

Ryan Johnson  
Town of Eagle  
1050 Chambers Avenue  
Eagle, Colorado 81631  
Ryan.Johnson@TownOfEagle.org

Subject: 629 Sawatch Road  
Drainage Letter

Ryan:

Yarnell Consulting and Civil Design LLC (YCCD) has been retained as the professional civil engineer-of-record for the redevelopment of the approximately one-acre subject property. The purpose of this letter is to summarize the existing and proposed drainage patterns for the site, and confirm the redevelopment is in conformance with the master drainage study for the subdivision.

## Existing Conditions

Presently, the subject property is primarily covered with gravel pavement. The structures on the site include two (2) mobile office units connected by a walkway, and a shed. Boulder walls define the west and north limits of the property. There are a few shipping containers and storage trailers on the site.

There is an existing stub to receive subsurface drainage near the west corner of the property. It is presently not being utilized. Alternatively, drainage flows overland from north to south across the property. Some run-on is received from the property toward the northeast. Surface water leaves the site near the south corner and enters an ill-defined ditch along the north side of Sawatch Road. From there, it is conveyed southwesterly approximately 410 linear feet to an existing inlet. From there, drainage is conveyed into an existing regional detention and water quality pond on Lot 2A within the subdivision. This pond was evaluated and design changes proposed by YCCD in the *700 Chambers Avenue Subdivision Regional Detention Pond Drainage Report* dated 25 January 2022. The analysis assumed each site within the tributary basin was developed to 80% impervious. Therefore, any redevelopment must ensure it does not exceed 80% imperviousness on the site, or else modifications to the pond are required.

The property was evaluated as a single drainage basin (EX1) as shown on *Drainage Plan (Existing)* sheet D1. The accompanying Rational Method analysis indicates the site discharges approximately 2.5 CFS during a 100-year storm event.

## Proposed Conditions

It is proposed to redevelop the site with a single building intended to serve both warehouse and industrial purposes. Additionally, concrete driveways and walkways, an asphalt parking lot (including stalls and a drive aisle), and a trash enclosure will be constructed. Some landscaping will be built around the perimeter of the site.

As shown on the attached *Drainage Plan (Proposed)* sheet D2, the redeveloped site has been evaluated as two (2) sub-basins. The first (PR1) is approximately 0.61 acres in area and 91% impervious. Run-off generated within this sub-basin is captured and tributary to the proposed, on-site, private storm drainage system for conveyance to the existing stub located near the west corner of the property. The second (PR2) is approximately 1.00 acres in area and 21% impervious. Run-off generated within this sub-basin flows overland and is tributary to the ditch along Sawatch Road. The run-on received from the property to the southeast will continue to be received on-site and conveyed to Sawatch Road.

The accompanying Rational Method analysis indicates two (2) important items relative to the project. First, it confirms the composite imperviousness of the site is approximately 48% -- well below the 80% maximum required to be in conformance with the master drainage study for the subdivision. Second, the analysis estimates the drainage flow rates from the redevelopment. This information is included in the table below.

<b>Sub-Basin</b>	<b>Area (acres)</b>	<b>Imperviousness</b>	<b>25-year Run-off Rate (CFS)</b>	<b>100-year Run-off Rate (CFS)</b>
PR1	0.61	91%	1.7	2.2
PR2	1.00	21%	1.3	2.2

Given that sub-basin PR1 is tributary to the on-site, 12-inch stub, it is critical to confirm the stub has capacity for the anticipated flow rate of 2.2 CFS. Per the attached Hydraflow Express analysis, we estimate the pipe to be approximately 50% full under the anticipated flow rate.

Since sub-basin PR2 is tributary to the ditch along Sawatch Road, it is imperative that the flow rate not exceed that which is existing (2.5 CFS) so as not to worsen the downstream drainage conditions within the right-of-way. Given that we estimate a run-off rate of 2.2 CFS during the 100-year storm event, the result is a reduction relative to the present-day condition of 2.5 CFS. Therefore, the redevelopment is in conformance with applicable town drainage standards.

## Summary

In summary, the proposed redevelopment of the subject property is in conformance with the master drainage report for the subdivision, as well as town standards. The composite imperviousness of the redeveloped site is less than 80% which means the regional detention and water quality pond can serve this site without needing modifications. Plus, there is not anticipated to be an increase in run-off leaving the site and entering the Sawatch Road right-of-way.

Do let me know if you have any questions.

P.O. Box 3901  
Eagle, Colorado 81631

**YARNELL CONSULTING &  
CIVIL DESIGN, LLC**  
(970) 323-7008 • 2/10/2025

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229 Midland Ave.  
Basalt, Colorado 81621

Sincerely,



Justin J. Yarnell, PE  
Colorado PE Number 47241



Attachments:

1. *Drainage Plan (Existing)* sheet D1
2. Rational Method calculations – Existing
3. *Drainage Plan (Proposed)* sheet D2
4. Rational Method calculations – Proposed
5. Hydraflow Express analysis for pipe capacity





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Eagle, Colorado 81631

YARNELL CONSULTING &  
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129 Midland Avenue  
Basalt, Colorado 81621

(970) 323-7008

2/10/2025

Project Name: 629 Sawatch Road

Project No.: 23.005

RATIONAL METHOD DRAINAGE CALCULATIONS

Storm Event: Existing

Jurisdiction: Town of Eagle

Soil Type: B

STORM EVENT:		2	5	10	25	100	PERCENT IMPERVIOUS
RUNOFF COEFF.:		C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>100</sub>	
SURFACE	Landscape	0.01	0.01	0.07	0.26	0.44	2.0%
	Roof	0.74	0.77	0.79	0.82	0.85	90.0%
	Asphalt	0.84	0.86	0.87	0.88	0.90	100.0%
	Concrete	0.74	0.77	0.79	0.82	0.85	90.0%
	Gravel	0.29	0.32	0.38	0.50	0.61	40.0%

SUB-BASIN	AREA (ac)	AREA PER SURFACE CHARACTERISTIC (ac)					COMPOSITE RUNOFF COEFFICIENTS					COMPOSITE IMPERVIOUS
		Landscape	Roof	Asphalt	Concrete	Gravel						
EX1	1.02					1.02	0.29	0.32	0.38	0.50	0.61	40.0%
	0.00											
	0.00											
	0.00											
	0.00											
	0.00											
	0.00											
	0.00											
	0.00											
	0.00											
	0.00											
	0.00											
	0.00											
	0.00											
	0.00											
	0.00											
TOTAL	1.02	0.00	0.00	0.00	0.00	1.02	0.29	0.32	0.38	0.50	0.61	40.0%

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P.O. Box 3901  
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(970) 323-7008

2/10/2025

Project Name: 629 Sawatch Road

Project No.: 23.005

## RATIONAL METHOD DRAINAGE CALCULATIONS

Storm Event: Existing

STANDARD FORM SF-2 (TIME OF CONCENTRATION SUMMARY)

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\*All calculations are per UDFCD (Volume 1), Chapter 5

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(970) 323-7008

2/10/2025

Project Name: 629 Sawatch Road

Project No.: 23.005

RATIONAL METHOD DRAINAGE CALCULATIONS

Storm Event: Existing  
Return Period: 25-YEAR  
Rainfall Depth: 0.886

STANDARD FORM SF-3 (STORM DRAINAGE SYSTEM DESIGN)

BASIN	DESIGN POINT	DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
		AREA (AC)	RUNOFF COEFF	t <sub>c</sub> (MIN)	CxA (AC)	I (IN/HR)	Q (CFS)	t <sub>c</sub> (MIN)	S(CxA) (AC)	I (IN/HR)	Q (CFS)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
EX1	B	1.02	0.50	12.3	0.51	3.10	1.59					

129 Midland Avenue  
Basalt, Colorado 81621

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(970) 323-7008

2/10/2025

Project Name: 629 Sawatch Road

Project No.: 23.005

## RATIONAL METHOD DRAINAGE CALCULATIONS

Storm Event: Existing  
Return Period: 100-YEAR  
Rainfall Depth: 1.18

STANDARD FORM SF-3 (STORM DRAINAGE SYSTEM DESIGN)

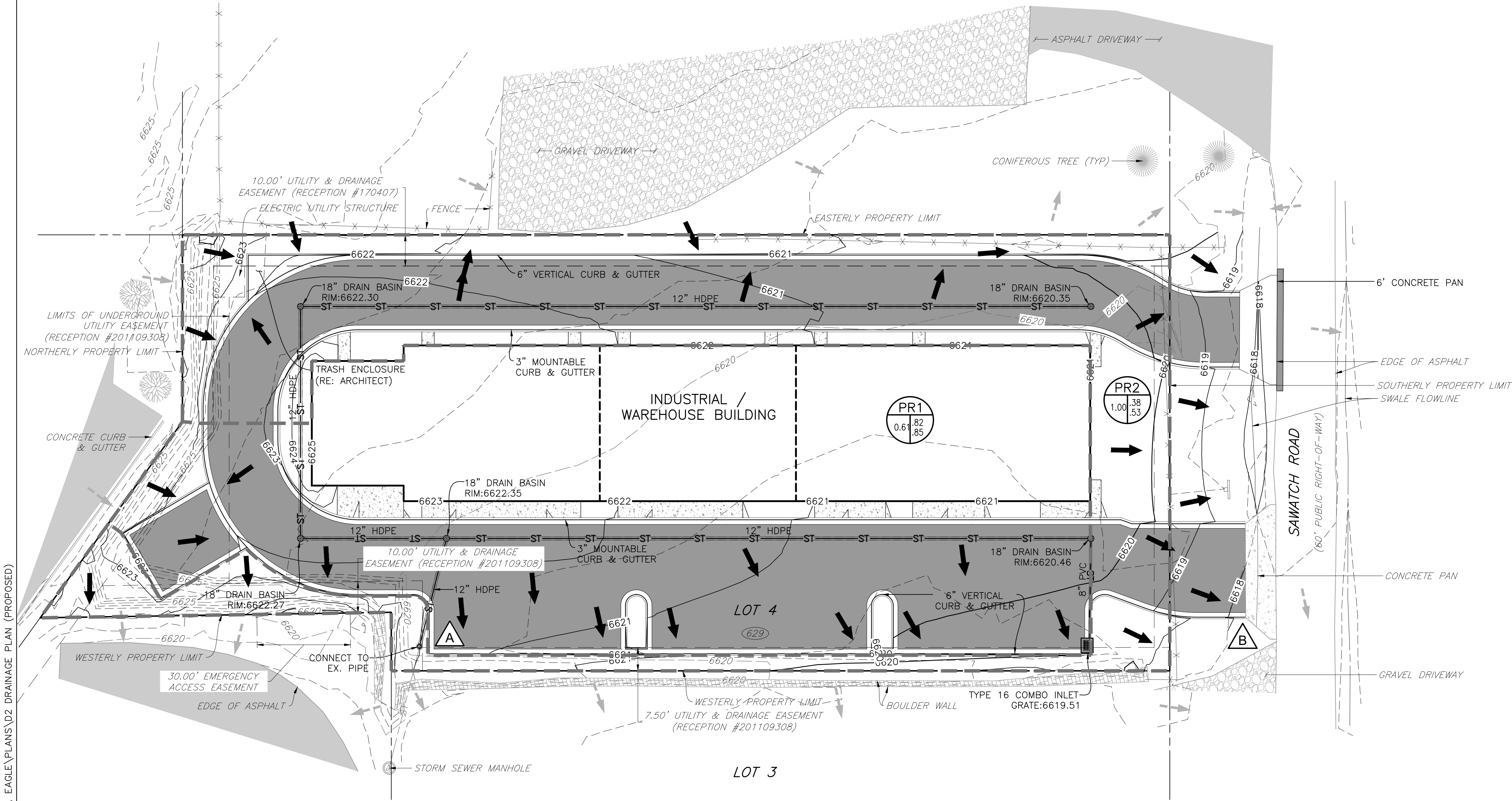
BASIN	DESIGN POINT	DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
		AREA (AC)	RUNOFF COEFF	t <sub>c</sub> (MIN)	CxA (AC)	I (IN/HR)	Q (CFS)	t <sub>c</sub> (MIN)	S(CxA) (AC)	I (IN/HR)	Q (CFS)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
EX1	B	1.02	0.61	12.3	0.63	3.90	2.45					

\*All calculations are per UDFCD (Volume 1), Chapter 5

100-YEAR  
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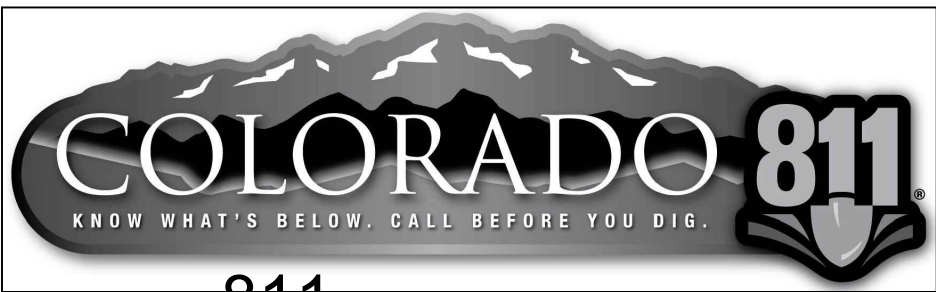
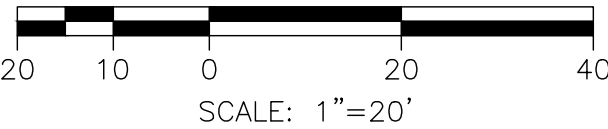
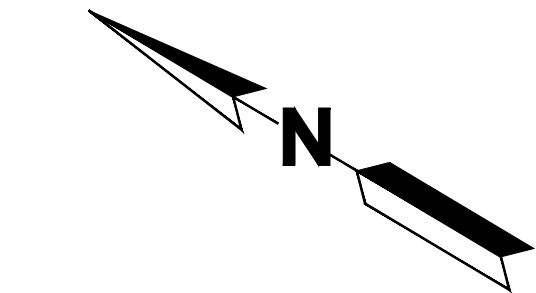
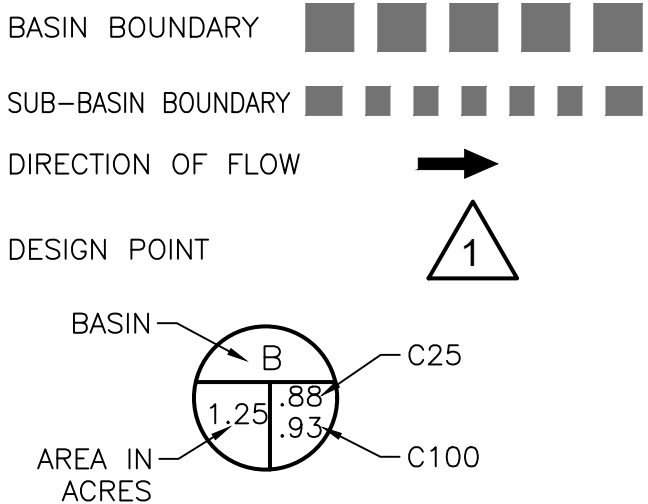
D:\DROPBOX\PROJECT FILES\23.005-629 SAWATCH ROAD, EAGLE\PLANS\D2 DRAINAGE PLAN (PROPOSED)



NOTES:

- FOR ADDITIONAL INFORMATION REGARDING THE DRAINAGE PATTERNS AND FLOW RATES FOR THE PROJECT, RE: DRAINAGE REPORT.

LEGEND



CALL 811 2-BUSINESS DAYS IN ADVANCE  
BEFORE YOU DIG, GRADE OR EXCAVATE FOR  
MARKING OF UNDERGROUND MEMBER UTILITIES

ENGINEER ASSUMES NO RESPONSIBILITY FOR UTILITY LOCATIONS.  
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NO.	ISSUE / REVISION	NAME	DATE
1.	SCHEMATIC DESIGN (NO CONST.)	J. YARNELL	12/19/24
2.	DESIGN DEVELOPMENT (NO CONST.)	J. YARNELL	1/17/25
3.		J. YARNELL	
4.		J. YARNELL	
5.		J. YARNELL	

DESIGN BY: J. YARNELL	DATE: 2/10/2025
DRAWN BY: J. YARNELL	
REVIEWED BY: J. YARNELL	
PROJECT NO.: 23.005	

SHEET TITLE  
DRAINAGE PLAN  
(PROPOSED)

SHEET NO.  
D2

YARNELL CONSULTING &  
CIVIL DESIGN, LLC  
P.O. BOX 3901, EAGLE, COLORADO 81631  
(970) 323-7008

WAREHOUSE /  
INDUSTRIAL FACILITY  
629 SAWATCH ROAD  
LOT 4, 700 CHAMBERS SUBDIVISION  
EAGLE, COLORADO

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Eagle, Colorado 81631

YARNELL CONSULTING &  
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129 Midland Avenue  
Basalt, Colorado 81621

(970) 323-7008

2/10/2025

Project Name: 629 Sawatch Road

Project No.: 23.005

RATIONAL METHOD DRAINAGE CALCULATIONS

Storm Event: Proposed

Jurisdiction: Town of Eagle

Soil Type: B

							STORM EVENT:	2	5	10	25	100	PERCENT IMPERVIOUS
							RUNOFF COEFF.:	C <sub>2</sub>	C <sub>5</sub>	C <sub>10</sub>	C <sub>25</sub>	C <sub>100</sub>	
SURFACE							Landscape	0.01	0.01	0.07	0.26	0.44	2.0%
							Roof	0.74	0.77	0.79	0.82	0.85	90.0%
							Asphalt	0.84	0.86	0.87	0.88	0.90	100.0%
							Concrete	0.74	0.77	0.79	0.82	0.85	90.0%
							Gravel	0.29	0.32	0.38	0.50	0.61	40.0%
SUB-BASIN	AREA (ac)	AREA PER SURFACE CHARACTERISTIC (ac)					COMPOSITE RUNOFF COEFFICIENTS					COMPOSITE IMPERVIOUS	
		Landscape	Roof	Asphalt	Concrete	Gravel							
PR1	0.61	0.03	0.28	0.28	0.03		0.75	0.77	0.79	0.82	0.85	90.5%	
PR2	1.00	0.80		0.19	0.00		0.17	0.18	0.23	0.38	0.53	21.3%	
	0.00												
	0.00												
	0.00												
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TOTAL	1.61	0.83	0.28	0.47	0.03	0.00	0.39	0.41	0.44	0.55	0.65	47.7%	

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2/10/2025

Project Name: 629 Sawatch Road

Project No.: 23.005

## RATIONAL METHOD DRAINAGE CALCULATIONS

Storm Event: Proposed

STANDARD FORM SF-2 (TIME OF CONCENTRATION SUMMARY)

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\*All calculations are per UDFCD (Volume 1), Chapter 5

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(970) 323-7008

2/10/2025

Project Name: 629 Sawatch Road

Project No.: 23.005

RATIONAL METHOD DRAINAGE CALCULATIONS

Storm Event: Proposed  
Return Period: 25-YEAR  
Rainfall Depth: 0.886

STANDARD FORM SF-3 (STORM DRAINAGE SYSTEM DESIGN)

BASIN	DESIGN POINT	DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
		AREA (AC)	RUNOFF COEFF	t <sub>c</sub> (MIN)	CxA (AC)	I (IN/HR)	Q (CFS)	t <sub>c</sub> (MIN)	S(CxA) (AC)	I (IN/HR)	Q (CFS)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
PR1	A	0.61	0.82	6.9	0.50	3.40	1.71					
PR2	B	1.00	0.38	8.9	0.38	3.30	1.26					

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Project Name: 629 Sawatch Road

Project No.: 23.005

## RATIONAL METHOD DRAINAGE CALCULATIONS

Storm Event: Proposed  
Return Period: 100-YEAR  
Rainfall Depth: 1.18

STANDARD FORM SF-3 (STORM DRAINAGE SYSTEM DESIGN)

BASIN	DESIGN POINT	DIRECT RUNOFF						TOTAL RUNOFF				REMARKS
		AREA (AC)	RUNOFF COEFF	t <sub>c</sub> (MIN)	CxA (AC)	I (IN/HR)	Q (CFS)	t <sub>c</sub> (MIN)	S(CxA) (AC)	I (IN/HR)	Q (CFS)	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
PR1	A	0.61	0.85	6.9	0.52	4.30	2.24					
PR2	B	1.00	0.53	8.9	0.52	4.20	2.20					

\*All calculations are per UDFCD (Volume 1), Chapter 5

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# Channel Report

## 12-inch HDPE at 1.0% Slope

### Circular

Diameter (ft) = 1.00

Invert Elev (ft) = 100.00

Slope (%) = 1.00

N-Value = 0.010

### Calculations

Compute by: Known Q

Known Q (cfs) = 2.20

### Highlighted

Depth (ft) = 0.49

Q (cfs) = 2.200

Area (sqft) = 0.38

Velocity (ft/s) = 5.72

Wetted Perim (ft) = 1.55

Crit Depth, Yc (ft) = 0.64

Top Width (ft) = 1.00

EGL (ft) = 1.00

