

Drainage Conformance Letter

Academy Charter School Parking Lot Improvements

(JN: 25031)

Castle Rock, CO

July 28, 2025

Prepared for:

Academy Charter School

Attn: Erin McMilon

1551 Prairie Hawk Drive

Castle Rock, CO 80109

303.660.4881

Prepared by:

Proof Civil

Jason DeYoung, PE

1531 Market Street

Denver, CO 80202

303.325.5709



Certification Page

Engineer's Statement

"I affirm that this Drainage Conformance Letter and plan for the final drainage design of Academy Charter School was prepared by me (or under my direct supervision) in accordance with the provisions of Town of Castle Rock Drainage Design and Technical Criteria for the owners thereof. I understand that the Town of Castle Rock does not and will not assume liability for drainage facilities designed by others."

Jason DeYoung, PE
State of Colorado No. 45332
For and on behalf of Proof Civil Co.

Owner/Developer's Statement:

Academy Charter School hereby certifies that the drainage facilities for the Academy Charter School Campus shall be constructed according to the design presented in this report. I understand that the Town of Castle Rock does not and will not assume liability for the drainage facilities designed and/or certified by my engineer and that the Town of Castle Rock reviews drainage plans pursuant to the Municipal Code; but cannot, on behalf of Academy Charter School, guarantee that final drainage design review will absolve Academy Charter School and/or their successors and/or assigns of future liability for improper design."

Name of Developer

Authorized Signature

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August 5, 2025

Town of Castle Rock
100 N. Wilcox Street
Castle Rock, CO 80104

This Drainage Conformance Letter for Academy Charter School will address the on-site stormwater conveyance and treatment for the development in accordance with criteria set forth by applicable governing agencies and demonstrate general conformance to the approved *Academy Charter School Castle Rock Lifelong Learning Center Phase III Drainage Study* prepared by Martin & Martin Inc., approved February 9, 2001, hereafter referred to as the Report and *Addendum No. 1 Academy Charter School Castle Rock Lifelong Learning Center Phase III Drainage Study (Parking Lot Expansion)* by Martin & Martin Inc, approved June 30, 2002 hereafter referred to as the Addendum.

I. Site Location and Description

Academy Charter School is located in Lot 1 of the Red Hawk Subdivision filing No. 1, in the southeast quarter of Section 3, Township 8 South, Range 67 West of the 6th Principal Meridian.

The site is 5.00 acres currently consisting of the existing Academy Charter School with associated parking, landscaping, and school playground programming. The proposed construction effort consists of limited improvement of site drainage ahead of a pavement maintenance effort.

Drainage patterns throughout the site will be largely unaltered as site flows will be directed to the same design points as originally intended. Drainage paths will be improved in material and slope in order to minimize maintenance concerns and erosion of site surfaces.

According to FEMA Flood Insurance Rate Map Panel #08035C0188G, effective March 16, 2016, the development portion of the subject site is located within flood hazard area Zone X. Zone X is defined as an area of minimal flood hazard. Refer to Appendix A for the applicable FEMA flood map.

According to the United States Department of Agriculture Natural Resources Conservation Service (NRCS) National Cooperative Soil Survey, onsite soils are identified as Hydrologic Soil Group B. A copy of the NRCS Soil Resource Report is included in Appendix A.

There are no known or identified existing irrigation ditches or canals within the project site. There are no other known significant geological features within the project site.

II. Drainage Basins and Sub-Basins

A. Major Drainage Basins

The subject property is tributary to the Tributary B (Omni Drainageway Tributary) of East Plum Creek via the existing regional water quality and detention facilities 'Detention Pond 2' and 'Detention Pond 3' within the Red Hawk residential development. The site is split between basins that are tributary to each detention facility, with a majority of the site tributary to Detention Pond 2 and one basin (Basin M1 from the Addendum) tributary to Detention Pond 3. This existing basin configuration will be maintained in the proposed condition.

B. Minor Drainage Basins

Three existing site basins are being affected by the proposed drainage improvements: Basin C/C1 from the Report, and Basins M-1 and L-1 from the addendum. The ultimate outfall design points of these basins will be unaltered, but sub-basins within these basins have been created to create more formal, intentional drainage paths. The newly created sub-basins are described as follows:

a. Basin C1-1 (0.30 ac, Imp. = 90%, Q₅ = 0.9 cfs, Q₁₀₀ = 2.0 cfs)

Basin C1-1 is a sub-basin of existing basins C and C1 from the Report, comprised of a northern portion of the existing school roof. This basin already exists in the current condition, as inspection of the site shows that the northern portion of the roof is tributary to live downspouts that discharge across a driveline on the northern side of the building rather than the entire roof being directed to the south as originally designed. For safety reasons, the downspouts are being tightlined underground across the driveline and discharged into the same swale that currently receives this basin's flow. The pipes across the driveline are sized at 8" each to avoid siltation and minimize maintenance concerns.

b. Basin M1-1 (1.36ac, Imp. = 56%, Q₅ = 1.9 cfs, Q₁₀₀ = 5.8 cfs)

Sub-basin M1-1 consists of a parking lot expansion and associated landscaping within Basin M-1 from the Addendum. Originally designed with an edge of asphalt and roadside swale, this basin will be modified to include a vertical curb to minimize the deterioration of the parking lot/landscape interface and corresponding maintenance issues. A curb cut has been sized to maintain historic drainage patterns that lead flows to 'Detention Pond 3' within the Red Hawk residential development. Curb cut sizing calculations have been included in the Appendix of this letter.

c. Basin L1-1 (0.07ac, Imp. = 95%, Q₅ = 0.2 cfs, Q₁₀₀ = 0.5 cfs)

Sub-basin L1-1 is made up of driveline area and associated landscaping within Basin L-1 from the Addendum. Originally designed with an edge of asphalt and roadside swale, this basin will be modified to include a vertical curb to minimize the deterioration of the parking lot/landscape interface and corresponding maintenance issues. This sub-basin will follow historical drainage patterns, and an on-grade inlet will be installed over the existing culvert pipe to alleviate the amount of flow tributary to an existing downstream curb inlet. Flows from this basin will be routed to regional 'Detention Pond 2' within the Red Hawk residential development.

III. Proposed Drainage Design

Proposed on-site drainage design will generally follow historic drainage patterns. Runoff from developed areas shall be directed via sheet flow, roof drains, curb and gutter and storm sewer to corresponding design points from the original drainage design and subsequent addendum.

Flow paths throughout the site will be formalized to avoid erosion, silt and sediment transfer, and maintenance concerns.

IV. Storage and Water Quality Design

The subject site is tributary to downstream regional ponds that provided stormwater detention volume, along with water quality treatment via water quality capture volume (WQCV). This arrangement will be maintained in the proposed condition.

V. Conclusion

This Drainage Conformance Letter presents the description and calculations for the drainage analysis and design of the Academy Charter School Drainage Improvements project. The drainage system has been designed in accordance with the Town of Castle Rock Storm Drainage Design and Technical Criteria Manual. The site complies with the previously approved master drainage report for the overall development and subsequent addendum.

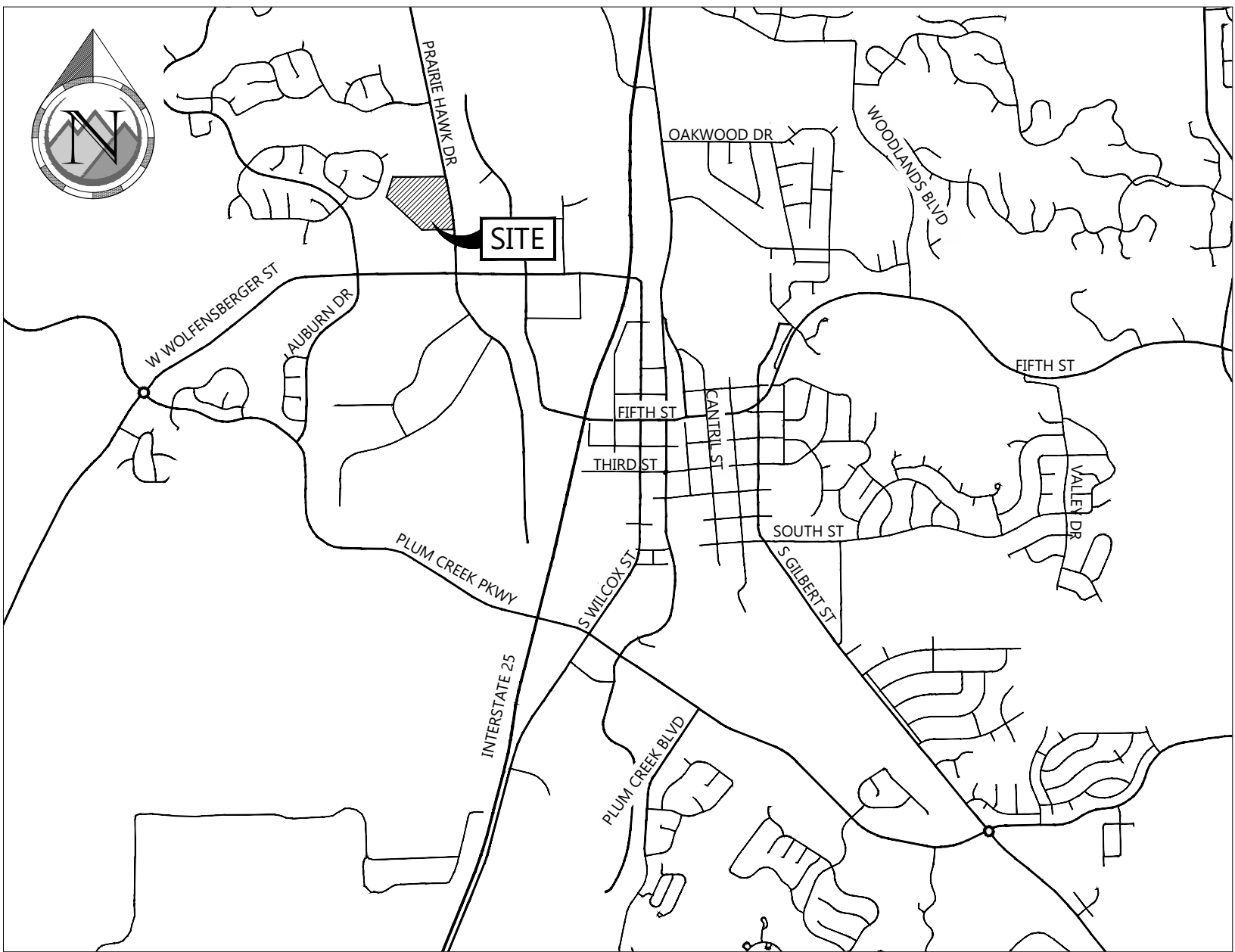
VI. References

1. *Urban Storm Drainage Criteria Manual Volumes 1, 2, and 3*, Urban Flood Control District, June, 2016.
2. *Storm Drainage Design and Technical Criteria Manual*, Town of Castle Rock, June, 2019.
3. *Phase III Drainage Report for the Meadows Filing No. 17, Lots 5 and 6*, CVL Consultants, Feb. 22, 2005
4. *Academy Charter School Castle Rock Lifelong Learning Center Phase III Drainage Study*, Martin & Martin Inc., approved February 9, 2001
5. *Addendum No. 1 Academy Charter School Castle Rock Lifelong Learning Center Phase III Drainage Study (Parking Lot Expansion)*, Martin & Martin Inc, approved June 30, 2002



APPENDIX A

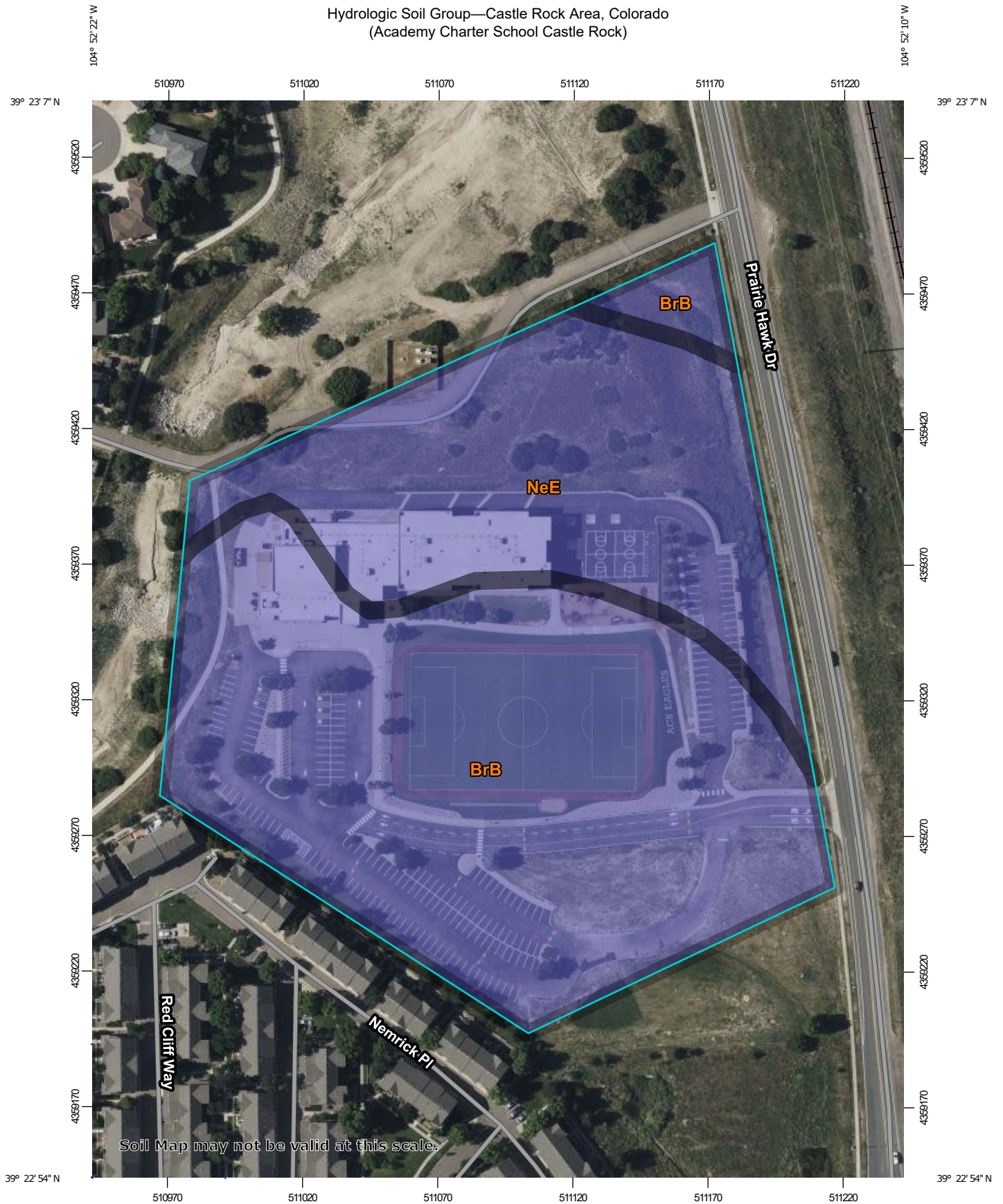
- VICINITY MAP
- FEMA FIRM MAPS
- WEB SOIL SURVEY RESULTS
- NOAA PRECIPITATION RESULTS



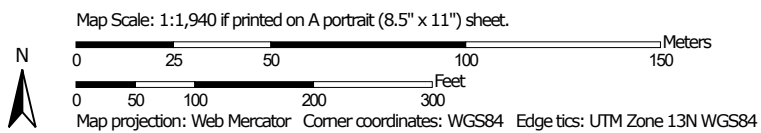
VICINITY MAP

SCALE: 1" = 2,000'

Hydrologic Soil Group—Castle Rock Area, Colorado (Academy Charter School Castle Rock)



Soil Map may not be valid at this scale.



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey

7/29/2025
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Hydrologic Soil Group—Castle Rock Area, Colorado (Academy Charter School Castle Rock)

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.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

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

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

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

Soil Survey Area: Castle Rock Area, Colorado
 Survey Area Data: Version 17, Aug 29, 2024

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

Date(s) aerial images were photographed: Mar 1, 2023—Sep 1, 2023

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
BrB	Bresser sandy loam, cool, 1 to 3 percent slopes	B	7.8	65.0%
NeE	Newlin gravelly sandy loam, 8 to 30 percent slopes	B	4.2	35.0%
Totals for Area of Interest			12.0	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



NOAA Atlas 14, Volume 8, Version 2
Location name: Castle Rock, Colorado, USA*
Latitude: 39.3838°, Longitude: -104.8716°
Elevation: 6205 ft**
 * source: ESRI Maps
 ** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Deborah Martin, Sandra Pavlovic, Ishani Roy, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Michael Yekta, Geoffrey Bonnin

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps & aeriels](#)

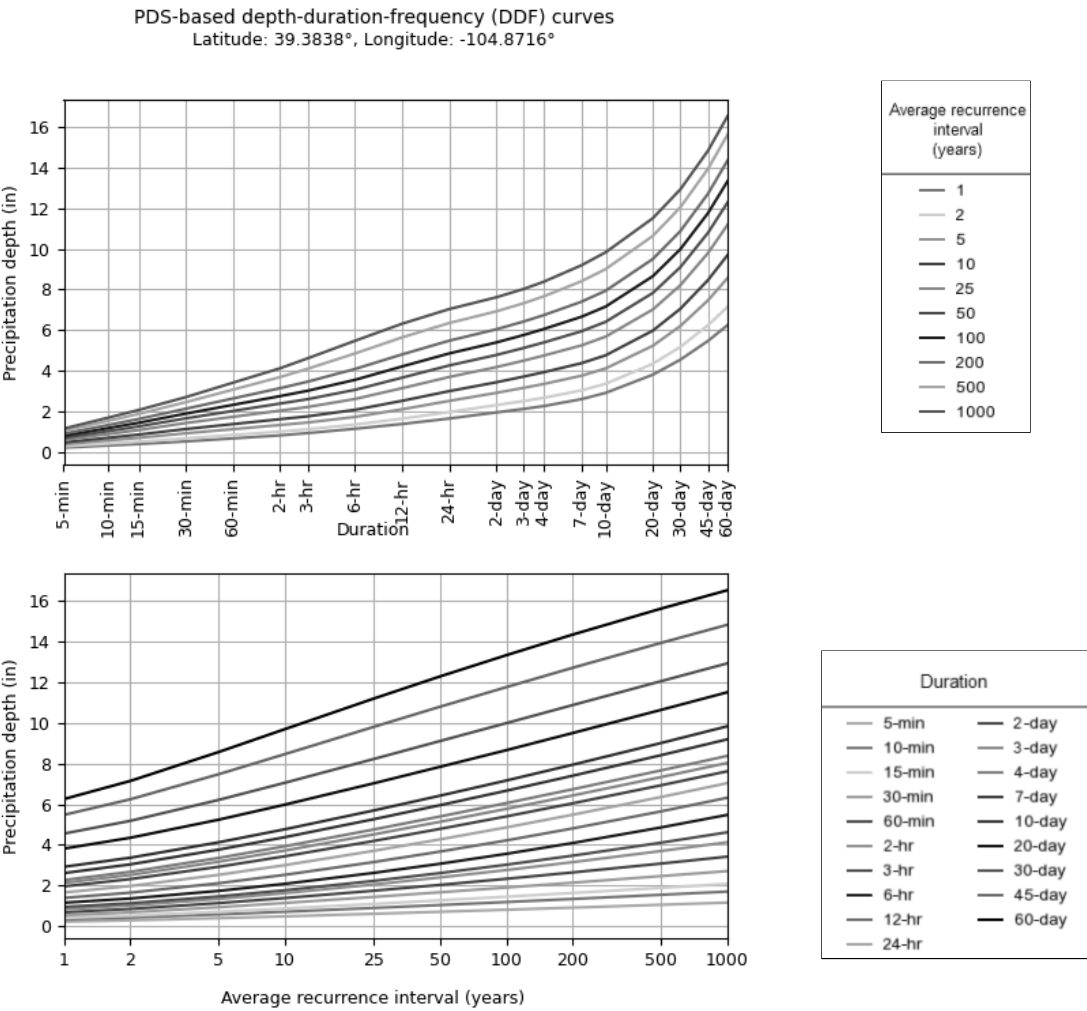
PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.230 (0.194-0.277)	0.294 (0.247-0.354)	0.399 (0.335-0.483)	0.489 (0.407-0.594)	0.615 (0.491-0.776)	0.713 (0.555-0.913)	0.814 (0.608-1.07)	0.918 (0.653-1.24)	1.06 (0.719-1.47)	1.17 (0.770-1.64)
10-min	0.337 (0.284-0.406)	0.430 (0.362-0.519)	0.585 (0.490-0.708)	0.716 (0.596-0.870)	0.900 (0.719-1.14)	1.04 (0.812-1.34)	1.19 (0.890-1.56)	1.34 (0.956-1.81)	1.55 (1.05-2.15)	1.71 (1.13-2.41)
15-min	0.411 (0.346-0.495)	0.524 (0.441-0.633)	0.713 (0.598-0.863)	0.873 (0.727-1.06)	1.10 (0.877-1.38)	1.27 (0.991-1.63)	1.45 (1.09-1.91)	1.64 (1.17-2.21)	1.89 (1.28-2.62)	2.08 (1.37-2.94)
30-min	0.537 (0.453-0.648)	0.688 (0.579-0.830)	0.937 (0.785-1.13)	1.15 (0.955-1.39)	1.44 (1.15-1.82)	1.67 (1.30-2.14)	1.90 (1.42-2.50)	2.14 (1.52-2.89)	2.47 (1.68-3.42)	2.71 (1.79-3.83)
60-min	0.686 (0.578-0.827)	0.854 (0.719-1.03)	1.14 (0.956-1.38)	1.39 (1.16-1.69)	1.75 (1.40-2.21)	2.03 (1.59-2.61)	2.33 (1.75-3.07)	2.65 (1.89-3.59)	3.08 (2.10-4.29)	3.42 (2.26-4.83)
2-hr	0.835 (0.707-1.00)	1.02 (0.863-1.22)	1.34 (1.13-1.62)	1.63 (1.36-1.97)	2.05 (1.66-2.59)	2.40 (1.88-3.07)	2.76 (2.08-3.62)	3.15 (2.26-4.25)	3.70 (2.54-5.13)	4.13 (2.75-5.79)
3-hr	0.948 (0.805-1.13)	1.13 (0.962-1.35)	1.47 (1.24-1.76)	1.77 (1.49-2.13)	2.23 (1.82-2.82)	2.61 (2.06-3.34)	3.03 (2.30-3.96)	3.47 (2.51-4.68)	4.11 (2.84-5.68)	4.62 (3.08-6.45)
6-hr	1.16 (0.989-1.37)	1.36 (1.16-1.62)	1.74 (1.48-2.07)	2.09 (1.76-2.50)	2.62 (2.15-3.30)	3.07 (2.44-3.91)	3.56 (2.72-4.64)	4.09 (2.98-5.48)	4.86 (3.38-6.68)	5.48 (3.68-7.59)
12-hr	1.39 (1.20-1.64)	1.65 (1.42-1.95)	2.12 (1.80-2.50)	2.53 (2.15-3.00)	3.15 (2.59-3.92)	3.67 (2.93-4.62)	4.22 (3.24-5.44)	4.81 (3.52-6.38)	5.64 (3.95-7.70)	6.32 (4.27-8.70)
24-hr	1.66 (1.43-1.94)	1.98 (1.70-2.32)	2.53 (2.17-2.96)	3.01 (2.56-3.54)	3.70 (3.05-4.55)	4.27 (3.42-5.31)	4.86 (3.74-6.20)	5.48 (4.03-7.20)	6.35 (4.46-8.58)	7.04 (4.79-9.62)
2-day	1.96 (1.70-2.28)	2.32 (2.01-2.69)	2.92 (2.52-3.40)	3.44 (2.95-4.03)	4.19 (3.46-5.09)	4.78 (3.85-5.90)	5.40 (4.18-6.83)	6.04 (4.46-7.86)	6.93 (4.90-9.28)	7.62 (5.22-10.3)
3-day	2.14 (1.86-2.47)	2.52 (2.19-2.92)	3.17 (2.74-3.68)	3.72 (3.20-4.34)	4.51 (3.73-5.45)	5.13 (4.14-6.29)	5.77 (4.48-7.26)	6.43 (4.76-8.32)	7.33 (5.20-9.77)	8.03 (5.53-10.9)
4-day	2.27 (1.98-2.62)	2.68 (2.33-3.09)	3.36 (2.91-3.88)	3.93 (3.39-4.57)	4.75 (3.94-5.72)	5.39 (4.36-6.59)	6.05 (4.71-7.59)	6.73 (5.00-8.69)	7.66 (5.44-10.2)	8.37 (5.78-11.3)
7-day	2.61 (2.28-3.00)	3.04 (2.66-3.49)	3.76 (3.28-4.33)	4.38 (3.79-5.06)	5.25 (4.38-6.30)	5.95 (4.83-7.23)	6.66 (5.21-8.31)	7.40 (5.52-9.50)	8.40 (6.01-11.1)	9.19 (6.38-12.3)
10-day	2.92 (2.56-3.34)	3.37 (2.95-3.85)	4.12 (3.60-4.73)	4.77 (4.14-5.49)	5.68 (4.76-6.79)	6.41 (5.23-7.77)	7.16 (5.62-8.90)	7.94 (5.95-10.2)	9.00 (6.46-11.9)	9.83 (6.85-13.1)
20-day	3.82 (3.36-4.33)	4.35 (3.83-4.94)	5.24 (4.59-5.96)	5.98 (5.21-6.84)	7.02 (5.90-8.29)	7.83 (6.42-9.40)	8.65 (6.83-10.7)	9.50 (7.16-12.0)	10.6 (7.68-13.9)	11.5 (8.07-15.3)
30-day	4.55 (4.02-5.14)	5.18 (4.58-5.86)	6.21 (5.46-7.04)	7.05 (6.17-8.03)	8.21 (6.91-9.63)	9.10 (7.47-10.8)	9.98 (7.89-12.2)	10.9 (8.21-13.7)	12.0 (8.72-15.6)	12.9 (9.10-17.1)
45-day	5.47 (4.85-6.16)	6.24 (5.53-7.03)	7.47 (6.59-8.43)	8.46 (7.42-9.60)	9.79 (8.25-11.4)	10.8 (8.87-12.8)	11.7 (9.31-14.3)	12.7 (9.62-15.9)	13.9 (10.1-17.9)	14.8 (10.5-19.5)
60-day	6.25 (5.55-7.01)	7.14 (6.34-8.02)	8.56 (7.57-9.64)	9.69 (8.52-11.0)	11.2 (9.42-13.0)	12.3 (10.1-14.5)	13.3 (10.6-16.1)	14.3 (10.9-17.8)	15.6 (11.4-20.0)	16.5 (11.7-21.7)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).
 Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.
 Please refer to NOAA Atlas 14 document for more information.

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PF graphical

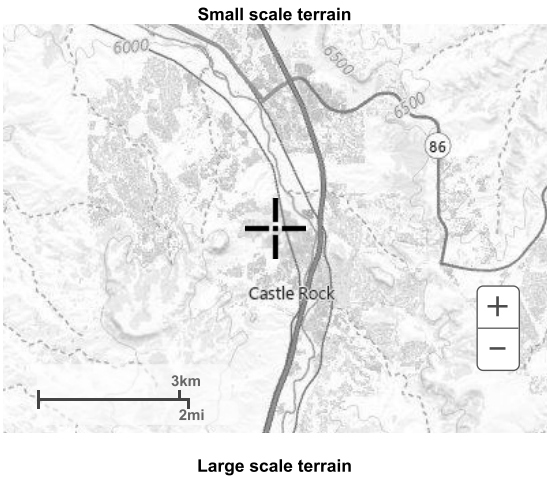


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Maps & aeri





Large scale map



Large scale aerial

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[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

[Disclaimer](#)

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 **roadways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Silviculture 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 Silviculture 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 computed with 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 Geographic Survey website at <http://www.ngs.noaa.gov> or contact the National Geographic Survey at the following address:

NGS Information Services
NOAA, NGS12
National Geographic 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 Geographic 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 OFPA.

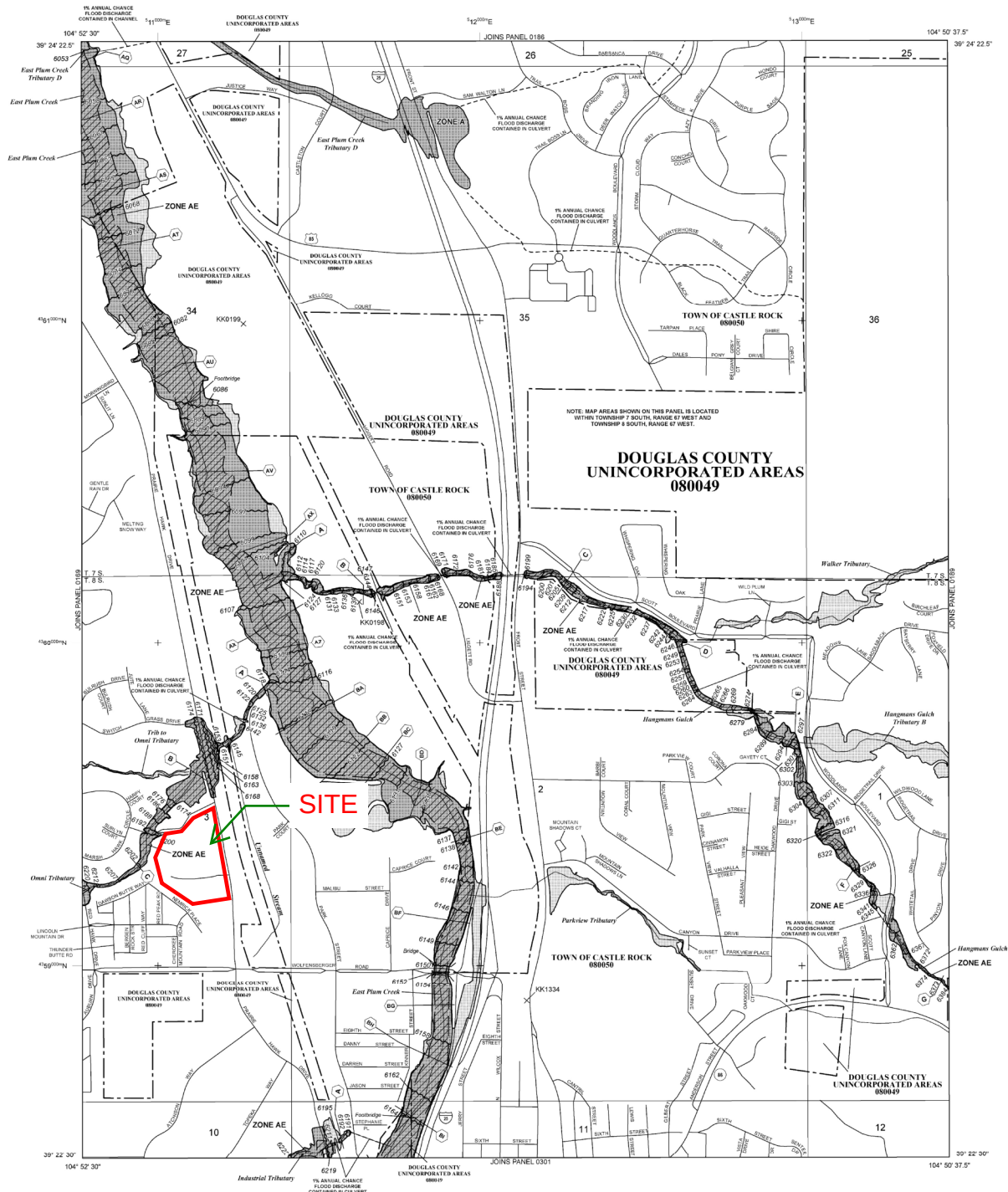
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations** and **floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the 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 unreviewed 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 data 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://map.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/businessmap>.



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. Areas of special flood hazard are the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zone A, AE, AH, AO, AR, AV, 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 AH** Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AR** Flood depths of 1 to 3 feet (usually shear flow on sloping terrain); average depths determined; for areas of shear flow no flooding, velocities are determined.
- ZONE AR** Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently destroyed. Zone AR indicates that the former flood control system is being retained to provide protection from the 1% annual chance or greater flood.
- ZONE AV** Areas to be protected from the 1% annual chance flood by a federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); no 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 the 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)**

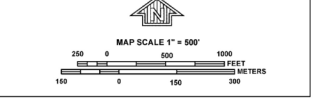
- CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.**
- 1% Annual Chance Floodplain Boundary**
- 0.2% Annual Chance Floodplain Boundary**
- Floodway boundary**
- Zone D boundary**
- CBRS and OPA boundary**
- Boundary defining Special Flood Hazard Area Zones and boundary defining Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.**
- 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**
- (EL 867)**
- Transverse line**
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere**
- 1000-meter Universal Transverse Mercator grid values, zone 13**
- Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere**
- 1000-meter Universal Transverse Mercator grid values, zone 13**
- Bench mark (See explanation in Notes to Users section of this FIRM panel)**
- CBRS and OPA boundary**
- Refer to Map Repository for Map Index**
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP**
- SEPTEMBER 30, 2006**

- MAP REPOSITORY**
- Refer to Map Repository for Map Index**
- EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP**
- SEPTEMBER 30, 2006**

- 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 geographic information, to incorporate previously issued letters of map revision.

- For community map revision history prior to coordinate 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 1-800-438-6623.**



NFIP

PANEL 0188G

FIRM

FLOOD INSURANCE RATE MAP

DOUGLAS COUNTY, COLORADO, AND INCORPORATED AREAS

PANEL 188 OF 495
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

COMMUNITY	NUMBER	PANEL	SUFFIX
CASTLE ROCK, TOWN OF	080049	0188	G
DOUGLAS COUNTY	080049	0188	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 08035C0188G

MAP REVISED MARCH 16, 2016

Federal Emergency Management Agency



APPENDIX B

- TOWN WORKSHEETS

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

Project:

Project #:

Applicant:

[illegible]

Section	Question	Response	Instructions
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 No	Proceed to next line. Proceed to 3.1.2.
	Is the trail for a roadway?	Yes No	Proceed to 3.1.2. Project is excluded. Submit variance for <u>Trails Excluded from Permanent Water Quality Requirements</u> .
3.1.2	Is the project primarily used for parking or access to parking?	Yes No	This exclusion does not apply. Permanent water quality is required. Proceed to 3.1.3.
3.1.3	Does the project add impervious area?	No Yes	Project is excluded. Submit variance for <u>Pavement Management Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.1.4.
3.1.4	Does the project add more than 8.25 feet of paved width at any location to the existing roadway?	No Yes	Project is excluded. Submit variance for <u>Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Does the project add more than one acre of paved area per mile to an existing roadway?	No Yes	Project is excluded. Submit variance for <u>Roadway Redevelopment Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to next line.
	Does the project increase the width by two times or more, on average, of the original roadway area?	No Yes	Existing areas of site are excluded only. Submit variance for <u>Existing Roadway Surfaces Only Excluded from Permanent Water Quality Requirements</u> . 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 No	Project is excluded. Submit variance for <u>Oil and Gas Exploration Sites Excluded from Permanent Water Quality Requirements</u> . Proceed to 3.2.2.
3.2.2	Is the project for stream stabilization?	Yes No	Project is excluded. Submit variance for <u>Stream Stabilization Sites Excluded from Permanent Water Quality Requirements</u> . 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 No	Project is excluded. Submit variance for <u>Aboveground and Underground Utilities Excluded from Permanent Water Quality Requirements</u> . 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 No	Project is excluded. Submit variance for <u>Sites with Land Disturbances to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> . 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 Yes	Project is excluded. Submit study along with variance for <u>Non-residential and Non-commercial Infiltration Conditions Excluded from Permanent Water Quality Requirements</u> . This exclusion does not apply. Permanent water quality is required.

Section	Question	Response	Instructions
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 <u>Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements</u> .
		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 <u>Large Lot Single Family Sites Excluded from Permanent Water Quality Requirements</u> .
		Yes	This exclusion does not apply. Permanent water quality is required.
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 <u>Sites with Land Disturbance to Undeveloped Land that will Remain Undeveloped Excluded from Permanent Water Quality Requirements</u> . 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 _____

Project Owner _____

Project Location _____

ToCR Project Number _____

Total Site Area _____ acres

Total Size of Common Plan of Development _____ acres

Check all that apply:

☐ **Project within Plum Creek Basin**

☐ **Project within Cherry Creek Basin**

Estimated construction completion date _____

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 C

- HYDROLOGIC CALCULATIONS

Project : Academy Charter School
 Project No. : 25031

Date : 7/31/2025
 By : JGD

Drainage Basin Imperviousness

Soil Type : **B**

	Roof	Concrete	Asphalt	Landscape	Playground	Gravel	Undeveloped						
Imperviousness :	90%	90%	100%	2%	10%	40%	2%	Total Area	Composite	Runoff Coefficients			
Basin Name	Areas (sq.ft.)							(sq.ft.)	% Imp.	C ₂	C ₅	C ₁₀	C ₁₀₀
M1.1			32,924	26,470				59,394	56%	0.43	0.46	0.51	0.69
C1.1	13,126							13,126	90%	0.74	0.77	0.78	0.85
L1.1		128	2,618	130				2,876	95%	0.79	0.81	0.82	0.87

Project : Academy Charter School
Project No. : 25031

Date : 7/31/2025
By : JGD

SF2 - Time of Concentration

Basin ID	Area (AC.)	C _s	Initial/Overland Time			Travel Time					Time of Concentration		Final
			L _i (ft.)	S (%)	T _i (min.)	L _t (ft.)	S (%)	Conveyance Factor	Vel (fps)	T _t (min.)	Comp. T _c (min.)	Regional T _c (Min.)	T _c (Min.)
M1.1	1.36	0.46	75	2.00	8.0	464	2.2	20	2.9	2.6	10.6	19.5	10.6
C1.1	0.30	0.77	48	5.00	2.5	1	5.0	20	4.5	0.0	2.5	10.7	5.0
L1.1	0.07	0.81	26	2.00	2.1	110	1.0	20	2.0	0.9	3.0	10.7	5.0



APPENDIX D

- HYDRAULIC CALCULATIONS

Date : 7/31/2025
By : JGD

1-hr Point Rainfall **1.14** in. (5-year Event)

Proof Civil Co. | 600 Grant Street, Ste. 210 | Denver, CO | 80203

Date : 7/31/2025
By : JGD

1-hr Point Rainfall **2.33** in. (100-year Event)

Proof Civil Co. | 600 Grant Street, Ste. 210 | Denver, CO | 80203

Weir Report

<Name>

Rectangular Weir

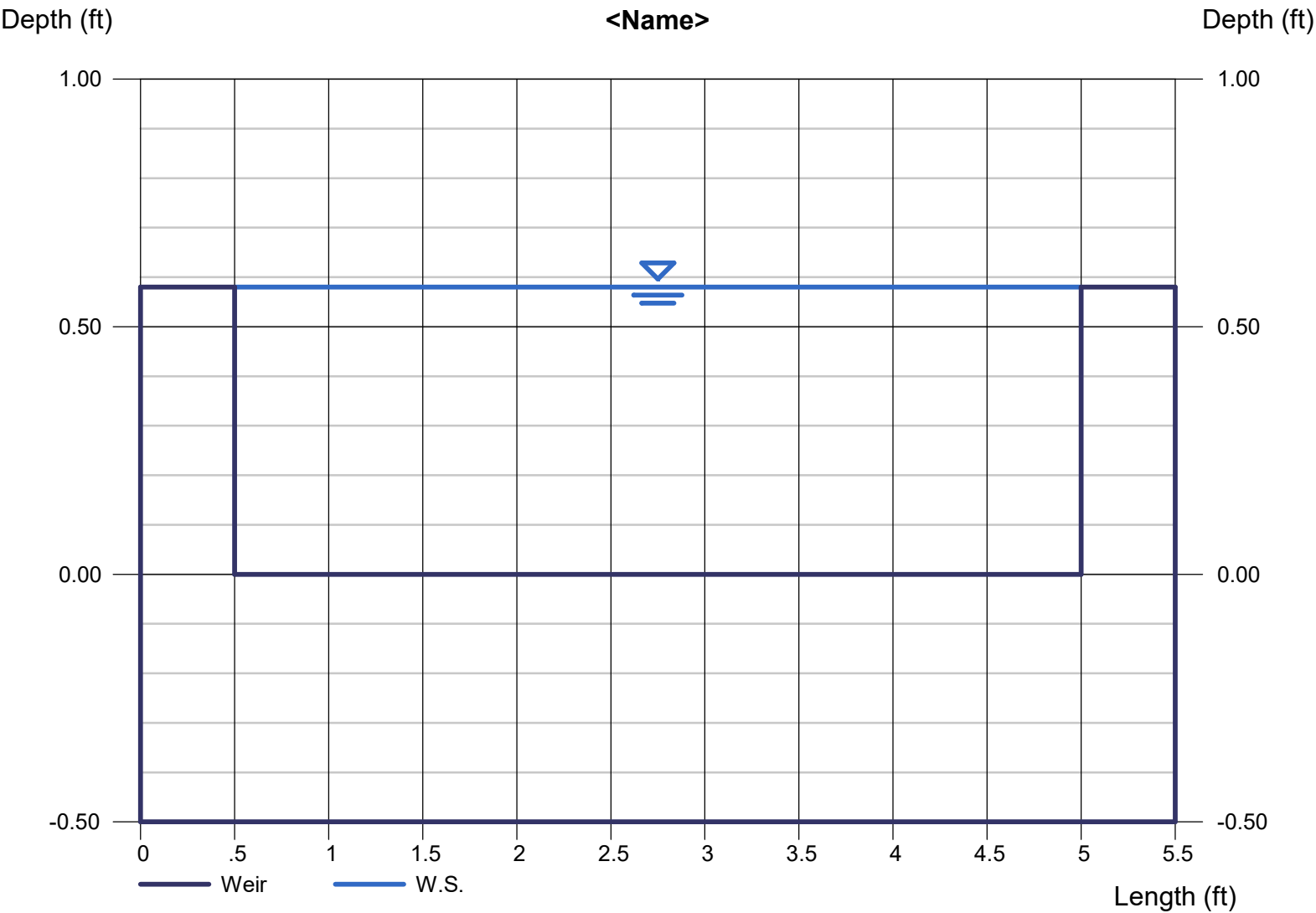
Crest = Sharp
Bottom Length (ft) = 4.50
Total Depth (ft) = 0.58

Highlighted

Depth (ft) = 0.58
Q (cfs) = 6.619
Area (sqft) = 2.61
Velocity (ft/s) = 2.54
Top Width (ft) = 4.50

Calculations

Weir Coeff. Cw = 3.33
Compute by: Q vs Depth
No. Increments = 10

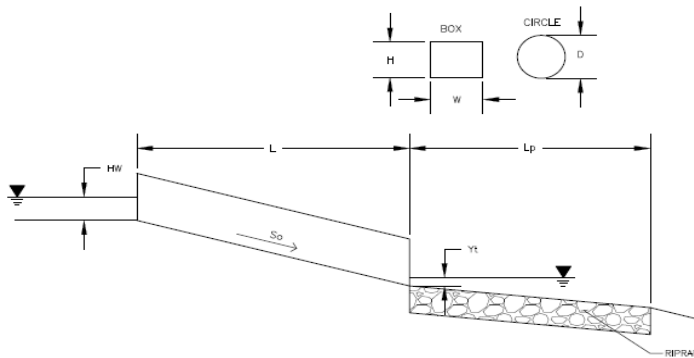


DETERMINATION OF CULVERT HEADWATER AND OUTLET PROTECTION

MHFD-Culvert, Version 4.00 (May 2020)

Project: Academy Charter School Drainage Improvements

ID: 25031



Soil Type:

Choose One:

☒ Sandy

☐ Non-Sandy

Supercritical Flow! Using Adjusted Rise to calculate protection type.

Design Information:

Design Discharge

Q = 5.8 cfs

Circular Culvert:

Barrel Diameter in Inches

D = inches

Inlet Edge Type (Choose from pull-down list)

OR:

Box Culvert:

Barrel Height (Rise) in Feet

H (Rise) = 0.5 ft

Barrel Width (Span) in Feet

W (Span) = 4.5 ft

Inlet Edge Type (Choose from pull-down list)

Square Edge w/ 90 deg. Headwall

Number of Barrels

Barrels = 1

Inlet Elevation

Elev IN = 6198 ft

Outlet Elevation **OR** Slope

So = 0.005 ft/ft

Culvert Length

L = 1 ft

Manning's Roughness

n = 0.012

Bend Loss Coefficient

k_b = 0

Exit Loss Coefficient

k_x = 1

Tailwater Surface Elevation

Y_t Elevation = ft

Max Allowable Channel Velocity

V = 5 ft/s

Calculated Results:

Culvert Cross Sectional Area Available

A = 2.25 ft²

Culvert Normal Depth

Y_n = 0.33 ft

Culvert Critical Depth

Y_c = 0.37 ft

Froude Number

Fr = 1.18 **Supercritical!**

Entrance Loss Coefficient

k_e = 0.20

Friction Loss Coefficient

k_f = 0.03

Sum of All Loss Coefficients

k_s = 1.23 ft

Headwater:

Inlet Control Headwater

HW_i = 0.65 ft

Outlet Control Headwater

HW_o = 0.56 ft

Design Headwater Elevation

HW = 6198.65 ft

Headwater/Diameter OR Headwater/Rise Ratio

HW/H = 1.31

Outlet Protection:

Flow/(Span * Rise^{1.5})

Q/WH^{1.5} = 3.65 ft^{0.5}/s

Tailwater Surface Height

Y_t = 0.20 ft

Tailwater/Rise

Y_t/H = 0.40

Expansion Factor

1/(2*tan(θ)) = 2.73

Flow Area at Max Channel Velocity

A_t = 1.16 ft²

Width of Equivalent Conduit for Multiple Barrels

W_{eq} = - ft

Length of Riprap Protection

L_p = 4 ft

Width of Riprap Protection at Downstream End

T = 6 ft

Adjusted Rise for Supercritical Flow

Ha = 0.42 ft

Minimum Theoretical Riprap Size

d_{50 min} = 1 in

Nominal Riprap Size

d_{50 nominal} = 6 in

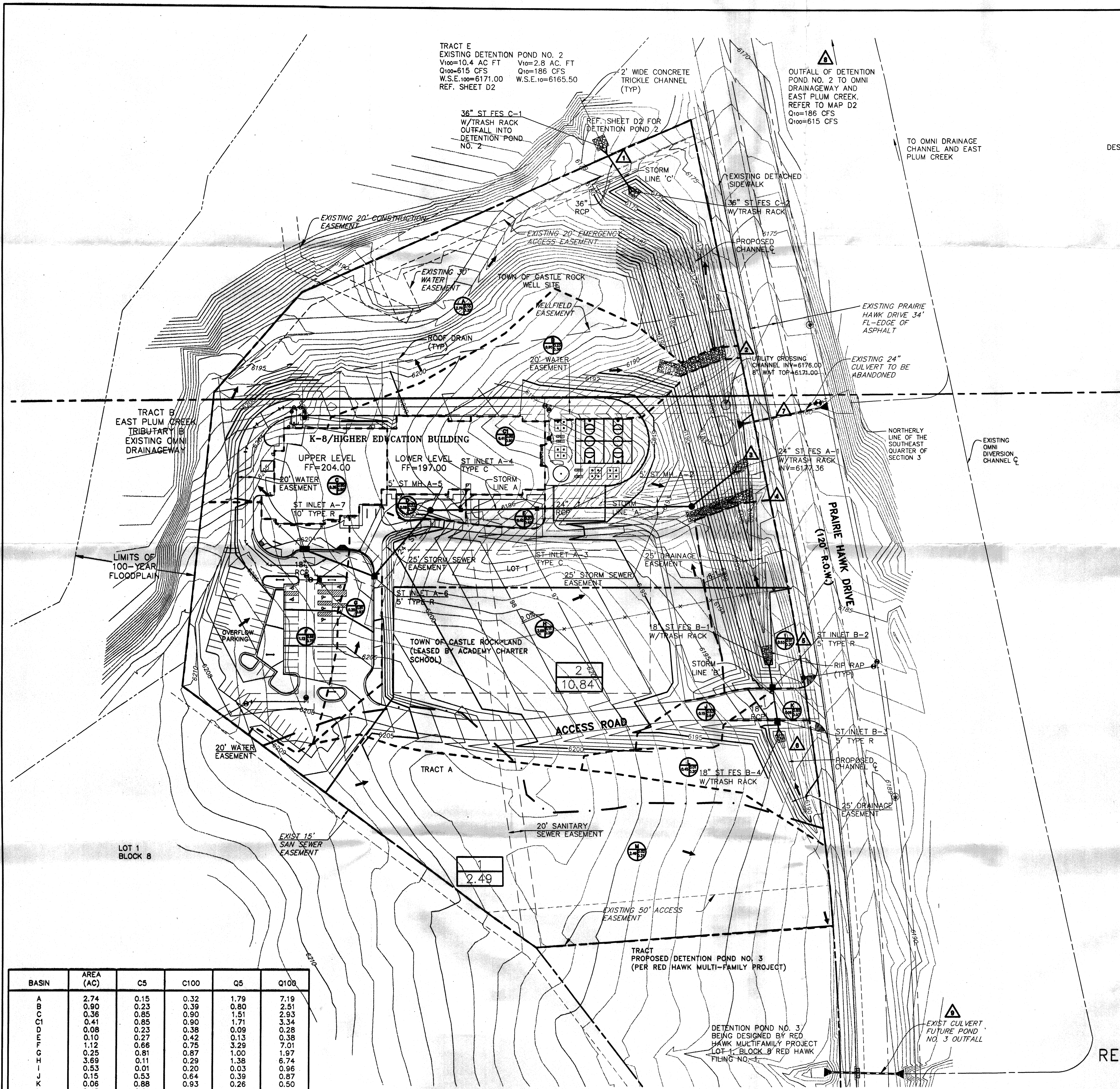
MHFD Riprap Type

Type = VL



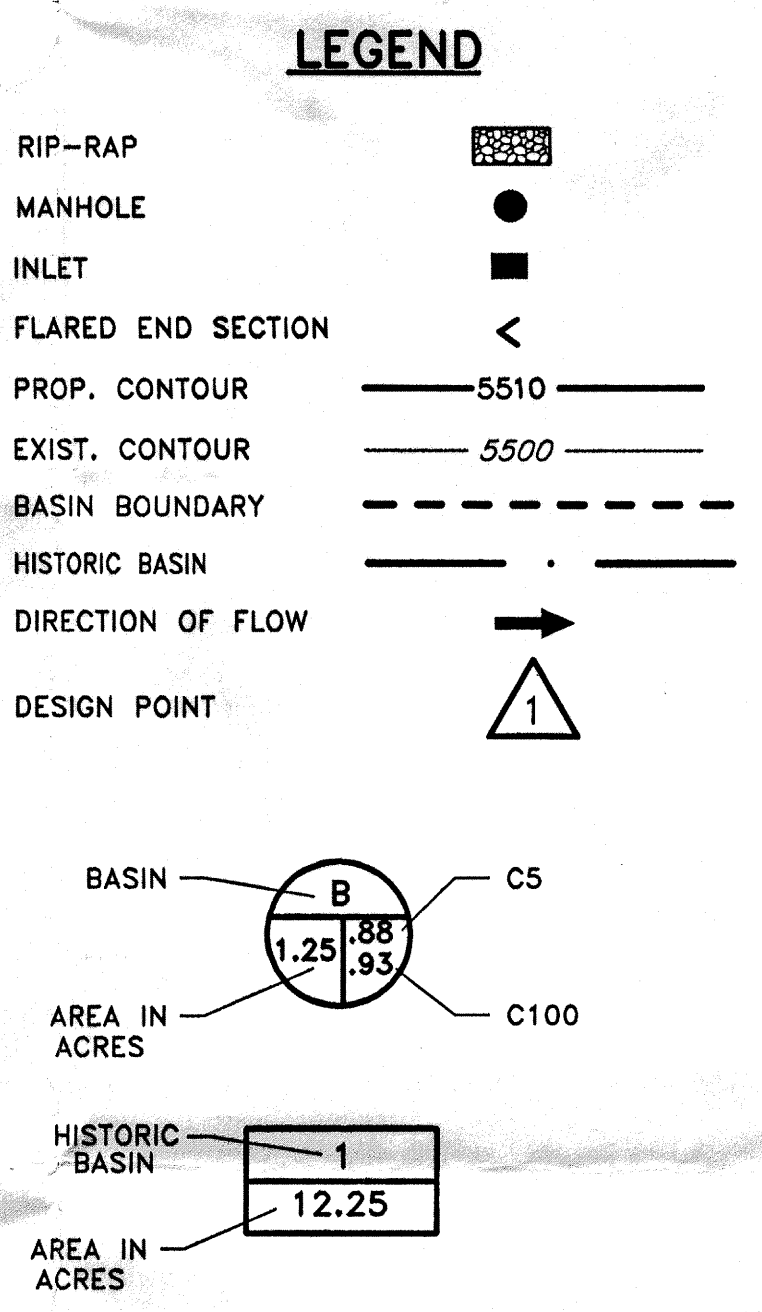
APPENDIX E

- REFERENCE MATERIAL



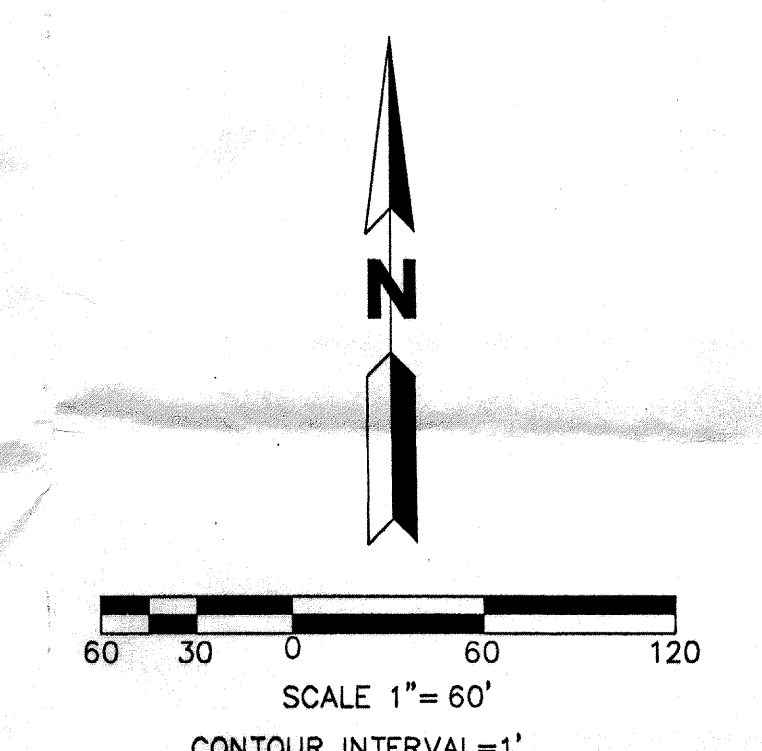
CHANNEL SUMMARY TABLE

DESIGN POINT	CONTRIBUTION AREA(A.C.)	CONTRIBUTION BASINS	RUN-OFF (5-YR)	RUN-OFF (10-YR)
1	10.78	A	12.14	34.76
2	8.04	B	10.35	27.57
3	7.14	C,D,E,F,G	9.55	25.06
4	4.82	H,I	1.82	9.15
5	0.60	J	0.41	1.45
6	0.45	L	0.02	0.58



NOTES:

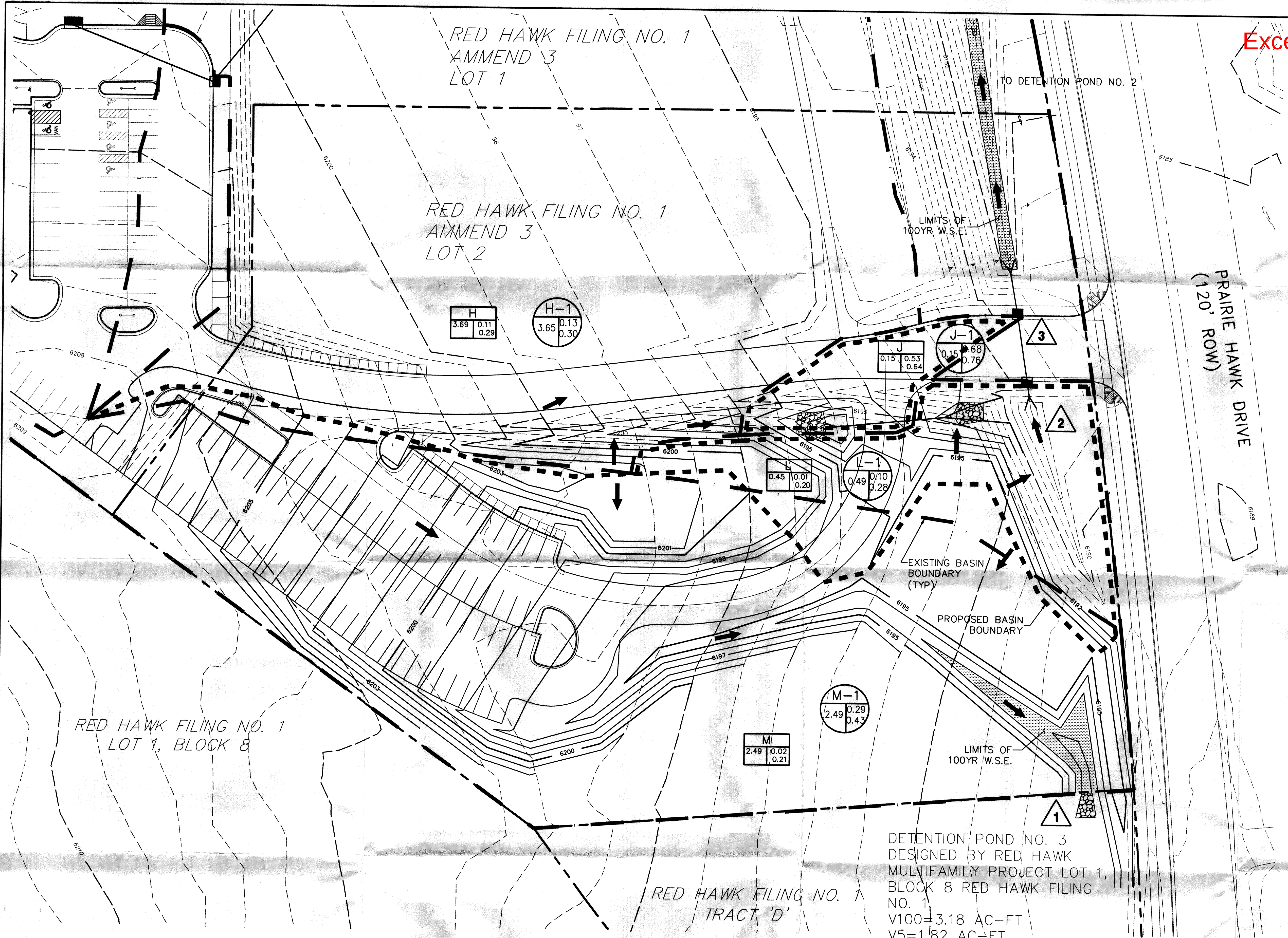
- HISTORICAL BASIN ACREAGE DETERMINED FROM TRACT 'A' ONLY. REFER TO RED HAWK MASTER DRAINAGE PLAN PREPARED FOR U.S. HOMES CORPORATION, PREPARED BY ROCKY MOUNTAIN CONSULTANTS, INC. REV. JANUARY 1998 FOR THE MASTER HISTORICAL BASIN SIZE.
- REFER TO ACADEMY CHARTER SCHOOL CONSTRUCTION PLANS STORM SEWER, SHEET C9 AND C10 FOR STORM SEWER, CHANNEL AND RIPRAP DESIGN.



MARTIN/MARTIN assumes no responsibility for utility locations. The utilities shown on this drawing have been plotted from the best available information. It is, however, the contractors responsibility to field verify the location of all utilities prior to the commencement of any construction.

DRAINAGE MAP
 FOR
 ACADEMY CHARTER SCHOOL
 RED HAWK FILING NO. 1, 3RD AMENDMENT
 LOT 1

BASIN	AREA (AC)	C5	C100	Q5	Q100
A	2.74	0.15	0.32	1.79	7.19
B	0.90	0.23	0.39	0.80	2.51
C	0.36	0.85	0.90	1.51	2.93
D	0.41	0.85	0.90	1.71	3.34
E	0.08	0.23	0.38	0.09	0.28
F	0.10	0.27	0.42	0.13	0.38
G	1.12	0.66	0.75	3.29	7.01
H	0.25	0.81	0.87	1.00	1.97
I	3.69	0.11	0.29	1.38	6.74
J	0.53	0.01	0.20	0.03	0.96
K	0.15	0.53	0.64	0.39	0.87
L	0.06	0.88	0.93	0.26	0.50
M	0.45	0.01	0.20	0.02	0.58
N	2.49	0.02	0.21	0.16	3.16



Excerpt from ADDENDUM

LEGEND

RIP-RAP
MANHOLE
INLET
FLARED END SECTION
PROP. CONTOUR
EXIST. CONTOUR
BASIN BOUNDARY
HISTORIC BASIN
DIRECTION OF FLOW
DESIGN POINT

BASIN
AREA IN ACRES
HISTORIC BASIN
AREA IN ACRES

C5
C100
C5
C100

BASIN	AREA (AC)	C5	C100	Q5	Q100
EXIST H	3.69	0.11	0.29	1.38	6.74
PROP H-1	3.65	0.13	0.30	1.65	6.97
EXIST J	0.15	0.53	0.64	0.39	0.87
PROP J-1	0.15	0.68	0.76	0.51	1.05
EXIST L	0.45	0.01	0.20	0.02	0.58
PROP L-1	0.49	0.10	0.28	0.18	0.89
EXIST M	2.49	0.02	0.21	0.16	3.16
PROP M-1	2.49	0.29	0.43	3.31	9.59

DETENTION POND NO. 3
DESIGNED BY RED HAWK
MULTIFAMILY PROJECT LOT 1,
BLOCK 8 RED HAWK FILING
NO. 1
V100=3.18 AC-FT
V5=1.82 AC-FT
100YR WSE=6193.90
5YR WSE=6191.70

DRAINAGE MAP
FOR
ACADEMY CHARTER SCHOOL
PARKING LOT EXPANSION
RED HAWK FILING NO. 1, 3RD AMENDMENT
LOT 1

MARTIN / MARTIN
CONSULTING ENGINEERS
4251 KIPLING
P.O. BOX 4001
WHEAT RIDGE, CO 80034
303-431-6100
FAX 303-431-4028

ACADEMY CHARTER SCHOOL
PARKING LOT EXPANSION
CASTLE ROCK, COLORADO

DRAINAGE MAP

no	description of revisions	date	name
1	SUBMITTED TO TOWN OF CASTLE ROCK	05/02/02	JCM
2	REV. PER CASTLE ROCK	06/02/02	JCM
3	SUBMITTED FOR SIGNATURE	06/28/02	JCM

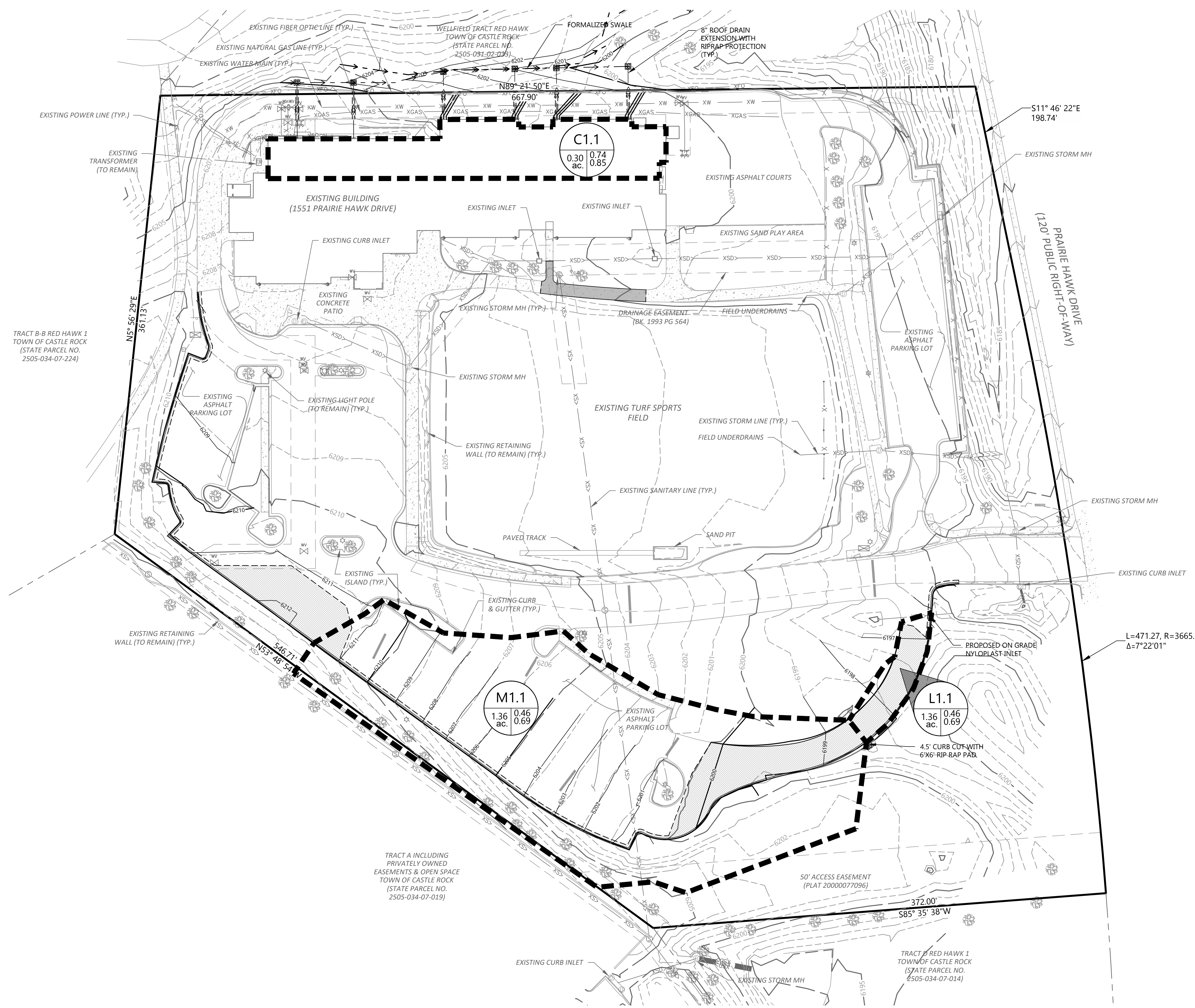
date: MAY 1, 2002
job number: 15186.C.01
design by: LNS
drawn by: LNS
checked by: JCC

sheet number: D3



APPENDIX F

- DRAINAGE PLAN



FOR AND ON BEHALF OF PROOF CIVIL CO.			
REVISONS	NO.	DATE	DESCRIPTION
PROJ. NO.:	25031	DATE:	07/30/2025
DRAWN BY:		CHECKED BY:	

DRAINAGE PLAN

ACADEMY CHARTER SCHOOL

CASTLE ROCK COLORADO