



October 05th, 2023

Town of Castle Rock Development Services

Villages of Castle Rock Pool Pavilion Drainage Conformance Letter
Town of Castle Rock Project No. SDP24-0009

This letter has been prepared in lieu of a Drainage Report for construction of the Villages of Castle Rock Pool Pavilion improvements. This letter provides general information regarding the proposed construction of a pool pavilion within Founders Village Filing No. 14 2nd Amendment.

This project proposes a pool pavilion consisting of a concrete pad and gazebo with abutting landscape improvements. The project is located at the north portion of the Founders Village Pool, at the northwest corner of Enderud Bolivar and East Benning Avenue.

The Master Drainage Plan for Founders Village dated June 1987, Mitchell Gulch Watershed Master Plan Preliminary Design Report dated November 2006 and Phase 3 Drainage Report for Founders Village Filing No. 25 dated October 21st 2015 have been used to examine the effects of the pool pavilion improvements to the existing drainage patterns. The affected existing basin examined within the referenced Mitchell Gulch Watershed Master Plan Preliminary Design Report dated November 2006 is denoted as Basin 21 and excerpts from said drainage report has been included within this letter.

Historically these flows are captured by an existing water quality pond located south of the proposed pool pavilion as shown on the included drainage maps at Design Point EX1 and A1, then enters existing storm infrastructure, and flows into the West Tributary of Mitchell Gulch. As stated in the referenced drainage reports, one downstream regional detention pond, West Tributary Existing Detention Pond, overdetains for the project so that downstream flows are maintained below historic flow rates. Developed flows from the project site are not detained, but they are treated within the existing water quality pond then released directly into West Tributary of Mitchell Gulch and flow into the West Tributary Existing Detention Pond.

It was found there were no adverse effects to the imperviousness of the site that resulted in an increase in stormwater runoff. As shown within the referenced Mitchell Gulch Watershed Master Plan Preliminary Design Report, the site had an anticipated imperviousness of 27%. With the addition of the pool pavilion the site imperviousness increased from 2% (open space) to 21.3%, which is below the anticipated imperviousness. Calculations have been provided that demonstrate when applying the

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rational method to the effected basin, there is no adverse effect to the existing stormwater improvements for the site.

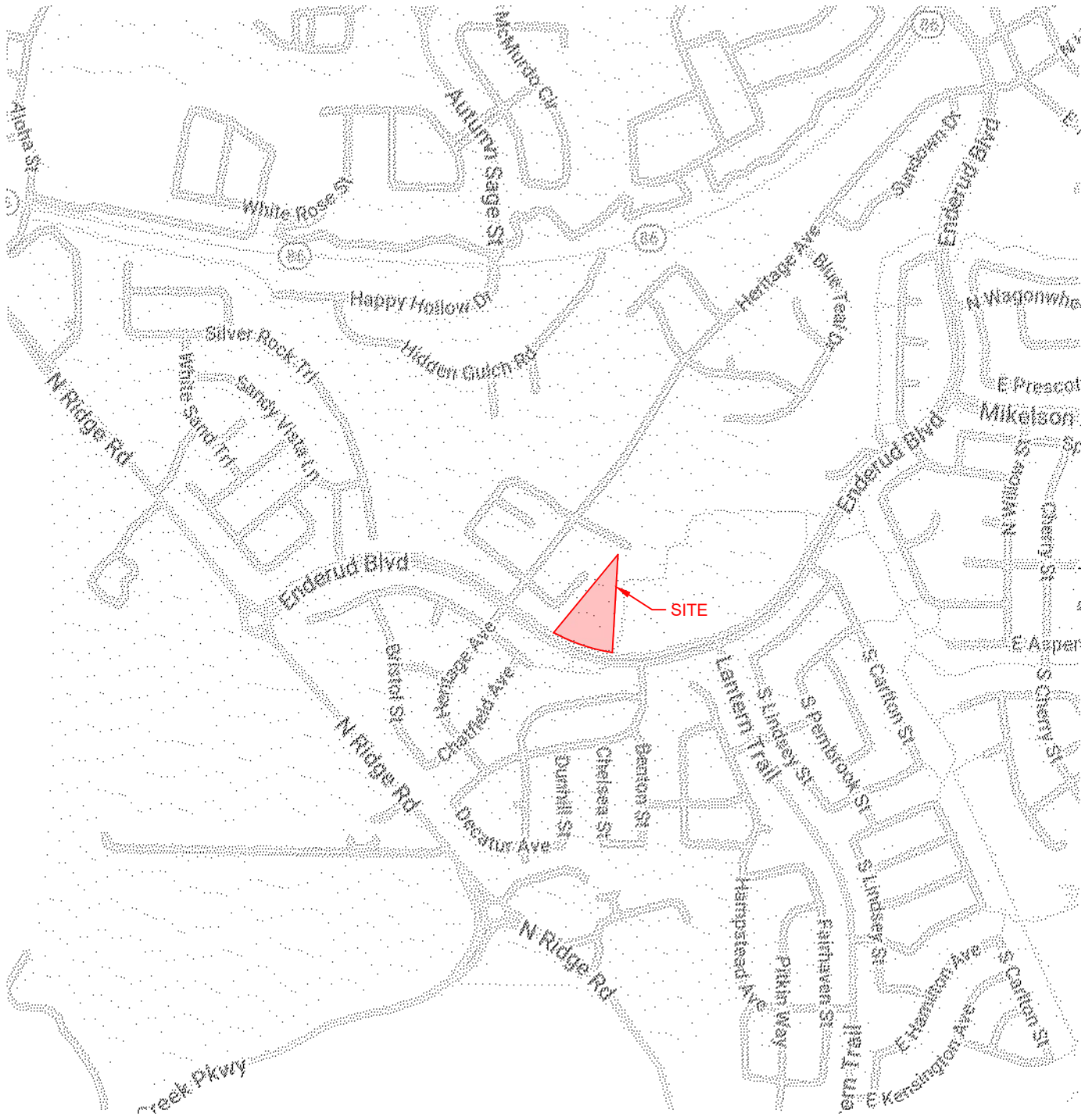
No improvements take place in the 100-year floodplain as shown on FEMA Map 08035C0302G dated March 16, 2016 within the attached plans.

Respectfully,
Terracina Design, LLC

Mike Guiffre, PE
Project Manager

terr a c i n a d e s i g n

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NOTES TO USERS

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

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

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

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 13. The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

NGS Information Services
NOAA, N/NGS-12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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

Base map information shown on this FIRM was provided by the Douglas County GIS Department and the Town of Castle Rock GIS Department. Additional input was provided by the City of Lone Tree and Town of Parker. These data are current as of 2010.

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

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

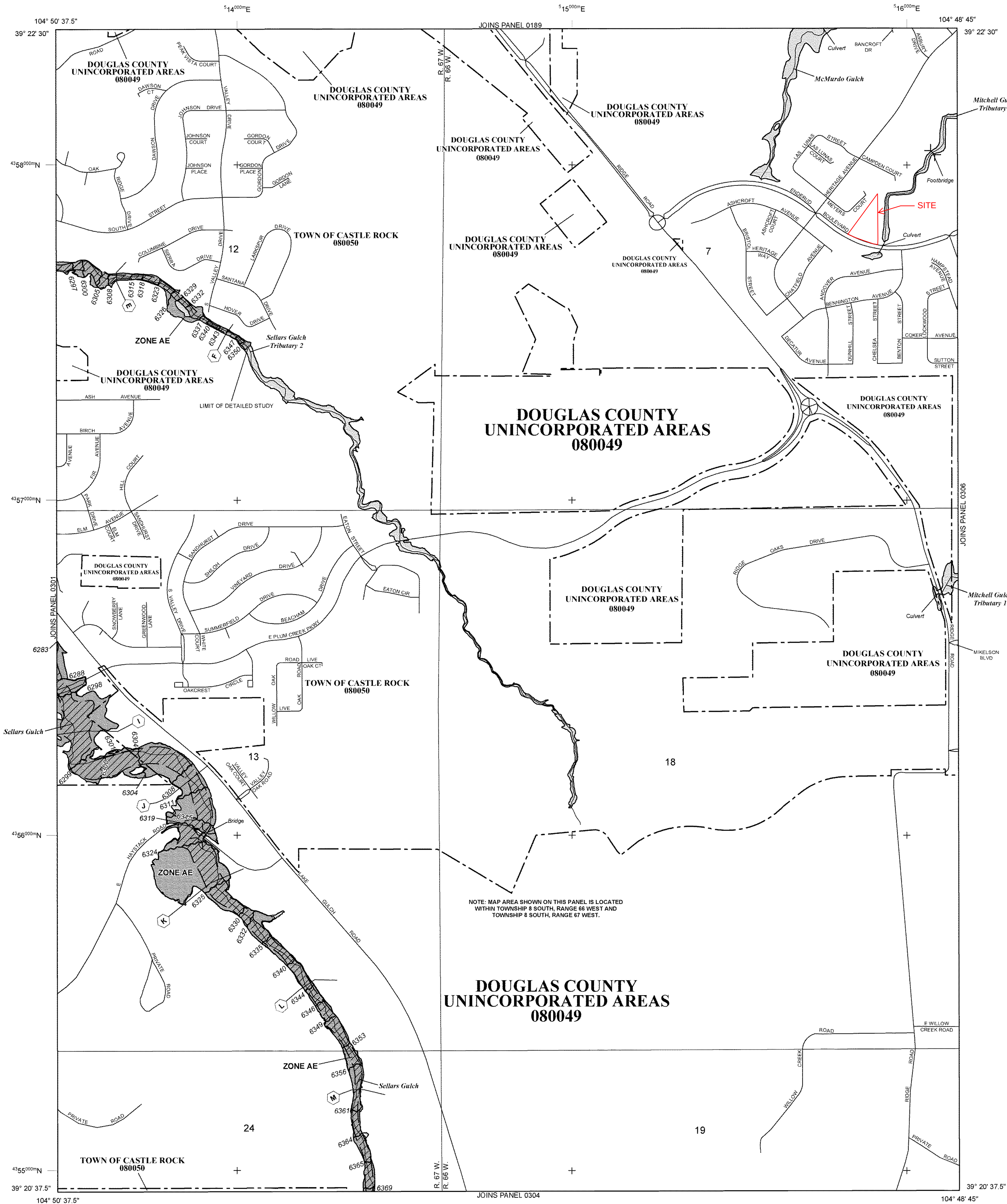
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations** and **floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the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

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

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

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

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



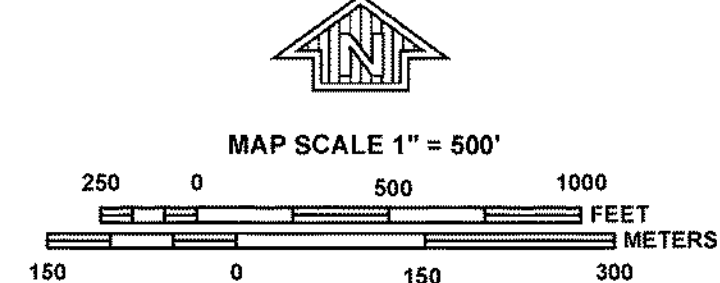
LEGEND

- SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**
The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.
 - ZONE A** No Base Flood Elevations determined.
 - ZONE AE** Base Flood Elevations determined.
 - ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
 - ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
 - ZONE AR** Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently identified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
 - ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
 - ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
 - ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.
 - FLOODWAY AREAS IN ZONE AE**
 - OTHER FLOOD AREAS**
 - ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
 - OTHER AREAS**
 - ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
 - ZONE D** Areas in which flood hazards are undetermined, but possible.
 - COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**
 - OTHERWISE PROTECTED AREAS (OPAs)**
- CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.
- 1% Annual Chance Floodplain Boundary
 - 0.2% Annual Chance Floodplain Boundary
 - Floodway boundary
 - Zone D boundary
 - CBRS and OPA boundary
 - Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
 - 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
- Cross section line
 - Transsect line
 - 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)
 - River Mile
 - MAP REPOSITORIES
 - Refer to Map Repositories list on Map Index
 - EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
 - SEPTEMBER 30, 2005
 - EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
 - MARCH 16, 2016, to update corporate limits, to change base flood elevations, to add base flood elevations, to add special flood hazard areas, to update map format, to add roads and road names, to reflect updated topographic information, to incorporate previously issued letters of map revision.

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

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6623.



NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0302G

FIRM
FLOOD INSURANCE RATE MAP
DOUGLAS COUNTY,
COLORADO
AND INCORPORATED AREAS

PANEL 302 OF 495
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CASTLE ROCK, TOWN OF	080050	0302	G
DOUGLAS COUNTY	080049	0302	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
08035C0302G
MAP REVISED
MARCH 16, 2016

Federal Emergency Management Agency



United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

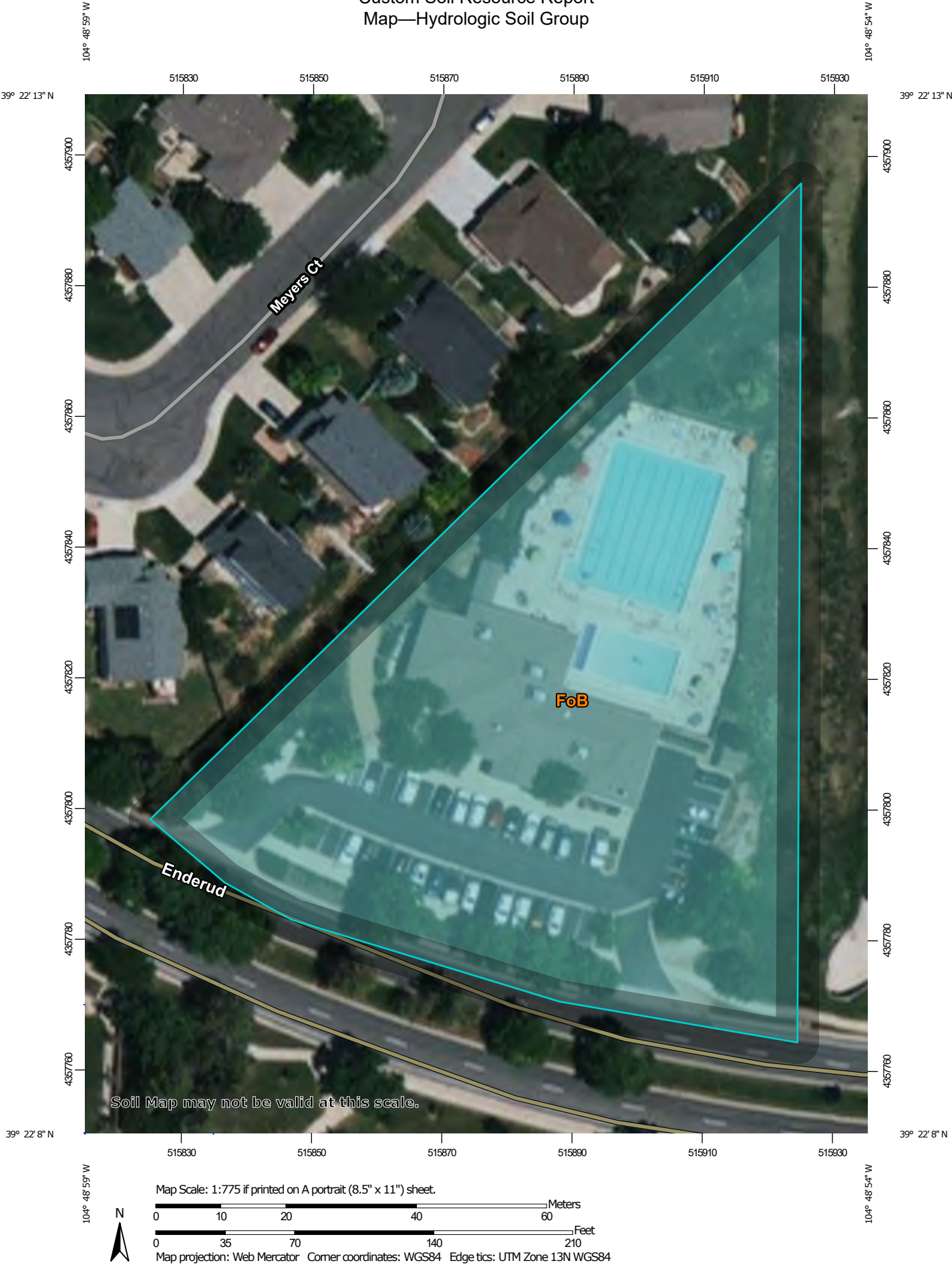
A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Castle Rock Area, Colorado**



September 15, 2023

Custom Soil Resource Report
Map—Hydrologic Soil Group



Custom Soil Resource Report

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 15, Sep 1, 2022

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

Date(s) aerial images were photographed: Jun 9, 2021—Jun 12, 2021

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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
FoB	Fondis clay loam, 1 to 3 percent slopes	C	1.7	100.0%
Totals for Area of Interest			1.7	100.0%

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

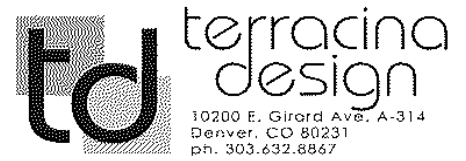
Project Name: Villages at Castle Rock Pavilion
 Prepared By: MJG



Percent Impervious Calculations

Basin Id	Design Point	Basin Area (Ac)	Historic Area	Paved Street Area	Roofs, Drives, Walks Area	Gravel Area	Single Family Lot Area						Weighted % Impervious
			2%	100%	90%	40%	45%						
A1	A1	0.12	0.10	0.02									21.3%
EX1	EX1	0.12	0.12										2.0%

Project Name: Villages at Castle Rock Pavilion
 Prepared By: MJG



Runoff Coefficient (C)

Runoff Coefficient calculations based on MHFD Volume 1: Chapter 6, Table 6-4 equations

Basin Id	Weighted % Impervious	i	Soil Type	Soil Type Area	Basin Area (Ac)	Runoff Coefficients, C		Weighted Coefficients, C	
						5-Year	100-Year	5-Year	100-Year
A1	21.3%	0.21	A	0.00	0.12	0.12	0.28	0.21	0.57
			B	0.00		0.16	0.53		
			C/D	0.12		0.21	0.57		
EX1	2.0%	0.02	A	0.00	0.12	0.01	0.13	0.05	0.49
			B	0.00		0.01	0.44		
			C/D	0.12		0.05	0.49		

Project Name: Villages at Castle Rock Pavilion
 Prepared By: MJG



Time of Concentration Calculations (T_c)

Sub-Basin Data			Initial or Overland Flow Time				Channelized Flow Time				T _c Check (Urbanized Basins)					
Basin Id	Basin Area (Ac)	C(5)	Length (ft)	Elev Change	Slope (%)	T _i (min)	Length (ft)	Elev Change	Slope (%)	NRCS Coeff. K	Velocity (FPS)	T _t (min)	Comp. T _c	Percent Imperv.	MHFD Eq. 6.5	Final T _c (min)
A1	0.12	0.21	105	8	7.5	8.49	10	0	1.4	20.0	2.37	0.1	8.6	21.3%	22.5	8.6
EX1	0.12	0.05	105	8	7.5	9.99	10	0	1.4	20.0	2.37	0.1	10.1	2.0%	25.8	10.1

Project Name: Villages at Castle Rock Pavilion

Prepared By: MJG

Peak Runoff Rational Method (5-Year)

Rainfall Depth-Duration-Frequency (1-hr) =							1.43
Design Point	Basin ID	Basin Area (Ac)	Runoff Coeff (5-Year)	T_c (min)	C X A	I (in/hr)	Q (cfs)
A1	A1	0.12	0.21	8.6	0.03	4.10	0.11
EX1	EX1	0.12	0.05	10.1	0.01	3.86	0.02

Project Name: Villages at Castle Rock Pavilion

Prepared By: MJG

Peak Runoff Rational Method (100-Year)

Rainfall Depth-Duration-Frequency (1-hr) =							2.60
Design Point	Basin ID	Basin Area (Ac)	Runoff Coeff (100-Year)	T_c (min)	C X A	I (in/hr)	Q (cfs)
A1	A1	0.12	0.57	8.6	0.07	7.46	0.53
EX1	EX1	0.12	0.49	10.1	0.06	7.02	0.43

#72



VILLAGES AT CASTLE ROCK
METROPOLITAN DISTRICT NO. 4

JUNE 1987

Excerpts from

MASTER DRAINAGE PLAN



SUBMITTAL #1



GREENHORNE & O'MARA, INC.

Regional Detention Ponds-Alternative No. 1

The concept of regional detention ponds for Founder's Village was first presented in the Master Drainage Plan for the Villages at Castle Rock (Reference 1). Three major ponds were proposed for the Mitchell Creek Basin and five smaller ponds for the Willow Creek Basin. These ponds would provide the necessary detention volume for attenuating developed peak flows to a level equal to historic peak flows.

The study presented in this report also evaluated the regional detention pond concept. For the Mitchell Gulch basin, three on-stream regional detention ponds were evaluated based on the Amended PUD for Founder's Village (dated August 1986). The location of these ponds is approximately as shown in the previous Master Drainage Plan. The first pond is located at the proposed Mikelson Boulevard crossing of Mitchell Gulch. This corresponds to regional detention pond no. 2 in the original Master Drainage Plan. Construction of this pond is substantially complete as of May 1987. The second regional pond is located on the west tributary of Mitchell Gulch adjacent to Enderud Boulevard and is the same as regional pond no. 3 as presented in the previous Master Drainage Plan. This detention pond was constructed in 1985 and provides detention for the existing development in that area. The last pond proposed is at the downstream property boundary of Founder's Village and corresponds to regional pond no. 1 in the original Master Drainage Plan.

Because of changes in the site plan, topography and site conditions, the location of the pond proposed at the downstream boundary was further evaluated. The original site plan proposed a roadway crossing of Mitchell Gulch at this location. However, the Amended PUD (August 1986) eliminated the road crossing because of construction and environmental constraints. A field reconnaissance of this area reveals a very steep rocky canyon not conducive to constructing an earthen embankment for either a roadway or a detention dam. The existing geologic formations indicate that extensive design constraints and difficult construction procedures would be required to build an embankment at this location. Additionally, there would be negative aesthetic and environmental impacts if a large embankment was constructed in this natural canyon area. Therefore, an alternate location for this detention pond was evaluated.

maximum pressure head corresponding to a peak discharge is met and the flow through the outlet culvert tapers off as the detention area drains.

Stage-storage and stage-discharge information prepared for this facility was taken from the final drainage study prepared for the Villages at Castle Rock Filing No. 3 and Filing No. 4 completed in December 1984 (Reference 7). Reservoir routing utilizing the UDSWMM computer model was completed for the pond. Figure 4 presents the stage-storage and stage-discharge data for this facility. Figure 5 presents the 100-year inflow and routed outflow hydrographs. Based on the design drawings for this pond, the embankment has side slopes of 3H:1V with a top width of 15 feet. The outlet pipe consists of a 6'x5' reinforced concrete box culvert under the embankment. Maximum storage capacity of this facility is rated to be about 12 acre-feet. Routing procedures indicate that 9.2 acre-feet is required for the 100-year storm.

Mitchell Gulch (M-1) Detention Pond - Mitchell Gulch (M-1) Detention Dam was originally constructed in 1962 for the purpose of providing flood protection for the low lying areas of Mitchell Gulch. In order to provide the required storage volume for a fully developed basin, the Mitchell Gulch (M-1) Dam requires some expansion.

The existing Mitchell Gulch (M-1) Dam embankment is approximately 39 feet high with a length of about 655 feet and a crest width of 15 feet. Total storage capacity is about 187.5 acre-feet. The dam drains by means of a 20-inch diameter pipe and has a grass-lined emergency spillway with a 90-foot bottom width with side-slopes of 2H:1V and 3H:1V.

Design information obtained from the hydrologic analysis completed for this study indicates that an additional 58 acre-feet of storage is required to keep outflow discharges equal to or less than the historic outflows.

Based on initial investigations, it may be necessary to raise the existing emergency spillway crest and dam embankment upwards of 5-feet. Since detailed topography is not available, stage-storage data for the proposed expansion were developed by extrapolating the existing surface area curves for the existing dam.

WEST TRIBUTARY DETENTION POND

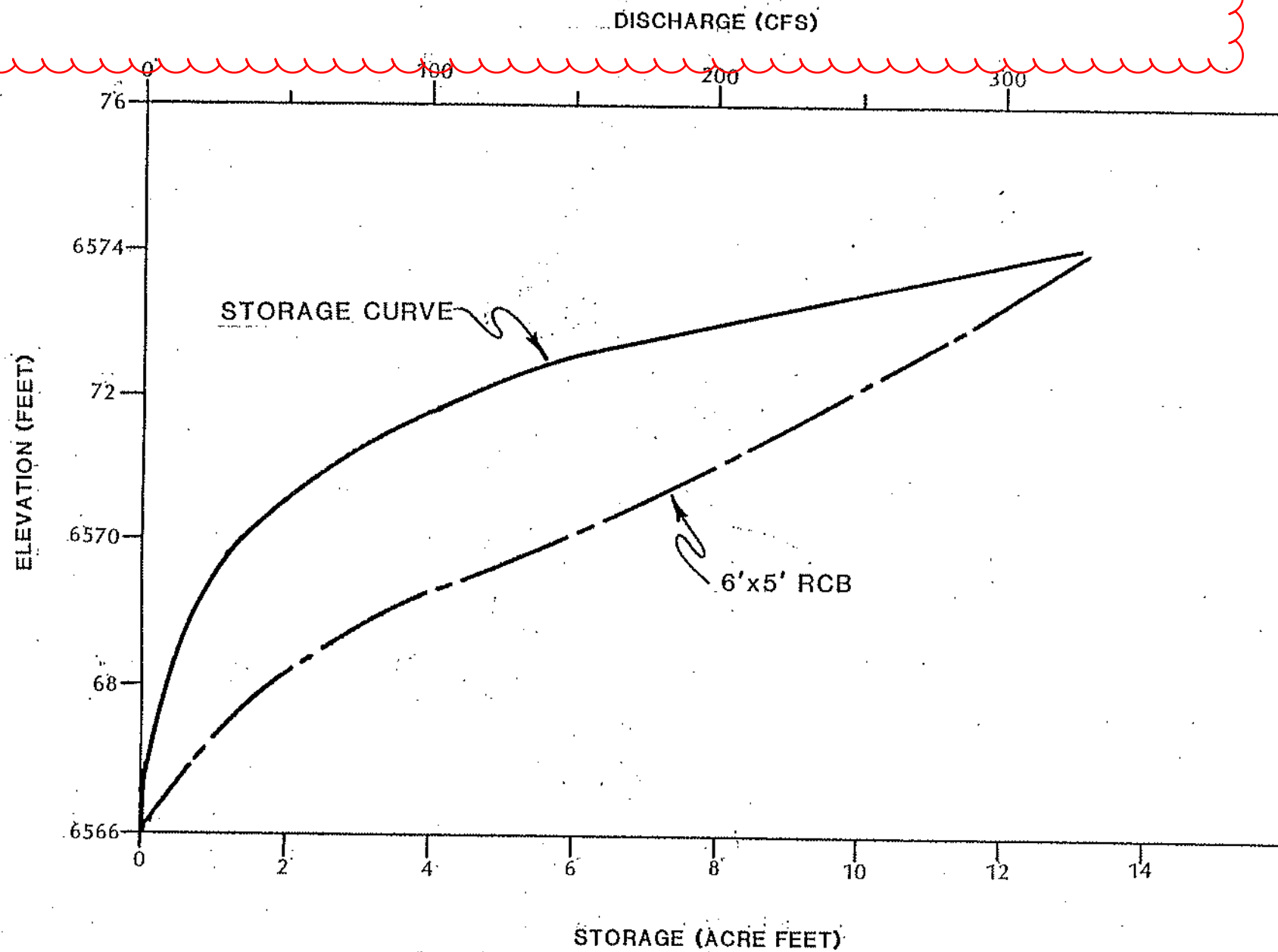


FIGURE 4

100-YEAR HYDROGRAPHS AT WEST TRIBUTARY DETENTION POND

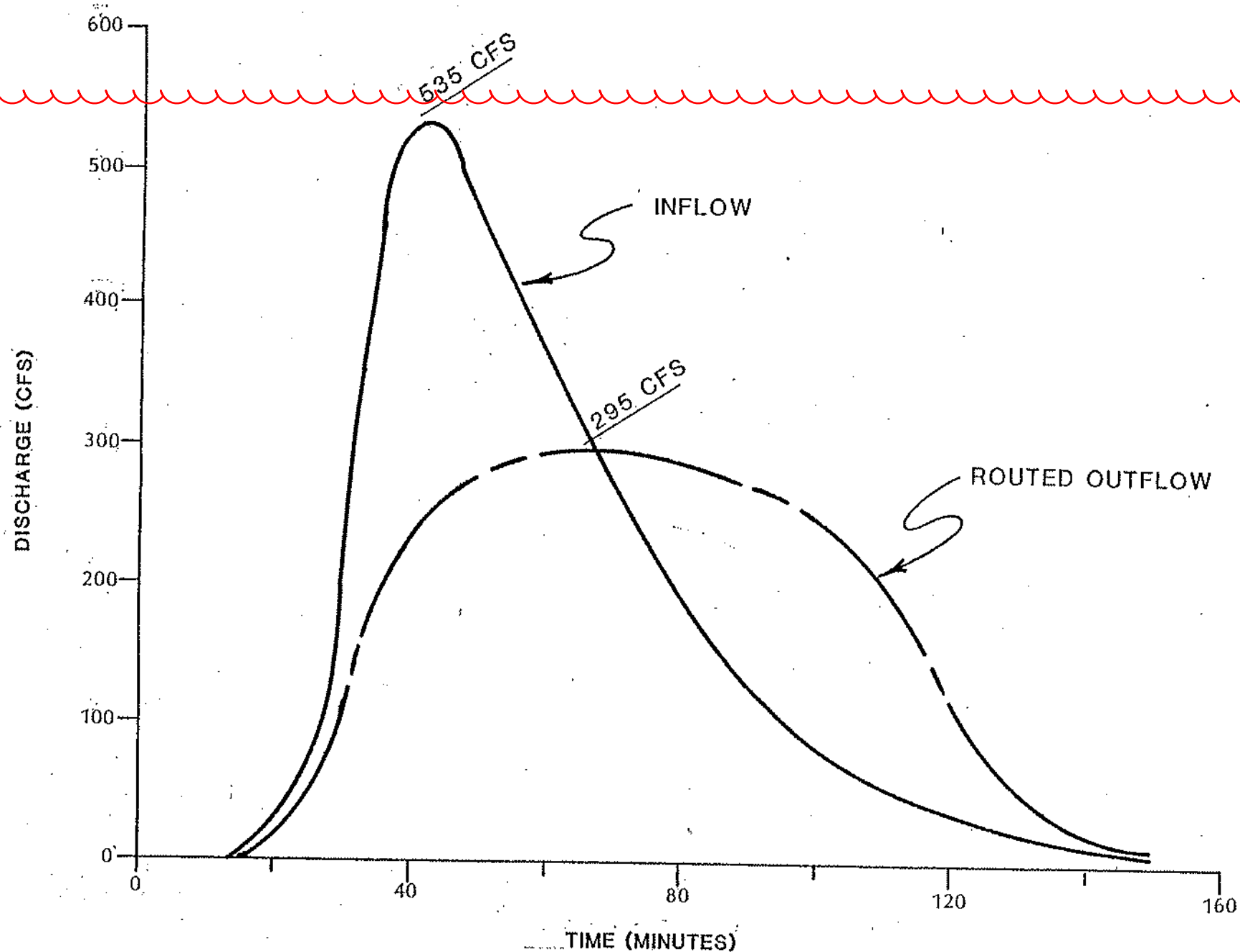


FIGURE 5.

inch diameter holes extending 5.5 feet above the surface of the water quality pond. The riser pipe connects into the existing 20-inch outlet pipe which serves as the principal spillway outlet. The principal spillway structure is to be raised approximately 5 feet in order to limit the release of the surcharge water quality volume through the riser pipe.

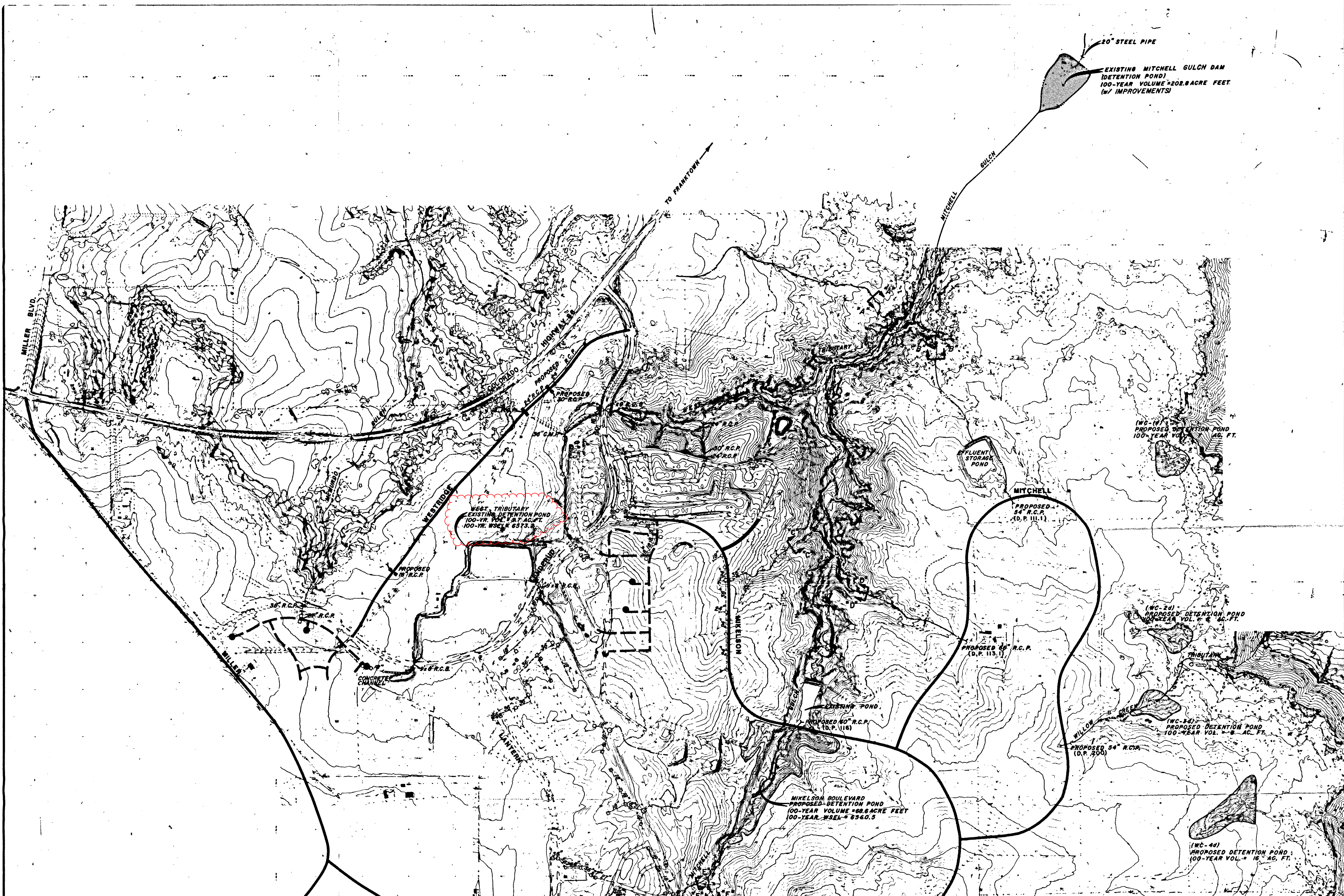
Flows released through the riser pipe will drain into a gravel filter bed placed downstream of the dam embankment. The filter bed required is approximately 220' wide x 450' long. An underdrain system is required within the gravel filter bed which consists of perforated underdrain pipe and PVC header pipes. A splitter box is required at the outlet of the 20-inch pipe on the downstream face of the dam. The purpose of this box is to direct the low flows into the gravel filter bed, while releasing the larger flood flows directly into Mitchell Gulch. Additionally, a basin baffle is recommended at the upstream end of the detention facility. The purpose of the basin baffle is to prevent short circuiting of the flow between the inlet and outlet of the pond. Detailed discussions of the proposed modifications to the Mitchell Gulch (M-1) Dam are presented in Reference 6. A summary of the three regional on-stream detention ponds on Mitchell Gulch for Alternative No. 1 is presented in Table 5.

Since developed flows in this master plan were generated based on ultimate buildout projects in Districts No. 1 and No. 2, it is recommended that final detention requirements be studied and based on updated projections of realistic buildout.

TABLE 5

MITCHELL GULCH DETENTION PONDS SUMMARY FOR ALTERNATIVE NO. 1

Location	Developed 100-Year Inflow (cfs)	Developed 100-Year Outflow (cfs)	100-Year Storage Volume (ac-ft)	100-Year Ponding Elevation (ft)	100-Year Ponding Depth (ft)
Mikelson Boulevard	1960	407	68.6	6560.5	24.7
West Tributary	535	295	9.7	6573.2	7.2
Mitchell Gulch (M-1) Dam (w/ improvements)	2164	668	202.8	NA	41.5



MILLER BLVD.

TO FRANKTOWN

20" STEEL PIPE

EXISTING MITCHELL GULCH DAM
(DETENTION POND)
100-YEAR VOLUME = 202.8 ACRE FEET
(W/ IMPROVEMENTS)

WEST TRIBUTARY
EXISTING DETENTION POND
100-YR. VOL. = 9.7 AC. FT.
100-YR. WSEL = 6373.2

(WC-18)
PROPOSED DETENTION POND
100-YEAR VOL. = 7 AC. FT.

(WC-28)
PROPOSED DETENTION POND
100-YEAR VOL. = 8 AC. FT.

(WC-32)
PROPOSED DETENTION POND
100-YEAR VOL. = 8 AC. FT.

(WC-48)
PROPOSED DETENTION POND
100-YEAR VOL. = 16 AC. FT.

MIKELSON BOULEVARD
PROPOSED DETENTION POND
100-YEAR VOLUME = 68.6 ACRE FEET
100-YEAR WSEL = 6360.5

PROPOSED 66" R.C.P.
(D.P. 113.1)

EXISTING POND
PROPOSED 60" R.C.P.
(D.P. 116)

MITCHELL
PROPOSED 53" R.C.P.
(D.P. 111.1)

PROPOSED 54" R.C.P.
(D.P. 200)

CONCRETE CHANNEL

EFFLUENT STORAGE POND

TRIBUTARY

WEST

WESTRIDGE

LANDERUD

LANTERN

MIKELSON

MITCHELL GULCH

HIGHWAY 86

PROPOSED R.C.P.

PROPOSED 30" R.C.P.

PROPOSED 30" R.C.P.

PROPOSED 30" R.C.P.

PROPOSED 30" R.C.P.

PROPOSED 30" R.C.P.

PROPOSED 30" R.C.P.

PROPOSED 30" R.C.P.

PROPOSED 30" R.C.P.

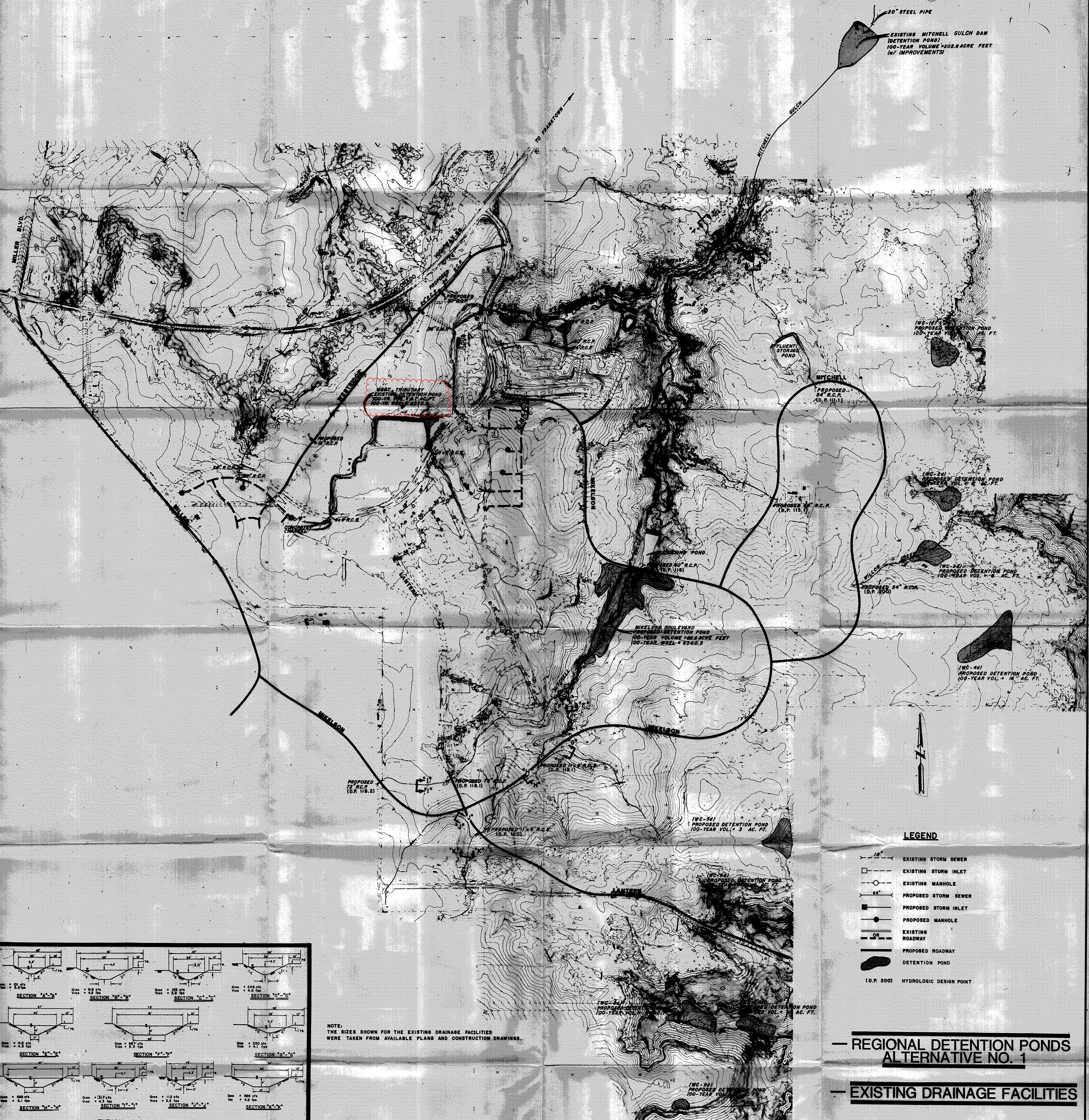
PROPOSED 30" R.C.P.

PROPOSED 30" R.C.P.

PROPOSED 30" R.C.P.

PROPOSED 30" R.C.P.

PROPOSED 30" R.C.P.



— REGIONAL DETENTION PONDS ALTERNATIVE NO. 1

— EXISTING DRAINAGE FACILITIES

MAP SHEET 2

JANUARY, 1987

**FOUNDERS VILLAGE
MASTER PLAN**

JOB NO. 4033-000-415

MITCHELL GULCH WATERSHED MASTER PLAN PRELIMINARY DESIGN REPORT

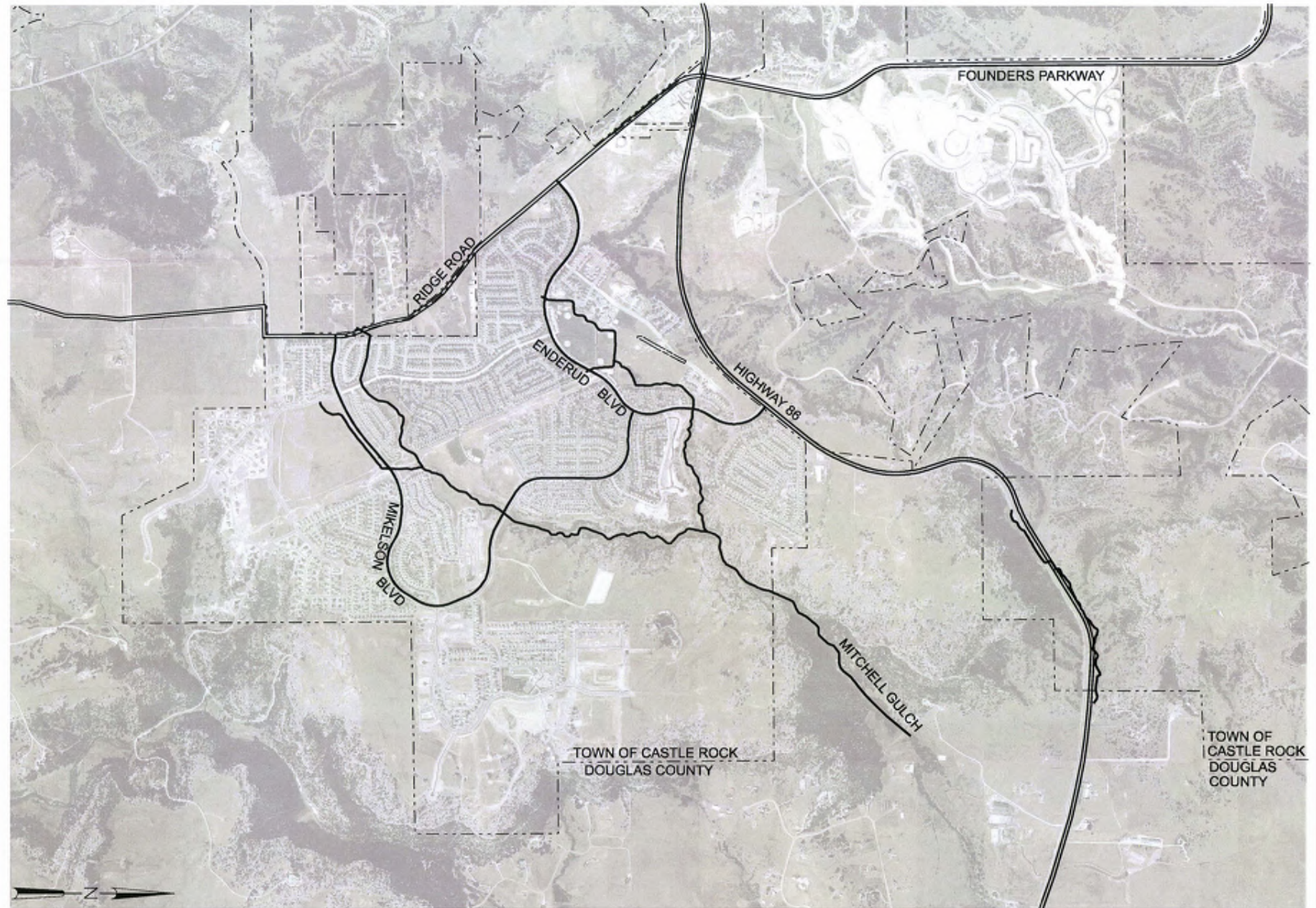
NOVEMBER 2006

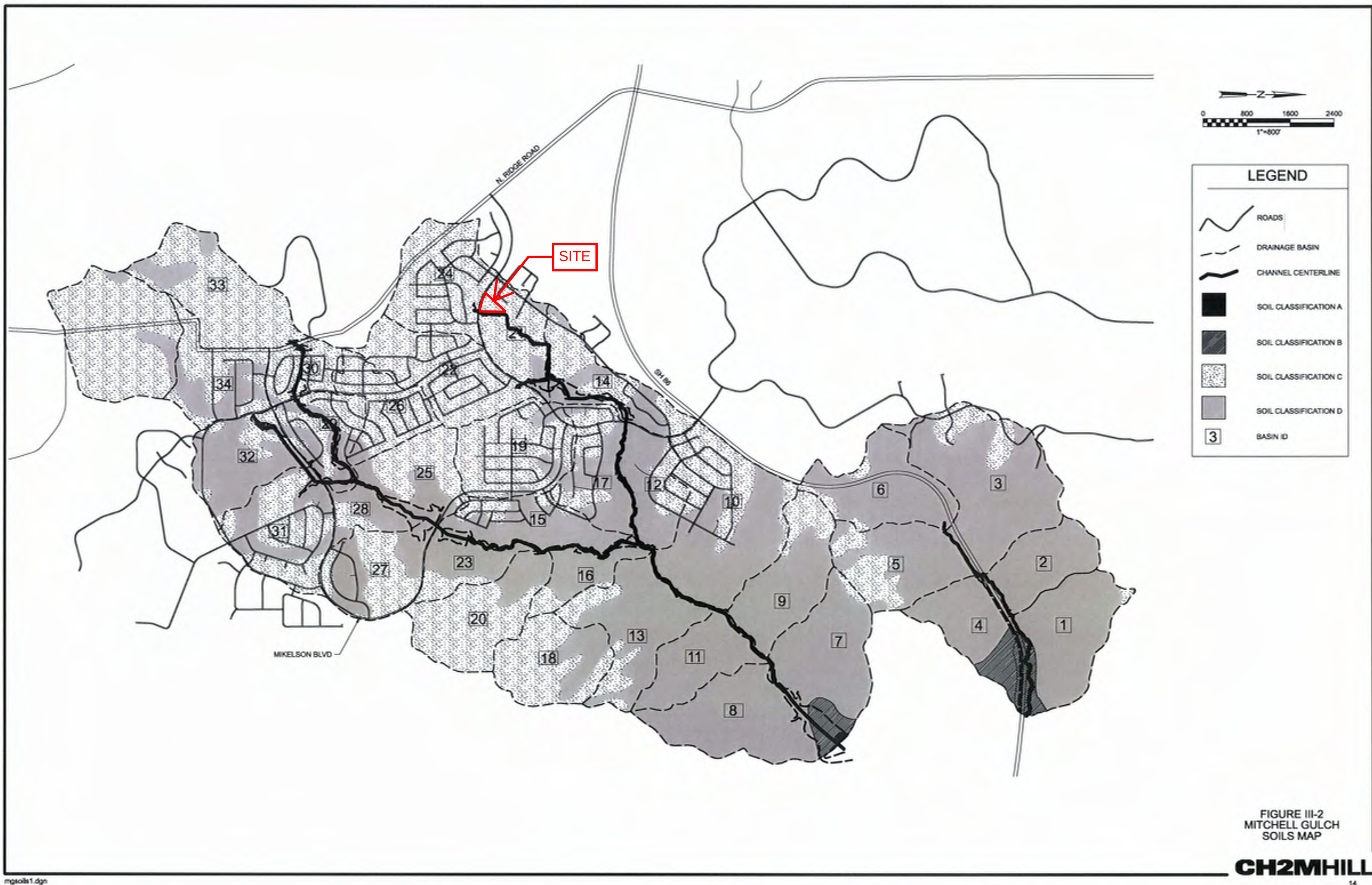


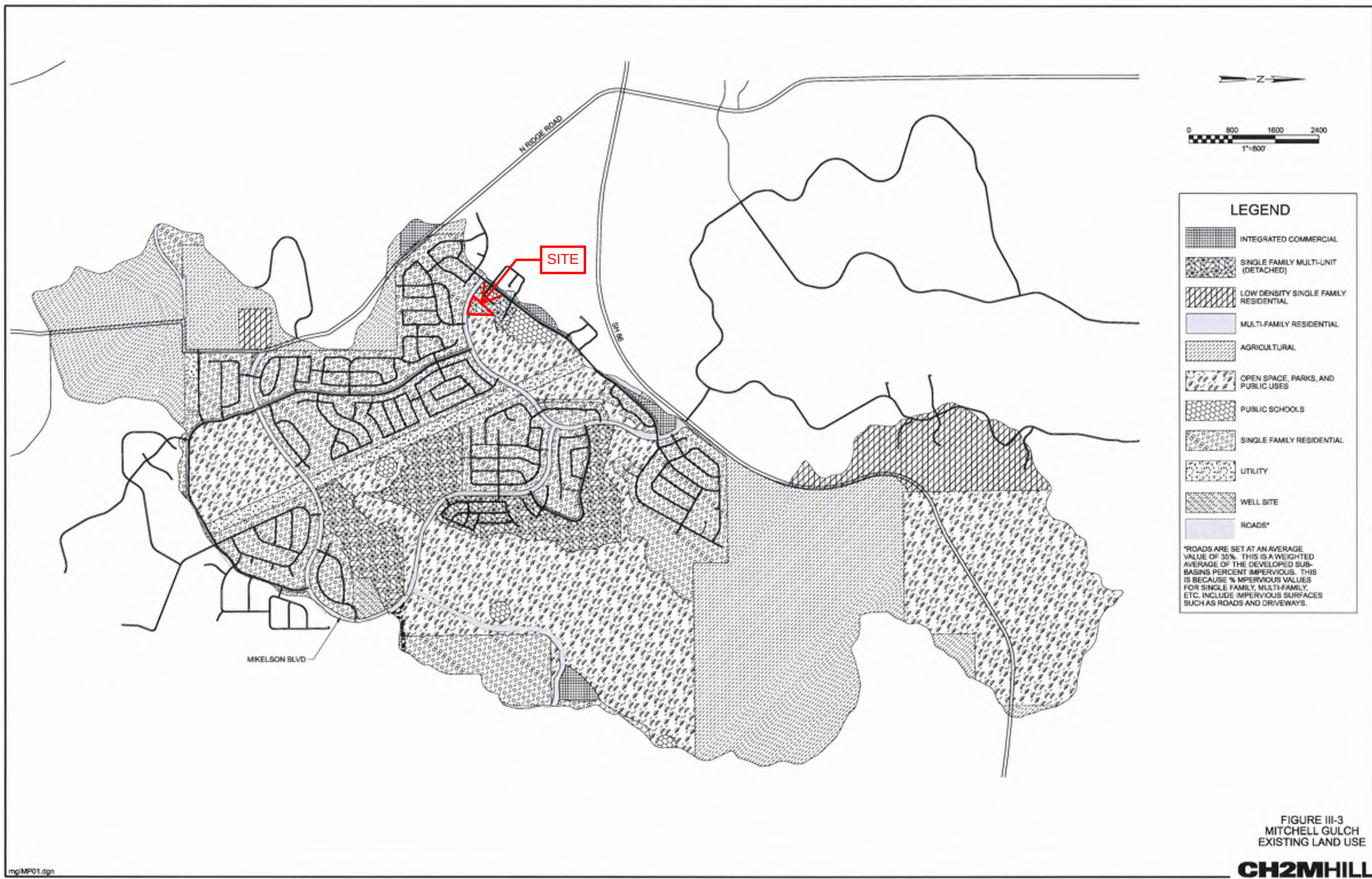
PREPARED FOR:



PREPARED BY:
CH2MHILL







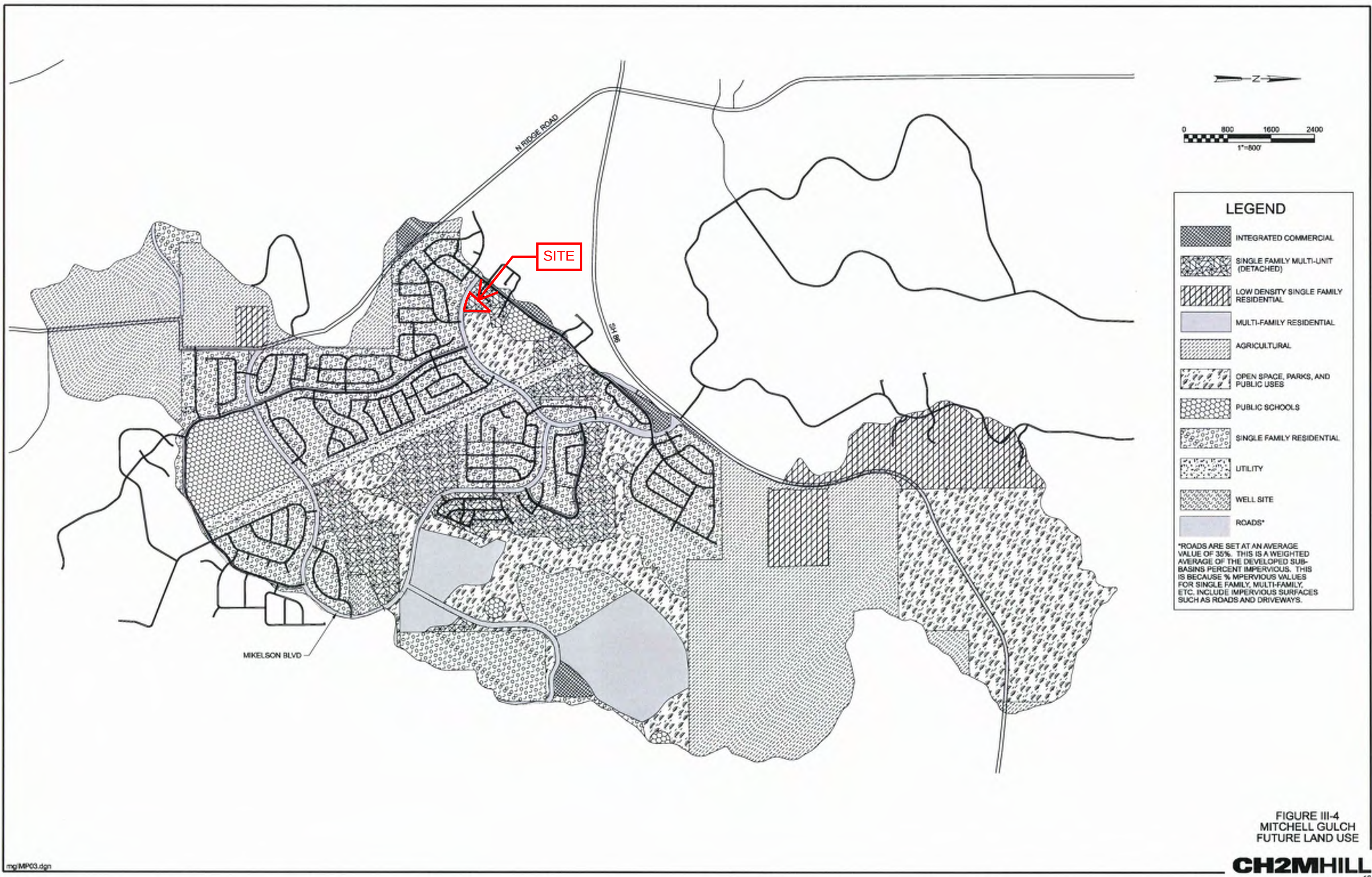


FIGURE III-4
MITCHELL GULCH
FUTURE LAND USE

TABLE III-5

CUHP SUBCATCHMENT PARAMETERS
EXISTING IMPERVIOUS CONDITION

Subcatchment ID	Area (acres)	Area (mi ²)	Distance to Centroid (mi)	Length (mi)	Slope (ft./ft.)	Percent Imperv.	Pervious Depression Storage (in)	Impervious Depression Storage (in)	Initial Rate (in/hr)	Decay Coeff. (1/sec.)	Final Rate (in/hr.)
1	82	0.13	0.43	0.69	0.03	5	0.40	0.10	3.000	0.0018	0.500
2	50	0.08	0.26	0.47	0.06	5	0.40	0.10	3.000	0.0018	0.500
3	126	0.20	0.30	0.58	0.04	11	0.40	0.10	3.000	0.0018	0.500
4	56	0.09	0.42	0.62	0.04	4	0.40	0.10	3.000	0.0018	0.500
5	72	0.11	0.37	0.65	0.04	3	0.40	0.10	3.000	0.0018	0.500
6	71	0.11	0.31	0.63	0.06	7	0.40	0.10	3.000	0.0018	0.500
7	87	0.14	0.39	0.76	0.03	2	0.40	0.10	3.000	0.0018	0.500
8	88	0.14	0.32	0.81	0.04	4	0.40	0.10	3.000	0.0018	0.500
9	70	0.11	0.45	0.82	0.03	2	0.40	0.10	3.000	0.0018	0.500
10	128	0.20	0.48	0.88	0.03	21	0.40	0.10	3.000	0.0018	0.500
11	50	0.08	0.27	0.63	0.05	4	0.40	0.10	3.000	0.0018	0.500
12	46	0.07	0.19	0.39	0.03	24	0.40	0.10	3.000	0.0018	0.500
13	84	0.13	0.28	0.60	0.03	7	0.40	0.10	3.000	0.0018	0.500
14	57	0.09	0.21	0.52	0.02	30	0.35	0.05	3.000	0.0018	0.500
15	56	0.09	0.63	0.76	0.02	45	0.35	0.05	3.000	0.0018	0.500
16	31	0.05	0.40	0.55	0.02	5	0.40	0.10	3.000	0.0018	0.500
17	55	0.09	0.29	0.63	0.01	46	0.35	0.05	3.000	0.0018	0.500
18	66	0.10	0.21	0.45	0.02	29	0.35	0.05	3.000	0.0018	0.500
19	75	0.12	0.10	0.41	0.02	39	0.35	0.05	3.000	0.0018	0.500
20	74	0.12	0.36	0.62	0.03	16	0.40	0.10	3.000	0.0018	0.500
21	46	0.07	0.22	0.56	0.02	27	0.35	0.05	3.000	0.0018	0.500
22	80	0.13	0.40	0.77	0.02	29	0.35	0.05	3.000	0.0018	0.500
23	35	0.05	0.36	0.54	0.03	7	0.40	0.10	3.000	0.0018	0.500
24	73	0.11	0.21	0.43	0.02	33	0.35	0.05	3.000	0.0018	0.500
25	54	0.08	0.23	0.47	0.02	38	0.35	0.05	3.000	0.0018	0.500
26	46	0.07	0.49	0.62	0.01	35	0.35	0.05	3.000	0.0018	0.500
27	63	0.10	0.35	0.69	0.02	39	0.35	0.05	3.000	0.0018	0.500
28	25	0.04	0.14	0.50	0.04	40	0.35	0.05	3.000	0.0018	0.500
29	47	0.07	0.22	0.42	0.03	35	0.35	0.05	3.000	0.0018	0.500
30	31	0.05	0.17	0.28	0.02	32	0.35	0.05	3.000	0.0018	0.500
31	76	0.12	0.49	0.64	0.01	28	0.35	0.05	3.000	0.0018	0.500
32	61	0.10	0.37	0.46	0.03	9	0.40	0.10	3.000	0.0018	0.500
33	89	0.14	0.26	0.65	0.02	8	0.40	0.10	3.000	0.0018	0.500
34	58	0.09	0.30	0.49	0.02	22	0.40	0.10	3.000	0.0018	0.500
35	104	0.16	0.28	0.58	0.02	2	0.40	0.10	3.000	0.0018	0.500

TABLE III-6

CUHP SUBCATCHMENT PARAMETERS
FUTURE IMPERVIOUS CONDITION

Subcatchment ID	Area (acres)	Area (mi ²)	Distance to Centroid (mi)	Length (mi)	Slope (ft./ft.)	Percent Imperv.	Pervious Depression Storage (in)	Impervious Depression Storage (in)	Initial Rate (in/hr)	Decay Coeff. (1/sec.)	Final Rate (in/hr.)
1	82	0.13	0.43	0.69	0.03	5	0.40	0.10	3.00	0.0018	0.50
2	50	0.08	0.26	0.47	0.06	5	0.40	0.10	3.00	0.0018	0.50
3	126	0.20	0.30	0.58	0.04	11	0.40	0.10	3.00	0.0018	0.50
4	56	0.09	0.42	0.62	0.04	4	0.40	0.10	3.00	0.0018	0.50
5	72	0.11	0.37	0.65	0.04	4	0.40	0.10	3.00	0.0018	0.50
6	71	0.11	0.31	0.63	0.06	8	0.40	0.10	3.00	0.0018	0.50
7	87	0.14	0.39	0.76	0.03	2	0.40	0.10	3.00	0.0018	0.50
8	88	0.14	0.32	0.81	0.04	7	0.40	0.10	3.00	0.0018	0.50
9	70	0.11	0.45	0.82	0.03	7	0.40	0.10	3.00	0.0018	0.50
10	128	0.20	0.48	0.88	0.03	21	0.40	0.10	3.00	0.0018	0.50
11	50	0.08	0.27	0.63	0.05	42	0.35	0.05	3.00	0.0018	0.50
12	46	0.07	0.19	0.39	0.03	24	0.40	0.10	3.00	0.0018	0.50
13	84	0.13	0.28	0.60	0.03	51	0.35	0.05	3.00	0.0018	0.50
14	57	0.09	0.21	0.52	0.02	49	0.35	0.05	3.00	0.0018	0.50
15	56	0.09	0.63	0.76	0.02	47	0.35	0.05	3.00	0.0018	0.50
16	31	0.05	0.40	0.55	0.02	19	0.40	0.10	3.00	0.0018	0.50
17	55	0.09	0.29	0.63	0.01	46	0.35	0.05	3.00	0.0018	0.50
18	66	0.10	0.21	0.45	0.02	44	0.35	0.05	3.00	0.0018	0.50
19	75	0.12	0.10	0.41	0.02	39	0.35	0.05	3.00	0.0018	0.50
20	74	0.12	0.36	0.62	0.03	35	0.35	0.05	3.00	0.0018	0.50
21	46	0.07	0.22	0.56	0.02	27	0.35	0.05	3.00	0.0018	0.50
22	80	0.13	0.40	0.77	0.02	29	0.35	0.05	3.00	0.0018	0.50
23	35	0.05	0.36	0.54	0.03	68	0.35	0.05	3.00	0.0018	0.50
24	73	0.11	0.21	0.43	0.02	33	0.35	0.05	3.00	0.0018	0.50
25	54	0.08	0.23	0.47	0.02	38	0.35	0.05	3.00	0.0018	0.50
26	46	0.07	0.49	0.62	0.01	35	0.35	0.05	3.00	0.0018	0.50
27	63	0.10	0.35	0.69	0.02	39	0.35	0.05	3.00	0.0018	0.50
28	25	0.04	0.14	0.50	0.04	40	0.35	0.05	3.00	0.0018	0.50
29	47	0.07	0.22	0.42	0.03	35	0.35	0.05	3.00	0.0018	0.50
30	31	0.05	0.17	0.28	0.02	32	0.35	0.05	3.00	0.0018	0.50
31	76	0.12	0.49	0.64	0.01	34	0.35	0.05	3.00	0.0018	0.50
32	61	0.10	0.37	0.46	0.03	48	0.35	0.05	3.00	0.0018	0.50
33	89	0.14	0.26	0.65	0.02	8	0.40	0.10	3.00	0.0018	0.50
34	58	0.09	0.30	0.49	0.02	22	0.40	0.10	3.00	0.0018	0.50
35	104	0.16	0.28	0.58	0.02	2	0.40	0.10	3.00	0.0018	0.50



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INFINITE SOLUTIONS.

Excerpts From
**Phase 3 Drainage Report
for
Founders Village Filing No. 25**

Town of Castle Rock, Colorado
(CD13-0051)

Developer:
Heritage Commons 67, LLC
514 Pike Street
Canon City, Colorado 81212
(760) 485-1824
Contact: Daniel Brown

Prepared By:
Atwell, LLC.
143 Union Boulevard, Suite 700
Lakewood, Colorado 80228
(303) 462 –1100
Contact: Bob Kelsey

Project Number 03.28
October 2015

concepts with some updates for new Regulations and current development status. Reference 18 also accepts the existing regional detention pond system for detention in this area and for the FV25 site. This FV25 report accepts the Master Plan findings adheres to the Master Plan concepts and is proposing no onsite detention as a result. Water quality for FV25 will be provided within the two proposed onsite ponds.

II.A.2

Existing land uses in both the Mitchell Creek and the West Tributary basins consist of a mix of residential, commercial, and agricultural uses.

II.A.3

Two existing Master Plans for the West Tributary has been followed for this site (References 5 and 18). Adjacent channels and swales are in natural condition with predominantly native grass cover. According to Reference 18, channel stabilization is not proposed for the portion of the West Tributary that traverses FV25. A potential water quality improvement to the existing stock pond and overflow weir for the regional pond are noted in the Master Plan. These improvements are noted as Priority 2 in the Master Plan and may be completed as a capital improvement project by the Town at a future date. The original Master Plan (Reference 5) identified an existing West Tributary regional detention pond located south (upstream) of Founders Village Filing No. 25 on the existing recreation ball field site (Villages of Castle Rock Filing 3). The 5.2 acre-feet pond discharged 100-year detained flows of 326 cfs (Reference 5, Design Point 4) into the West Tributary through an existing 5'x6' RCB outlet structure located near the Filing 25 south property line. Refer to page 14 of Reference 5 (Appendix F) for additional information. The current Master Plan (Reference 18) acknowledges the reduced flows resultant from the existing 5'x6' RCB and the upstream ball fields, but does not officially recognize the area as a detention pond. Reference 18 calculates the 100-year flowrate discharging into Reach W-1 as 370 cfs (Design Point J3). This FV25 report also recognizes the supplemental storage benefit of this upstream area and the 370 cfs flowrate in the drainageway calculated by Reference 18.

Both References 5 and 18 recognize another existing regional detention pond that is located on Mitchell Gulch at Mikelson Boulevard (Storage Element MBDF, Reference 18). The Mikelson Boulevard detention pond over-detains upstream Mitchell Gulch basin runoff to keep flows within the drainageway at the convergence of the West Tributary and Mitchell Gulch at historic levels or less. Detention storage required for drainage basins contributing runoff to the West Tributary north of the West Tributary detention pond and west of the Mikelson Boulevard pond has been incorporated within the existing MBDF "over-detention" storage volume. Per Reference 5, the historic 100-year flowrate in Mitchell Gulch at this pond is 1012 cfs, while the 100-year pond discharge is only 407 cfs. Per the current Master Plan (Reference 18), the future 100-year flowrate in Mitchell Gulch at this pond is 1264 cfs, while the future developed 100-year pond discharge through the 60" RCP at Mikelson Boulevard is only 378 cfs.

A second detention pond (Pond M-2) is located just downstream of the MBDF. This pond further attenuates Mitchell Gulch flowrates and holds the 100-year rate at approximately 390 cfs in the channel.

The over-detention in these regional ponds results in developed 100-year flows within Mitchell Gulch that are comparable to historic levels at the convergence of the West Tributary and Mitchell Gulch (Reference 18, Node J2: Q100 Historic=1092 cfs, Q100 Developed=1173 cfs). Refer to pages 11-15 of Reference 5 and the Reference 18 pages in Appendix F for additional information.

A third pond was originally proposed to be built on Mitchell Gulch at the Villages at Castle Rock north property line, but the location was changed to the existing Mitchell Creek Dam (M-1) location approximately 0.5 miles downstream. The improvements to this pond have not been required due to the actual development densities within Founders Village being constructed at approximately 33% less density than anticipated in the Founders Village PUD (Reference 12, page 3, Appendix F). This existing SCS dam has additional capacity for areas east of Mitchell Gulch within the Founders development (with modifications), as outlined in References 5, 12, and 13. The current Master Plan (Reference 18) also recognizes this potential future pond, but does not recommend any improvements to this facility.

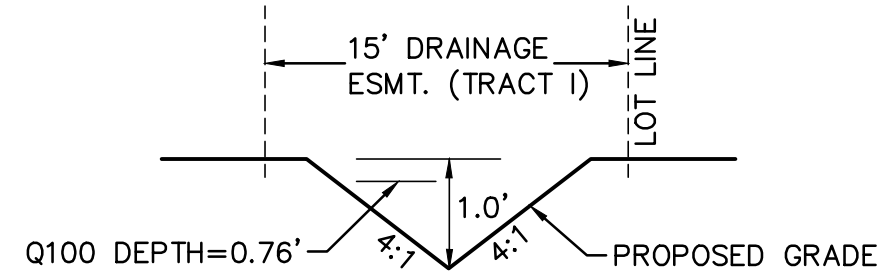
As noted previously, Founders Village Filing 25 is located within Basin D1-3 of Reference 5 and Basin 14 of Reference 18 (the current Master Plan). The Founders Village No. 25 site was originally zoned as LMF, allowing up to 198 multi-family units. The site plan proposed within this drainage report is for 66 single family detached units (which is an allowed use under the PUD). The Master Plan percent impervious area assumed for this site was 42% (Reference 5) and 49% (Reference 18). The actual percent impervious area for the site is approximately 33.8%, which is lower than assumed within both of the Master Plans. The lower impervious area for the FV25 development will result in lower runoff for the site than was anticipated in both References 5 and 18. Since the development of FV25 will create less runoff than included within the Master Plan, no update to the Towns Master Plan is necessary. Detention storage for this site is included within the regional MBDF pond, the M-2 pond, and supplementally in the existing recreation fields upstream of FV25, therefore no onsite detention for this project is proposed for the FV25 site. This is in conformance to the Master Plan (Reference 18)

Refer to Appendix F of this report for additional information on the Mitchell Gulch basin regional drainage and pertinent Reference 5 and 18 information. The West Tributary is delineated as Zone X on the preliminary FIRM maps (References 9 and 10). No irrigation ditches or facilities exist on the site. No improvements are proposed for offsite drainageways or Reach W-1 of the West Tributary traversing the site. No impacts to downstream drainageway flow paths or patterns are anticipated with development of FV25.

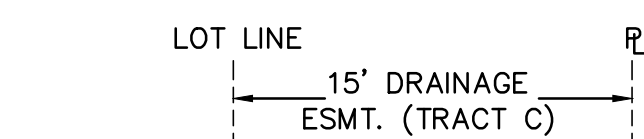
A HEC-Ras analysis of the West Tributary was completed with this report to delineate the 100-year inundation limits and base flood elevations for the existing Reach W-1 drainageway traversing the site. These limits are shown on the drainage map and the analysis is presented in the Appendix of this report. The 100-year inundation limit refines the approximate Zone X limits delineated on the preliminary FIRM panels (References 9 and 10) based on HEC-Ras analysis that incorporates detailed site topography and cross-sections. This 100-year inundation limits delineated in this report have been used for site layout and floodplain analysis for FV25. The Zone X limits are shown on the Drainage Plan for information. The 100-year flow used for the West Tributary in this analysis was 486 cfs as presented in the Master Plan (Reference 18). The water surface elevation (WSEL) results of the FV25 HEC-Ras analysis are generally consistent with the 100-year WSEL and profile presented in Reference 18 for this portion of Reach W-1. All of the proposed lot grades abutting the drainageway are at least 1.0 foot above the calculated 100-year water surface elevation. Anticipated basement finished floors elevations are also at least 2.0 foot above the calculated 100-year water surface elevation. FV25 Lots 26-36 are anticipated to be walkouts or garden level lots. The existing lots on Founders Village 2 (east of the site) are considerably higher than the anticipated 100-year inundation water surface elevations, except for Lots 3 and 4, Block 2. The lot grades for these Filing 2 lots are above the 100-year inundation limit, but these basement finished floor elevations could potentially be below the freeboard limit. These Filing 2 lots are not built as high on the hillside as the southern lots and are located on the north end of the drainageway as it drops down into the bowl area upstream of Design Point 16. Since these homes are existing, and the development of Founders Village Filing 25 is not increasing the anticipated water surface elevations and flows in the drainageway (Reference 5 and 18), this information is being provided for information only. The inundation limits are completely within either Tract C (to be dedicated to the Town with Founders Village 25) or Tract A (already owned by the Town, Founders Village 2). Refer to pages E18-E20 in the appendix for a comparison of the rear lot elevations and the anticipated 100-year inundation water surface elevations for both Founders Village 25 and the existing Founders Village Filing 2 lots.

An analysis of the existing dry stock pond and its overflow are also presented in the Appendix of this report. The existing pond is to remain undisturbed with FV25 development. Currently, 100-year storm flows overtop the pond embankment. An existing overflow exists on the east side of the existing pond embankment, but cannot convey the 100-year event. A new overflow weir will be constructed on the north end of the embankment to alleviate some of the existing overtopping. With the new north weir, the remainder of the embankment will only overtop by approximately 0.5 feet during the 100-year event.

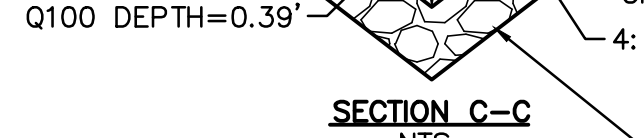
The existing West Tributary drainageway near the northeast portion of the project is boulder lined. The original 36" CMP that was located near Design Point 15 will be replaced with a new 36" RCP underneath the proposed sidewalk crossing. The original culvert was removed or destroyed with past channel and sanitary sewer construction.



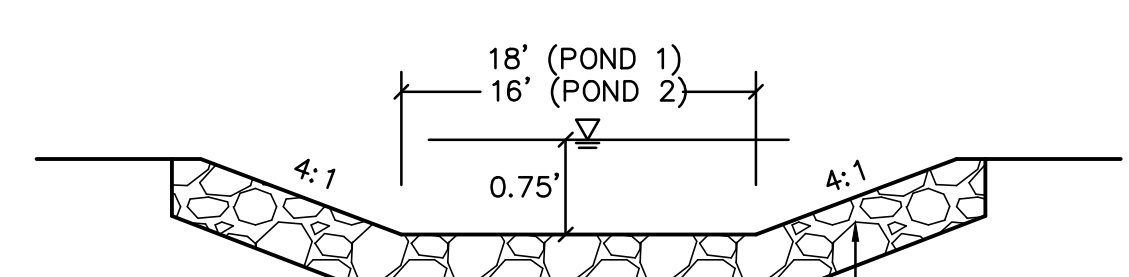
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NTS
(BETWEEN LOTS 3,4,16)



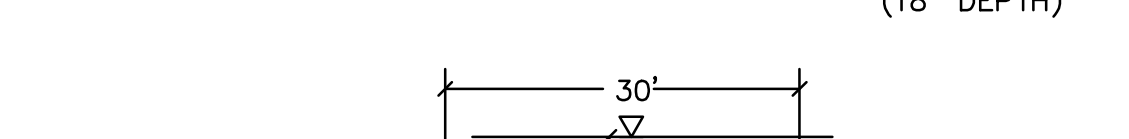
SECTION C-C
NTS
(BEHIND LOTS 38-41)



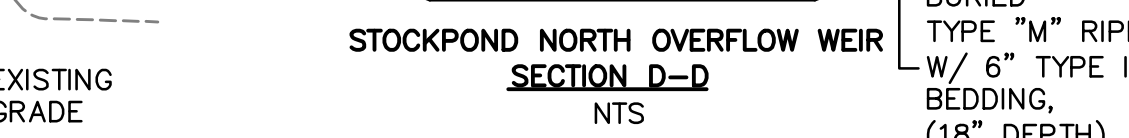
SECTION E-E
NTS
(BEHIND LOTS 58-61)



POND OVERFLOW WEIR
SECTION B-B
NTS



STOCKPOND NORTH OVERFLOW WEIR
SECTION D-D
NTS



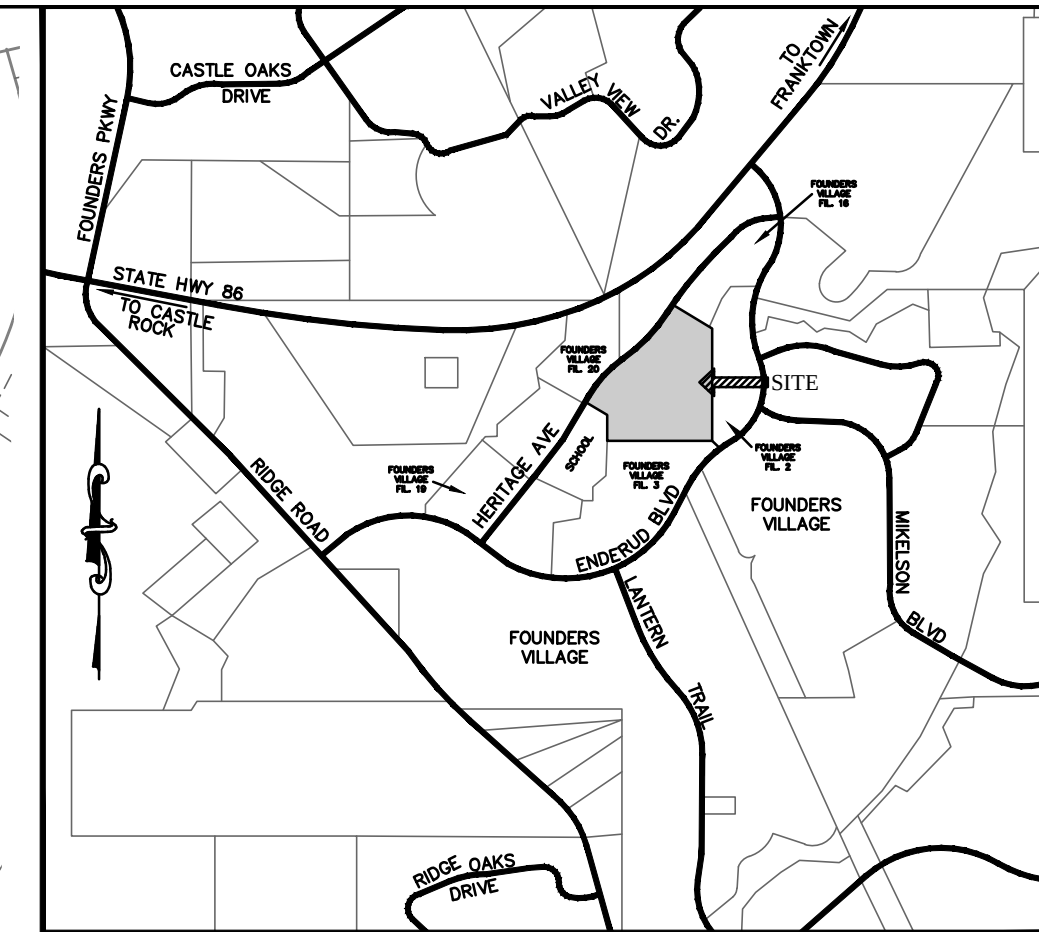
EMERGENCY OVERFLOW SWALE
SECTION F-F
NTS

WATER QUALITY POND SUMMARY TABLE

	REQUIRED VOLUME*		WQ WSEL	100 YR WSEL
	CF	AC-FT		
POND 1 WQ	18,632	0.43	6567.49	6569.24
POND 2 WQ	18,415	0.42	6552.90	6554.61

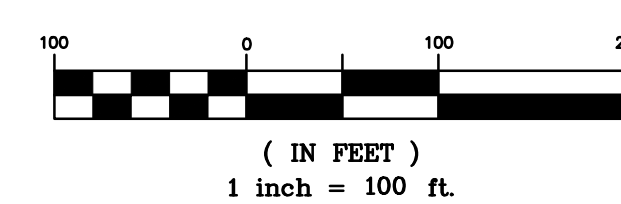
* REQUIRED VOLUME = PROVIDED VOLUME.

NOTES:
1. BASEMENT FINISHED FLOOR ELEVATIONS FOR LOTS BACKING TO THE WEST TRIBUTARY SHALL BE MINIMUM 2.0' HIGHER THAN 100 YR INUNDATION WSEL.
2. THE APPROXIMATE ZONE X FLOODPLAIN LIMITS PER PRELIMINARY FIRM PANELS 08035C0306G AND 08035C0193G DATED JULY 11, 2014 ARE SHOWN FOR INFORMATION ONLY. THE 100-YR INUNDATION LIMITS ON THIS PLAN REFLECT DETAILED ANALYSIS OF THIS SECTION OF THE WEST TRIBUTARY THAT SUPERCEDES THE APPROXIMATE ZONE X LIMITS. REFER TO THE PHASE 3 DRAINAGE REPORT FOR ADDITIONAL INFORMATION.



SUMMARY RUNOFF TABLE

DESIGN POINT	CONTRIBUTING AREA (ACRES)	RUNOFF 5YR (CFS)	PEAK 100YR (CFS)
1	0.50	0.90	2.60
2	1.91	2.60	7.20
3	5.75	6.60	17.8
4	10.19	10.1	30.4
5	11.44	11.5	34.3
6	1.99	2.70	7.50
7	6.92	9.50	26.0
8	8.44	11.5	31.4
9	8.77	11.6	31.9
10	12.11	11.6	35.3
11	1.98	3.30	8.70
12	1.66	1.20	5.90
13	2.50	1.60	7.50
14	1.26	5.40	9.30
15	REF. 18	N/A	486
16	REF. 18	N/A	486
17	1.38	5.2	10.2



LEGEND

- PROPERTY BOUNDARY
- PROPOSED RIGHT OF WAY
- PROPOSED LOT LINE
- BASIN DESIGNATION
- 100 YR RUNOFF COEFFICIENT
- 5 YR RUNOFF COEFFICIENT
- PROPOSED GRADE CONTOUR
- EXISTING GRADE CONTOUR
- PROPOSED STORM SEWER
- DESIGN POINT
- MINOR DRAINAGE BASIN BOUNDARY
- EXISTING CONTOUR
- FLOW DIRECTION
- EXISTING WETLAND LIMITS
- 100 YR INUNDATION LIMITS
- PROPOSED RIPRAP
- 100 YR INUNDATION WATER SURFACE ELEVATION
- SWALE
- APPROXIMATE ZONE X FLOODPLAIN LIMITS (PRELIMINARY FIRM PANEL, SEE NOTE 2)

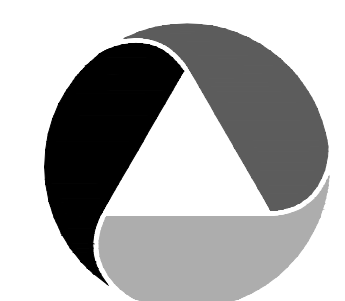
NO.	REVISION	DATE	BY
5	PLAN UPDATE/RESUBMITTAL	10/31/13	BK
6	TOWN COMMENTS	03/27/15	BK
7	TOWN COMMENTS	08/28/15	BK
8	TOWN COMMENTS	09/28/15	BK
8	TOWN COMMENTS	10/21/15	BK

FOUNDERS VILLAGE FILING NO. 25 PHASE III DRAINAGE PLAN

DEVELOPER

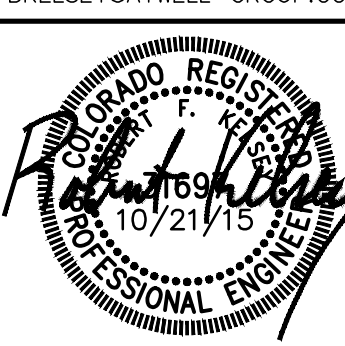
HERITAGE COMMONS 67 L.L.C.
514 PIKE
CANON CITY,
COLORADO 81212
(760) 485-1824

CONTACT: DANIEL BROWN



ATWELL
www.atwell-group.com

203.462.1100
CONTACT: BOB KELSEY
BKELSEY@ATWELL-GROUP.COM



DATE: 06/20/05
JOB NO: 03.28
DRAWN BY: GMV
APPROVED:
CADD FILE: 03.28\FINDRN



LEGEND

PROPOSED MAJOR CONTOUR
PROPOSED MINOR CONTOUR
PROPOSED MAJOR CONTOUR
PROPOSED MINOR CONTOUR
PROPOSED DRAINAGE BASIN
EXISTING DRAINAGE BASIN
STORM (FES, MH, & INLET)

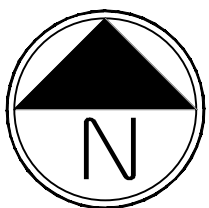
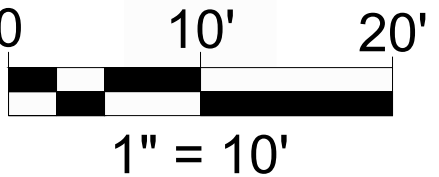
EXISTING PROPOSED

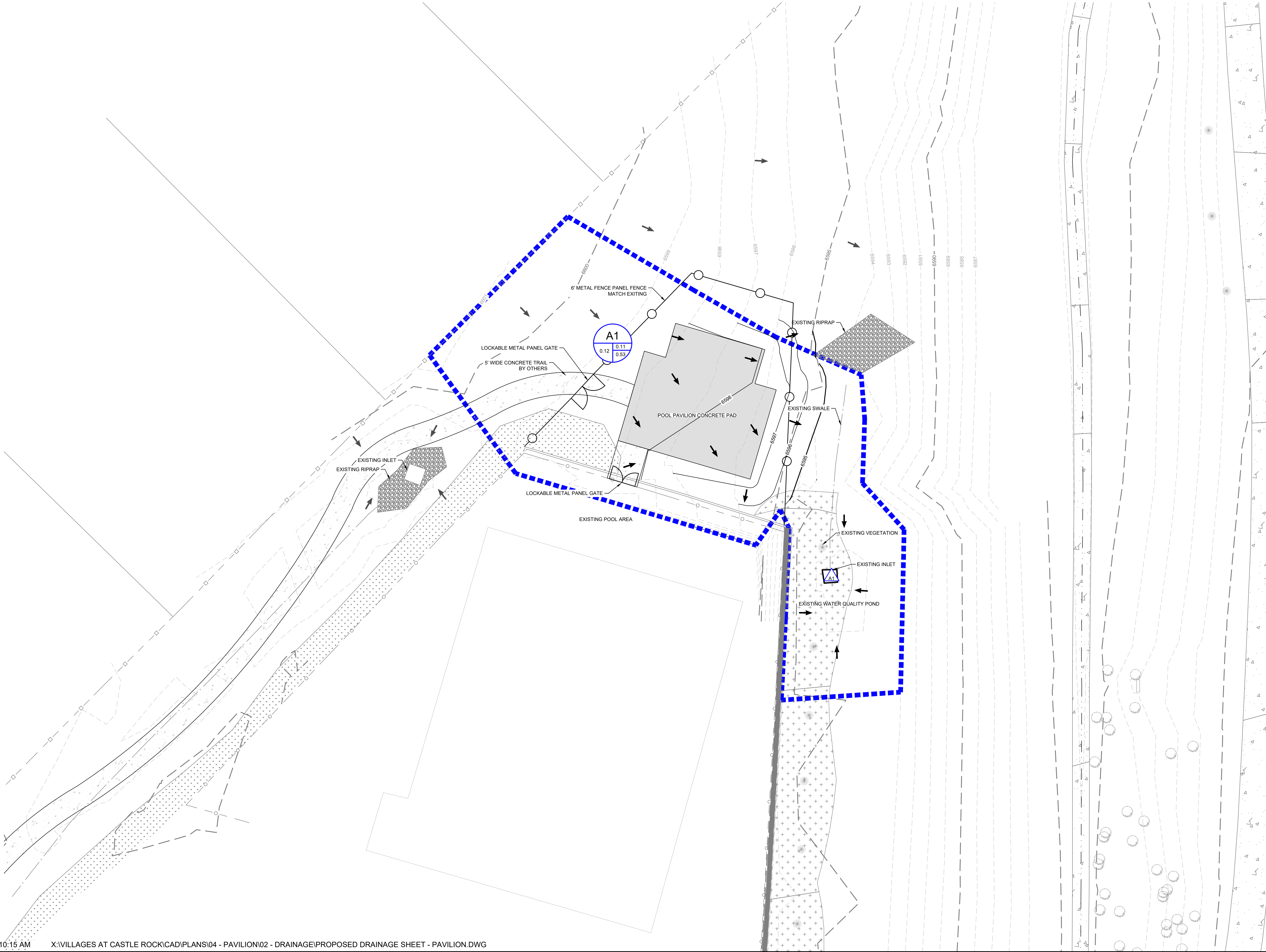
BASIN DESIGNATION
MINOR STORM RUNOFF CFS
MAJOR STORM RUNOFF CFS

DIRECTIONAL FLOW ARROW

DESIGN POINT
EMERGENCY OVERFLOW ROUTE

Design Point	Basin ID	Basin Area (Ac)	5-Year	100-Year
			Runoff (CFS)	Runoff (CFS)
A1	A1	0.12	0.11	0.53
EX1	EX1	0.12	0.02	0.43





LEGEND

PROPOSED MAJOR CONTOUR
PROPOSED MINOR CONTOUR
PROPOSED MAJOR CONTOUR
PROPOSED MINOR CONTOUR
PROPOSED DRAINAGE BASIN
EXISTING DRAINAGE BASIN
STORM (FES, MH, & INLET)

EX-1 PR-1
AREA 0.XX 0.XX
X.XX X.XX
(AC) (AC)

DIRECTIONAL FLOW ARROW

DESIGN POINT
EMERGENCY OVERFLOW ROUTE

Runoff Summary Table				
Design Point	Basin ID	Basin Area (Ac)	5-Year	100-Year
			Runoff (CFS)	Runoff (CFS)
A1	A1	0.12	0.11	0.53
EX1	EX1	0.12	0.02	0.43

