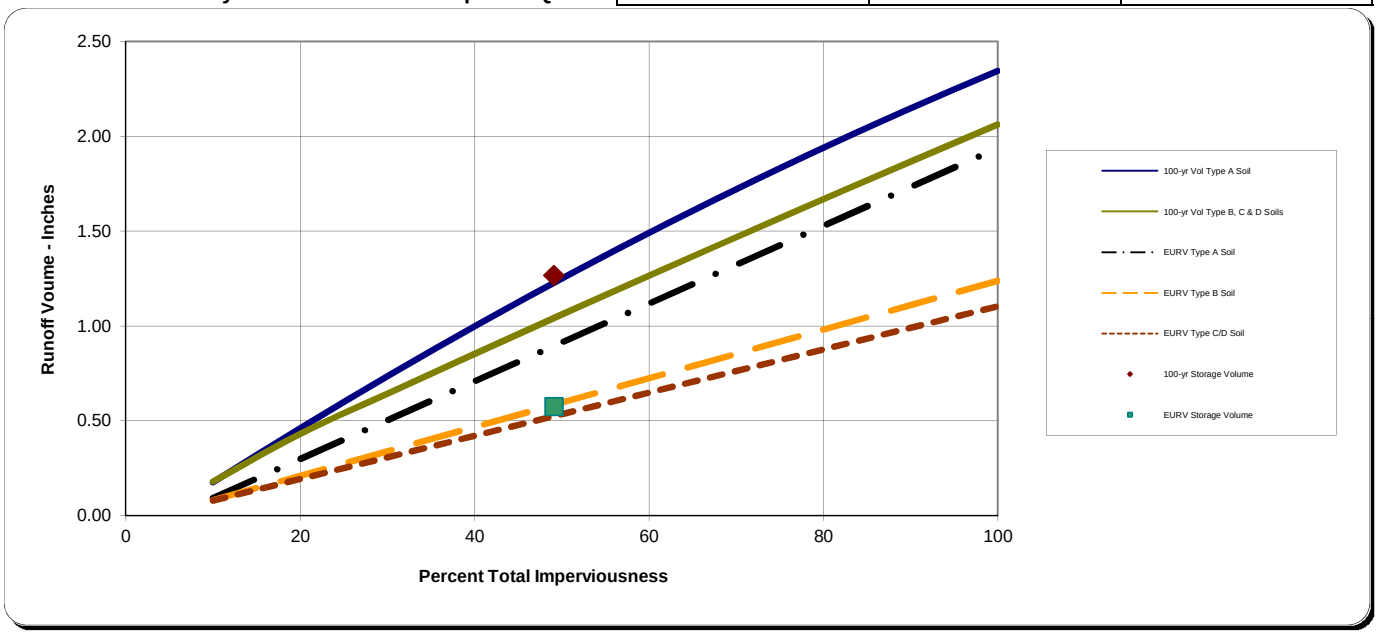
* User input data shown in blue.

Area of Watershed (acres)	34.50	
Subwatershed Imperviousness	49.1%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	49.1%	

Hydrologic Soil Type	**Percentage of Area**	**Area (acres)**
Type A		0.0
Type B		0.0
Type C or D	100.0%	34.5

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		**Decay Coefficient--α**
Initial--f_i	**Final--fo**	
3	0.5	0.0018

	Detention Volumes [2,5]		**Maximum Allowable Release Rate, cfs[3]**
	(watershed inches)	**(acre-feet)**	
Excess Urban Runoff Volume[4]	0.58	1.66	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume plus WQCV [5]	1.27	3.64	34.50



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) User has opted to add the WQCV to the 100-year detention volume to satisfy local regulations. This is not required per the USDCM.

DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project: Pioneer Ranch

Basin ID: C

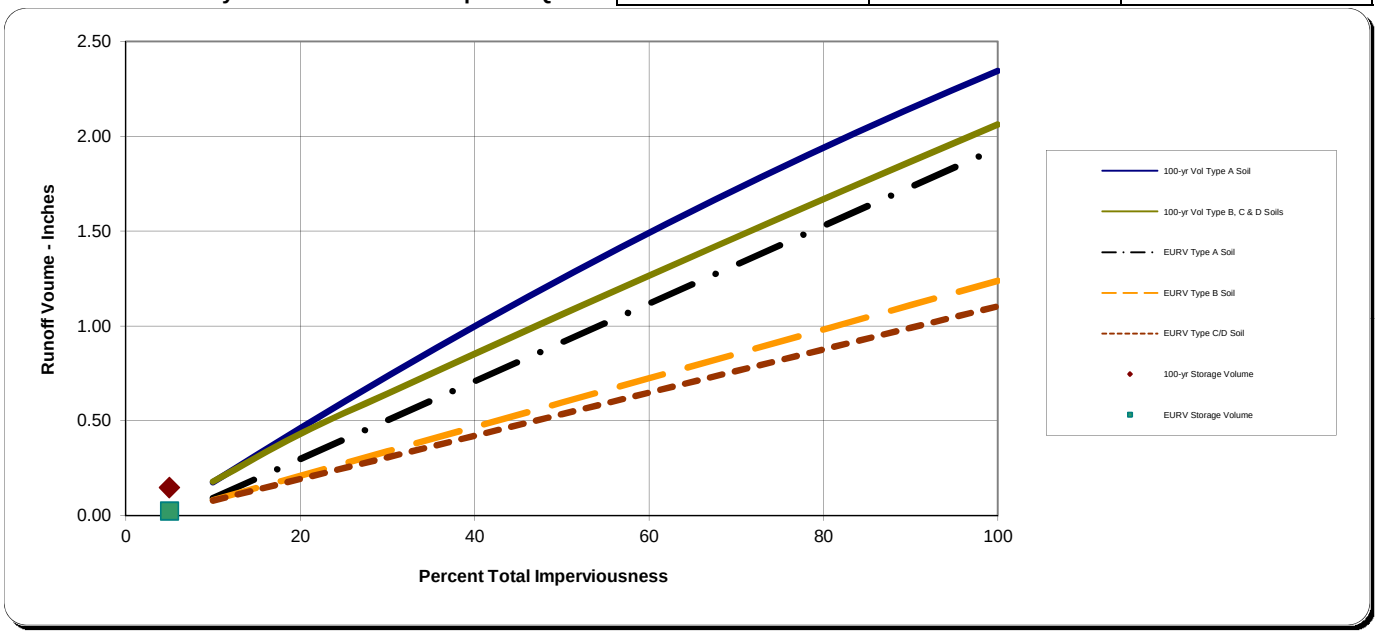
* User input data shown in blue.

Area of Watershed (acres)	8.80	
Subwatershed Imperviousness	5.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	5.0%	

Hydrologic Soil Type	**Percentage of Area**	**Area (acres)**
Type A		0.0
Type B		0.0
Type C or D	100.0%	8.8

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		**Decay Coefficient--α**
Initial--f_i	**Final--fo**	
3	0.5	0.0018

	Detention Volumes [2,5]		**Maximum Allowable Release Rate, cfs[3]**
	(watershed inches)	**(acre-feet)**	
Excess Urban Runoff Volume[4]	0.03	0.02	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume plus WQCV [5]	0.15	0.11	8.80



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) User has opted to add the WQCV to the 100-year detention volume to satisfy local regulations. This is not required per the USDCM.

DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project: Pioneer Ranch

Basin ID: D

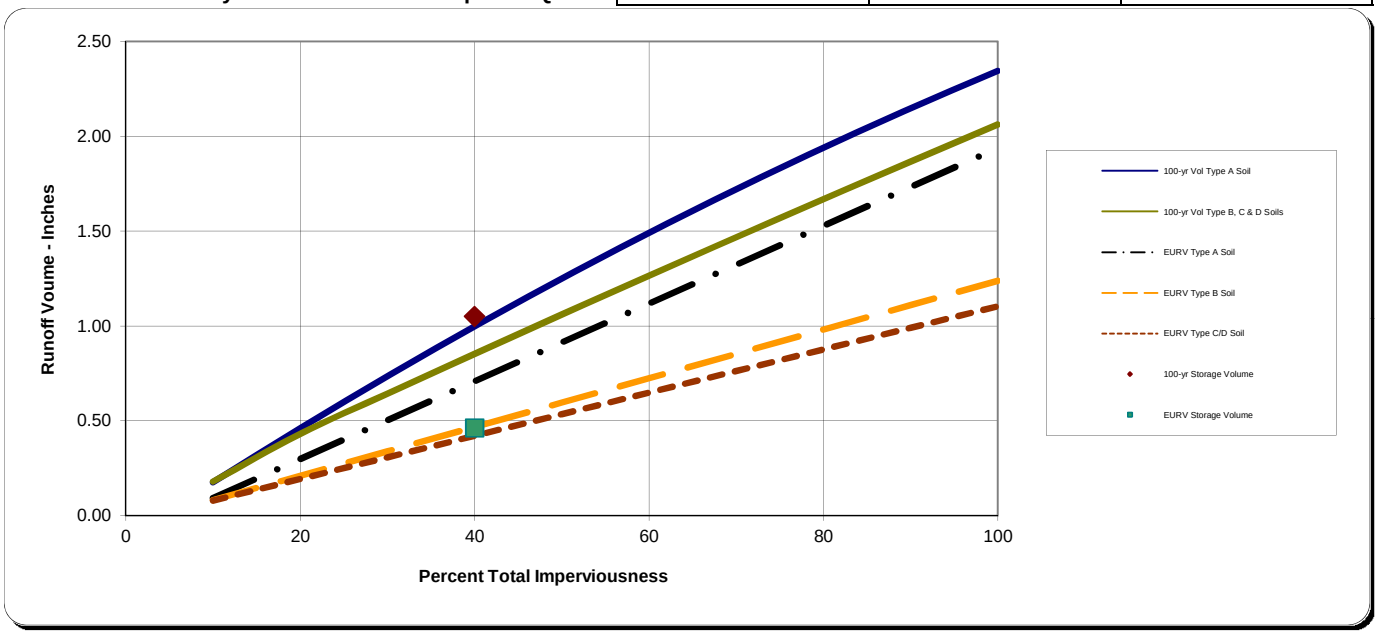
* User input data shown in blue.

Area of Watershed (acres)	5.70	
Subwatershed Imperviousness	40.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	40.0%	

Hydrologic Soil Type	**Percentage of Area**	**Area (acres)**
Type A		0.0
Type B		0.0
Type C or D	100.0%	5.7

Recommended Horton's Equation Parameters for CUHP		
Infiltration (inches per hour)		**Decay Coefficient--α**
Initial--f_i	**Final--fo**	
3	0.5	0.0018

	Detention Volumes [2,5]		
	(watershed inches)	**(acre-feet)**	**Maximum Allowable Release Rate, cfs**[3]
Excess Urban Runoff Volume[4]	0.46	0.22	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume plus WQCV [5]	1.05	0.50	5.70



Notes:

1) Effective imperviousness is based on Figure ND-1 of the Urban Storm Drainage Criteria Manual (USDCM).

2) Results shown reflect runoff reduction from Level 1 or 2 MDCIA and are plotted at the watershed's total imperviousness value; the impact of MDCIA is reflected by the results being below the curves.

3) Maximum allowable release rates for 100-year event are based on Table SO-1. Outlet for the Excess Urban Runoff Volume (EURV) to be designed to empty out the EURV in 72 hours. Outlet design is similar to one for the WQCV outlet of an extended detention basin (i.e., perforated plate with a micro-pool) and extends to top of EURV water surface elevation.

4) EURV approximates the difference between developed and pre-developed runoff volume.

5) User has opted to add the WQCV to the 100-year detention volume to satisfy local regulations. This is not required per the USDCM.

LEGEND

- H2 / 13.64 — BASIN DESIGNATION / AREA IN ACRES
- 2 — DESIGN POINT
- MAJOR DRAINAGE BASIN BOUNDARY
- MINOR DRAINAGE BASIN BOUNDARY
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- 6500 — EXISTING CONTOUR
- 6500 — PROPOSED CONTOUR
- EXISTING CURB & GUTTER
- PROPOSED BERM
- PROPOSED EMERGENCY OVERLOW PATH
- FLOW DIRECTION
- EXISTING DITCH\SWALE
- CONCEPTUAL DETENTION/WATER QUALITY POND LOCATION

DEVELOPED RUN-OFF SUMMARY TABLE

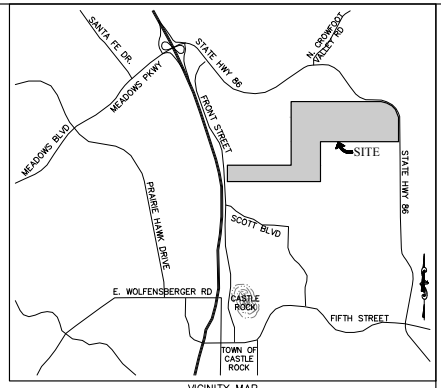
DESIGN POINT	BASINS	Q_{100} (CFS)
1	A, OS-1	82.7
2	B	123.7
3	C	24.8
4	D	19.5
5	E, OS-2	504.0
6	F	44.2
7	G	59.0
8	H, OS-3	231.9

POND SUMMARY

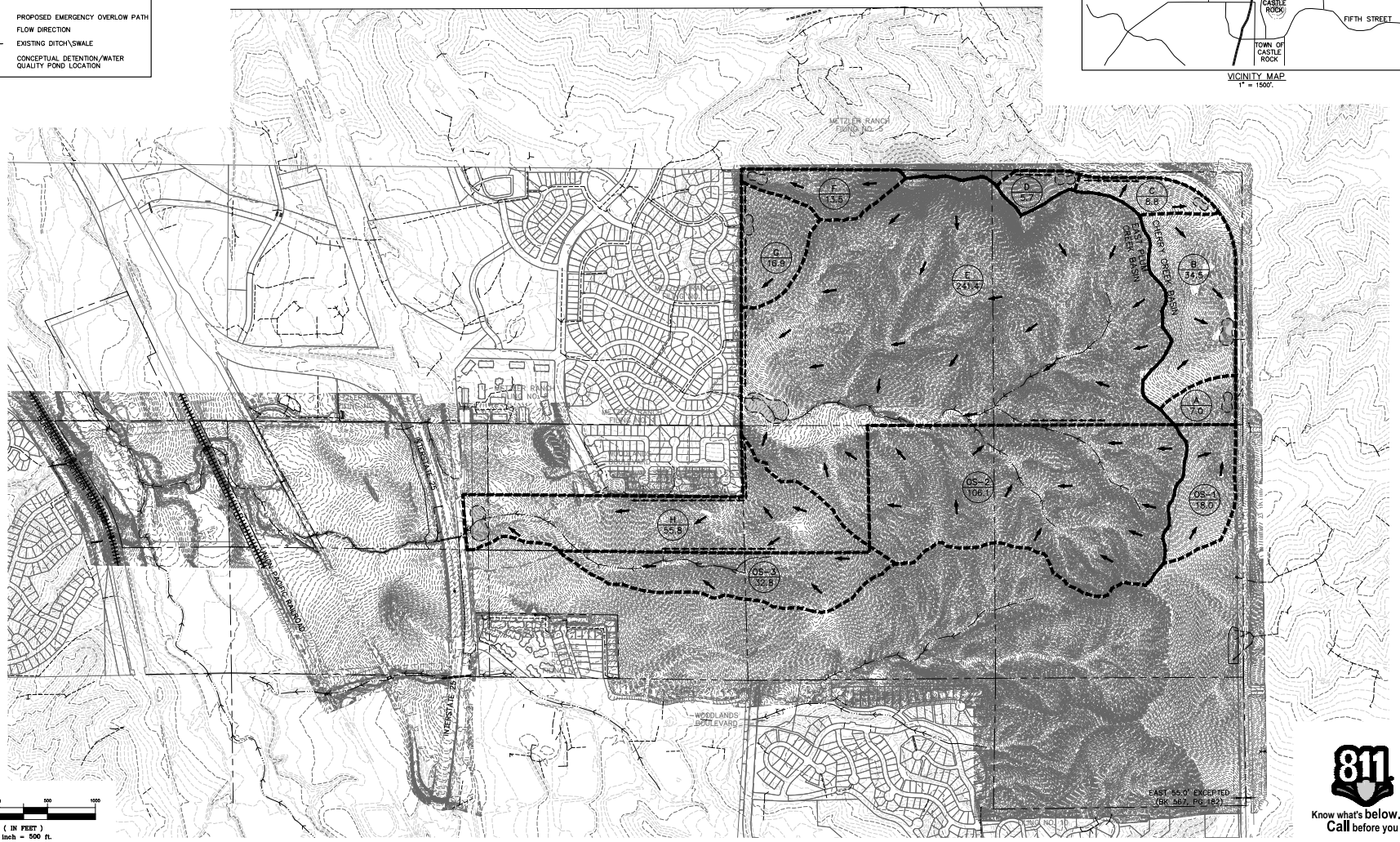
POND	EURV (AC-FT)	100 YR VOL (AC-FT)	Q_{100} RELEASE (CFS)
A	0.54	1.37	25.00
B	1.66	3.64	34.50
C	0.02	0.11	8.80
D	0.22	0.50	5.70
E	--	14.32	198.00
F	0.27	0.68	13.50
G	0.83	1.81	16.90
H	2.88	6.72	88.60

SHEET INDEX

1. OVERALL PLAN
2. DETAILED PLAN



VICINITY MAP
1" = 1500'.



(IN FEET)
1 inch = 500 ft.

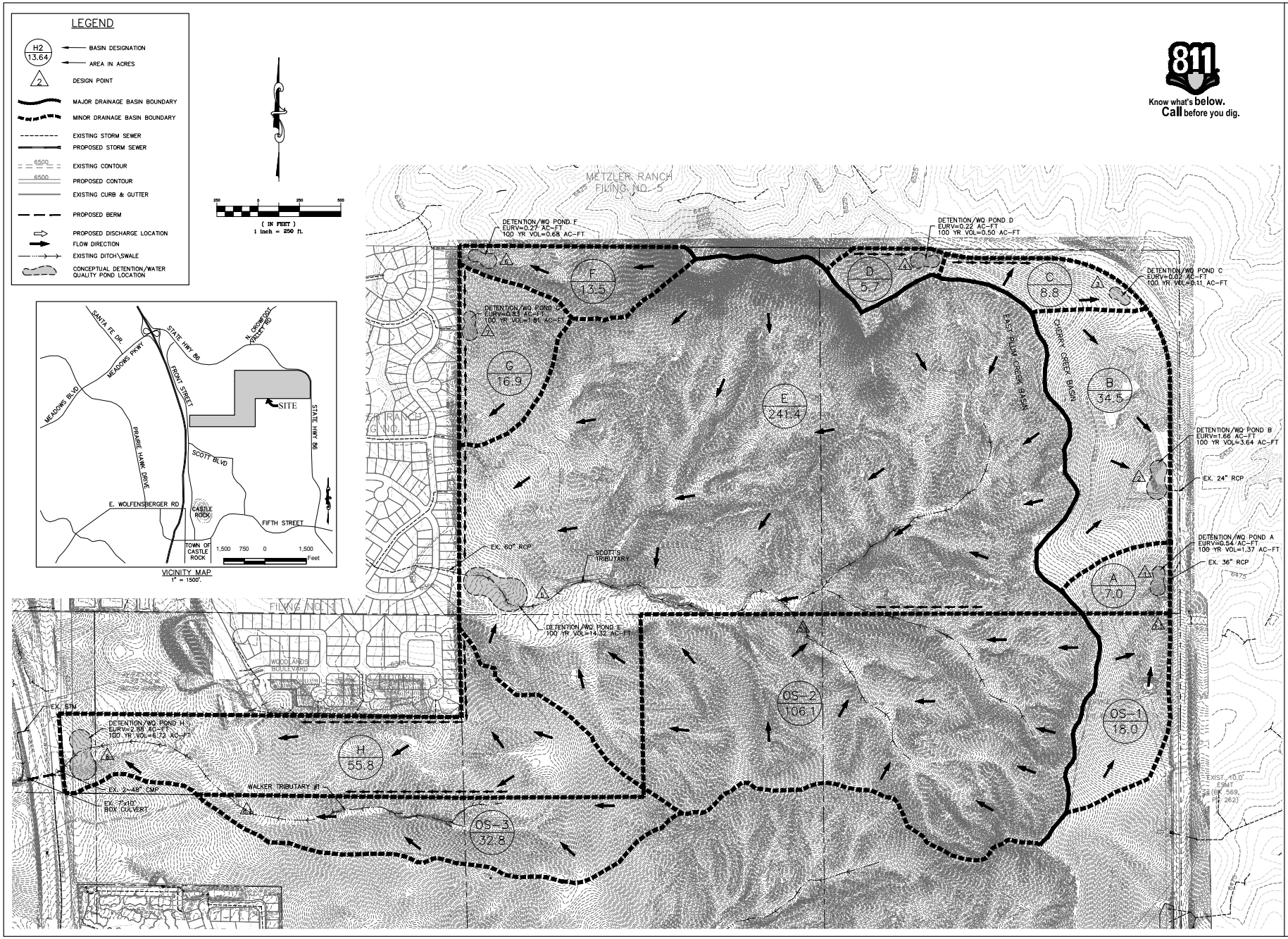
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PIONEER RANCH
TOWN OF CASTLE ROCK, COLORADO
PHASE I DRAINAGE PLAN

NO.	REVISION	DATE	BY

ATWELL
www.atwell-group.com

DATE: 10/30/15
JOB NO: 15001404
DRAWN BY: GDB
APPROVED:
CADD FILE:



NO.	REVISION	DATE	BY

PIONEER RANCH

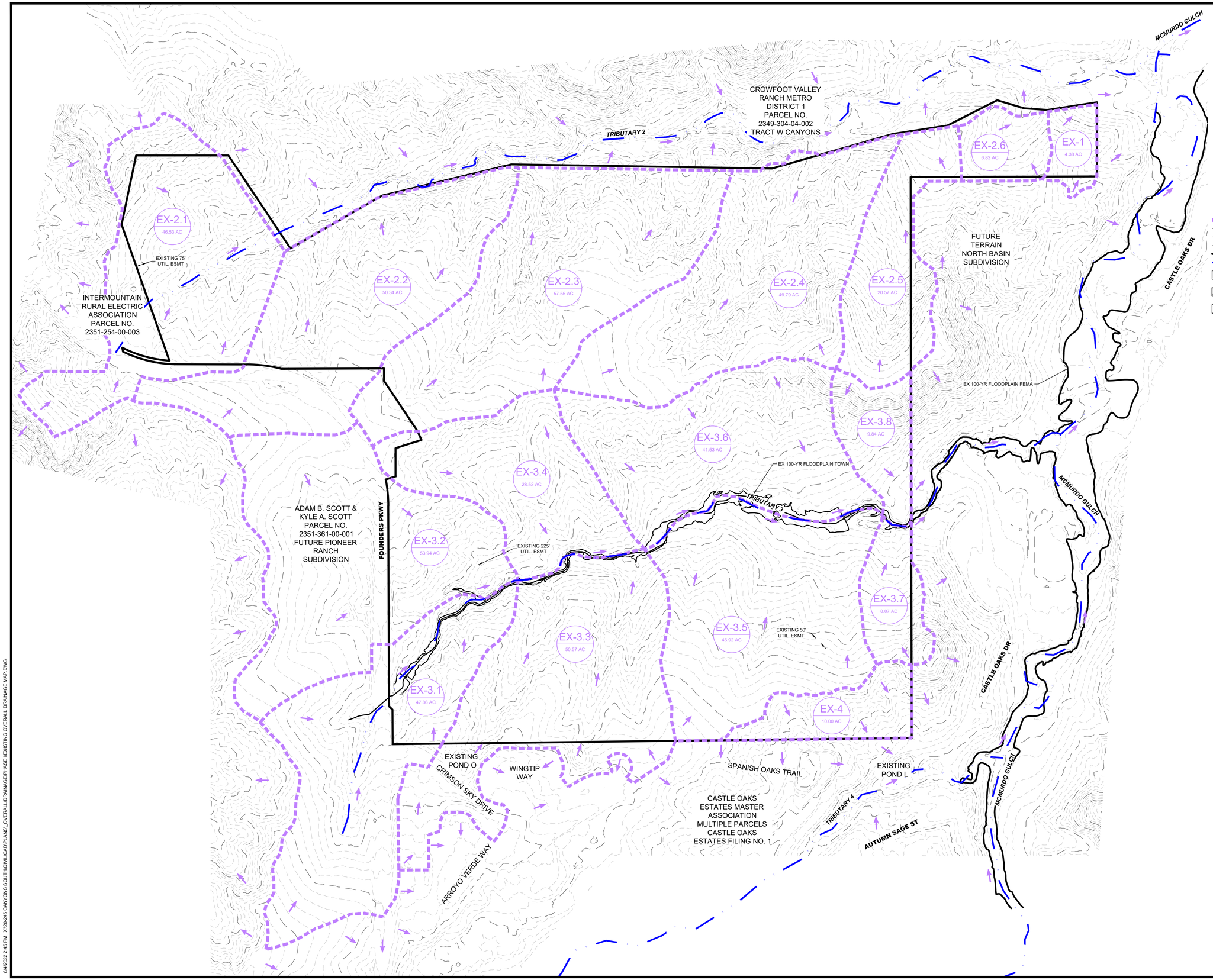
TOWN OF CASTLE ROCK, COLORADO

PHASE I DRAINAGE PLAN

ATWELL

DATE: 10/30/15
JOB NO: 15001404
DRAWN BY: GDB
APPROVED:
CADD FILE:

Appendix C
Drainage Maps
Major Drainageway Delineation Exhibit



CORE CONSULTANTS. INC.
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A	FOR REVIEW	9/2021	KJR
B	FOR REVIEW	3/1/2022	KJR
C	FOR REVIEW	3/25/2022	KJR
D	FOR REVIEW	8/4/2022	KJR

CANYONS SOUTH
CASTLE ROCK, COLORADO

PHASE I DRAINAGE REPORT
EXISTING OVERALL DRAINAGE MAP

NOT FOR CONSTRUCTION

DESIGNED BY: DJB
DRAWN BY: DJB
CHECKED BY: KJR

JOB NO.
20-245

SHEET
1 OF 10

8/4/2022 2:45 PM X:\20-245 CANYONS SOUTH\CIVIL\CAD\PLANS_OVERALL\DRAINAGE\PHASE I\EXISTING OVERALL DRAINAGE MAP.DWG

SHEET 3

SHEET 4

SHEET 5

SHEET 6

SHEET 7

SHEET 8

SHEET 9

SHEET 10

CROWFOOT VALLEY RANCH METRO DISTRICT 1
PARCEL NO. 2349-304-04-002
TRACT W CANYONS

INTERMOUNTAIN RURAL ELECTRIC ASSOCIATION
PARCEL NO. 2351-254-00-003

ADAM B. SCOTT & KYLE A. SCOTT
PARCEL NO. 2351-361-00-001
FUTURE PIONEER RANCH SUBDIVISION

FUTURE TERRAIN NORTH BASIN SUBDIVISION

CASTLE OAKS ESTATES MASTER ASSOCIATION
MULTIPLE PARCELS
CASTLE OAKS ESTATES FILING NO. 1

Z-1 32.32 AC
Z-2 11.08 AC
Z-3 11.29 AC
Z-4 9.32 AC
Z-5 6.82 AC
Z-6 4.38 AC
Z-7 8.64 AC
A-1 13.57 AC
A-2 16.96 AC
B 16.83 AC
C 25.34 AC
D 30.31 AC
E 31.09 AC
F 11.78 AC
G 206.01 AC
H 5.62 AC
OS-1 5.70 AC
OS-2 8.80 AC
OS-3 34.50 AC
OS-4 25.00 AC
OS-5 4.03 AC
OS-6 9.13 AC
OS-7 4.12 AC

PA-1 15.8 AC
PA-2 74.7 AC
PA-3 10.6 AC
PA-4 51.5 ac
PA-5 12.5 ac

POND A1
POND A2
POND B
POND C
POND D
POND E
POND F
POND H
EXISTING POND O
EXISTING POND L

EXISTING 75' UTIL. ESMT
EXISTING 20' WATER ESMT
EXISTING 225' UTIL. ESMT
EXISTING 50' UTIL. ESMT
EX 100 YR FLOODPLAIN TOWN
EX 100 YR FLOODPLAIN FEMA

FOUNDERS PKWY
MCMURDO GULCH
TRIBUTARY 2
TRIBUTARY 3
TRIBUTARY 4
CASTLE OAKS DR
WINGTIP WAY
CRIMSON SKY DRIVE
ARROYO VERDE WAY
SPANISH OAKS TRAIL
AUTUMN SAGE ST

0 300' 600'
1 inch = 300 ft.

LEGEND

EXISTING	PROPOSED	
X	X	BASIN DESIGNATION
XX.XX	XX.XX	BASIN AREA
		DIRECTIONAL FLOW ARROW
		EMERGENCY OVERFLOW ROUTE
		PROPOSED DRAINAGE BASIN
		EXISTING DRAINAGE BASIN
5280		EXISTING MAJOR CONTOUR
5279		EXISTING MINOR CONTOUR
		EXISTING EASEMENT
		PROJECT BOUNDARY
		100 YEAR FLOODPLAIN
		WETLAND
		DRAINAGEWAY
		PLANNING AREA BOUNDARY
		EX.100 YEAR FLOODPLAIN FEMA
		EX.100 YEAR FLOODPLAIN TOWN
		WETLANDS
		APPROXIMATE LOCATION OF PROPOSED DETENTION POND

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C	FOR REVIEW	KJR	3/25/2022
D	FOR REVIEW	KJR	8/4/2022

CANYONS SOUTH
CASTLE ROCK, COLORADO

PHASE I DRAINAGE REPORT
PROPOSED OVERALL DRAINAGE MAP

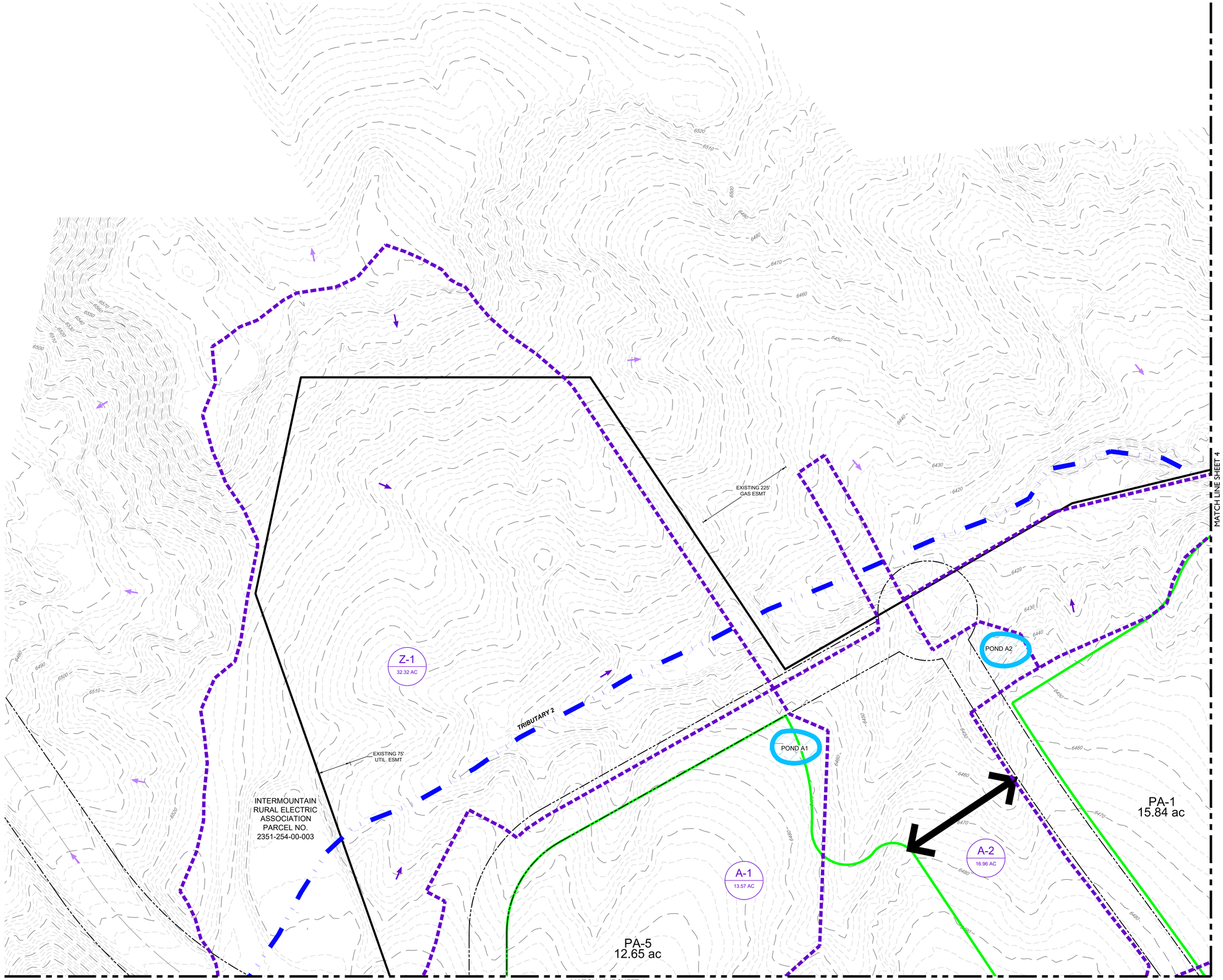
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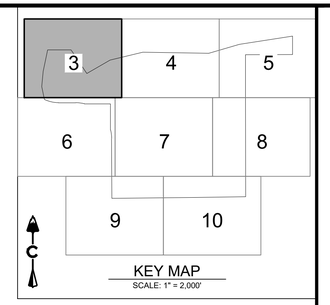
DESIGNED BY: DJB
DRAWN BY: DJB
CHECKED BY: KJR

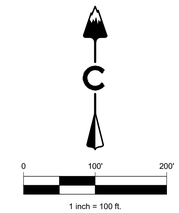
JOB NO. 20-245

SHEET 2 OF 10

8/4/2022 2:45 PM X:\20-245 CANYONS SOUTH\CIVIL\CAD\PLANS_OVERALL\DRAINAGE\PHASE I\PROPOSED OVERALL DRAINAGE MAP.DWG







LEGEND

EXISTING / PROPOSED

- BASIN DESIGNATION (X / XX.XX)
- BASIN AREA
- DIRECTIONAL FLOW ARROW
- EMERGENCY OVERFLOW ROUTE
- PROPOSED DRAINAGE BASIN
- EXISTING DRAINAGE BASIN
- EXISTING MAJOR CONTOUR (5280)
- EXISTING MINOR CONTOUR (5279)
- EXISTING EASEMENT
- PROJECT BOUNDARY
- DRAINAGEWAY
- PROPOSED PLANNING AREAS
- EX 100-YEAR FLOODPLAIN FEMA
- EX 100-YEAR FLOODPLAIN TOWN
- DELINEATED WETLANDS
- APPROXIMATE LOCATION OF PROPOSED DETENTION POND

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CANYONS SOUTH
CASTLE ROCK, COLORADO

PHASE I DRAINAGE REPORT
PROPOSED DETAILED DRAINAGE MAP

NOT FOR CONSTRUCTION

DESIGNED BY: DJB
DRAWN BY: DJB
CHECKED BY: KJR

JOB NO. 20-245

SHEET 3 OF 10

8/4/2022 2:45 PM X:\20-245 CANYONS SOUTH\CIVIL\CADPLANS_OVERALL\DRAINAGE\PHASE I\PROPOSED DETAILED DRAINAGE MAPS.DWG

MATCH LINE SHEET 3

MATCH LINE SHEET 5

MATCH LINE SHEET 7

CROWFOOT VALLEY
RANCH METRO
DISTRICT 1
PARCEL NO.
2349-304-04-002
TRACT W CANYONS

TRIBUTARY 2

POND B

POND C

POND D

POND E

Z-2
11.08 AC

B
16.83 AC

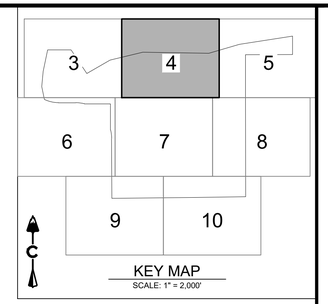
C
25.34 AC

D
30.31 AC

E
31.09 AC

PA-1
15.84 ac

PA-2
76.02 ac



KEY MAP
SCALE: 1" = 2,000'

C

0 100' 200'

1 inch = 1 ft.

LEGEND

EXISTING	PROPOSED	
X / XX.XX	X / XX.XX	BASIN DESIGNATION / BASIN AREA
		DIRECTIONAL FLOW ARROW
		EMERGENCY OVERFLOW ROUTE
		PROPOSED DRAINAGE BASIN
		EXISTING DRAINAGE BASIN
5280		EXISTING MAJOR CONTOUR
5279		EXISTING MINOR CONTOUR
		EXISTING EASEMENT
		PROJECT BOUNDARY
		DRAINAGEWAY
		PROPOSED PLANNING AREAS
		EX 100-YEAR FLOODPLAIN FEMA
		EX 100-YEAR FLOODPLAIN TOWN
		DELINEATED WETLANDS
		APPROXIMATE LOCATION OF PROPOSED DETENTION POND

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ENGLEWOOD, CO 80113
303.703.4444
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B	FOR REVIEW	3/1/2022	KJR
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D	FOR REVIEW	8/4/2022	KJR

CANYONS SOUTH
CASTLE ROCK, COLORADO

PHASE I DRAINAGE REPORT
PROPOSED DETAILED DRAINAGE MAP

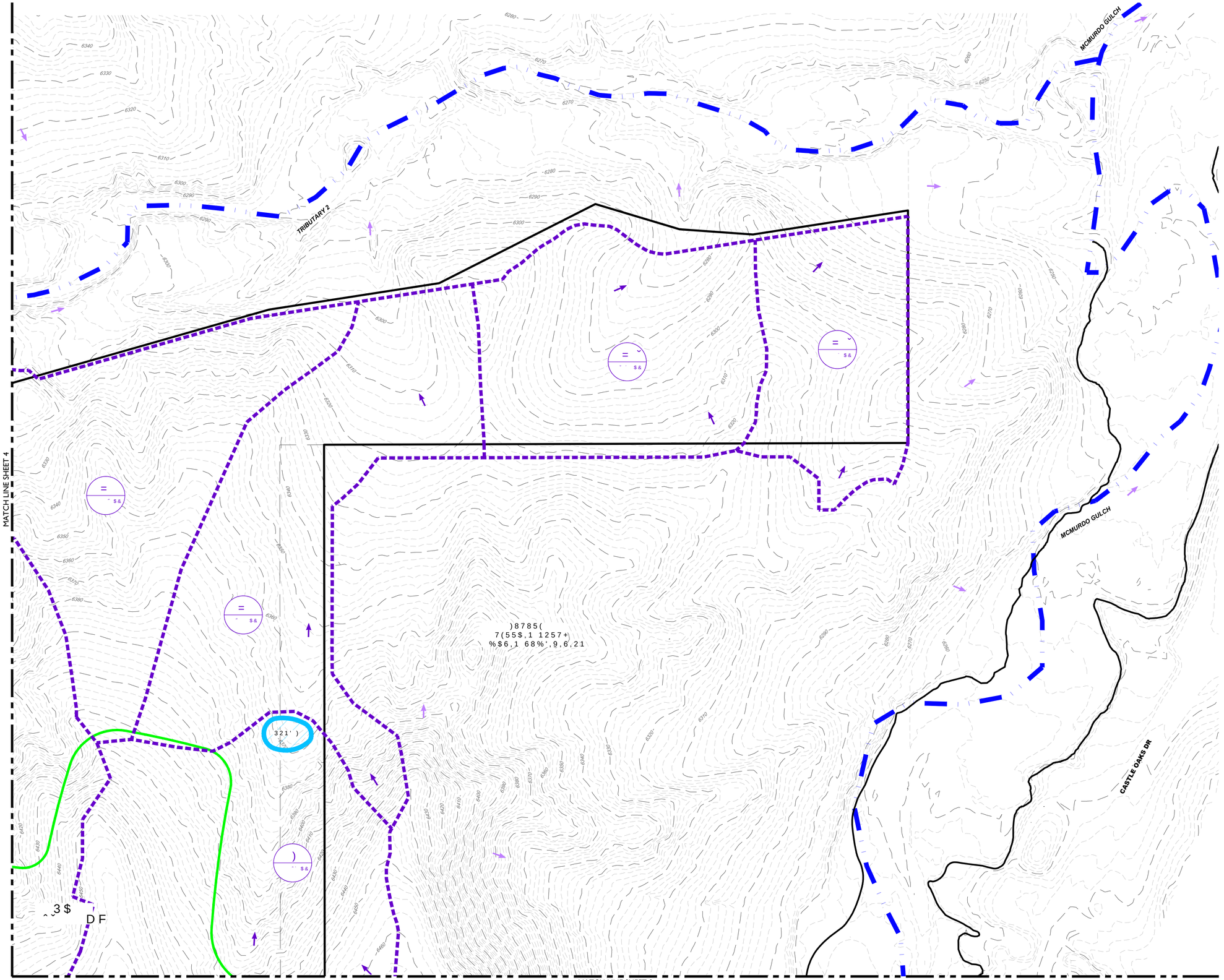
NOT FOR CONSTRUCTION

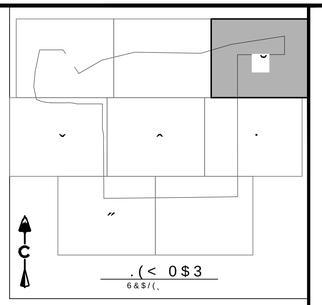
DESIGNED BY: DJB
DRAWN BY: DJB
CHECKED BY: KJR

JOB NO.
20-245

SHEET
4 OF 10

8/4/2022 2:45 PM X:\20-245 CANYONS SOUTH\CIVIL\LOADI\PLANS_OVERALL\DRAINAGE\PHASE I\PROPOSED DETAILED DRAINAGE MAPS.DWG





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CANYONS SOUTH
CASTLE ROCK, COLORADO

PHASE I DRAINAGE REPORT
PROPOSED DETAILED DRAINAGE MAP

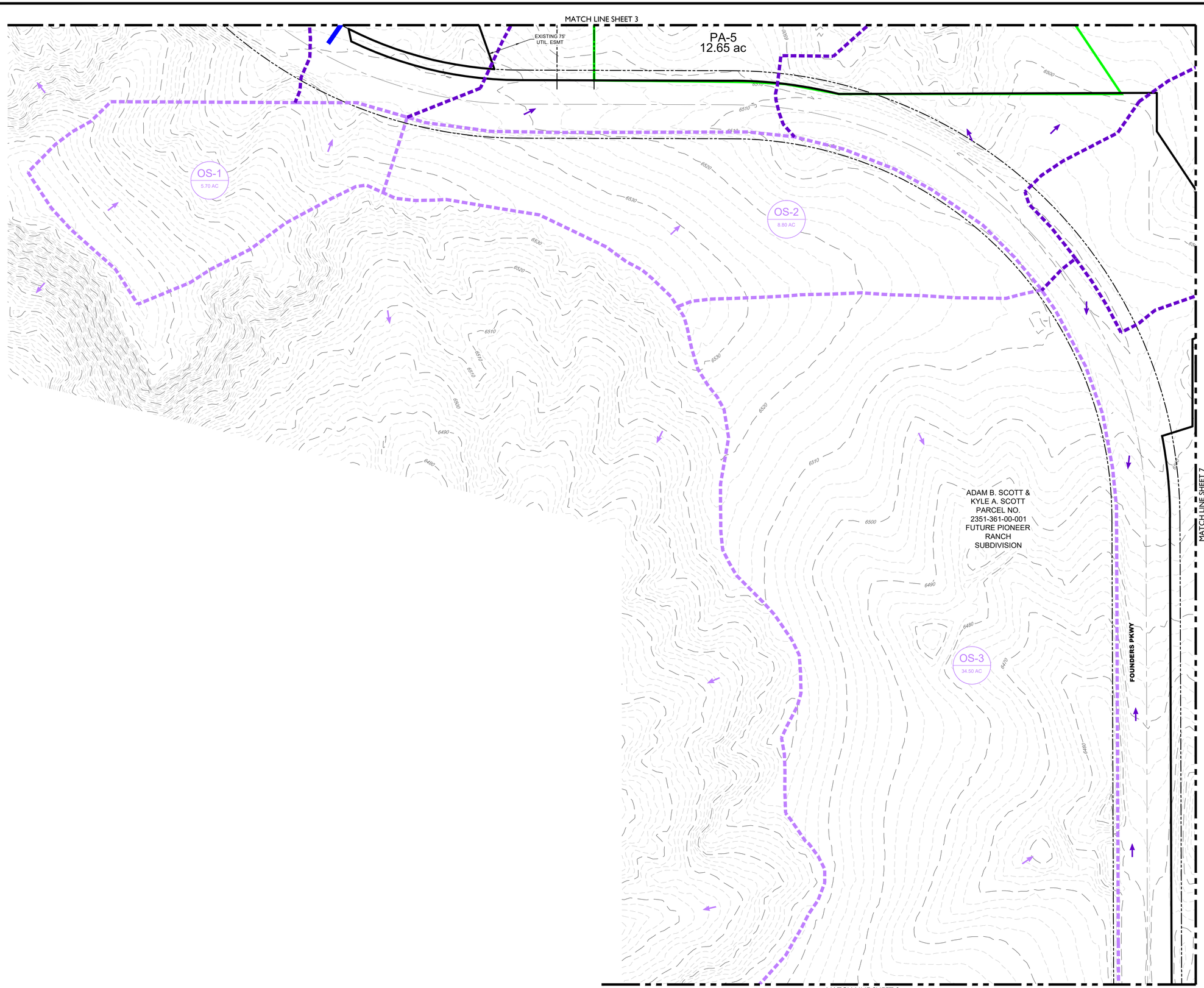
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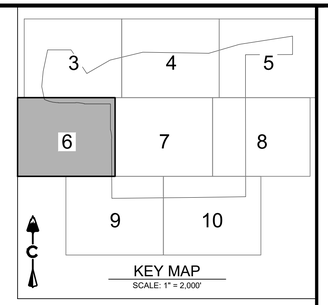
DESIGNED BY: DJB
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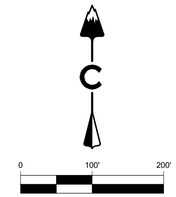
JOB NO.
20-245

SHEET
5 OF 10

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LEGEND

EXISTING	PROPOSED	
X / XX.XX	X / XX.XX	BASIN DESIGNATION / BASIN AREA
		DIRECTIONAL FLOW ARROW
		EMERGENCY OVERFLOW ROUTE
		PROPOSED DRAINAGE BASIN
		EXISTING DRAINAGE BASIN
5280		EXISTING MAJOR CONTOUR
5279		EXISTING MINOR CONTOUR
		EXISTING EASEMENT
		PROJECT BOUNDARY
		DRAINAGEWAY
		PROPOSED PLANNING AREAS
		EX 100-YEAR FLOODPLAIN FEMA
		EX 100-YEAR FLOODPLAIN TOWN
		DELINEATED WETLANDS
		APPROXIMATE LOCATION OF PROPOSED DETENTION POND

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CANYONS SOUTH
CASTLE ROCK, COLORADO

PHASE I DRAINAGE REPORT
PROPOSED DETAILED DRAINAGE MAP

NOT FOR CONSTRUCTION

DESIGNED BY: DJB
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CHECKED BY: KJR

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20-245

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6 OF 10

8/4/2022 2:45 PM X:\20-245 CANYONS SOUTH\CIVIL\CAD\PLANS_OVERALLDRAINAGE\PHASE I\PROPOSED DETAILED DRAINAGE MAPS.DWG

MATCH LINE SHEET 4

MATCH LINE SHEET 6

MATCH LINE SHEET 8

MATCH LINE SHEET 9

MATCH LINE SHEET 10

PA-2
76.02 ac

PA-3
10.61 ac

PA-4
58.99 ac

PA-4
58.99 ac

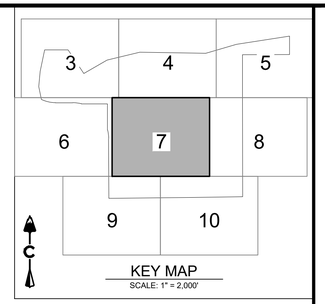
G
206.01 AC

TRIBUTARY 3

EX. 100 YR FLOODPLAIN TOWN

EXISTING 20' WATER ESMT

EXISTING 225' GAS ESMT



KEY MAP
SCALE: 1" = 2,000'

C

0 100' 200'

1 inch = 100 ft.

LEGEND

EXISTING	PROPOSED	
X / XX.XX	X / XX.XX	BASIN DESIGNATION / BASIN AREA
		DIRECTIONAL FLOW ARROW
		EMERGENCY OVERFLOW ROUTE
		PROPOSED DRAINAGE BASIN
		EXISTING DRAINAGE BASIN
5280		EXISTING MAJOR CONTOUR
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CANYONS SOUTH
CASTLE ROCK, COLORADO

PHASE I DRAINAGE REPORT
PROPOSED DETAILED DRAINAGE MAP

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CHECKED BY: KJR

JOB NO.
20-245

SHEET
7 OF 10

8/4/2022 2:45 PM X:\20-245 CANYONS SOUTH\CIVIL\CAD\PLANS_OVERALL DRAINAGE\PHASE I\PROPOSED DETAILED DRAINAGE MAPS.DWG

MATCH LINE SHEET 5

PA-2
76.02 ac

PA-3
10.61 ac

PA-4
58.99 ac

MATCH LINE SHEET 7

MATCH LINE SHEET 10

EX. 100 YR FLOODPLAIN FEMA

EX. 100 YR FLOODPLAIN TOWN

EXISTING 50' UTIL. ESMT

TRIBUTARY 3

POND G

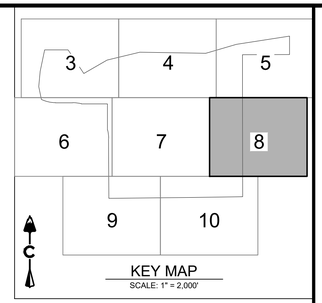
POND H

H
5.62 AC

CASTLE OAKS DR
(FUTURE ALIGNMENT)

CASTLE OAKS DR

MCMURDO GULCH



KEY MAP
SCALE: 1" = 2,000'

C

0 100' 200'

1 inch = 100 ft.

LEGEND

EXISTING	PROPOSED	
X / XX.XX	X / XX.XX	BASIN DESIGNATION / BASIN AREA
		DIRECTIONAL FLOW ARROW
		EMERGENCY OVERFLOW ROUTE
		PROPOSED DRAINAGE BASIN
		EXISTING DRAINAGE BASIN
5280		EXISTING MAJOR CONTOUR
5279		EXISTING MINOR CONTOUR
		EXISTING EASEMENT
		PROJECT BOUNDARY
		DRAINAGEWAY
		PROPOSED PLANNING AREAS
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		DELINEATED WETLANDS
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CANYONS SOUTH
CASTLE ROCK, COLORADO

PHASE I DRAINAGE REPORT
PROPOSED DETAILED DRAINAGE MAP

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8 OF 10

8/4/2022 2:45 PM X:\20-245 CANYONS SOUTH\CIVIL\LOADPLANS_OVERALL\DRAINAGE\PHASE I\PROPOSED DETAILED DRAINAGE MAPS.DWG

MATCH LINE SHEET 6

MATCH LINE SHEET 7

MATCH LINE SHEET 10

OS-3
34.50 AC

OS-4
25.00 AC

OS-5
4.03 AC

OS-6
9.13 AC

OS-7
4.12 AC

PA-4
58.99 ac

EX. 100 YR FLOODPLAIN TOWN

ADAM B. SCOTT &
KYLE A. SCOTT
PARCEL NO.
2351-361-00-001
FUTURE PIONEER
RANCH
SUBDIVISION

EXISTING
POND O

EXISTING 225'
GAS ESMT

CASTLE OAKS
ESTATES MASTER
ASSOCIATION
MULTIPLE PARCELS
CASTLE OAKS
ESTATES FILING NO. 1

WINGTIP
WAY

CRIMSON SKY DRIVE

ARROYO VERDE WAY

TRIBUTARY 3

TRIBUTARY 4

6470
6480
6490
6500
6510

3 4 5
6 7 8
9 10

KEY MAP
SCALE: 1" = 2,000'

N

0 100' 200'

1 inch = 100 ft.

LEGEND

EXISTING	PROPOSED	
X XX.XX	X XX.XX	BASIN DESIGNATION BASIN AREA
		DIRECTIONAL FLOW ARROW
		EMERGENCY OVERFLOW ROUTE
		PROPOSED DRAINAGE BASIN
		EXISTING DRAINAGE BASIN
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		DELINEATED WETLANDS
		APPROXIMATE LOCATION OF PROPOSED DETENTION POND

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CANYONS SOUTH
CASTLE ROCK, COLORADO

PHASE I DRAINAGE REPORT
PROPOSED DETAILED DRAINAGE MAP

NOT FOR CONSTRUCTION

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CHECKED BY: KJR

JOB NO.
20-245

SHEET
9 OF 10

8/4/2022 2:45 PM X:\20-245 CANYONS SOUTH\CIVIL\CADPLANS_OVERALL\DRAINAGE\PHASE I\PROPOSED DETAILED DRAINAGE MAPS.DWG

MATCH LINE SHEET 7

MATCH LINE SHEET 8

MATCH LINE SHEET 9

PA-4
58.99 ac

EXISTING 50' UTIL. ESMT.

Z-7
8.64 AC

OS-7
4.12 AC

CASTLE OAKS DR

SPANISH OAKS TRAIL

EXISTING POND L

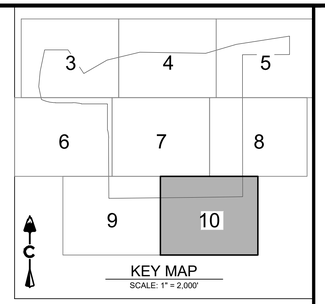
CASTLE OAKS ESTATES MASTER ASSOCIATION MULTIPLE PARCELS CASTLE OAKS ESTATES FILING NO. 1

EXISTING 225' GAS ESMT

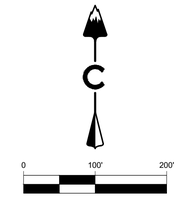
TRIBUTARY 4

AUTUMN SAGE ST

6450
6440
6430
6420
6410
6400
6390
6380
6370
6360
6350



KEY MAP
SCALE: 1" = 2,000'



1 inch = 100 ft.

LEGEND

EXISTING	PROPOSED	
X / XX.XX	X / XX.XX	BASIN DESIGNATION / BASIN AREA
		DIRECTIONAL FLOW ARROW
		EMERGENCY OVERFLOW ROUTE
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CANYONS SOUTH
CASTLE ROCK, COLORADO

PHASE I DRAINAGE REPORT
PROPOSED DETAILED DRAINAGE MAP

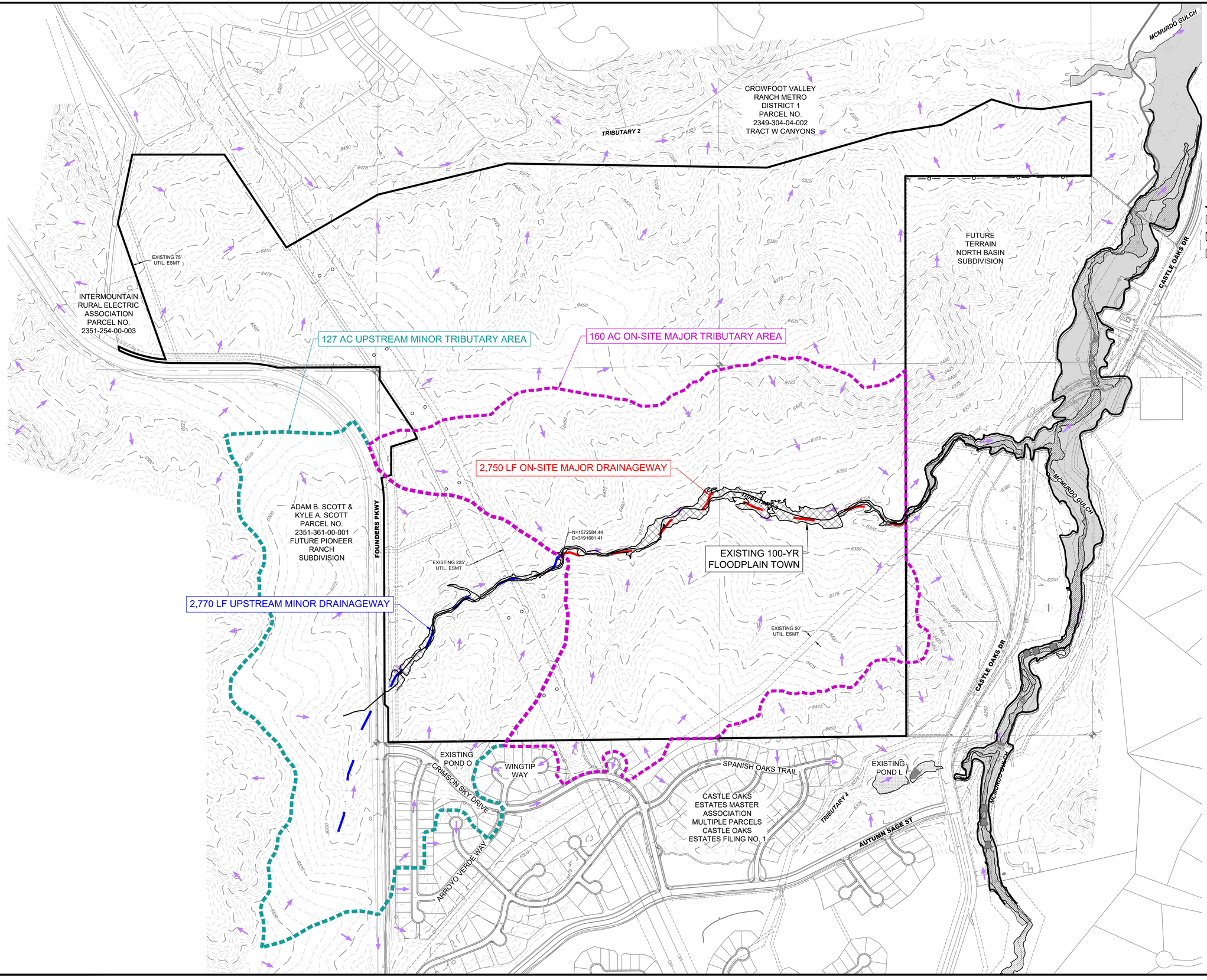
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SHEET
10 OF 10

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0 300' 600'
1 inch = 300 ft.

LEGEND

- DIRECTIONAL FLOW ARROW
- 5280 EXISTING MAJOR CONTOUR
- 5279 EXISTING MINOR CONTOUR
- EXISTING EASEMENT
- PROJECT BOUNDARY
- EX.100 YEAR FLOODPLAIN FEMA
- EX.100 YEAR FLOODPLAIN FEMA
- DELINEATED WETLANDS

0 50'
1 inch = 50 ft.

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MAJOR DRAINAGEWAY DELINEATION EXHIBIT

CANYONS SOUTH

DATE: 10/20/2021
CREATED BY: DJB
JOB NO. 20-245
SHEET 1 OF 1

2021-09-11 (4:25 PM) Caroline Van Horn X:\20-245 Canyons South\Civil\CAD\Exhibits_Overall\2021-10-20 Major Drainageway Delineation Major Drainageway Delineation Exhibit.dwg