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.

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INTRODUCTION

The purpose of this report is to present a Phase I Drainage Study for Pioneer Ranch. This study has been prepared to support the annexation and zoning applications of the project in the Town of Castle Rock. This report outlines a general stormwater management plan for the site. Included within this report is an overall drainage plan for the site along with reference information for drainage basins and stormwater conveyance facilities.

GENERAL LOCATION AND DESCRIPTION

Pioneer Ranch is previously known as the Scott Parcels and is located on the east side of I-25 between the Wolfensberger Road exit and the Founders Parkway exit, north of the downtown area of Castle Rock. There are four platted parcels within the overall site boundary. Parcels A, B, C and D consist of approximately 388 acres located within portions of Sections 35 and 36, Township 7 South, Range 67 West of the 6th Principle Meridian, Douglas County, Colorado. These four parcels are bounded by unplatted agricultural land to the south (Walker Parcels also known as Pine Canyon), Front Street to the west, Founders Parkway to the east, and the Hazen Moore and Metzler Ranch subdivisions to the west and north. Refer to the attached vicinity map, annexation map and overall Phase 1 drainage Map for additional location information.

The Walker and Scott Tributaries are drainageways within the proposed site that flow east to west across the parcels discharging into East Plum Creek, west of I-25. Stabilization of the existing waterways may be required to convey developed flows, which will be determined in subsequent drainage studies. No other major drainageways, existing irrigation ditches, or canals cross the parcels. Parcel A consists of the Castle Rock ridgeline in the eastern portion of the property, approximately 800-feet west of Founders Parkway. Areas east of the ridge drain to the east into the Cherry Creek Basin, areas west of the ridge drain to the west to the East Plum Creek Basin.

Pioneer Ranch is currently undeveloped land that is covered with natural grasses, ponderosa pine, and rock outcroppings. The existing terrain is divided into two major basins. The far eastern basin generally slopes towards Founders Parkway and stormwater ultimately flows to Cherry Creek. Flows from the remainder of the site is conveyed to the west within existing swtorm drains and culvert crossings of the interstate and ultimately to East Plum Creek. There are no existing irrigation or drainage facilities on the site.

The site lies entirely within Zone X, which is designated as outside the 500-year floodplain as determined by FEMA (Reference 3). Please refer to the FEMA panel and documentation in the appendix for additional information.

Onsite soil types and characteristics are illustrated in the Web Soil Survey found on the National Resource Conservation Service (NRCS) website. The site is comprised of soils in the Hydrologic Soil Groups C and D. The majority of the D soils are located west of the ridge in the site. The C soils are located east of the ridge (along Founders Parkway). Significant geologic features include the rock outcroppings along the ridgeline within the site.

Upon development, Pioneer Ranch will be occupied by mixed use development including multi-family and single-family residential lots, commercial areas, parks, roadways and other infrastructure. Refer to the attached Conceptual Zoning Map for additional information.

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.

REFERENCES

1) Storm Drainage Design And Technical Criteria Manual, Town of Castle Rock; latest edition.

2) Urban Storm Drainage Criteria Manuals; Urban Drainage and Flood Control District; latest edition.

3) Flood Insurance Rate Map of Douglas County Colorado, Federal Emergency Management Agency, Panel Nos. 08035C0188F and 08035C0189F, September 30, 2005.

4) Final Drainage Report for Metzler Ranch Filing No. 1; Rocky Mountain Consultants; February 1998.

5) Phase III Drainage Study for Hazen Moore Subdivision Filing No. 2; Tetratech RMC, Inc.; June 17, 2003.

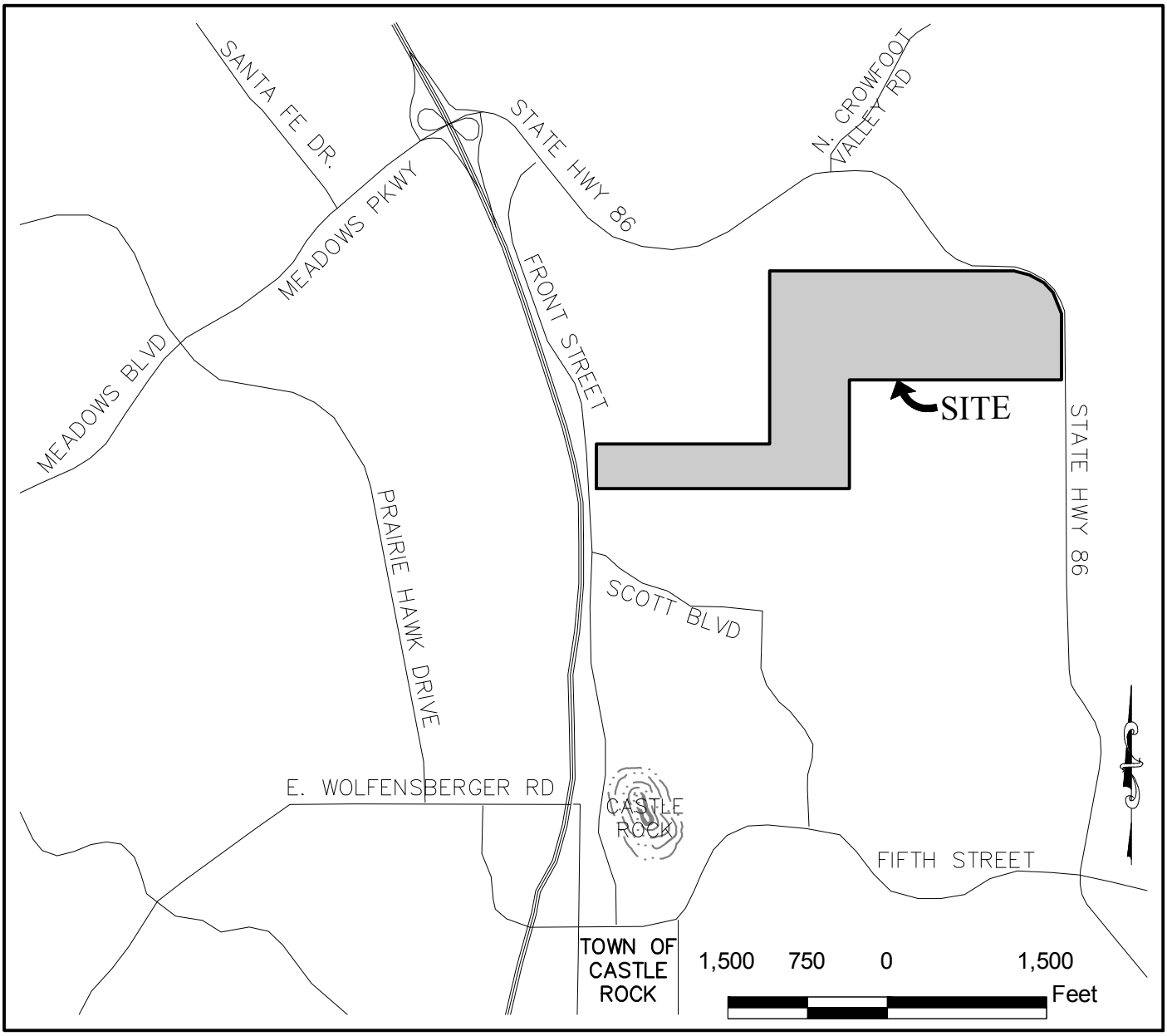
6) Castle Oaks Estates Filing No. 1 Phase III Drainage Report; Nolte & Associates; September 25, 2003.

7) Castle Oaks Estates Filing No. 1- Amendment No. 2 Phase III Drainage Report; Nolte & Associates; June, 2006.

8) Hangmans Gulch and Parkview Tributary Drainageway Master Plan ; Enginuity; March 8, 2013.

APPENDIX A

MAPS, TABLES AND FIGURES



VICINITY MAP

1" = 1500'.

SCOTT PROPERTY

OVERALL BOUNDARY EXHIBIT

PROPERTY DESCRIPTIONS:

PROPERTY DESCRIPTION: (PARCEL A)
ALL THAT PART OF THE NORTH 1/2 OF SECTION 36, TOWNSHIP 7 SOUTH, RANGE 67 WEST OF THE 6TH PRINCIPAL MERIDIAN, DOUGLAS COUNTY, COLORADO, LYING WESTERLY AND SOUTHERLY OF MILLER BOULEVARD FILING NO. 2 FINAL PLAT AS RECORDED UNDER RECEPTION NO. 8603133, MARCH 27, 1986, DOUGLAS COUNTY CLERK AND RECORDER OFFICE.
CONTAINING 309.71 ACRES, MORE OR LESS.

PROPERTY DESCRIPTION: (PARCEL B)
A TRACT OF LAND SITUATED IN THE NORTHWEST 1/4 OF THE SOUTHWEST 1/4 OF SECTION 36, TOWNSHIP 7 SOUTH, RANGE 67 WEST OF THE 6TH PRINCIPAL MERIDIAN, DOUGLAS COUNTY, COLORADO MORE PARTICULARLY DESCRIBED AS FOLLOWS:
BEGINNING AT THE NORTHWEST CORNER OF THE SOUTHWEST 1/4 OF SAID SECTION 36 AND CONSIDERING THE WEST LINE OF SAID NORTHWEST 1/4 OF THE SOUTHWEST 1/4 TO BEAR S01°33'36"E WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;
THENCE S01°33'36"E ALONG SAID WEST LINE A DISTANCE OF 744.14 FEET;
THENCE S89°27'39"E A DISTANCE OF 1311.92 FEET TO THE EAST LINE OF SAID NORTHWEST 1/4 OF THE SOUTHWEST 1/4;
THENCE N01°00'03"W ALONG SAID EAST LINE A DISTANCE OF 759.11 FEET TO THE NORTHEAST CORNER OF SAID NORTHWEST 1/4 OF THE SOUTHWEST 1/4;
THENCE ALONG THE NORTH LINE OF SAID SOUTHWEST 1/4, N89°52'44"W A DISTANCE OF 1318.86 FEET TO THE POINT OF BEGINNING.
CONTAINING 22.69 ACRES, MORE OR LESS.

PROPERTY DESCRIPTION: (PARCEL C)
THE NORTHWEST 1/4 OF THE SOUTHWEST 1/4 OF SECTION 36, TOWNSHIP 7 SOUTH, RANGE 67 WEST OF THE 6TH PRINCIPAL MERIDIAN, DOUGLAS COUNTY, COLORADO;
EXCEPT THAT PORTION DESCRIBED AS FOLLOWS:
BEGINNING AT THE NORTHWEST CORNER OF THE SOUTHWEST 1/4 OF SAID SECTION 36 AND CONSIDERING THE WEST LINE OF SAID NORTHWEST 1/4 OF THE SOUTHWEST 1/4 TO BEAR S01°33'36"E WITH ALL BEARINGS CONTAINED HEREIN RELATIVE THERETO;
THENCE S01°33'36"E ALONG SAID WEST LINE A DISTANCE OF 744.14 FEET;
THENCE S89°27'39"E A DISTANCE OF 1311.92 FEET TO THE EAST LINE OF SAID NORTHWEST 1/4 OF THE SOUTHWEST 1/4;
THENCE N01°00'03"W ALONG SAID EAST LINE A DISTANCE OF 759.11 FEET TO THE NORTHEAST CORNER OF SAID NORTHWEST 1/4 OF THE SOUTHWEST 1/4;
THENCE ALONG THE NORTH LINE OF SAID SOUTHWEST 1/4, N89°52'44"W A DISTANCE OF 1318.86 FEET TO THE POINT OF BEGINNING.
CONTAINING 17.28 ACRES, MORE OR LESS.

PROPERTY DESCRIPTION: (PARCEL D)
ALL THAT PART OF THE NORTH 1/2 OF THE SOUTH 1/2 OF SECTION 35, TOWNSHIP 7 SOUTH, RANGE 67 WEST OF THE 6TH PRINCIPAL MERIDIAN, DOUGLAS COUNTY, COLORADO, LYING EASTERLY OF THE EAST RIGHT OF WAY LINE OF INTERSTATE HIGHWAY 25.
EXCEPT THAT PORTION DESCRIBED IN BOOK 911 AT PAGE 357, IN THE DOUGLAS COUNTY CLERK AND RECORDER OFFICE;
CONTAINING 38.75 ACRES, MORE OR LESS.

PROPERTY DESCRIPTION: (PARCEL E)
A PORTION OF THE SOUTHWEST 1/4 OF SECTION 35, TOWNSHIP 7 SOUTH, RANGE 67 WEST OF THE 6TH PRINCIPAL MERIDIAN, DOUGLAS COUNTY COLORADO BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTH 1/4 CORNER OF SAID SECTION 35;
THENCE N89°09'30"W, A DISTANCE OF 573.76 FEET, TO THE WESTERLY RIGHT OF WAY LINE OF INTERSTATE HIGHWAY 25 AND THE TRUE POINT OF BEGINNING;
THENCE CONTINUING ALONG THE SOUTH LINE OF SAID SOUTHWEST 1/4, N89°09'30"W, A DISTANCE OF 453.47 FEET TO THE EASTERLY RIGHT OF WAY LINE OF LIGGETT ROAD(COLORADO STATE HIGHWAY NO. 1);
THENCE ALONG SAID EASTERLY RIGHT OF WAY LINE, N28°23'31"W, A DISTANCE OF 1,508.77 FEET TO THE NORTH LINE OF THE SOUTH 1/2 OF THE SOUTHWEST 1/4 OF SAID SECTION 35;
THENCE ALONG SAID NORTH LINE, S89°18'36"E, A DISTANCE OF 1,118.69 FEET TO THE WESTERLY RIGHT OF WAY LINE OF INTERSTATE 25;
THENCE ALONG SAID WESTERLY RIGHT OF WAY LINE, S42°44'04"E, A DISTANCE OF 21.32 FEET;
THENCE S05°22'15"E, A DISTANCE OF 15.02 FEET;
THENCE S05°08'16"E, A DISTANCE OF 489.61 FEET;
THENCE S10°54'35"E, A DISTANCE OF 362.78 FEET;
THENCE S00°02'41"E, A DISTANCE OF 388.23 FEET;
THENCE S52°55'22"W, A DISTANCE OF 95.81 FEET TO THE SOUTH LINE OF SAID SOUTHWEST 1/4 AND THE TRUE POINT OF BEGINNING.
CONTAINING 25.47 AC. MORE OR LESS.

PROPERTY DESCRIPTION: (PARCEL F)
A PORTION OF THE NORTHWEST 1/4 OF SECTION 2, TOWNSHIP 8 SOUTH, RANGE 67 WEST OF THE 6TH PRINCIPAL MERIDIAN, DOUGLAS COUNTY COLORADO BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTH 1/4 CORNER OF SAID SECTION 2;
THENCE ALONG THE NORTH LINE OF SAID NORTHWEST 1/4, N89°09'30"W, A DISTANCE OF 573.76 FEET TO THE WESTERLY RIGHT OF WAY LINE OF INTERSTATE HIGHWAY 25 AND THE TRUE POINT OF BEGINNING;
THENCE ALONG SAID WESTERLY RIGHT OF WAY LINE, S07°50'28"E, A DISTANCE OF 73.70 FEET;
THENCE S47°52'19"E, A DISTANCE OF 73.09 FEET;
THENCE S00°31'11"W, A DISTANCE OF 161.03 FEET;
THENCE N53°23'09"E, A DISTANCE OF 15.02 FEET;
THENCE S08°27'13"W, A DISTANCE OF 460.19 FEET;
THENCE S31°30'47"W, A DISTANCE OF 212.33 FEET;
THENCE N25°23'55"W, A DISTANCE OF 206.09 FEET TO THE BEGINNING POINT OF A NON-TANGENT CURVE TO THE LEFT HAVING A RADIUS OF 1940.00 FEET FROM WHICH THE RADIUS POINT BEARS SOUTH 82° 05' 27" WEST, THENCE LEFT ALONG SAID CURVE FOR AN ARC LENGTH OF 258.62 FEET, SAID CURVE HAVING A CHORD BEARING OF NORTH 11° 43' 41" WEST FOR 258.43 FEET;
THENCE N29°14'11"E, A DISTANCE OF 100.42 FEET TO THE BEGINNING POINT OF A NON-TANGENT CURVE TO THE RIGHT HAVING A RADIUS OF 1382.50 FEET FROM WHICH THE RADIUS POINT BEARS NORTH 50° 31' 11" EAST, THENCE RIGHT ALONG SAID CURVE FOR AN ARC LENGTH OF 288.74 FEET, SAID CURVE HAVING A CHORD BEARING OF NORTH 33° 29' 49" WEST FOR 288.22 FEET;
THENCE N40°20'46"W, A DISTANCE OF 76.06 FEET;
THENCE N28°23'31"W, A DISTANCE OF 104.35 FEET TO THE NORTH LINE OF THE NORTHWEST 1/4 OF SAID SECTION 2;
THENCE ALONG SAID NORTH LINE, N89°09'30"W, A DISTANCE OF 453.47 FEET TO THE TRUE POINT OF BEGINNING.
CONTAINING 5.75 AC. MORE OR LESS.

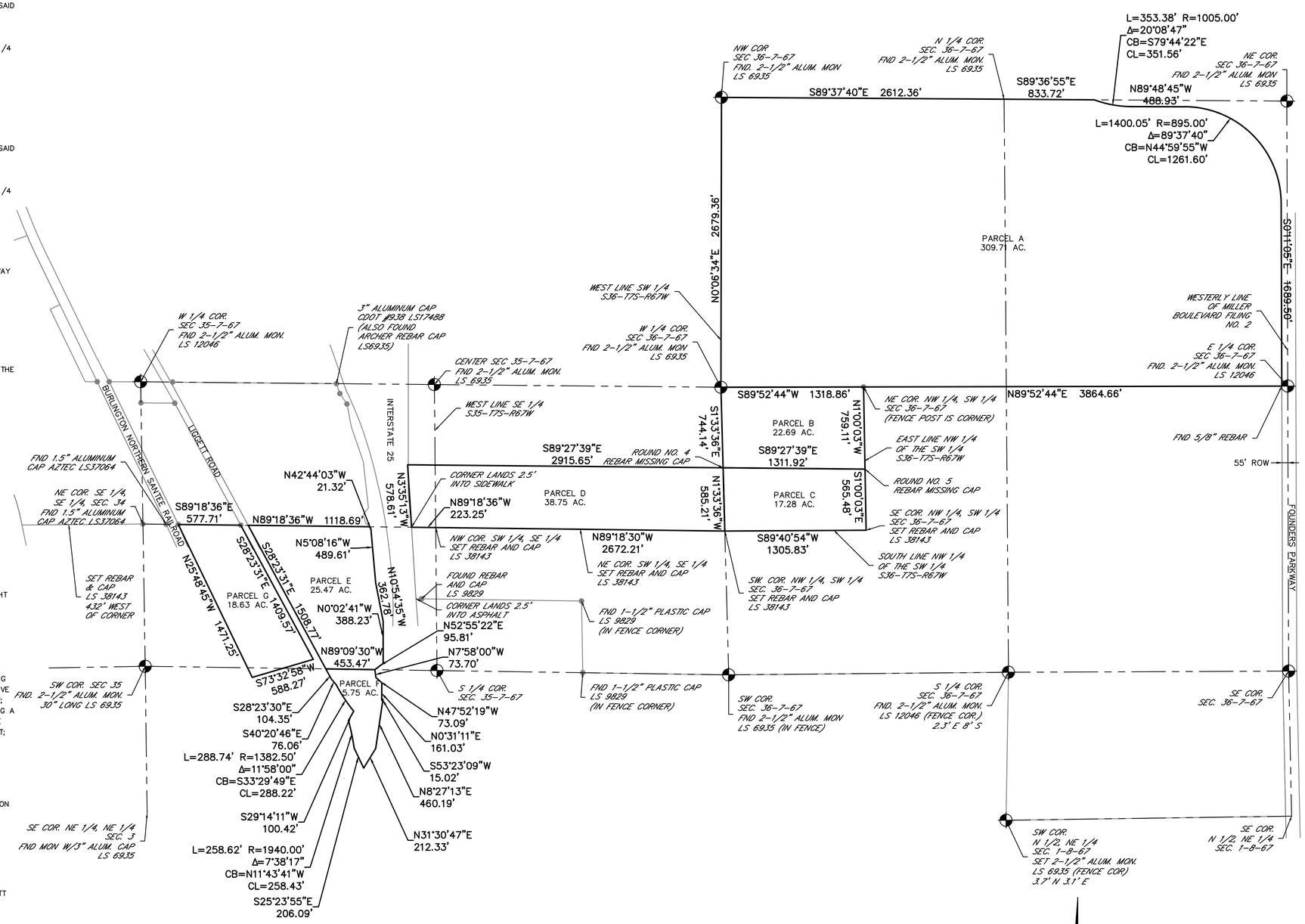
PROPERTY DESCRIPTION: (PARCEL G)
A PORTION OF THE SOUTHWEST 1/4 OF SECTION 35, TOWNSHIP 7 SOUTH, AND A PORTION OF THE NORTHWEST 1/4 OF SECTION 2, TOWNSHIP 8 SOUTH, ALL IN RANGE 67 WEST OF THE 6TH PRINCIPAL MERIDIAN, DOUGLAS COUNTY COLORADO BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE SOUTHWEST CORNER OF SAID SECTION 35;
THENCE ALONG THE SOUTH LINE OF SOUTHWEST 1/4, S89°09'30"E, A DISTANCE OF 945.96 FEET TO THE EASTERLY RIGHT OF WAY LINE OF THE DENVER & RIO GRANDE WESTERN RAILROAD RIGHT OF WAY AND THE TRUE POINT OF BEGINNING;
THENCE ALONG SAID EASTERLY RIGHT OF WAY LINE, N25°48'45"W, A DISTANCE OF 1471.25 FEET TO THE NORTH LINE OF THE SOUTH HALF OF SAID SOUTHWEST 1/4;
THENCE ALONG SAID NORTH LINE, S89°18'36"E, A DISTANCE OF 577.71 FEET TO THE WESTERLY RIGHT OF WAY LINE OF LIGGETT ROAD(COLORADO STATE HIGHWAY NO. 1);
THENCE ALONG SAID WESTERLY RIGHT OF WAY LINE, S28°23'31"E, A DISTANCE OF 1409.57 FEET;
THENCE S73°32'58"W, A DISTANCE OF 588.27 FEET TO SAID EASTERLY RIGHT OF WAY LINE;
THENCE ALONG SAID EASTERLY RIGHT OF WAY LINE, N25°48'45"W, A DISTANCE OF 98.99 FEET TO THE SOUTH LINE OF SAID SOUTHWEST 1/4 AND THE TRUE POINT OF BEGINNING.

CONTAINING 18.63 ACRES, MORE OR LESS.

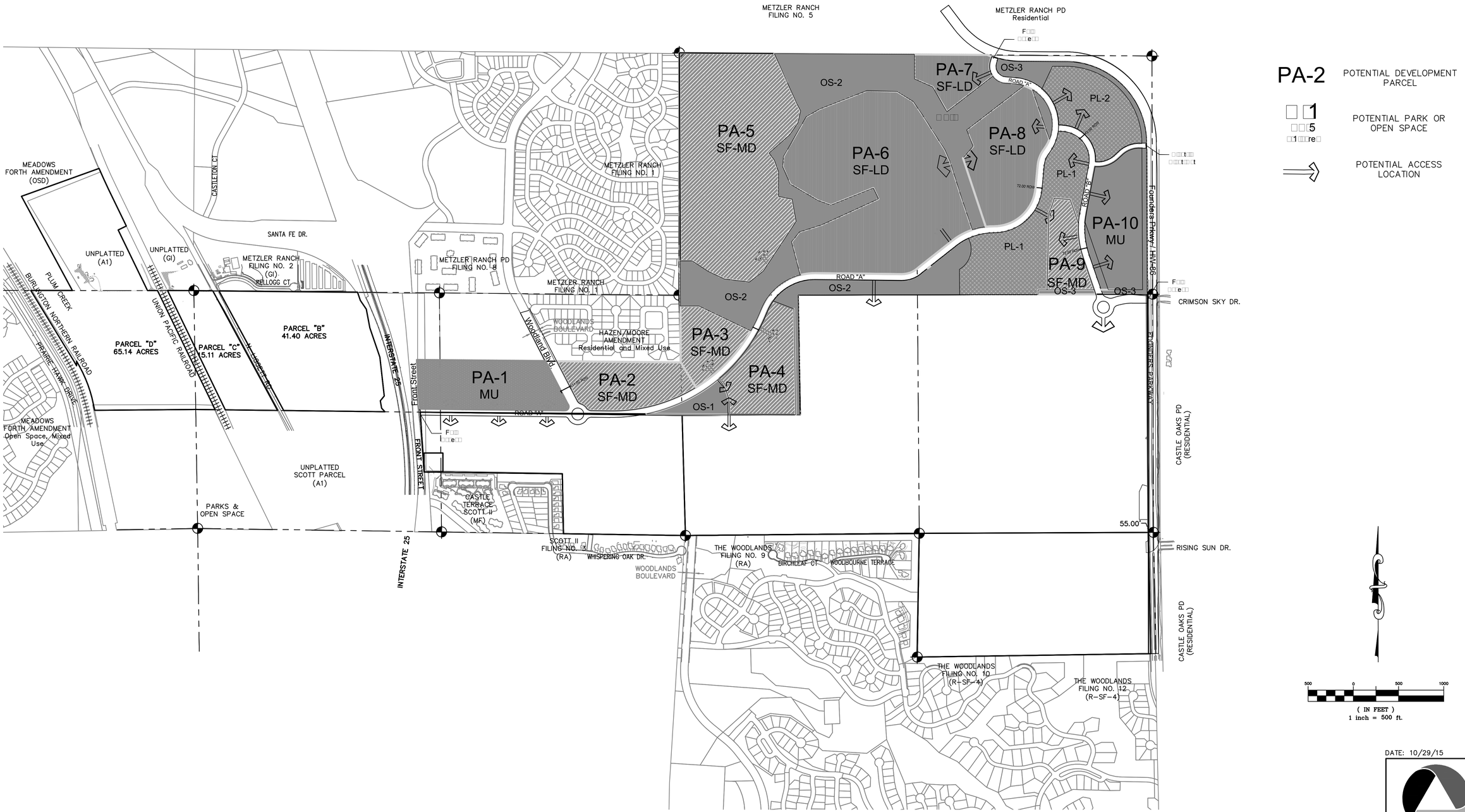
COLORADO LICENSED
MICHAEL R. DEWITT
38143
PROFESSIONAL LAND SURVEYOR

MICHAEL R. DEWITT
COLORADO PROFESSIONAL LAND SURVEYOR – NO 38143
FOR AND ON BEHALF OF PEAK CIVIL CONSULTANTS, INC.



DATE: 12/19/11

Peak Civil Consultants



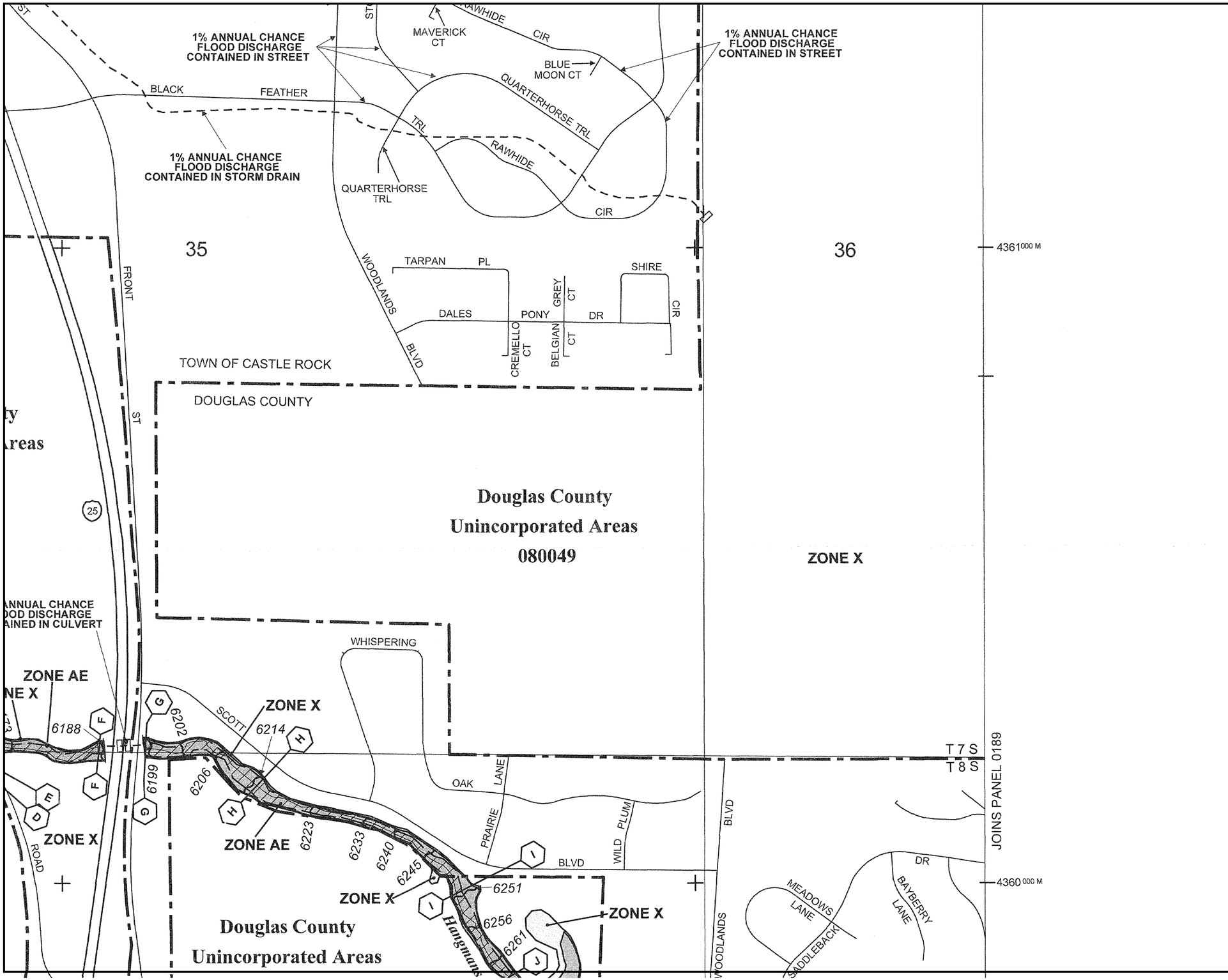
PIONEER RANCH

PROPOSED ZONING MAP

PAR TS OF SE TI S 35 6, 7S, R67W OF T E 6 M.,
COUN TY OF DOUGLA S, ST TE COLORADO
S EET OF 1

DATE: 10/29/15

ATWELL
www.atwell-group.com
303.462.1100
CONTACT: BOB KELSEY
BKELSEY@ATWELL-GROUP.COM



MAP SCALE 1" = 500'

250 0 500 1000 FEET

MET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0188F

FIRM

FLOOD INSURANCE RATE MAP

DOUGLAS COUNTY, COLORADO

AND INCORPORATED AREAS

PANEL 188 OF 495

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
CASTLE ROCK, TOWN OF	080050	0188	F
DOUGLAS COUNTY	080049	0188	F

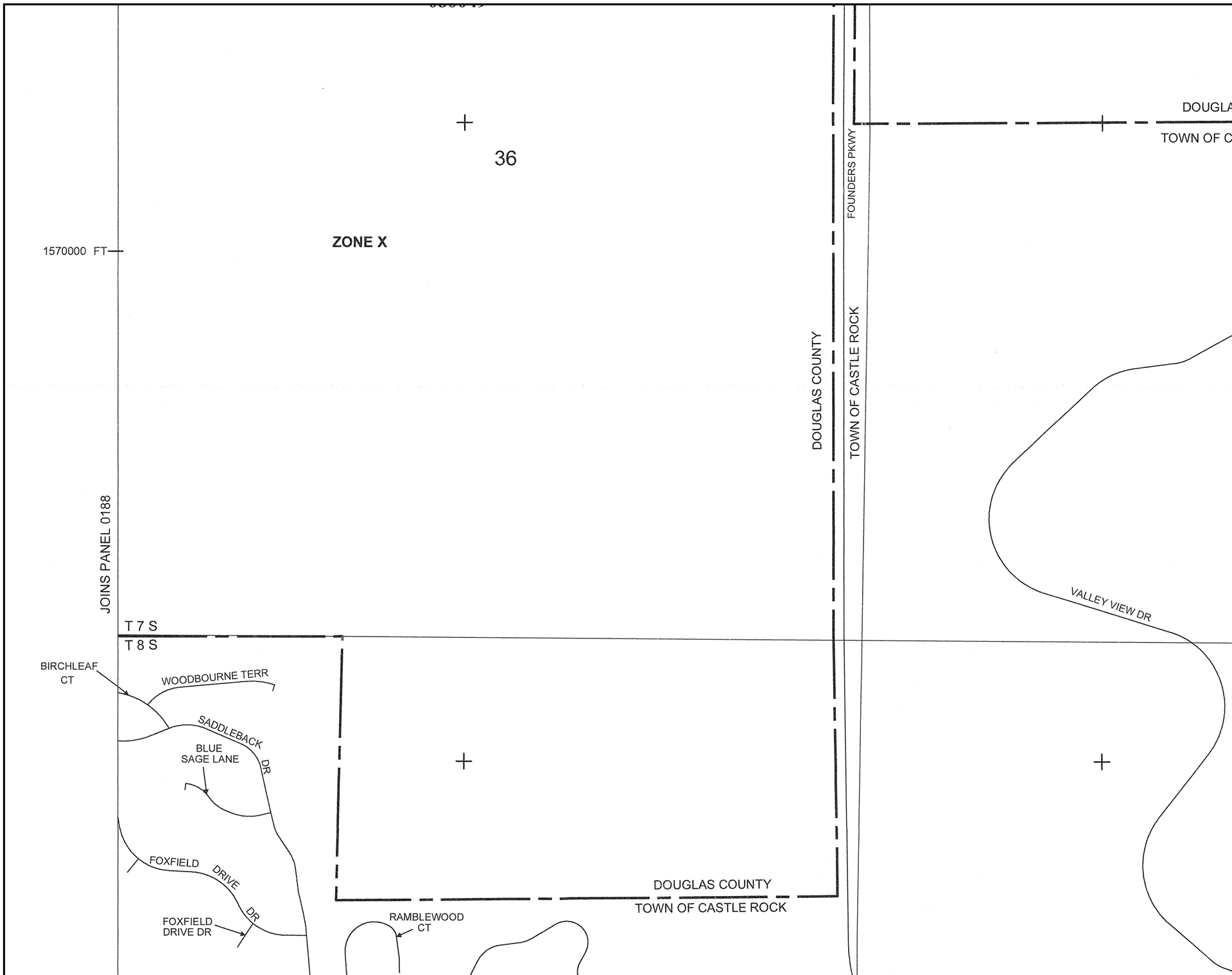
Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08035C0188F

EFFECTIVE DATE:
SEPTEMBER 30, 2005

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



MAP SCALE 1" = 500'

250 0 500 1000 FEET

METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0189F

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	F
DOUGLAS COUNTY	080049	0189	F

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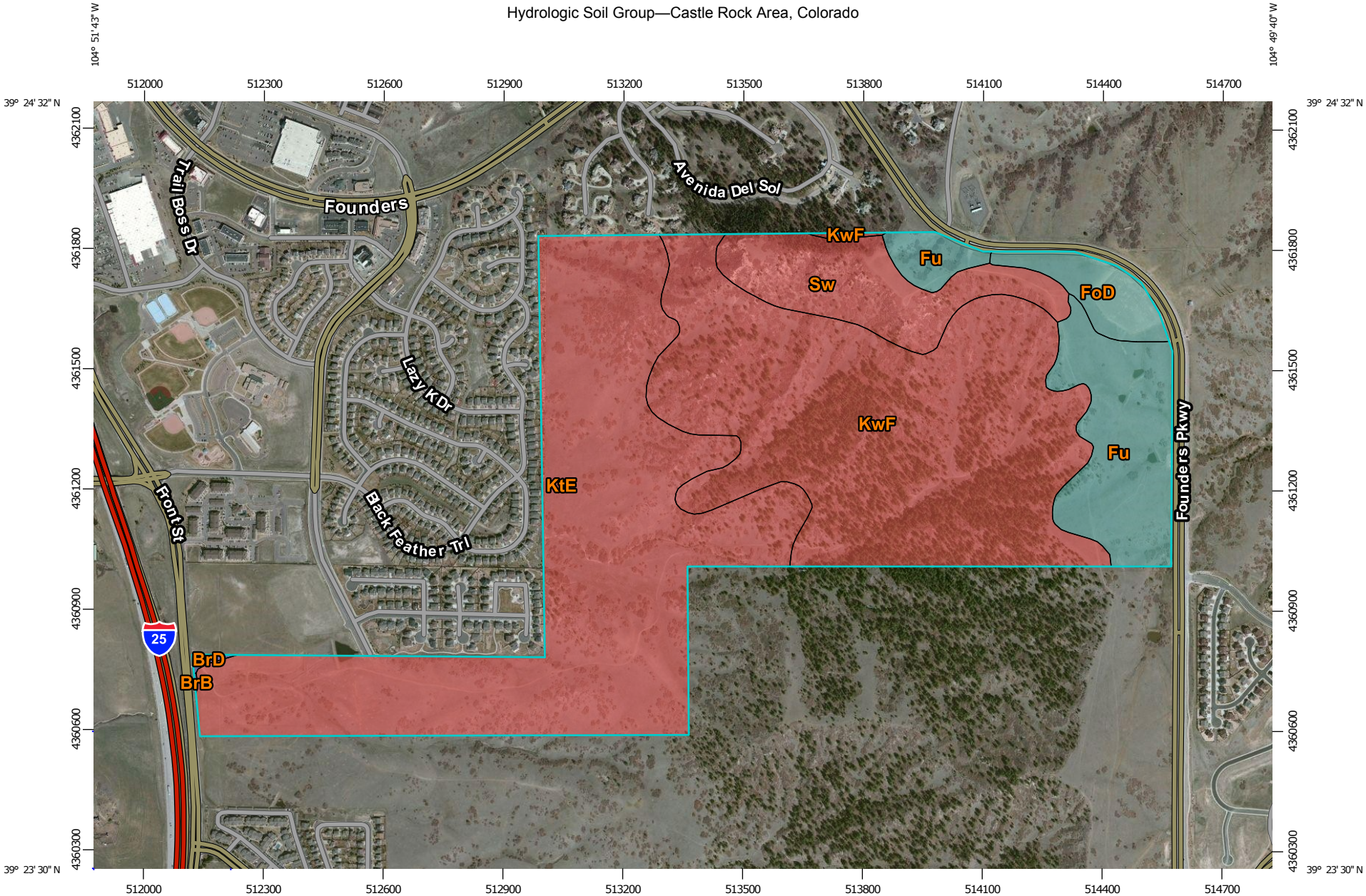
08035C0189F

EFFECTIVE DATE:
SEPTEMBER 30, 2005

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Hydrologic Soil Group—Castle Rock Area, Colorado



Map Scale: 1:13,500 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 200 400 800 1200

Feet: 0 500 1000 2000 3000

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

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

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

Soil Rating Lines

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

Soil Rating Points

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

Water Features

Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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 8, Sep 23, 2014

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

Date(s) aerial images were photographed: Mar 16, 2012—Apr 13, 2012

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

Hydrologic Soil Group— Summary by Map Unit — Castle Rock Area, Colorado (CO622)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
BrB	Bresser sandy loam, 1 to 3 percent slopes	B	0.1	0.0%
BrD	Bresser sandy loam, 3 to 9 percent slopes	B	0.5	0.1%
FoD	Fondis clay loam, 3 to 9 percent slopes	C	11.2	2.8%
Fu	Fondis-Kutch association	C	42.1	10.6%
KtE	Kutch sandy loam, 5 to 20 percent slopes	D	162.2	41.0%
KwF	Kutch-Newlin-Stapleton complex, 8 to 40 percent slopes	D	147.9	37.4%
Sw	Stony steep land, cold	D	31.9	8.0%
Totals for Area of Interest			**395.9**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: *None Specified*

Tie-break Rule: Higher

FIGURE 6-1
RAINFALL INTENSITY-DURATION CURVE
TOWN OF CASTLE ROCK

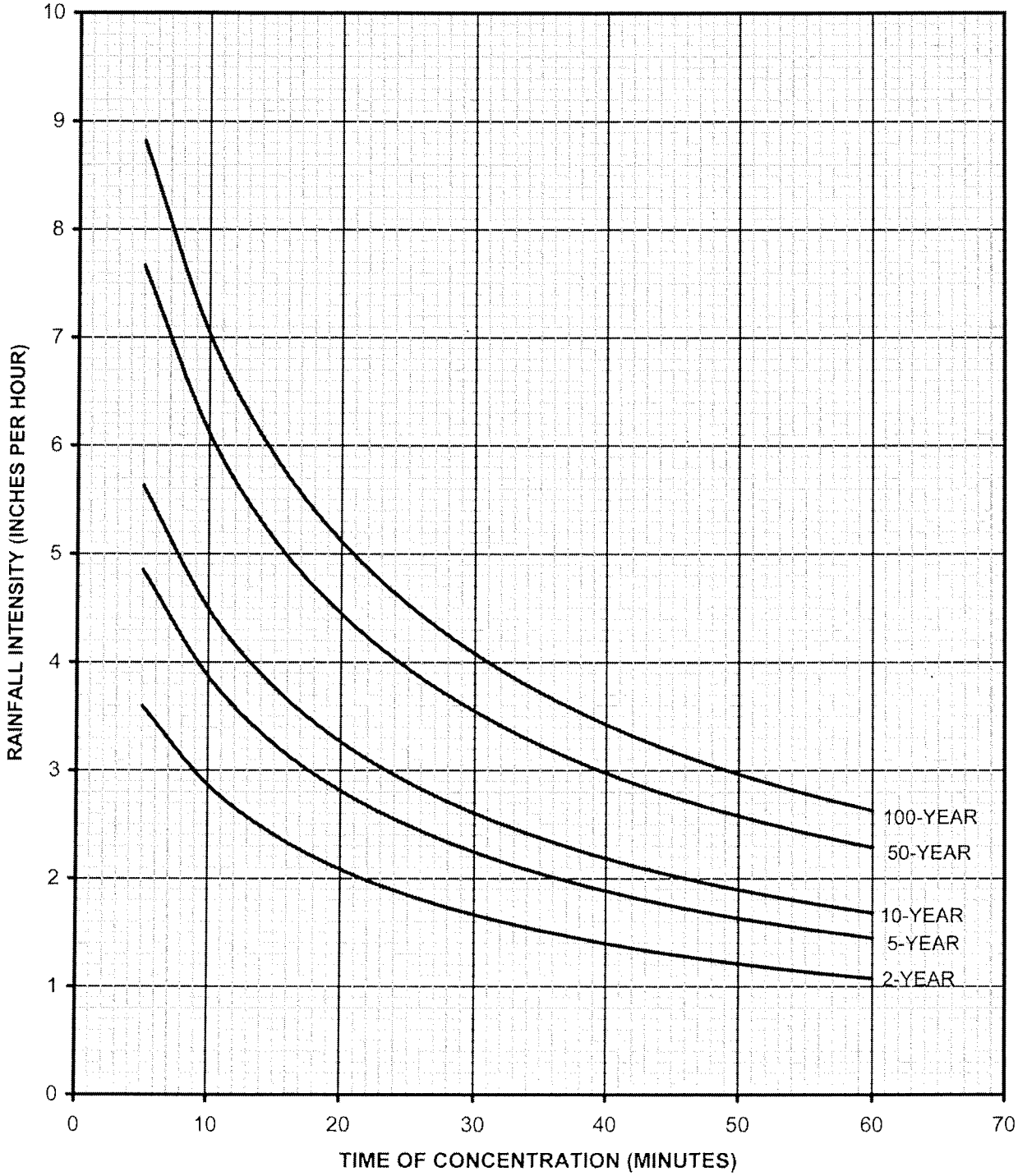


Table RO-3—Recommended Percentage Imperviousness Values

Land Use or Surface Characteristics	Percentage Imperviousness
Business:	
Commercial areas	95
Neighborhood areas	85
Residential:	
Single-family	*
Multi-unit (detached)	60
Multi-unit (attached)	75
Half-acre lot or larger	*
Apartments	80
Industrial:	
Light areas	80
Heavy areas	90
Parks, cemeteries	5
Playgrounds	10
Schools	50
Railroad yard areas	15
Undeveloped Areas:	
Historic flow analysis	2
Greenbelts, agricultural	2
Off-site flow analysis (when land use not defined)	45
Streets:	
Paved	100
Gravel (packed)	40
Drive and walks	90
Roofs	90
Lawns, sandy soil	0
Lawns, clayey soil	0

* See Figures RO-3 through RO-5 for percentage imperviousness.

$$C_A = K_A + \left(1.31i^3 - 1.44i^2 + 1.135i - 0.12\right) \text{ for } C_A \geq 0\text{, otherwise } C_A = 0 \qquad \text{(RO-6)}$$

$$C_{CD} = K_{CD} + \left(0.858i^3 - 0.786i^2 + 0.774i + 0.04\right) \qquad \text{(RO-7)}$$

$$C_B = \left(C_A + C_{CD}\right)/2$$

Table RO-5— Runoff Coefficients, *C*

Percentage Imperviousness	Type C and D NRCS Hydrologic Soil Groups					
	2-yr	5-yr	10-yr	25-yr	50-yr	100-yr
0%	0.04	0.15	0.25	0.37	0.44	0.50
5%	0.08	0.18	0.28	0.39	0.46	0.52
10%	0.11	0.21	0.30	0.41	0.47	0.53
15%	0.14	0.24	0.32	0.43	0.49	0.54
20%	0.17	0.26	0.34	0.44	0.50	0.55
25%	0.20	0.28	0.36	0.46	0.51	0.56
30%	0.22	0.30	0.38	0.47	0.52	0.57
35%	0.25	0.33	0.40	0.48	0.53	0.57
40%	0.28	0.35	0.42	0.50	0.54	0.58
45%	0.31	0.37	0.44	0.51	0.55	0.59
50%	0.34	0.40	0.46	0.53	0.57	0.60
55%	0.37	0.43	0.48	0.55	0.58	0.62
60%	0.41	0.46	0.51	0.57	0.60	0.63
65%	0.45	0.49	0.54	0.59	0.62	0.65
70%	0.49	0.53	0.57	0.62	0.65	0.68
75%	0.54	0.58	0.62	0.66	0.68	0.71
80%	0.60	0.63	0.66	0.70	0.72	0.74
85%	0.66	0.68	0.71	0.75	0.77	0.79
90%	0.73	0.75	0.77	0.80	0.82	0.83
95%	0.80	0.82	0.84	0.87	0.88	0.89
100%	0.89	0.90	0.92	0.94	0.95	0.96
	TYPE B NRCS HYDROLOGIC SOILS GROUP					
0%	0.02	0.08	0.15	0.25	0.30	0.35
5%	0.04	0.10	0.19	0.28	0.33	0.38
10%	0.06	0.14	0.22	0.31	0.36	0.40
15%	0.08	0.17	0.25	0.33	0.38	0.42
20%	0.12	0.20	0.27	0.35	0.40	0.44
25%	0.15	0.22	0.30	0.37	0.41	0.46
30%	0.18	0.25	0.32	0.39	0.43	0.47
35%	0.20	0.27	0.34	0.41	0.44	0.48
40%	0.23	0.30	0.36	0.42	0.46	0.50
45%	0.26	0.32	0.38	0.44	0.48	0.51
50%	0.29	0.35	0.40	0.46	0.49	0.52
55%	0.33	0.38	0.43	0.48	0.51	0.54
60%	0.37	0.41	0.46	0.51	0.54	0.56
65%	0.41	0.45	0.49	0.54	0.57	0.59
70%	0.45	0.49	0.53	0.58	0.60	0.62
75%	0.51	0.54	0.58	0.62	0.64	0.66
80%	0.57	0.59	0.63	0.66	0.68	0.70
85%	0.63	0.66	0.69	0.72	0.73	0.75
90%	0.71	0.73	0.75	0.78	0.80	0.81
95%	0.79	0.81	0.83	0.85	0.87	0.88
100%	0.89	0.90	0.92	0.94	0.95	0.96

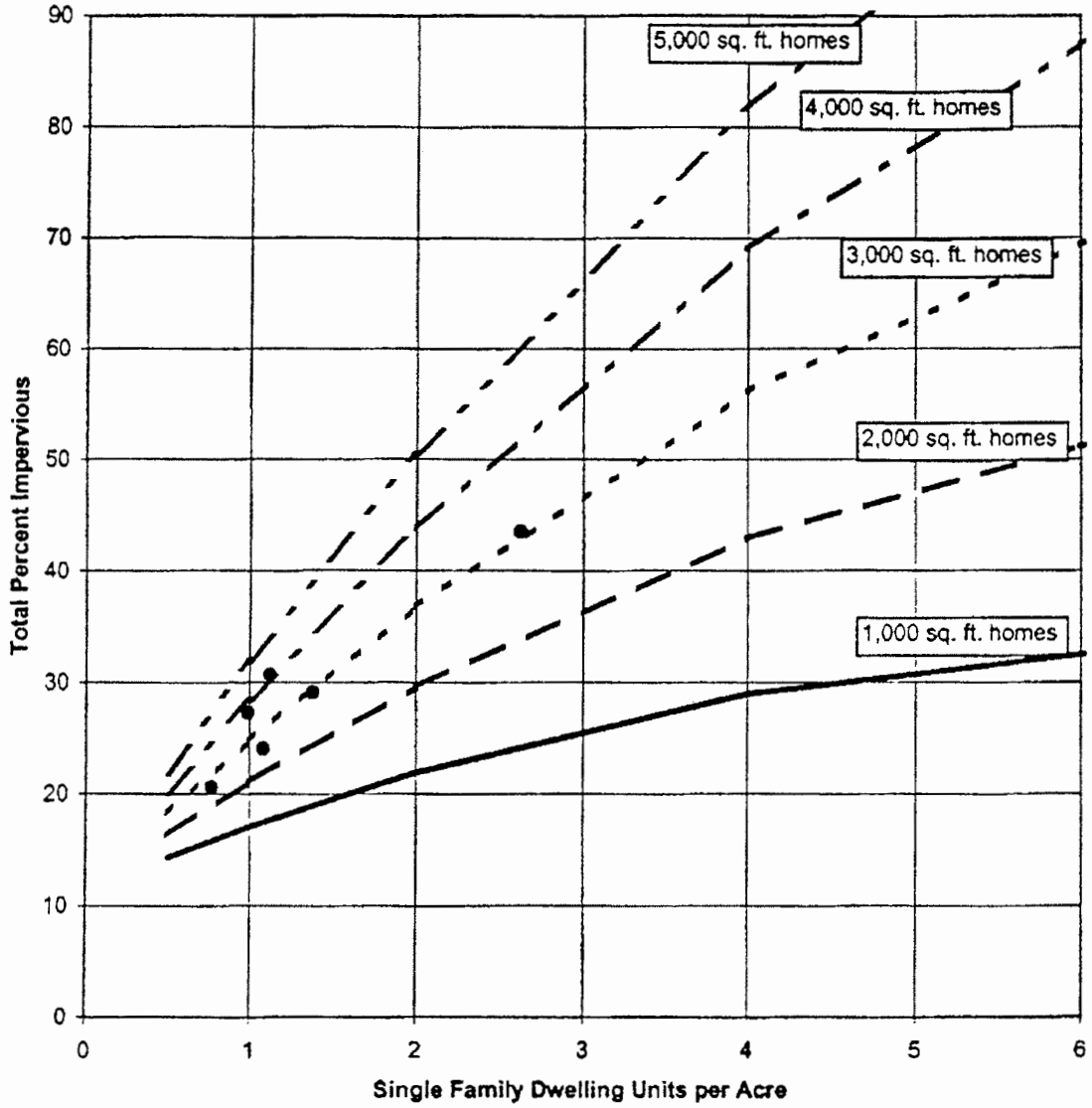


Figure RO-3— Watershed Imperviousness, Single-Family Residential Ranch Style Houses

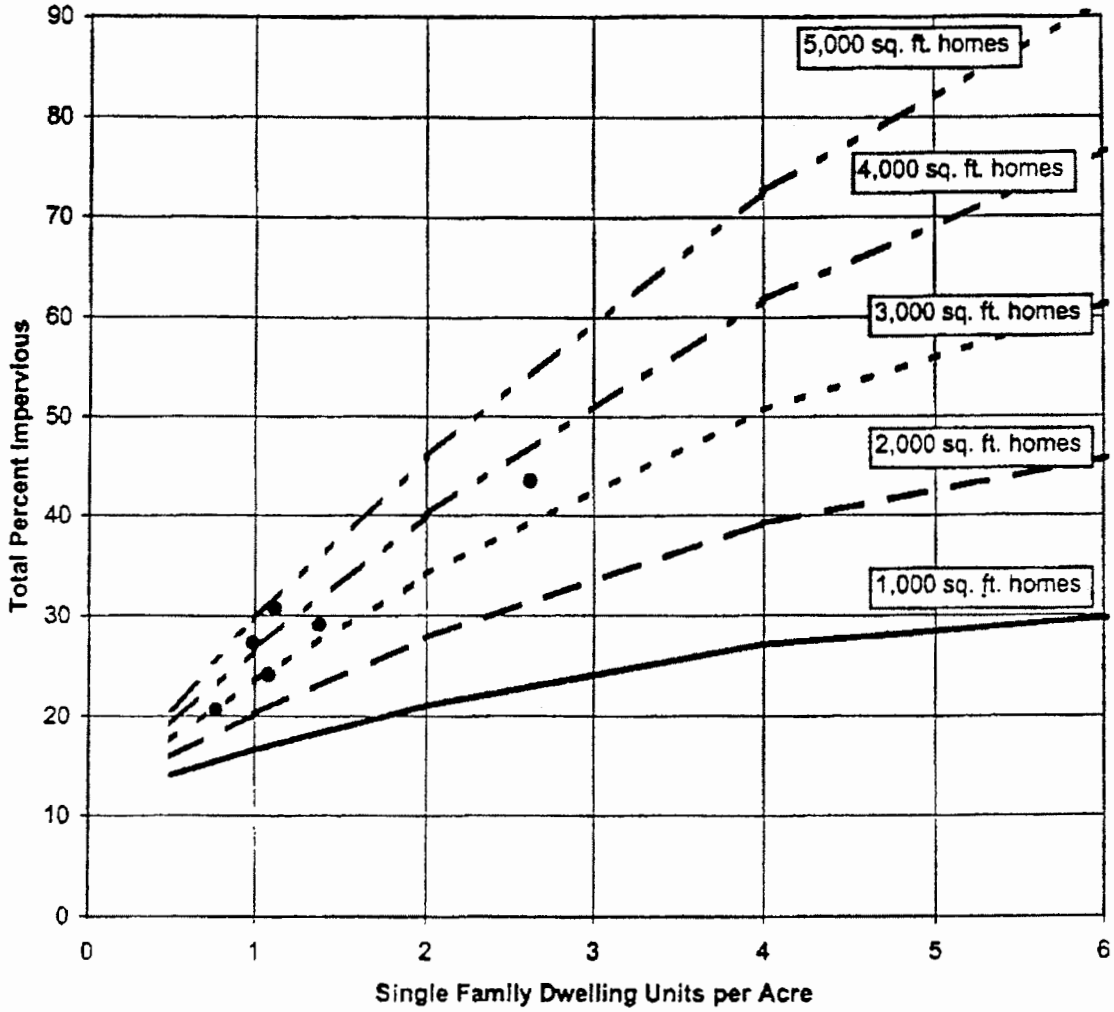


Figure RO-4—Watershed Imperviousness, Single-Family Residential Split-Level Houses

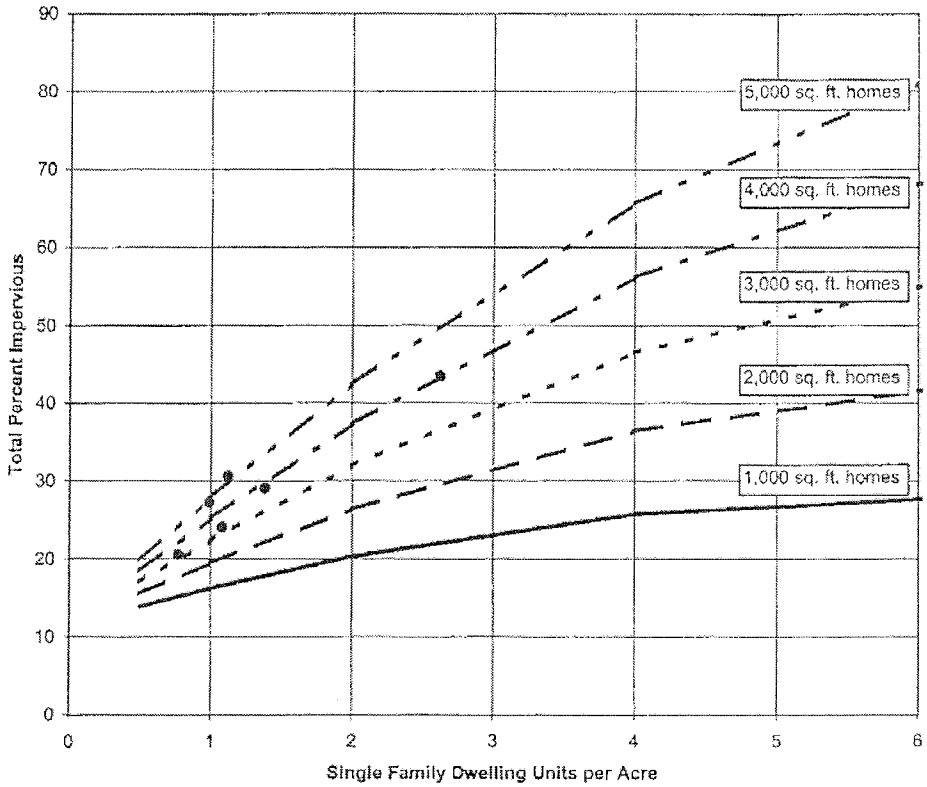


Figure RO-5—Watershed Imperviousness, Single-Family Residential Two-Story Houses

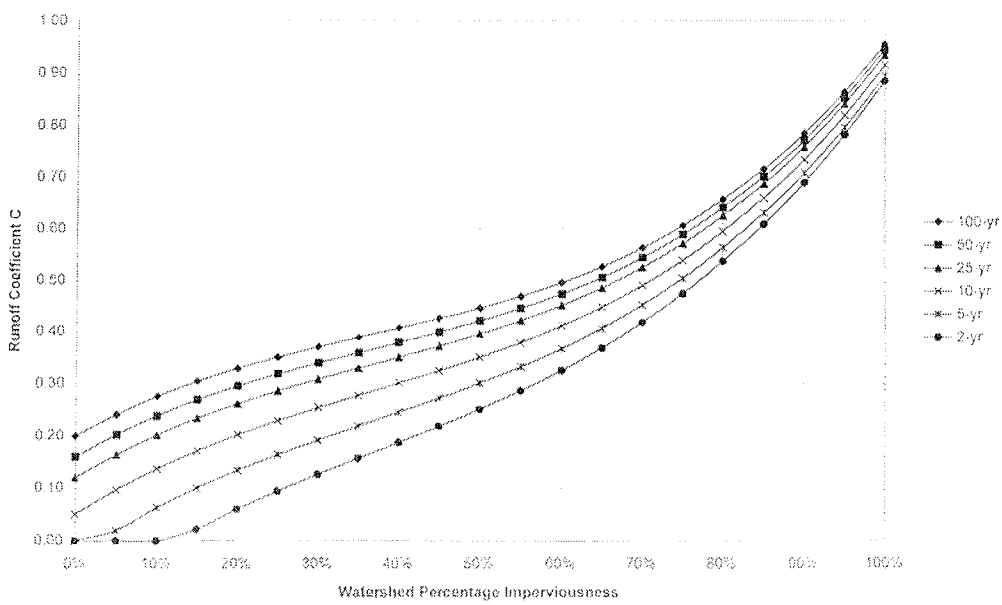


Figure RO-6—Runoff Coefficient, *C*, vs. Watershed Percentage Imperviousness NRCS Hydrologic Soil Group A

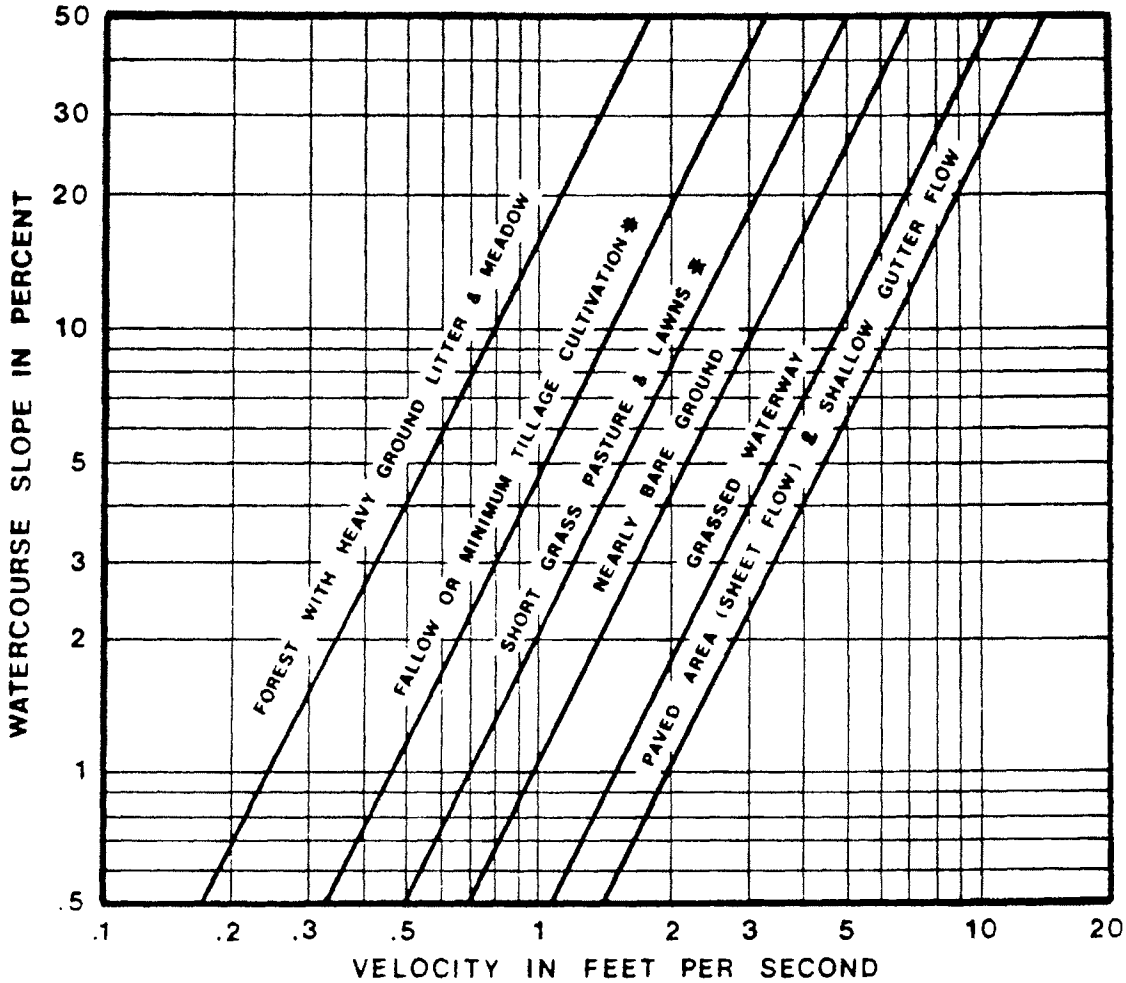


Figure RO-1—Estimate of Average Overland Flow Velocity for Use With the Rational Formula

APPENDIX B

CALCULATIONS

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)

Summary of Unit Hydrograph Parameters Used By Program and Calculated Results (Version 1.4.4)

		Unit Hydrograph Parameters and Results									Excess Precip.		Storm Hydrograph			
Catchment Name/ID	User Comment for Catchment	Ct	Cp	W50 (min.)	W50 Before Peak	W75 (min.)	W75 Before Peak	Time to Peak (min.)	Peak (cfs)	Volume (c.f)	Excess (inches)	Excess (c.f.)	Time to Peak (min.)	Peak Flow (cfs)	Total Volume (c.f.)	Runoff per Unit Area (cfs/acre)
1		0.114	0.279	32.3	8.43	16.8	5.96	14.1	504	1,261,498	1.80	2,268,480	45.0	620	2,263,452	1.78

Summary of CUHP Input Parameters (Version 1.4.4)

								Depression Storage		Horton's Infiltration Parameters			DCIA Level and Fractions			
Catchment Name/ID	SWMM Node/ID	Raingage Name/ID	Area (sq.mi.)	Dist. to Centroid (miles)	Length (miles)	Slope (ft./ft.)	Percent Imperv.	Pervious (inches)	Imperv. (inches)	Initial Rate (in./hr.)	Final Rate (in.hr.)	Decay Coeff. (1/sec.)	DCIA Level	Dir. Con'ct Imperv. Fraction	Receiv. Perv. Fraction	Percent Eff. Imperv.
1	101	RAINGAGE 1	0.543	0.540	1.084	0.039	18.3	0.35	0.10	3.00	0.50	0.0018	0.00	0.37	0.12	17.16

DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project: Pioneer Ranch
Basin ID: A

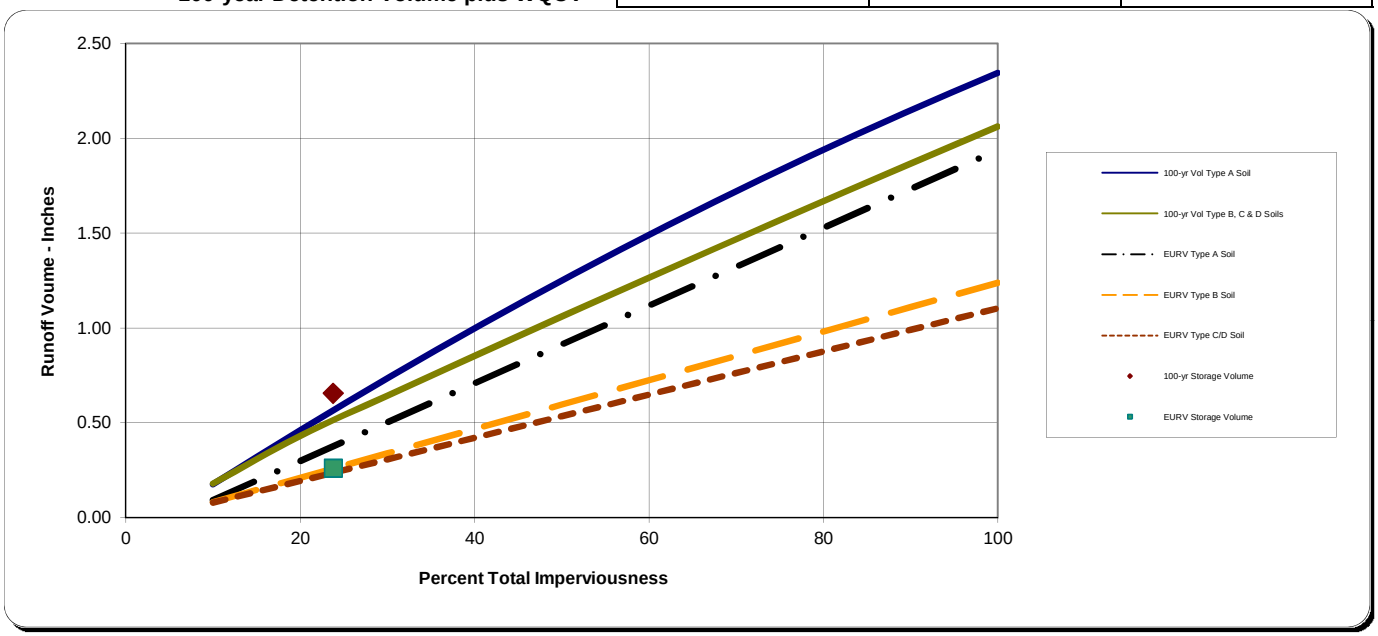
* User input data shown in blue.

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]		**Maximum Allowable Release Rate, cfs[3]**
	(watershed inches)	**(acre-feet)**	
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

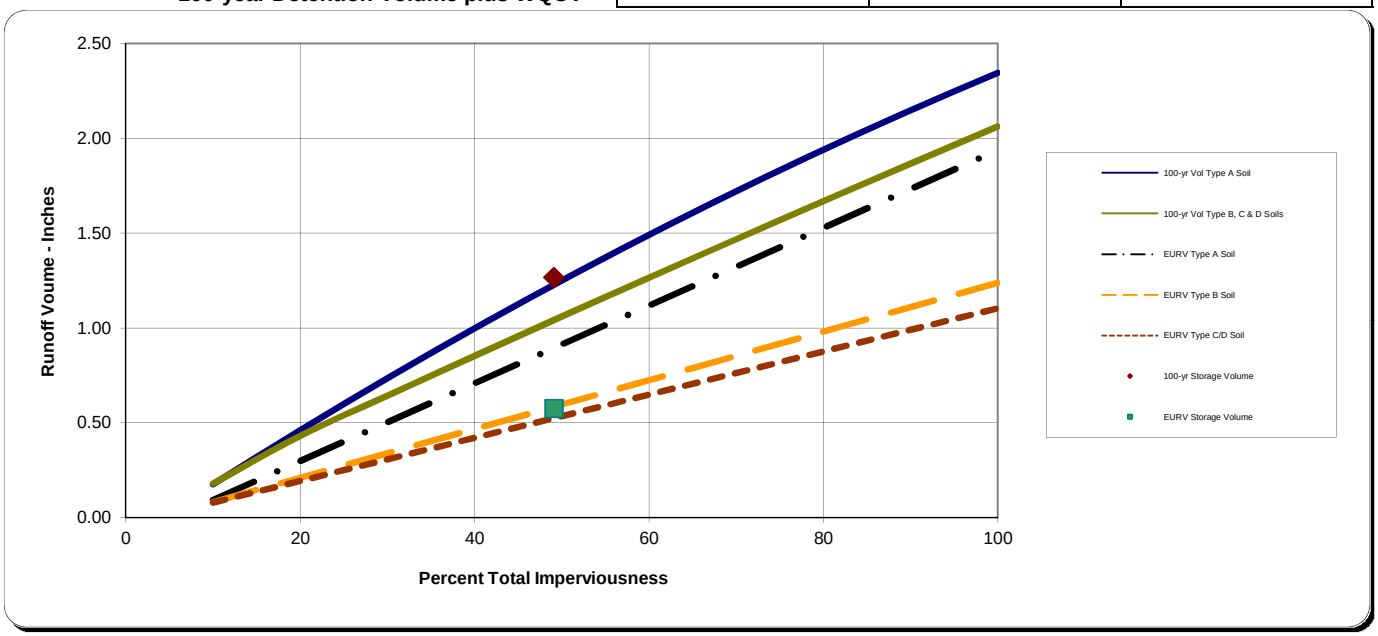
* User input data shown in blue.

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

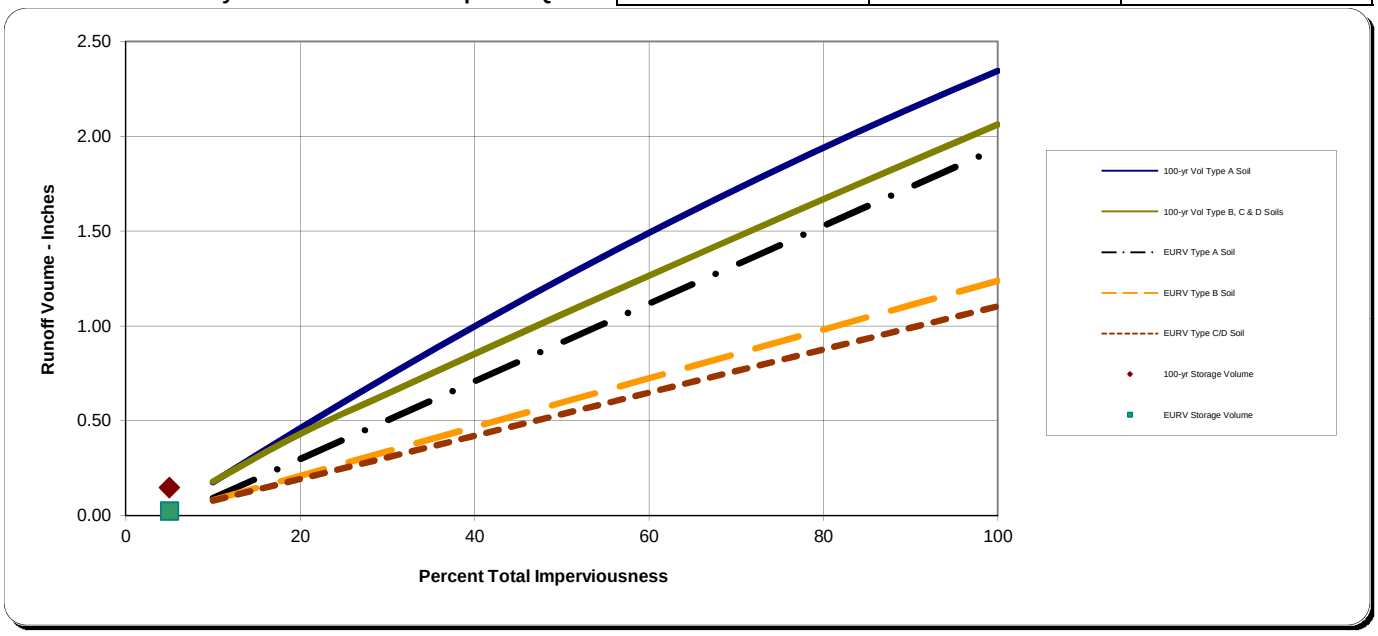
* User input data shown in blue.

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

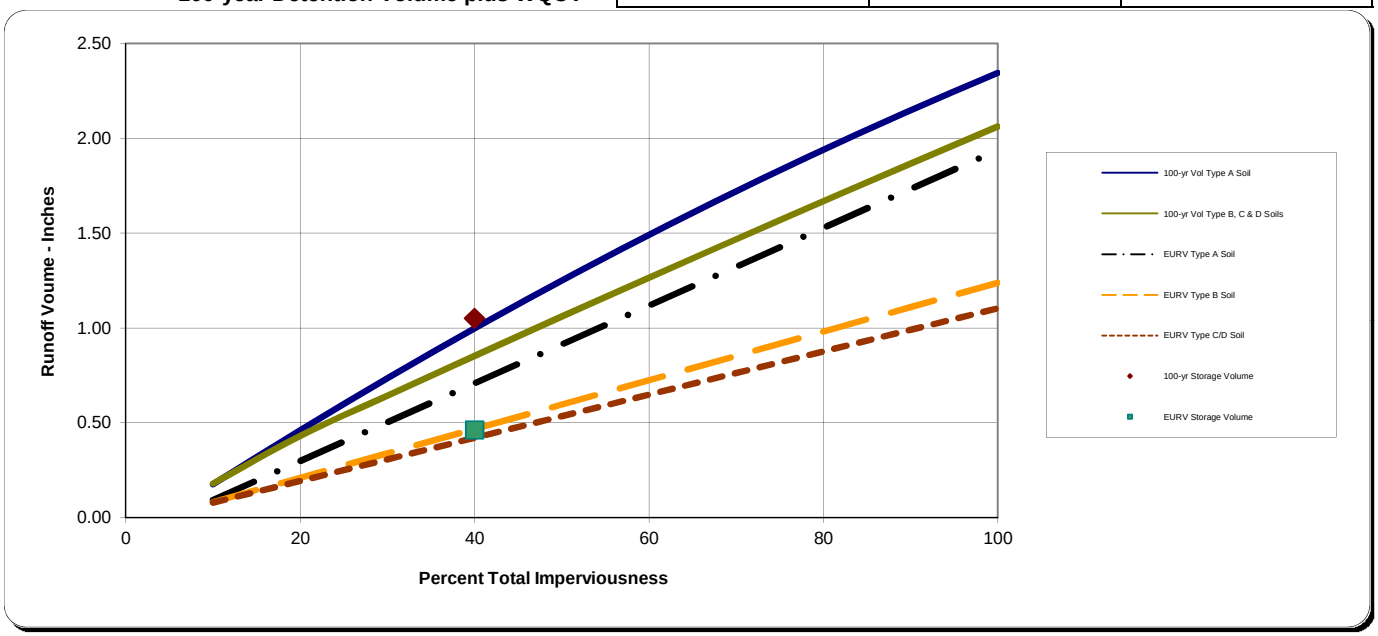
* User input data shown in blue.

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]		**Maximum Allowable Release Rate, cfs[3]**
	(watershed inches)	**(acre-feet)**	
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.

DETENTION VOLUME BY THE HYDROGRAPH METHOD

Project: Pioneer Ranch

Basin ID: E

Design Information (Input):

		MINOR	MAJOR	
Max. Allowable Peak Outflow	Qp-out =		198.00	cfs
Time to Peak Outflow	Tp-out =		45	minutes

Major Storage Volume (cubic ft.): **623,788**
Major Storage Volume (acre-ft.): **14.32**

5	MINOR (e.g. 2-, 5-, OR 10-year) EVENT				MAJOR (e.g. 25-, 50-, or 100-year) EVENT			
Time	Inflow hydrograph	**Outflow** Rising Hy	Increm. Volume	**Storage** Volume	Inflow hydrograph	**Outflow** Rising Hy	Increm. Volume	**Storage** Volume
minutes	cfs	cfs	acre-ft	acre-ft	cfs	cfs	acre-ft	acre-ft
(input)	(input)	(output)	(output)	(output)	(input)	(output)	(output)	(output)
0		#N/A	0.00	0.00	0.00	0.00	0.00	0.00
5		#N/A			214.51	22.00	1.33	1.33
10		#N/A			445.27	44.00	2.76	4.09
15		#N/A			502.65	66.00	3.01	7.10
20		#N/A			465.90	88.00	2.60	9.70
25		#N/A			376.90	110.00	1.84	11.54
30		#N/A			328.67	132.00	1.35	12.89
35		#N/A			280.45	154.00	0.87	13.76
40		#N/A			240.90	176.00	0.45	14.21
45		#N/A			214.04	198.00	0.11	14.32
50		#N/A			187.19	#N/A		
55		#N/A			160.33	#N/A		
60		#N/A			133.48	#N/A		
65		#N/A			106.62	#N/A		
70		#N/A			93.74	#N/A		
75		#N/A			84.78	#N/A		
80		#N/A			75.83	#N/A		
85		#N/A			66.88	#N/A		
90		#N/A			57.93	#N/A		
95		#N/A			48.98	#N/A		
100		#N/A			40.03	#N/A		
105		#N/A			31.07	#N/A		
110		#N/A			22.12	#N/A		
115		#N/A			13.17	#N/A		
120		#N/A			4.22	#N/A		
125		#N/A			0.00	#N/A		
130		#N/A				#N/A		
135		#N/A				#N/A		
140		#N/A				#N/A		
145		#N/A				#N/A		
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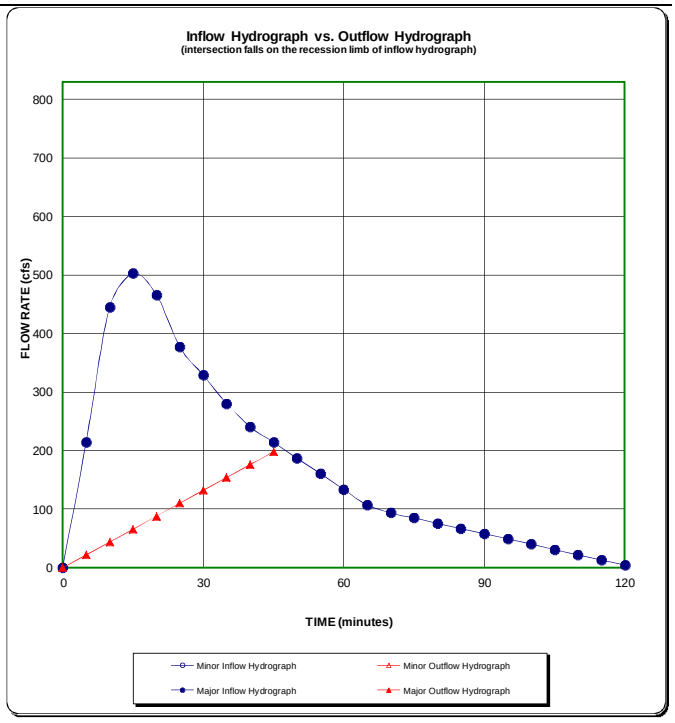
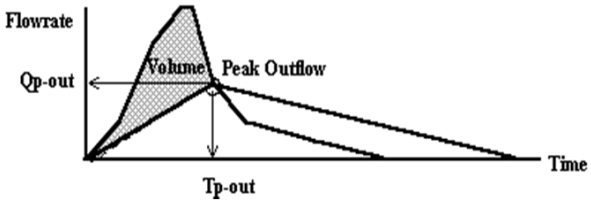


NOTE: THIS IS A FIRST APPROXIMATION ONLY



DETENTION VOLUME BY THE FULL SPECTRUM METHOD

Project: Pioneer Ranch
Basin ID: F

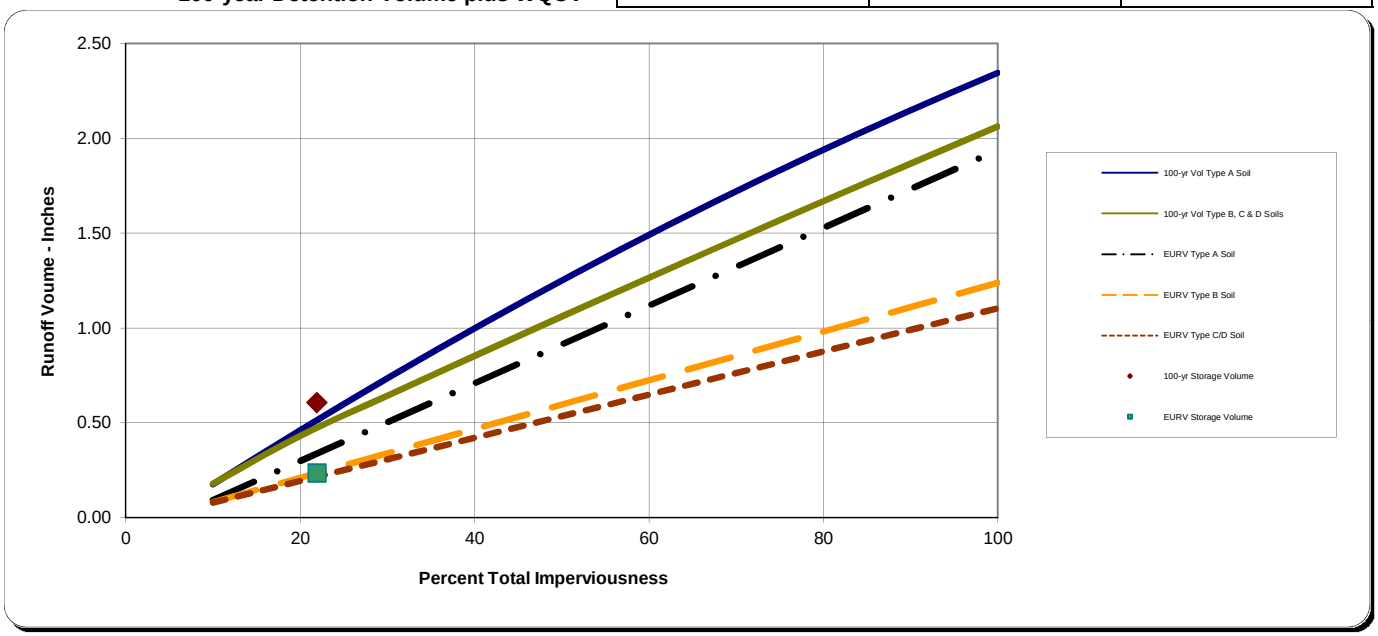
* User input data shown in blue.

Area of Watershed (acres)	13.50	
Subwatershed Imperviousness	21.9%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	21.9%	

Hydrologic Soil Type	**Percentage of Area**	**Area (acres)**
Type A		0.0
Type B		0.0
Type C or D	100.0%	13.5

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]	0.24	0.27	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume plus WQCV [5]	0.61	0.68	13.50



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: G

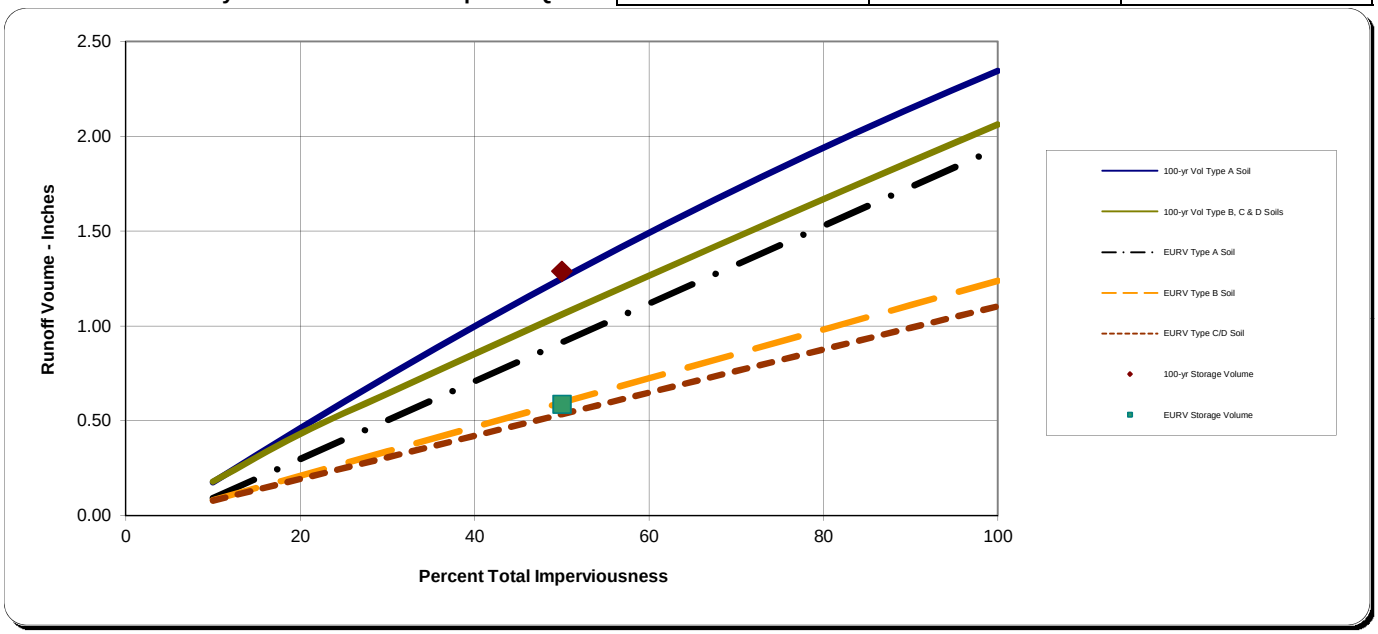
* User input data shown in blue.

Area of Watershed (acres)	16.90	
Subwatershed Imperviousness	50.0%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	50.0%	

Hydrologic Soil Type	**Percentage of Area**	**Area (acres)**
Type A		0.0
Type B		0.0
Type C or D	100.0%	16.9

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]	0.59	0.83	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume plus WQCV [5]	1.29	1.81	16.90



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: H

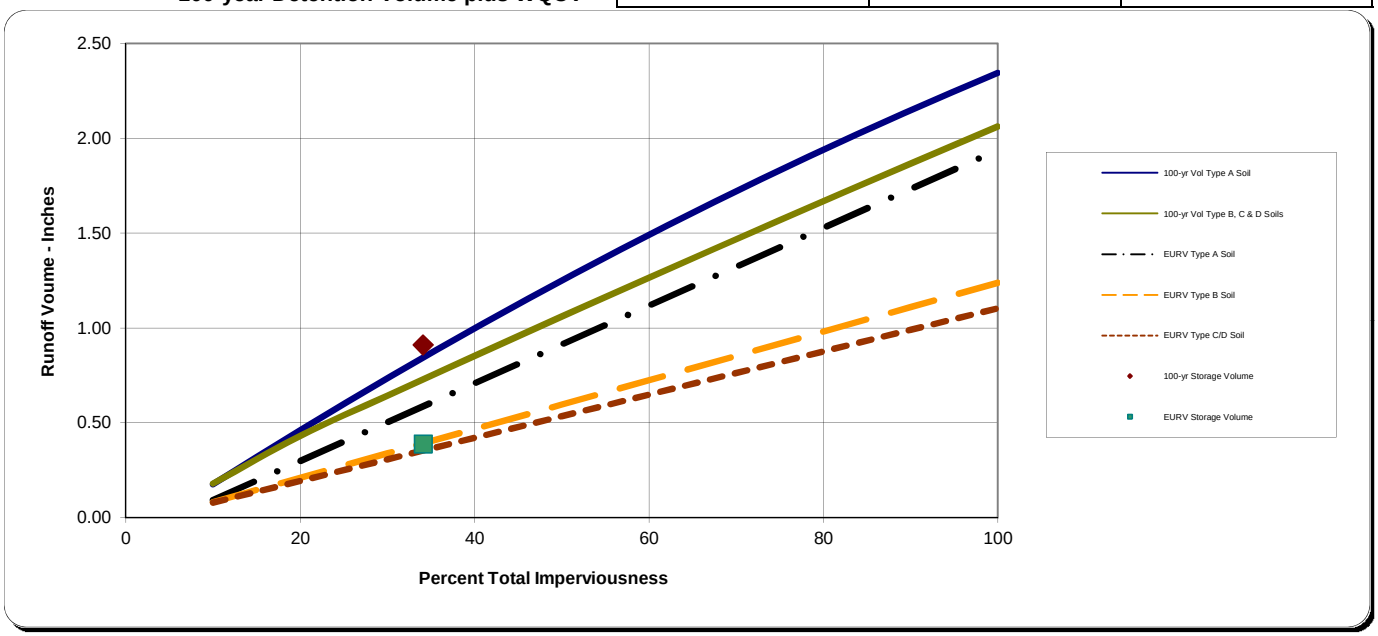
* User input data shown in blue.

Area of Watershed (acres)	88.60	
Subwatershed Imperviousness	34.1%	
Level of Minimizing Directly Connected Impervious Area (MDCIA)	0	0
Effective Imperviousness[1]	34.1%	

Hydrologic Soil Type	**Percentage of Area**	**Area (acres)**
Type A		0.0
Type B		0.0
Type C or D	100.0%	88.6

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]	0.39	2.88	Design Oulet to Empty EURV in 72 Hours
100-year Detention Volume plus WQCV [5]	0.91	6.72	88.60



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.

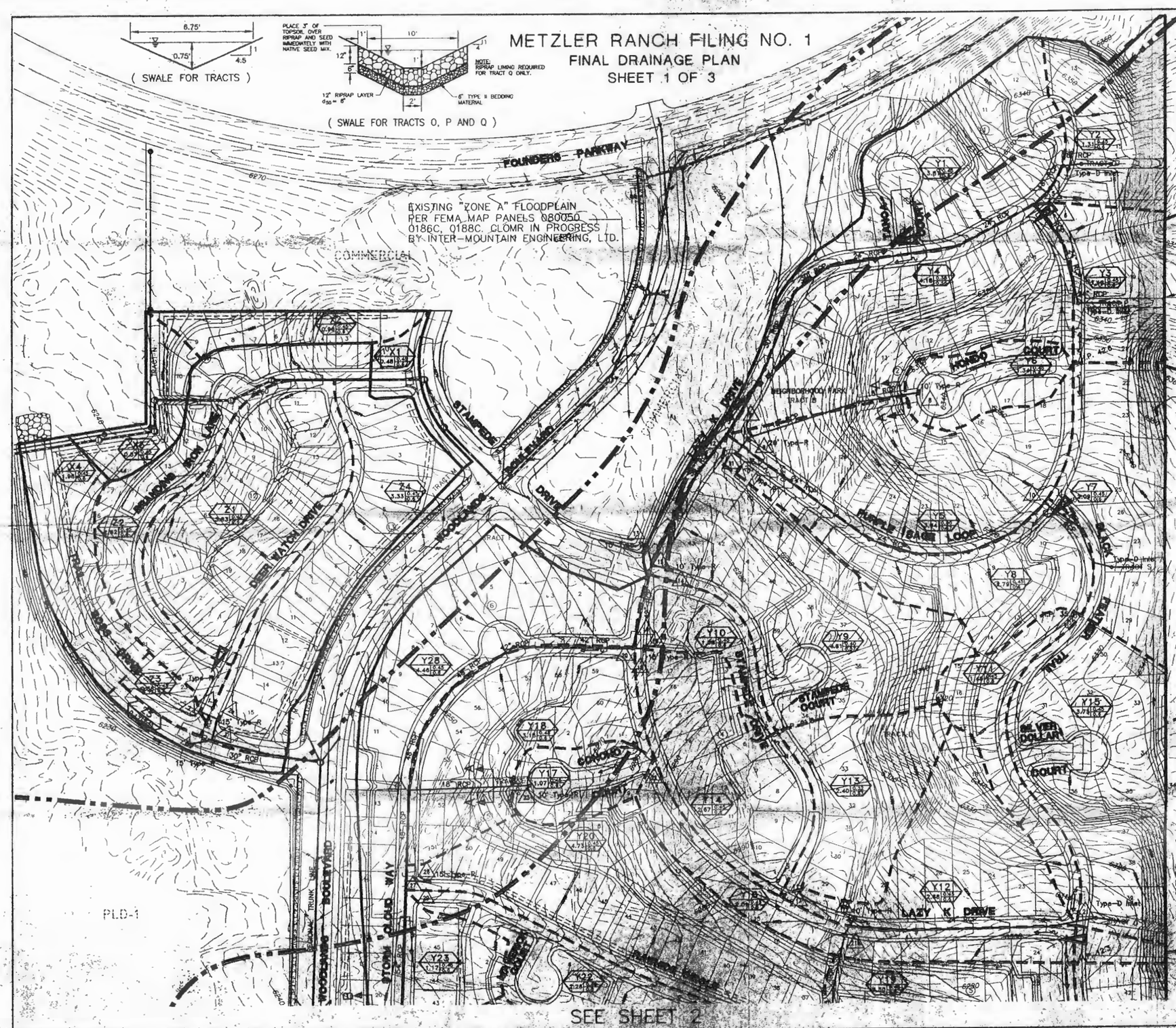
APPENDIX C

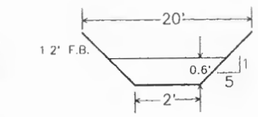
EXCERPTS FROM PERTINENT REFERENCES

METZLER RANCH FILING NO. 1

FINAL DRAINAGE PLAN

SHEET 1 OF 3





SECTION A-A

GROUND BENCHMARK:
USE THE 3" BRASS CAP 0.337 1.3 MILES NORTH OF CASTLE ROCK TRAIN STATION, 6' WEST OF WEST RAIL SET AT TOP WEST END OF NORTH ABUTTMENT OF BRIDGE 51-30.
ELEV.=6149.80 DATUM USC+GS

PROJECT BENCHMARK:
SET #5 REBAR 6' EAST OF WEST R.O.W. FENCE OF FOUNDERS PARKWAY; APPROXIMATELY 600' WEST OF THE INTERSECTION OF FOUNDERS PARKWAY AND CROWFOOT VALLEY RD.
ELEV.=6270.50 PROJECT DATUM (RMC FB. 375028)
ELEV.=6271.37 USC+GS
(PROJECT DATUM BASED ON PREVIOUS CONSTRUCTION WORK IN THE AREA)

POINT OF BEGINNING

SHADED AREA REPRESENTS PRESERVATION EASEMENT AREA.

LEGEND

- A01 — BASIN I.D.
- 0.00 — 5 YEAR "C" VALUE
- 0.00 — 100 YEAR "C" VALUE
- 0.00 — AREA IN ACRES
- .00 — DESIGN POINT
- PROPOSED CROSS-PAN FLOW ARROW
- MAJOR BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- OFFSITE BASIN BOUNDARY
- PROPOSED STORM SEWER
- EXISTING 100 YR FLOODPLAIN

100 50 0 100 200

SCALE: 1" = 100'

PREPARED UNDER THE DIRECT SUPERVISION OF LEONARD R. WILSON

LEONARD R. WILSON, P.E. #18810 — 18810 — 6-16-98 DATE

TOWN OF CASTLE ROCK APPROVALS

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

RECOMMENDED APPROVAL:

ENGINEERING DIVISION

DATE

APPROVED BY:

PUBLIC WORKS DIRECTOR

DATE

RMC
ROCKY MOUNTAIN CONSULTANTS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING
8301 E. Prentice Ave.
Suite 101
Greenwood Village, CO 80111
(303) 741-6000
FAX (303) 741-6106

REVISIONS

NO.		DATE	BY
1	REV PER TOWN COMMENTS	8/30/97	MG
2	PER TOWN COMMENTS	9/15/97	MG
3	REVISED	10/20/97	DM
4	REVISED	10/21/97	DM
5	REVISED	12/19/97	DM
6	REVISED	2/4/98	DM

TOWN OF CASTLE ROCK
METZLER RANCH
FINAL DRAINAGE PLAN

DATE: JUNE '97
DESIGNED BY: MG
DRAWN BY: MLB
CHECKED BY: MG

JOB NO. 2748.012.00

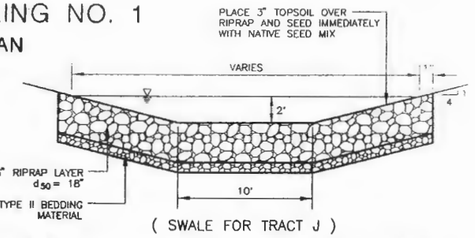
SHEET 1 OF 3

REF. 6

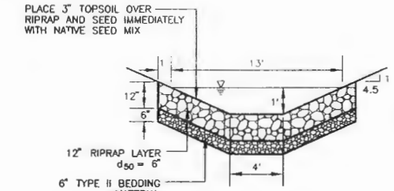
METZLER RANCH FILING NO. 1

FINAL DRAINAGE PLAN

SHEET 2 OF 3

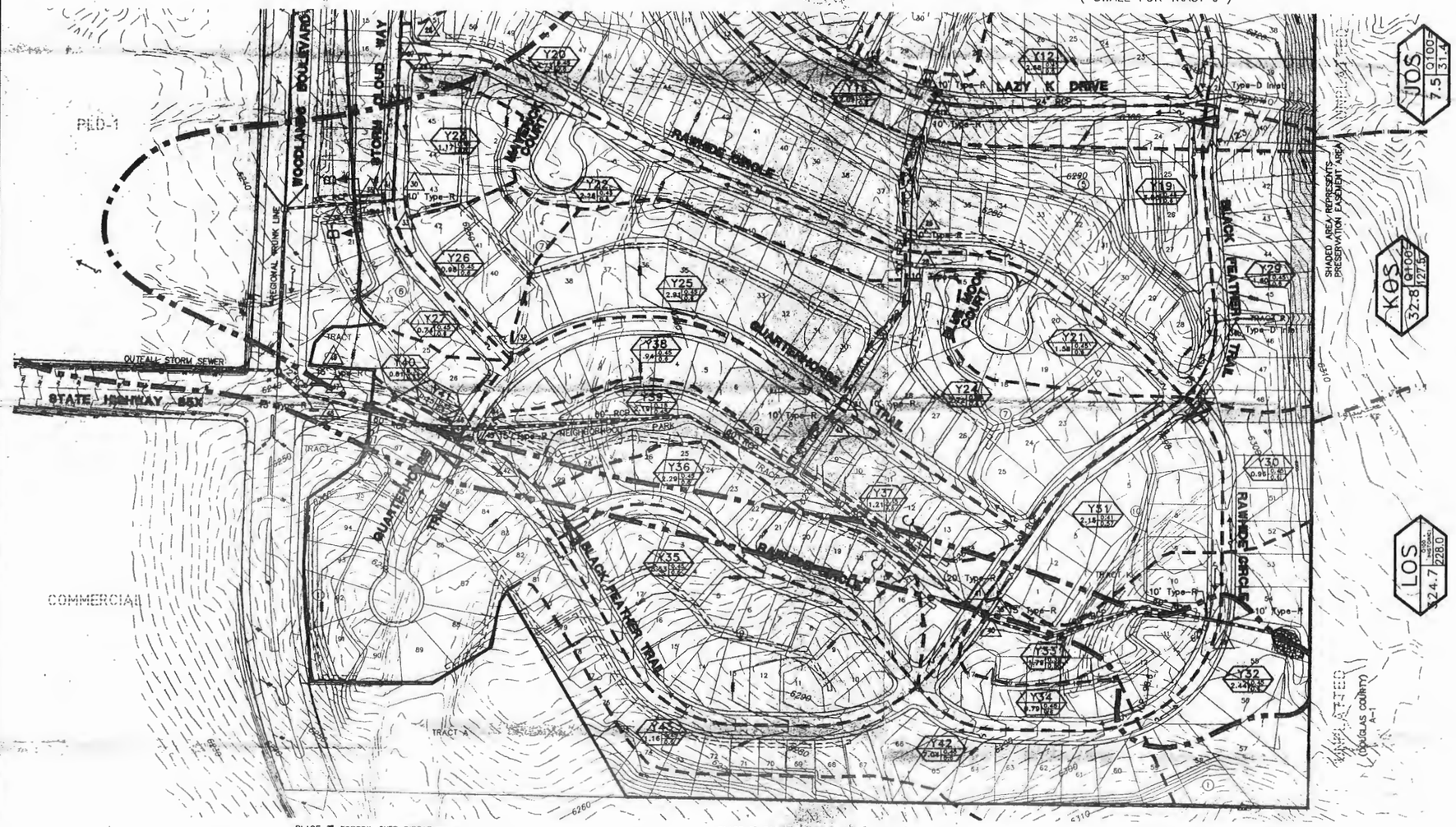


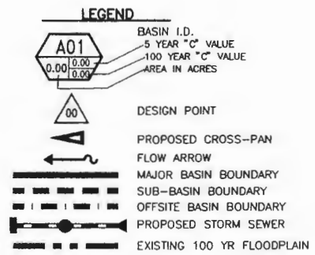
(SWALE FOR TRACT J)

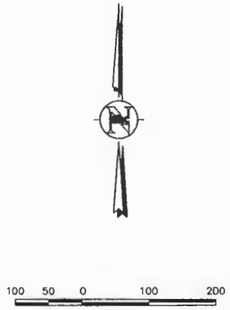


(SWALE FOR TRACT R)

SEE SHEET 1

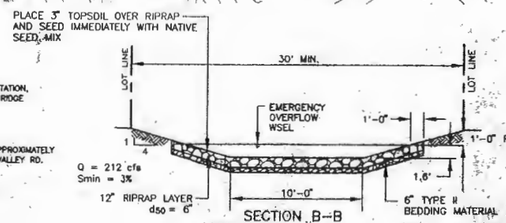




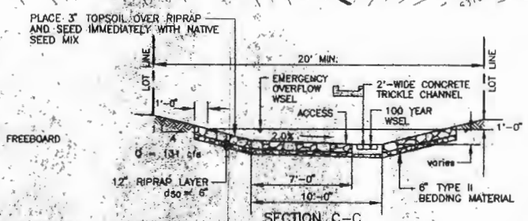


ORIGIN BENCHMARK:
USE THE 3" BRASS CAP Q337 1.3 MILES NORTH OF CASTLE ROCK TRAIN STATION, 6' WEST OF WEST RAIL SET AT TOP WEST END OF NORTH ABUTTMENT OF BRIDGE
ELEV.=6141.90 DATUM USC+GS

PROJECT BENCHMARK:
SET 2½ NGSBM, 6" EMB OF WEST R.O.W. FENCE OF FOUNDERS PARKWAY; APPROXIMATELY 800' WEST OF THE INTERSECTION OF FOUNDERS PARKWAY AND CROWFOOT VALLEY RD.
ELEV.=6270.80 PROJECT DATUM (RMC FB. 375028)
ELEV.=6271.37 USC+GS
(PROJECT DATUM BASED ON PREVIOUS CONSTRUCTION WORK IN THE AREA)



SECTION B-B
EMERGENCY OVERFLOW CHANNEL



SECTION C-C
EMERGENCY OVERFLOW CHANNEL

PREPARED UNDER THE DIRECT SUPERVISION OF LEONARD R. WILSON

LEONARD R. WILSON, P.E. #18810 DATE 6-16-98

TOWN OF CASTLE ROCK APPROVALS

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

RECOMMENDED APPROVAL:

ENGINEERING DIVISION

DATE

APPROVED BY:

PUBLIC WORKS DIRECTOR

DATE

RMC
ROCKY MOUNTAIN CONSULTANTS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING
8301 E. Prentice Ave.
Suite 100
Englewood, CO 80111
(303) 741-6000
FAX (303) 741-6106

REVISIONS

NO.		DATE	BY
1	REV. PER TOWN COMMENTS	4/30/97	MG
2	PER TOWN COMMENTS	5/15/97	MG
3	REVISED	8/26/97	DJ
4	REVISED	12/19/97	DJ
5	REVISED	1/21/98	DJ
6	REVISED	2/4/98	DJ

TOWN OF CASTLE ROCK
METZLER RANCH
FINAL DRAINAGE PLAN

DATE: JUNE '97
DESIGNED BY: MG
DRAWN BY: NLD
CHECKED BY: MG

JOB NO. 2748.012.00

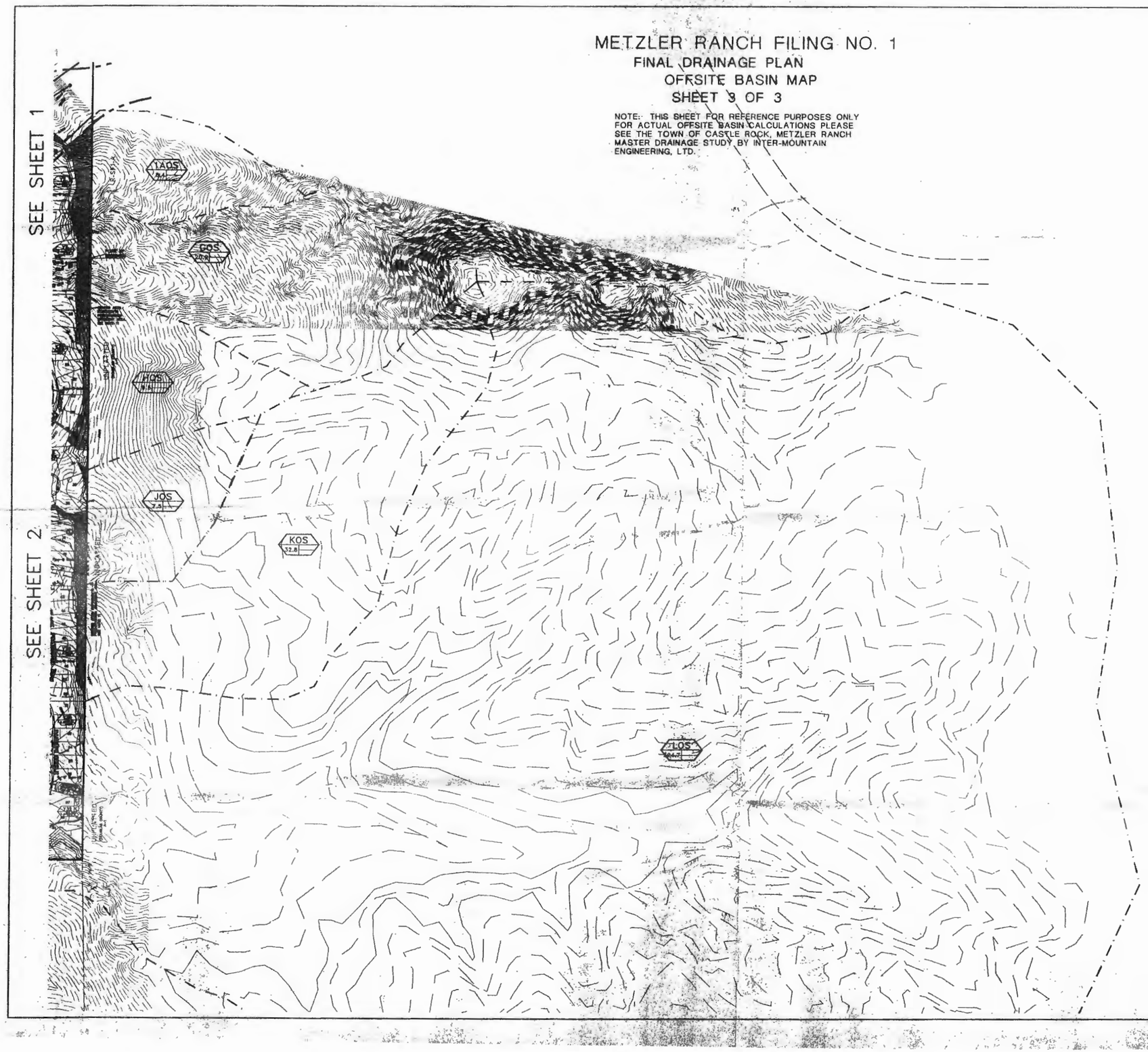
SHEET 2 OF 3

REF. 6

METZLER RANCH FILING NO. 1

FINAL DRAINAGE PLAN
OFFSITE BASIN MAP
SHEET 3 OF 3

NOTE: THIS SHEET FOR REFERENCE PURPOSES ONLY FOR ACTUAL OFFSITE BASIN CALCULATIONS PLEASE SEE THE TOWN OF CASTLE ROCK, METZLER RANCH MASTER DRAINAGE STUDY BY INTER-MOUNTAIN ENGINEERING, LTD.



ORIGIN BENCHMARK:
USE THE 3" BRASS CAP Q337 1.3 MILES NORTH OF CASTLE ROCK TRAIN STATION, 6' WEST OF WEST RAIL SET AT TOP WEST END OF NORTH ABUTTMENT OF BRIDGE #31.20.
ELEV.=6149.90 DATUM USC+GS

PROJECT BENCHMARK:
SET #5 REBAR 6" EAST OF WEST R.O.W. FENCE OF FOUNDERS PARKWAY; APPROXIMATELY 800' WEST OF THE INTERSECTION OF FOUNDERS PARKWAY AND CROWFOOT VALLEY RD.
ELEV.=8270.80 PROJECT DATUM (RMC FB. 375028)
ELEV.=8271.37 USC+GS
(PROJECT DATUM BASED ON PREVIOUS CONSTRUCTION WORK IN THE AREA)

LEGEND

- A01 / 0.00 / 0.00 / 0.00 — BASIN I.D.; 5 YEAR "C" VALUE; 100 YEAR "C" VALUE; AREA IN ACRES
- 00 — DESIGN POINT
- PROPOSED CROSS-PAN
- FLOW ARROW
- MAJOR BASIN BOUNDARY
- SUB-BASIN BOUNDARY
- OFFSITE BASIN BOUNDARY
- PROPOSED STORM SEWER
- EXISTING 100 YR FLOODPLAIN

200 100 0 200 400
SCALE: 1" = 200'

PREPARED UNDER THE DIRECT SUPERVISION OF LEONARD R. WILSON

LEONARD R. WILSON, P.E. #18810 — DATE 6-16-97

REGISTERED PROFESSIONAL ENGINEER 18810 COLORADO

TOWN OF CASTLE ROCK APPROVALS
THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM THE APPROVAL DATE OF THE PUBLIC WORKS DEPARTMENT.

RECOMMENDED APPROVAL:
ENGINEERING DIVISION
DATE
APPROVED BY:
PUBLIC WORKS DIRECTOR
DATE

RMC
ROCKY MOUNTAIN CONSULTANTS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING
8301 E. Prentice Ave.
Suite 101
Englewood, CO 80111
(303) 741-6000
FAX (303) 741-6106

REVISIONS			
NO.		DATE	BY
1	REV PER TOWN COMMENTS	4/30/97	MG
2	REVISED	6/23/97	GM

TOWN OF CASTLE ROCK – METZLER RANCH
FINAL DRAINAGE PLAN
OFFSITE BASIN MAP

DATE: JUNE '97
DESIGNED BY: MG
DRAWN BY: MLD
CHECKED BY: MG

JOB NO. 2748.012.00

SHEET 3 OF 3

REF. 6

C:\PROJECTS\2748.012\METZDSKN Mon Dec 22 07:57:23 1997 HUNTER

HAZEN/MOORE FILING NO. 2
PHASE III DRAINAGE MAP

HISTORIC CONDITIONS

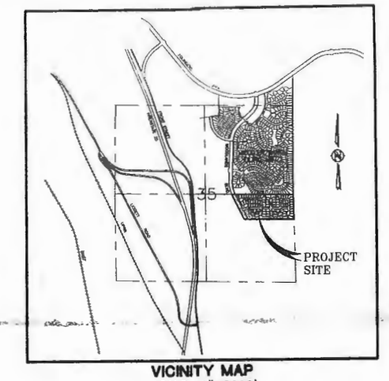
UNCC
CALL BEFORE YOU DIG
1-800-922-1987
Utility Notification Center of Colorado
Administrative Office 303-232-1991
12600 W. Colfax Ave., Suite B-310
Lakewood, Co 80215

CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES.

ROCKY MOUNTAIN CONSULTANTS ASSUMES NO RESPONSIBILITY FOR EXISTING UTILITY LOCATIONS (HORIZONTAL AND VERTICAL). THE EXISTING UTILITIES SHOWN ON THIS DRAWING HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. IT IS, HOWEVER, THE RESPONSIBILITY OF THE CONTRACTOR TO FIELD VERIFY THE LOCATION OF ALL UTILITIES PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES.

100 50 0 100 200
SCALE: 1" = 100'

DISCHARGE SUMMARY HISTORIC CONDITION			
DESIGN POINT	CONTRIBUTING AREA acres	RUNOFF 5-YEAR PEAK (cfs)	RUNOFF 100-YEAR PEAK (cfs)
H1	50.0	19.5	115.0
H2	2.1	1.5	9.5



VICINITY MAP
SCALE: 1"=2000'

LEGEND

- 04 / 12.7 13.3 / 13.3 — BASIN I.D. — 5 YEAR "C" VALUE — 100 YEAR "C" VALUE — AREA IN ACRES
- H1 — DESIGN POINT
- MAJOR BASIN BOUNDARY
- OFFSITE SUB-BASIN BOUNDARY
- 5000 — EXISTING CONTOUR
- EXISTING CULVERT

PROJECT BENCHMARK

DOUGLAS COUNTY CONTROL POINT 2010010. A STANDARD DOUGLAS COUNTY 3 1/4" ALUMINUM CAP ON STEEL ROD SET IN CONCRETE. LOCATED +\- 140' SOUTH OF THE SOUTHEAST CORNER OF SECTION 26, T7S, R67W.
ELEVATION = 6365.03' NAVD 88

COLORADO REGISTERED PROFESSIONAL ENGINEER VISRA B. STERNEK 26800

TOWN OF CASTLE ROCK APPROVALS
THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM DATE OF THE PUBLIC WORKS DIRECTOR APPROVAL.

Recommend Approval By:

Engineering Division *Date*

Approved By:

Public Works Department *Date*

RMC
ROCKY MOUNTAIN CONSULTANTS, INC.
CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING
8301 E. Prentice Ave. Suite 101
Greenwood Village, CO 80111
(303) 741-6000
FAX (303) 741-6106

REVISIONS			
NO.		DATE	BY
1	Added Basin H2	3.21.03	WM

HAZEN/MOORE FILING NO. 2
PHASE III DRAINAGE MAP
HISTORIC CONDITIONS

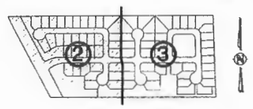
DATE: March 03
DESIGNED BY: MW
DRAWN BY: TLK
CHECKED BY: VS

JOB NO. 0965.044.01

SHEET 1 OF 3

REF.7

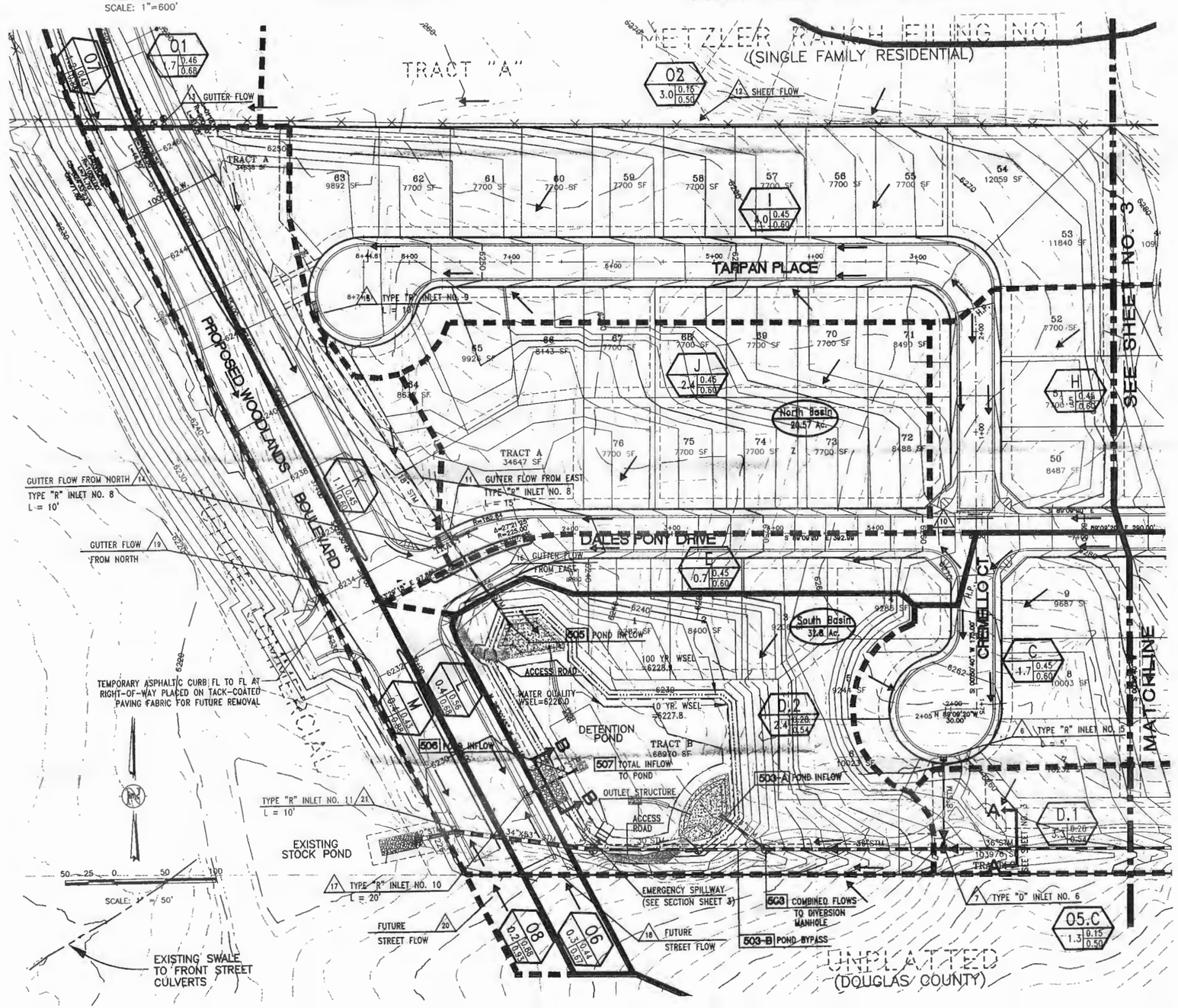
HAZEN/MOORE FILING NO. 2
PHASE III DRAINAGE MAP
PROPOSED CONDITIONS

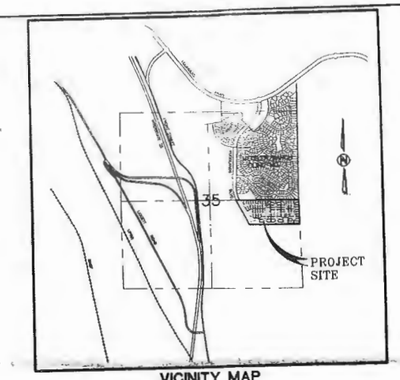


KEY MAP
SCALE: 1"=600'

PROJECT BENCHMARK

DOUGLAS COUNTY CONTROL POINT 2010010. A STANDARD DOUGLAS COUNTY 3 1/4" ALUMINUM CAP ON STEEL ROD SET IN CONCRETE. LOCATED +\- 140' SOUTH OF THE SOUTHEAST CORNER OF SECTION 26, T7S, R67W. ELEVATION = 6365.03' NAVD 88





VICINITY MAP
SCALE: 1"=2000'
HAZEN/MOORE FILING 2

Discharge Summary Developed Flows

BASIN DETAILS: Design Point	Contributing Basins	Area (acres)	RUNOFF: Initial Storm (cfs)	Major Storm (cfs)	DESCRIPTION
1	O3	1.40	0.7	3.6	Sheet Flow
2	O3,A	4.10	4.4	11.8	Inlet No.1
3	O4	12.70	5.0	29.2	Inlet No.2
4	0.6A	3.30	1.5	8.9	Inlet No.3
501	O3,O4,O5.A,A	20.10	9.9	47.5	
5	B	1.80	3.0	5.0	Inlet No.4
502	O3,O4,O5.A,O5.B,A	24.10	17.5	52.3	Pipe/Swale
6	C	1.70	2.9	6.4	
7	D.1	3.30	5.6	11.2	
503	O3,O4,O5.A-B,.A-D.1,F & G Intercept	29.10	23.3	76.2	Total to Diversion Manhole
503-A	503 Diverted to pond		[illegible]	[illegible]	Pond Inflow (B.)
503-B	503 Bypass		0.0	39.5	High-Flow Bypass
	0.5C + D.2	3.70	[illegible]	[illegible]	Pond Inflow Direct
8	F	2.30	4.5	11.0	
	G	2.80	4.7	10.6	
9	Intercept		6.5	8.6	Inlet No. 7
9	bypass		2.1	12.8	Inlet No. 7
10	H	1.60	2.5	6.9	
11	F-H,J	9.00	8.5	28.6	Inlet No.8 (E. gutter)
12	O3	3.00	1.7	9.6	Sheet Flows
13	O1,O2	4.70	5.0	16.0	
14	O1,O2,K	5.80	6.8	19.3	Inlet No.8 (W. gutter)
15	I	4.00	6.1	19.4	Inlet No.8
505	O2,O1,F-H,I-K	18.80	29.0	82.8	Pond Inflow (N.)
16	E	0.70	1.5	3.6	
17	L	0.40	1.0	1.4	
18	O6	0.30	0.5	2.1	
506	O6,E,L	1.40	[illegible]	[illegible]	Pond Inflow (W.)
507	503+D.2+O5C+505+506	53.00	[illegible]	[illegible]	Total Pond Inflow
19	O7	1.20	1.8	7.2	
20	O8	0.20	0.9	1.2	
21	O7,O8,M	1.80	3.0	10.0	Inlet No.11
22	N	0.80	1.7	4.2	Flow to Metzler

DETENTION POND SUMMARY

	WATER SURFACE ELEVATION (ft)	TOTAL VOLUME (ac ft) REQUIRED	TOTAL VOLUME (ac ft) PROVIDED	RELEASE RATE (cfs)
WATER QUALITY CAPTURE VOLUME	6226.0	0.48	0.60	40 HR RELEASE
10 YR. STORAGE *	6227.8	1.50	1.65	8.9
100 YR. STORAGE *	6228.9	2.32	2.45	29.3

* = VOL. INCLUDES WATER QUALITY VOL.

LEGEND

- A1 — SUB-BASIN I.D.
- 0.00 / 0.00 — 5 YEAR "C" VALUE / 100 YEAR "C" VALUE
- 0.00 — AREA IN ACRES
- 1 — DESIGN POINT
- PROPOSED SUB-BASIN BOUNDARY
- PROPOSED BASIN (NORTH & SOUTH) BOUNDARY
- 5000 — PROPOSED CONTOUR
- 5000 — EXISTING CONTOUR
- CROSS PAN

TOWN OF CASTLE ROCK APPROVALS
THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM DATE OF THE PUBLIC WORKS DIRECTOR APPROVAL.

Recommend Approval By:

Engineering Division *Date*

Approved By:

Public Works Department *Date*

COLORADO REGISTERED PROFESSIONAL ENGINEER VERA B. STERNEK 26800

RMC
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CIVIL AND ENVIRONMENTAL ENGINEERING • PLANNING
8301 E. Prentice Ave. Suite 101
Greenwood Village, CO 80111
(303) 741-6000
FAX (303) 741-6105

NO.	REVISIONS	DATE	BY
1	AS PER TOWN OF CASTLE ROCK	3.21.03	MW
2	AS PER TOWN OF CASTLE ROCK	5.28.03	MW

HAZEN/MOORE FILING NO. 2
PHASE III DRAINAGE MAP
PROPOSED CONDITIONS

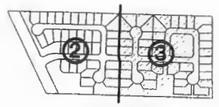
DATE: MARCH 03
DESIGNED BY: MW
DRAWN BY: TLK
CHECKED BY: VS

JOB NO. 0965.044.02

SHEET 2 OF 3

REF.7

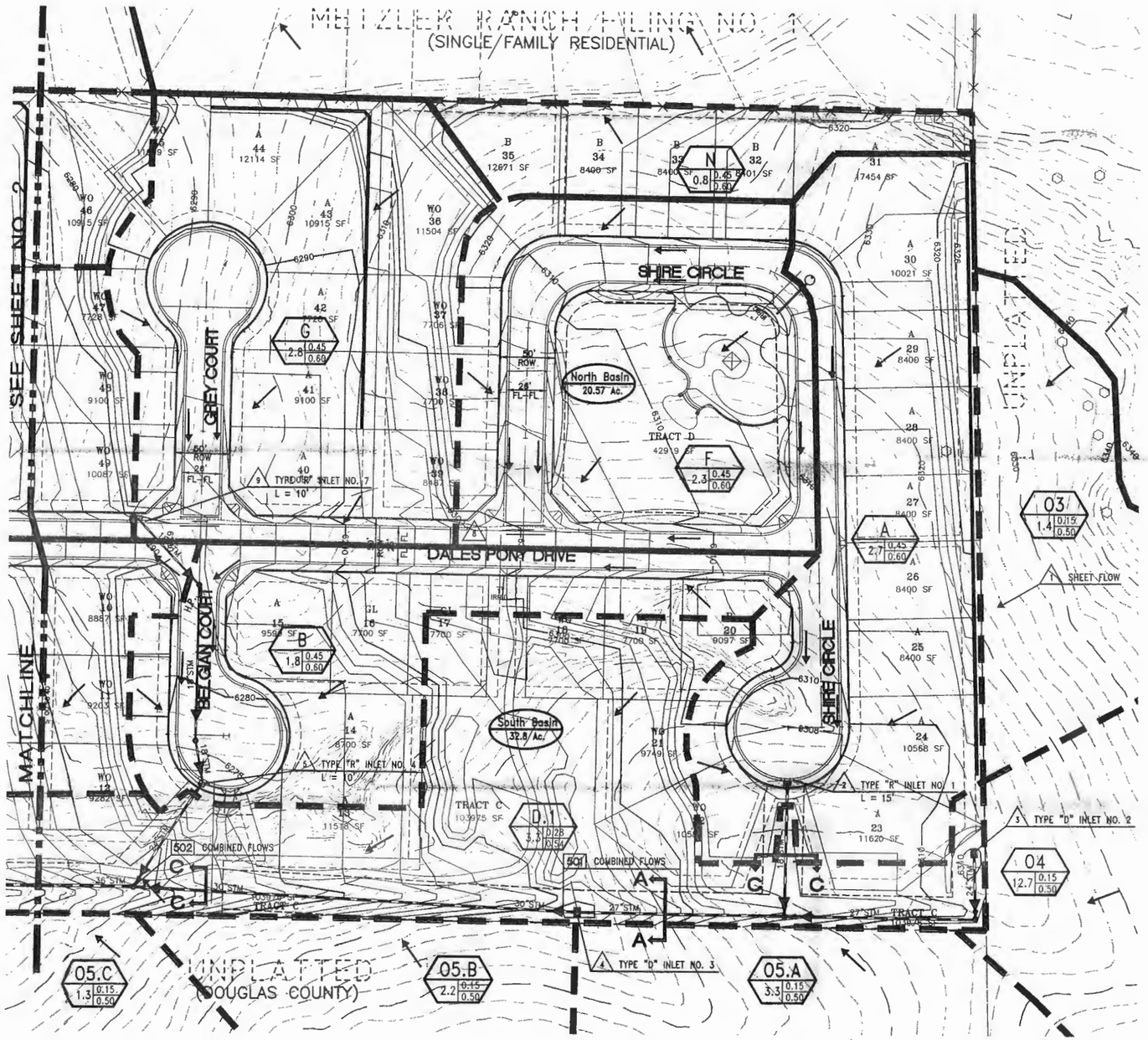
HAZEN/MOORE FILING NO. 2
PHASE III DRAINAGE MAP
PROPOSED CONDITIONS

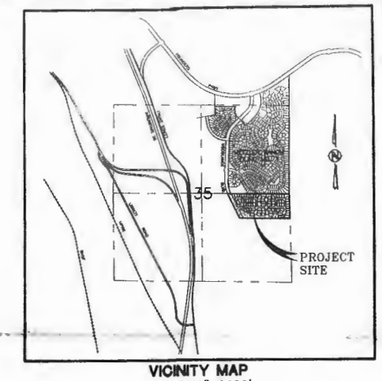


KEY MAP
SCALE: 1"=600'

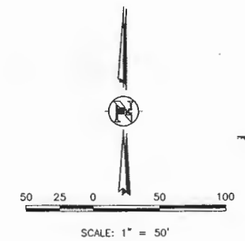
PROJECT BENCHMARK

DOUGLAS COUNTY CONTROL POINT 2010010. A STANDARD DOUGLAS COUNTY 3 1/4" ALUMINUM CAP ON STEEL ROD SET IN CONCRETE. LOCATED +\- 140' SOUTH OF THE SOUTHEAST CORNER OF SECTION 26, T7S, R67W. ELEVATION = 6365.03' NAVD 88



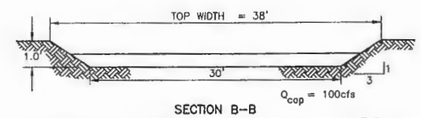


VICINITY MAP
SCALE: 1"=2000'



SCALE: 1" = 50'

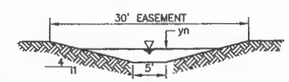
SECTION A–A
SWALE SECTION
SCALE: 1/2"=1'-0"



SECTION B–B
EMERGENCY SPILLWAY – DETENTION POND
SCALE: 1"=5'

SHIRE CIRCLE
Smin. = 1%
Q_{100} = 11.6cfs
Yn = 2ft (min.)

BELGIAN COURT
Smin. = 1%
Q_{100} = 8.2cfs
Yn = 2ft (min.)



SECTION C–C
EMERGENCY SPILLWAY – FROM CUL-DE-SAC
SCALE: 1"=5'

LEGEND

- A1 / 0.00 / 0.00 / 0.00 — SUB-BASIN I.D.; 5 YEAR "C" VALUE; 100 YEAR "C" VALUE; AREA IN ACRES
- 1 — DESIGN POINT
- PROPOSED SUB-BASIN BOUNDARY
- PROPOSED BASIN (NORTH & SOUTH) BOUNDARY
- 5000 — PROPOSED CONTOUR
- 5000 — EXISTING CONTOUR
- CROSS PAN

COLORADO REGISTERED PROFESSIONAL ENGINEER VERA B. STEPNER 26800

TOWN OF CASTLE ROCK APPROVALS
THESE PLANS ARE HEREBY APPROVED FOR ONE YEAR FROM DATE OF THE PUBLIC WORKS DIRECTOR APPROVAL.

Recommend Approval By:

Engineering Division *Date*

Approved By:

Public Works Department *Date*

RMC
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8301 E. Prentice Ave.
Suite 101
Greenwood Village, CO 80111
(303) 741-6000
FAX (303) 741-6106

NO.	REVISIONS	DATE	BY
1	AS PER TOWN OF CASTLE ROCK	3.21.03	MW

HAZEN/MOORE FILING NO. 2
PHASE III DRAINAGE MAP
PROPOSED CONDITIONS

DATE: MARCH 03
DESIGNED BY: MW
DRAWN BY: TLK
CHECKED BY: VS

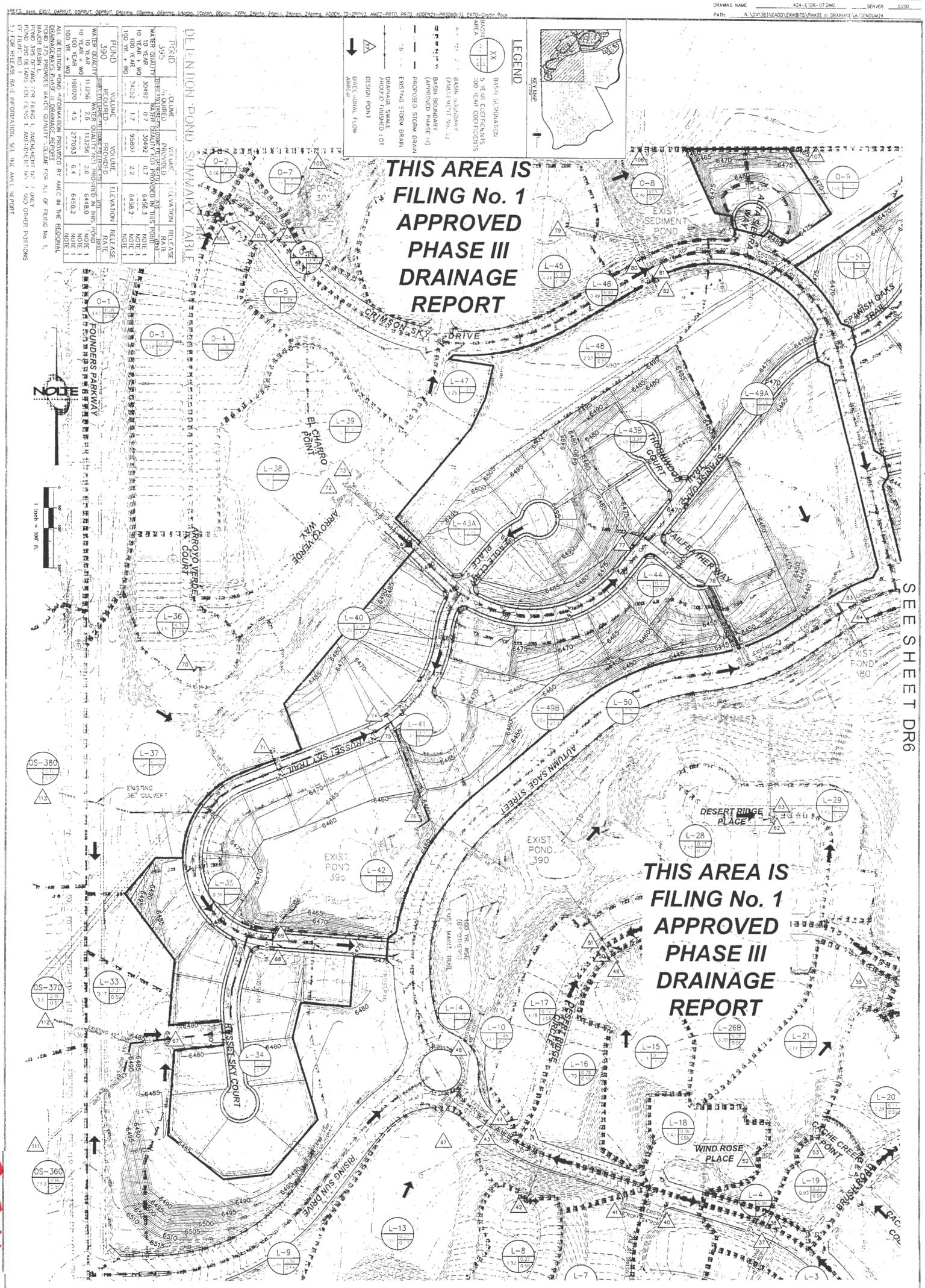
JOB NO.
0965.044.02

SHEET
3 OF 3

REF. 7

DATE: 7/6/06 TIME: 10:46:03 AM DESIGNER: DM APPL: MCR CT
DRAWING NAME: A24-CTDR-07.DWG SERVER: DV50
PATH: N:\DV1383\CADD\EXHIBITS\PHASE III DRAINAGE\ADDENDUM24

XREFS: exb; EXVT; CAPRUT; CAPRUT; CAPRUT; C4pump; C5pump; C6pump; C4pump; C5pump; C6pump; EXPN; 24pnb; 24pnl; 24pnp; 24pnq; ADDEN; TD-DRPH1; AMEC-PRTD; PRTD; ADDEN24-PRSDOD1; EXTD-Costco Pad



REF. 14

NOLTE
BEYOND ENGINEERING
8000 SOUTH CHESTER STREET, SUITE 200, CENTENNIAL, CO. 80112
303.220.6400 TEL 303.220.9001 FAX WWW.NOLTE.COM

CASTLE OAKS ESTATES FILING NO. 1

AMENDMENT No. 2 - EXHIBIT VIII
DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: AUTUMN SAGE DEVELOPMENT LTD, INC. DATE SUBMITTED: 08/2005

NO.	BY	DATE	REVISION
1	CS	7/06/2006	APPROVAL FOR CONSTRUCTION

JOB NUMBER: DV1383
SHEET NUMBER: DR7 OF 8 SHEETS
SCALE: VERTICAL: 1"=N/A HORIZONTAL: 1"=100'

SEE SHEET DR7

THIS AREA
FILING No
APPROVE
PHASE II
DRAINAG
REPORT

SEE SHEET DR7

SAGE STREET
EXIST POND 390
100 YR WSE (BY OTHERS)
EXIST. MAINT. TRAIL
EXIST POND 395
RUSSET SKY TRAIL
RUSSET SKY COURT
RISING SUN DRIVE
TERRAVITA WAY
OYO VERDE COURT
EXISTING 36" CULVERT
EXISTING 18" CMP
L-33
L-34
L-35
L-36
L-37
L-40
L-41
L-42
L-9
L-11
L-12
L-13
L-14
L-16
L-17
H-12
H-16
H-17
H-18A
OS-380
OS-370
OS-360

DETENTION POND SUMMARY TABLE

(H-13A)

POND 395	VOLUME REQUIRED (CUBIC FT)	VOLUME REQUIRED (ACRE-FT)	VOLUME PROVIDED (CUBIC FT)	VOLUME PROVIDED (ACRE-FT)	ELEVATION (FT)	RELEASE RATE (CFS)
WATER QUALITY	WATER QUALITY NOT PROVIDED IN THIS POND					
10 YEAR	30492	0.7	30492	0.7	6456.3	NOTE 1
10 YEAR + WQ	---	---	---	---	---	NOTE 1
100 YEAR	74052	1.7	95807	2.2	6458.2	NOTE 1
100 YR. + WQ	---	---	---	---	---	NOTE 1

POND 390	VOLUME REQUIRED (CUBIC FT)	VOLUME REQUIRED (ACRE-FT)	VOLUME PROVIDED (CUBIC FT)	VOLUME PROVIDED (ACRE-FT)	ELEVATION (FT)	RELEASE RATE (CFS)
WATER QUALITY	WATER QUALITY NOT PROVIDED IN THIS POND					
10 YEAR	113256	2.6	113256	2.6	6448.0	NOTE 1
10 YEAR + WQ	---	---	---	---	---	NOTE 1
100 YEAR	196020	4.5	277093	6.4	6450.2	NOTE 1
100 YR. + WQ	---	---	---	---	---	NOTE 1

ALL DETENTION POND INFORMATION PROVIDED BY AMEC IN THE REGIONAL DRAINAGEWAYS PHASE III DRAINAGE REPORT
POND 395 PROVIDES WATER QUALITY VOLUME FOR ALL OF FILING No. 1, MAJOR BASIN L.
POND 395 DETAINS FOR FILING 1, AMENDMENT NO 2 ONLY
POND 390 DETAINS FOR FILING 1, AMENDMENT NO 2 AND OTHER PORTIONS OF FILING NO 1
1) FOR RELEASE RATE INFORMATION, SEE THE AMEC REPORT.

KEY MAP

LEGEND

- BASIN DESIGNATION (XX)
- BASIN AREA (X.X); 5 YEAR COEFFICIENTS (.XX); 100 YEAR COEFFICIENTS (.XX)
- BASIN BOUNDARY (AMENDMENT No. 2)
- BASIN BOUNDARY (APPROVED PHASE III)
- PROPOSED STORM DRAIN
- EXISTING STORM DRAIN
- DRAINAGE SWALE AROUND FINISHED LOT
- DESIGN POINT
- DIRECTIONAL FLOW ARROW

1 inch = 100' ft.

NO.	BY	DATE	REVISION

CASTLE OAKS ESTATES FILING NO. 1

AMENDMENT No. 2 - EXHIBIT IX
DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: AUTUMN SAGE DEVELOPMENT LTD, INC.

DATE SUBMITTED: 08/2005

NOLTE
BEYOND ENGINEERING
8000 SOUTH CHESTER STREET, SUITE 200,
CENTENNIAL, CO. 80112
303.220.6400 TEL 303.220.9001 FAX
WWW.NOLTE.COM

SHEET NUMBER DR8 OF 9 SHEETS

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

JOB NUMBER DV1383

REF. 14

LEGEND

XX	BASIN DESIGNATION
BASIN AREA; XX.X / X.XX / X.XX	5 YEAR COEFFICIENTS / 100 YEAR COEFFICIENTS
	BASIN BOUNDARY
	DIRECTIONAL FLOW ARROW
HP	HIGH POINT
LP	LOW POINT

NOTE: 100-YR FLOODPLAIN SHOWN IS TAKEN FROM FIRM, TOWN OF CASTLE ROCK, COLORADO, COMMUNITY PANEL NUMBER, 080050 0189 C, SEPTEMBER 30, 1987.

BASIN DESIGNATION	TRIBUTARY AREA (acres)	5 YEAR RUNOFF COEF.	100 YEAR RUNOFF COEF.	RUNOFF (cfs)
G-1	3.50	4.4	12.7	
G-2	3.44	5.7	12.9	
G-3A	4.64	7.6	18.9	
G-3B	4.01	6.3	15.6	
G-4	4.42	6.0	14.5	
G-5	4.04	4.7	13.9	
G-6	1.09	1.9	4.7	
OS-210	37.25	55.0	52.0	
OS-240	17.05	9.0	32.0	
G-7	15.91	10.7	45.4	
G-8	1.00	4.4	8.7	
G-9	0.68	3.0	5.9	
G-10	3.56	8.1	18.2	
G-11	3.83	8.7	19.4	
G-12	21.40	18.4	67.8	
OS-360	9.63	12.0	24.0	
OS-270	8.36	16.0	30.0	
H-1	7.30	9.9	28.7	
H-2	2.45	2.5	8.3	
H-3	1.51	1.5	5.1	
H-4	3.04	3.7	11.7	
H-5	3.09	3.7	11.1	

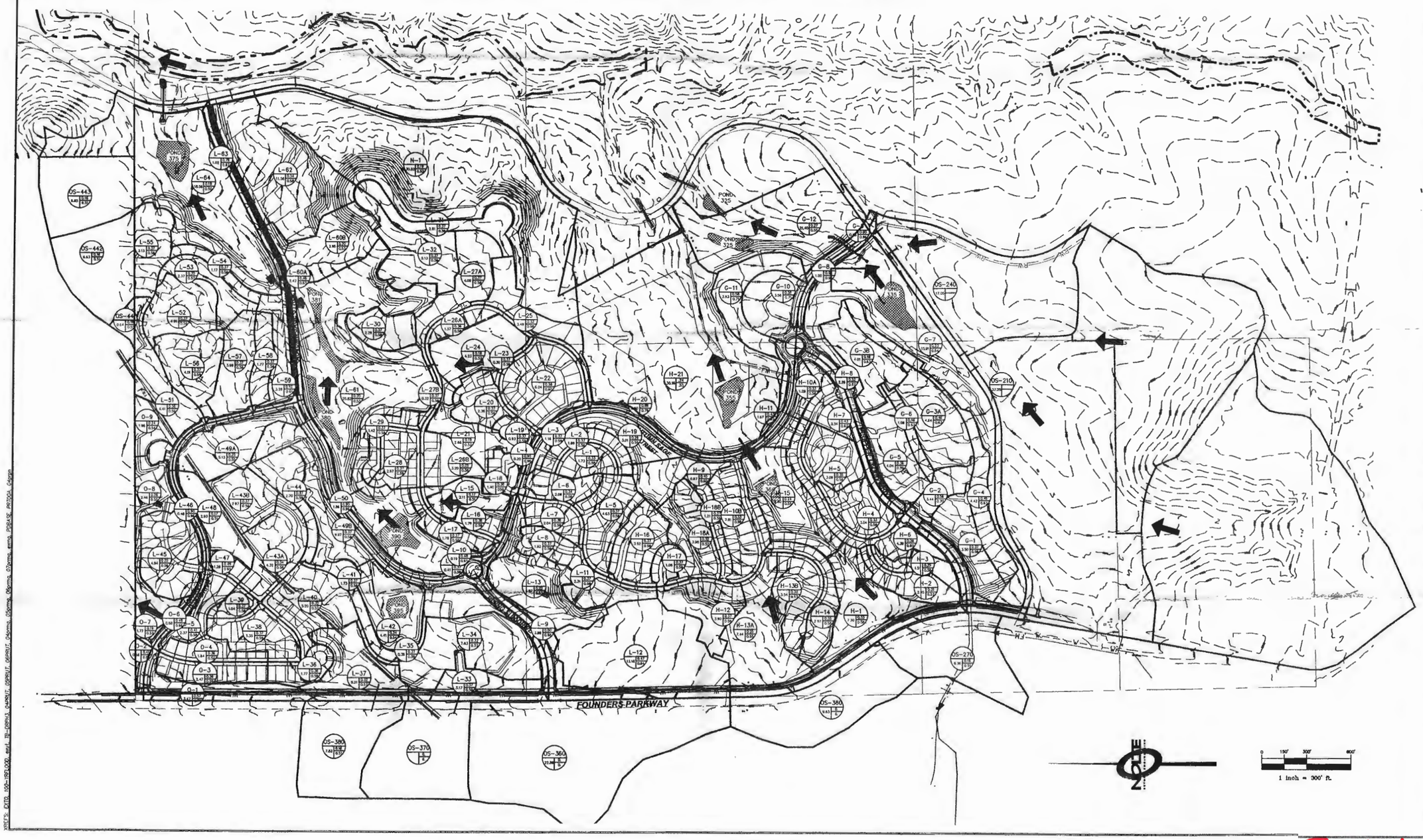
BASIN DESIGNATION	TRIBUTARY AREA (acres)	5 YEAR RUNOFF COEF.	100 YEAR RUNOFF COEF.	RUNOFF (cfs)
H-6	4.39	6.5	18.2	
H-7	3.34	6.5	17.2	
H-8	2.26	5.4	12.8	
H-9	0.67	0.7	2.8	
H-10A	1.28	1.8	5.9	
H-10B	7.81	7.8	24.7	
H-11	1.67	3.4	8.9	
H-12	3.90	4.6	13.3	
H-13A	7.44	5.9	23.5	
H-13B	3.54	3.7	11.9	
H-14	2.92	3.4	10.1	
H-15	5.80	5.1	21.4	
H-16	3.52	4.3	12.5	
H-17	1.06	1.5	4.3	
H-18A	3.98	4.1	13.2	
H-18B	1.21	1.6	4.8	
H-19	3.01	3.2	11.7	
H-20	0.60		4.1	
L-1	1.73	1.9	6.3	
L-2	1.89	2.4	6.9	
L-3	1.16	1.9	5.5	
L-4	0.20	0.9	1.7	

BASIN DESIGNATION	TRIBUTARY AREA (acres)	5 YEAR RUNOFF COEF.	100 YEAR RUNOFF COEF.	RUNOFF (cfs)
L-5	4.03	5.1	14.7	
L-6	2.06	2.5	7.8	
L-7	2.04	2.9	8.1	
L-8	1.92	2.4	7.0	
L-9	3.88	7.1	17.3	
L-10	0.19	0.4	1.1	
L-11	2.31	2.9	8.4	
L-12	13.18	19.7	48.5	
L-13	5.07	4.7	20.0	
L-14	0.41	0.6	1.7	
L-15	2.11	1.4	7.8	
L-16	1.79	2.2	6.3	
L-17	1.78	2.3	6.6	
L-18	1.40	1.8	5.2	
L-19	0.93	1.2	3.6	
L-20	2.38	3.1	8.8	
L-21	2.66	2.0	9.8	
L-22	6.04	7.3	21.0	
L-23	0.30	0.5	1.6	
L-24	4.23	2.8	14.5	
L-25	3.49	3.6	11.5	
L-26A	1.57	1.8	5.4	

BASIN DESIGNATION	TRIBUTARY AREA (acres)	5 YEAR RUNOFF COEF.	100 YEAR RUNOFF COEF.	RUNOFF (cfs)
L-26B	3.20	2.9	10.5	
L-27A	4.09	4.7	13.6	
L-27B	0.32	0.5	1.5	
L-28	2.67	3.4	9.8	
L-29	1.42	1.8	5.4	
L-30	2.29	2.9	8.5	
L-31	2.81	3.5	10.0	
L-32	5.13	5.8	16.7	
OS-360	22.89	30.0	57.0	
OS-370	7.83	17.0	32.0	
L-33	4.41	4.9	13.1	
L-34	7.63	8.3	26.9	
L-35	0.36	0.5	1.5	
OS-380	7.83	13.0	25.0	
L-36	1.77	2.2	5.7	
L-37	5.21	5.7	18.3	
L-38	3.35	4.2	12.2	
L-39	1.04	1.4	4.2	
L-40	5.20	5.8	17.8	
L-41	1.73	2.3	6.5	
L-42	4.41	3.8	15.7	
L-43A	4.32	4.7	14.4	

BASIN DESIGNATION	TRIBUTARY AREA (acres)	5 YEAR RUNOFF COEF.	100 YEAR RUNOFF COEF.	RUNOFF (cfs)
L-43B	2.97	3.9	11.3	
L-44	2.70	3.5	10.2	
L-45	4.94	5.9	17.8	
L-46	0.49	2.2	4.3	
L-47	1.28	2.1	4.9	
L-48	2.93	2.2	12.0	
L-49A	5.13	4.5	17.0	
L-49B	9.97	11.1	32.0	
L-50	1.86	6.5	12.6	
OS-441	0.64	1.0	0.8	
L-51	4.41	4.9	14.7	
L-52	4.01	6.5	18.0	
L-53	2.37	3.5	11.6	
L-54	1.17	1.6	4.5	
OS-442	6.63	8.8	6.9	
L-55	3.13	4.2	12.2	
L-56	4.01	5.0	14.4	
L-57	3.89	4.4	12.7	
L-58	1.37	2.3	6.8	
L-59	3.28	5.9	15.8	
L-60a	2.42	4.8	11.9	
L-60b	3.96	5.0	14.6	

BASIN DESIGNATION	TRIBUTARY AREA (acres)	5 YEAR RUNOFF COEF.	100 YEAR RUNOFF COEF.	RUNOFF (cfs)
L-61	25.82	14.2	68.0	
L-62	11.58	14.4	44.7	
L-63	1.02	3.9	8.0	
OS-443	6.85	8.5	6.7	
L-64	18.56	10.2	51.1	
O-1	3.47	8.0	18.2	
O-2	0.56	1.1	2.9	
O-3	2.47	2.9	8.7	
O-4	1.84	2.4	7.1	
O-5	2.37	2.7	8.3	
O-6	0.68	1.6	4.0	
O-7	1.77	1.4	7.1	
O-8	2.46	2.8	11.0	
O-9	1.68	1.6	6.5	



CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT V

DEVELOPED DRAINAGE - OVERALL RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: JUNE 2003

NOLTE
BEYOND ENGINEERING
7000 SOUTH YOSEMITE ST., SUITE 200, ENGLEWOOD, CO. 80112
303.220.1001 TEL 303.220.9001 FAX WWW.NOLTE.COM

NO.	BY	DATE	REVISIONS
1	MWD	7/9/03	TOW COMMENTS DATED 7/2/03

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

SHEET NUMBER V OF 10 SHEETS

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

JOB NUMBER DV1383

REF. 14

RUNOFF SUMMARY TABLE

DESIGN POINT	TRIBUTARY AREA (ACRES)	5-YR RUNOFF (CFS)	100-YR RUNOFF (CFS)
1	4.6	5.3	9.6
2	0.8	1.0	1.8
3	1.9	2.4	4.3
4	4.4	5.3	9.5
5	1.5	1.8	3.3
6	3.2	5.3	9.6
7	1.5	2.1	3.8
8	0.8	1.0	1.9
9	1.8	2.2	4.0
	56.4	41.0	194.0
	30.5	21.0	97.0
10	37.3	20.0	95.0
11	4.3	5.7	10.3
12	20.0	18.7	33.8
13	12.4	6.5	11.7
14	0.9	4.1	7.5
15	1.0	4.3	7.8
16	2.6	5.1	9.2
17	3.0	6.1	11.1
18	3.1	5.6	10.2

DESIGN POINT	TRIBUTARY AREA (ACRES)	5-YR RUNOFF (CFS)	100-YR RUNOFF (CFS)
19	20.9	17.5	31.7
20	9.6??	16.0	30.0
21	7.5	8.0	14.6
22	2.3	2.9	5.3
23	1.6	2.1	3.9
24	5.0	3.9	7.1
25	3.1	7.8	14.2
26	3.3	6.9	12.6
27	5.0	6.0	10.9
28	2.9	3.8	6.9
29	3.4	4.5	8.2
30	7.4	5.3	9.7
31	5.5	6.3	11.5
32	3.2	4.2	7.7
33	1.0	1.3	2.5
34	7.4	7.5	13.5
35	3.3	4.2	7.6
36	2.3	5.8	10.6
37	0.9	2.3	4.1
38	1.3	1.8	3.4

DESIGN POINT	TRIBUTARY AREA (ACRES)	5-YR RUNOFF (CFS)	100-YR RUNOFF (CFS)
39	4.8	5.7	10.3
40	3.0	2.2	4.0
41	1.7	2.6	4.7
42	1.5	5.6	10.3
43	25.0	18.8	34.0
44	5.0	2.8	5.1
45	1.7	2.0	3.5
46	1.8	2.3	4.2
47	1.4	2.1	3.9
48	3.7	4.6	8.4
49	2.2	2.6	4.7
50	2.1	2.6	4.8
51	0.3	1.3	2.4
52	0.9	1.2	2.2
53	2.0	2.5	4.6
54	3.6	4.9	8.9
55	3.9	5.0	9.1
56	1.4	3.0	5.5
57	1.9	4.6	8.4
58	7.8	7.1	12.8

DESIGN POINT	TRIBUTARY AREA (ACRES)	5-YR RUNOFF (CFS)	100-YR RUNOFF (CFS)
59	1.4	5.7	10.4
60	1.5	4.5	8.3
61	1.4	2.8	5.1
62	0.7	3.0	5.5
63	1.4	3.9	7.0
64	32.5	42.0	81.0
65	9.3	17.0	32.0
66	5.3	5.7	10.4
67	8.2	8.6	15.6
68	0.7	1.6	2.9
69	3.7	3.0	5.5
70	8.9	13.0	25.0
71	1.8	2.3	4.2
72	4.6	4.0	7.3
73	3.3	4.1	7.5
74	4.9	5.1	9.3
75	2.4	3.1	5.6
76	1.0	1.3	2.3
77	7.0	7.8	14.1
78	2.1	2.6	4.8

DESIGN POINT	TRIBUTARY AREA (ACRES)	5-YR RUNOFF (CFS)	100-YR RUNOFF (CFS)
79	4.3	6.3	11.5
80	5.0	4.3	7.7
81	0.5	2.3	4.3
82	4.3	5.3	9.7
83	4.1	5.3	9.7
84	4.0	4.9	8.7
85	3.8	4.6	8.4
86	1.8	2.3	4.2
87	7.1	7.4	13.4
88	6.1	13.4	24.2
89	2.8	1.6	2.8
90	1.1	1.4	2.6
91	1.7	2.2	4.0
92	1.3	1.7	3.2
93	1.0	1.3	2.4
94	2.1	2.7	4.9
95	4.2	2.9	5.3
96	6.0	7.1	12.9
97	0.2	1.1	2.0
98	2.1	2.0	3.6

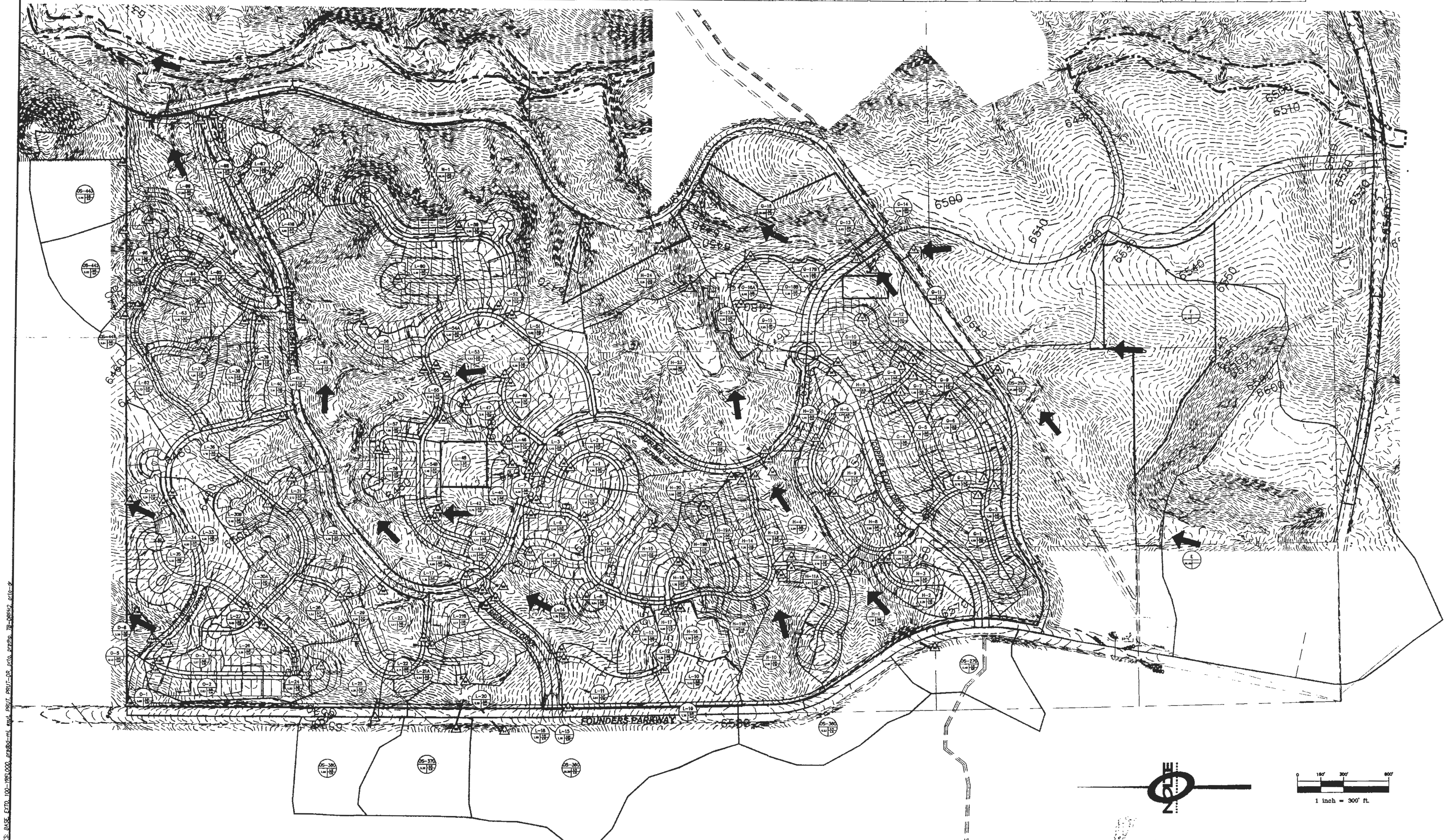
DESIGN POINT	TRIBUTARY AREA (ACRES)	5-YR RUNOFF (CFS)	100-YR RUNOFF (CFS)
99	1.6	2.1	3.8
100	4.5	2.8	5.0
101	3.0	4.2	7.6
102	0.4	1.5	2.7
103	2.7	3.4	6.1
104	1.3	1.7	[illegible]
105	5.6	6.1	11.1
106	2.5	3.1	5.7
107	4.4	5.0	9.0
108	32.0	17.9	32.5
109	0.6	0.4	0.8
110	4.3	4.7	8.5
111	4.0	4.9	9.0
112	2.3	2.7	4.9
113	1.0	1.3	2.4
114	6.6	3.8	6.9
115	3.1	4.0	7.2
116	6.3	7.3	13.2
117	0.9	4.1	7.5
118	6.9	3.7	6.7

DESIGN POINT	TRIBUTARY AREA (ACRES)	5-YR RUNOFF (CFS)	100-YR RUNOFF (CFS)
119	17.8	13.7	25.1
120	3.9	4.1	7.5
121	2.8	3.2	5.9
122	1.9	2.3	4.1
123	1.9	2.9	5.3
124	0.4	1.9	3.5
125	2.2	2.1	3.9
126	4.5	7.2	9.5

LEGEND

- XX — BASIN DESIGNATION; 5 YEAR COEFFICIENTS; 100 YEAR COEFFICIENTS; BASIN AREA
- BASIN BOUNDARY
- DESIGN POINT
- DIRECTIONAL FLOW ARROW
- HP — HIGH POINT
- LP — LOW POINT

NOTE: 100-YR FLOODPLAIN SHOWN IS TAKEN FROM FIRM, TOWN OF CASTLE ROCK, COLORADO, COMMUNITY PANEL NUMBER, 080050 0189 C, SEPTEMBER 30, 1987.



NO	BY	DATE	REVISIONS:
1	KLD	09/27/02	PER TOWN COMMENTS
2	KLD	01/10/03	PER TOWN COMMENTS DATED 10/11/02

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.

CASTLE OAKS ESTATES FILING NO. 1
EXHIBIT VIII
DEVELOPED DRAINAGE - OVERALL RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: 04/02

NOLTE
BEYOND ENGINEERING
7000 SOUTH YOSEMITE ST., SUITE 200, ENGLEWOOD, CO. 80112
303.220.1001 TEL 303.220.9001 FAX WWW.NOLTE.COM

DATE PRINTED JAN 13 2003 NOLTE & ASSOC.

SHEET NUMBER VIII OF 14 SHEETS

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

JOB NUMBER DV1383

REF. 14

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT VI-A
DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: JUNE 2003

NOLTE
BEYOND ENGINEERING
7000 SOUTH YOSEMITE ST., SUITE 200, ENGLEWOOD, CO. 80112
303.220.1001 TEL 303.220.9001 FAX WWW.NOLTE.COM

NO.	BY	DATE	REVISIONS
1	KES	12/9/03	DW COMMENTS DATED 12/1/03

The engineer preparing this plans will not be responsible for or liable for unauthorized changes to or uses of these plans. All changes must be approved in writing by the engineer in charge. If the plans must be used in the field, the approved plans must be signed and dated.

NOT FOR CONSTRUCTION

SHEET NUMBER
DR6
OF 10 SHEETS

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

JOB NUMBER
DV1383

REF. 14

SEE SHEET DR10

SEE SHEET DR9

SEE SHEET DR7

SEE SHEET DR6

1 inch = 100' ft.

KEY MAP

LEGEND

- XX — BASIN DESIGNATION
- BASIN AREA — 5 YEAR COEFFICIENTS / 100 YEAR COEFFICIENTS
- BASIN BOUNDARY
- DESIGN POINT
- DIRECTIONAL FLOW ARROW
- HP — HIGH POINT
- LP — LOW POINT

NO.	BY	DATE	REVISIONS
1	KGS	7/24/03	PER COMMENTS DTD 7/7/03

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

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT IX-A

DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: JUNE 2003

NOLTE
BEYOND ENGINEERING
7000 SOUTH YOSEMITE ST., SUITE 200, ENGLEWOOD, CO. 80112
303.220.1001 TEL 303.220.8001 FAX WWW.NOLTE.COM

SHEET NUMBER
DR8
OF 10 SHEETS

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

JOB NUMBER
DV13383

REF. 14

CASTLE OAKS ESTATES FILING NO. 1

EXHIBIT VI-E

DEVELOPED DRAINAGE - RATIONAL METHOD

PREPARED FOR: CASTLE OAKS ESTATES, LLC

DATE SUBMITTED: JUNE 2003

NOLTE
BEYOND ENGINEERING
7000 SOUTH YOSELITE ST., SUITE 200, ENGLEWOOD, CO. 80112
303.220.1001 TEL 303.220.9001 FAX WWW.NOLTE.COM

SHEET NUMBER
DR10
OF 10 SHEETS

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

JOB NUMBER
DV1383

REF. 14