CROSS ENGINEERING SERVICES

Tommy's Express Carwash & Weinerschnitzel
36560 Penfeild Rd
Murietta, CA 92596

Winter, 2022

FINAL STORM DRAINAGE REPORT

Project name: Tommy's - French valley

Preparer: Bryan Schmutz, PE
Cross Engineering Services
203 West Main Street, Suite F3
Lexington, South Carolina 29072

Engineer's Certification: *I hereby certify that this Final Drainage Report (plan) for the design of Tommy's - French Valley was prepared by me (or under my direct supervision) in accordance with the provisions of the Storm Water Management Manual for the owners thereof. I understand that the (local jurisdiction) does not and will not assume liability for drainage facilities designed by others.*

_____

Registered Professional Engineer
State of California No.70554
(Affix Seal)

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MEMORANDUM – UPDATED STORM WATER INFORMATION

Updated information from previous submittal

N/A – this is the first submittal.

Design revisions from previous submittal

N/A – this is the first submittal.

1.0 INTRODUCTION

A. Background

This storm drain report is being prepared by Bryan Schmutz, P.E. with Cross Engineering services, for the proposed development of a new Tommy's Express car wash, Weinerschnitzel restaurant, and a third restaurant with related parking, landscaping, and utility improvements to include storm drainage.

This report was prepared per Riverside County storm water requirements.

B. Project Location

The development is located at 36560 Penfield Road, Murrieta, California 92596. The project coordinates are:

Latitude: 33.5905; Longitude: -117.1222

Section 6, Township 7 South, Range 2 West, San Bernardino Meridian

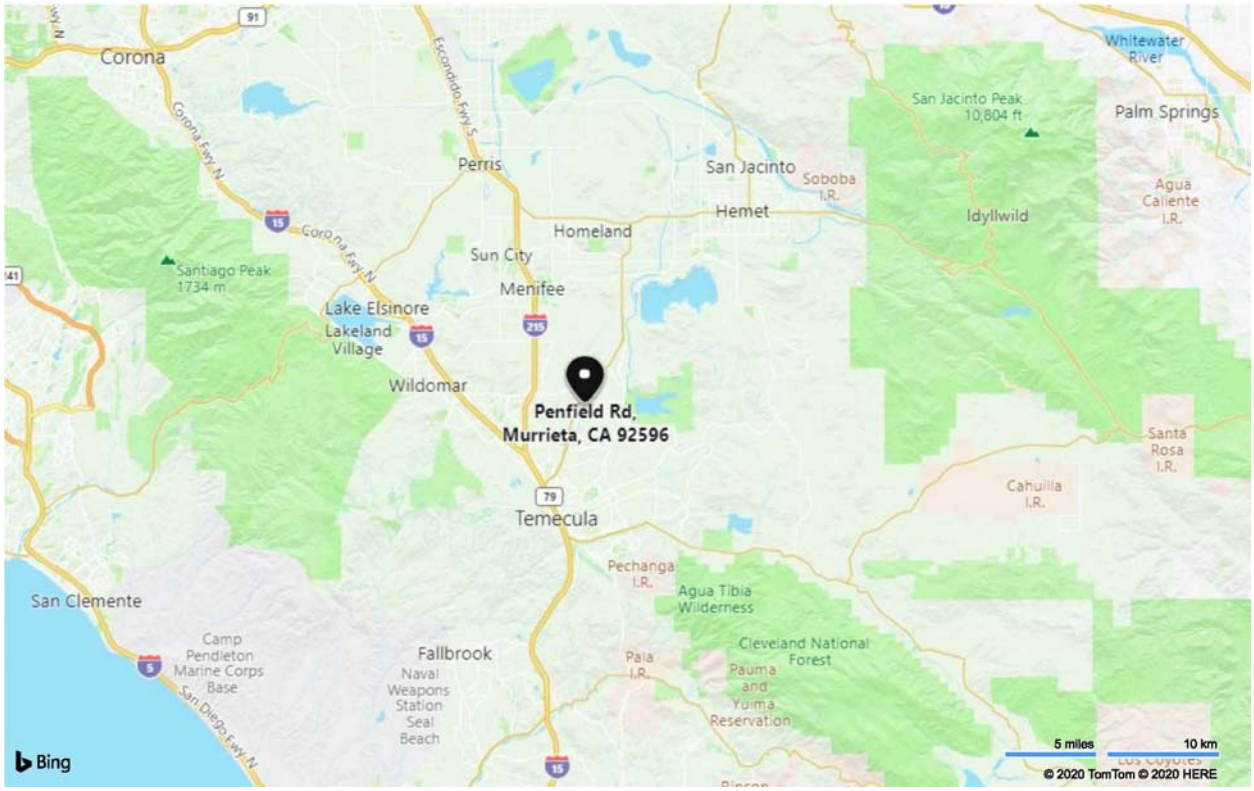


Figure 1 - Vicinity Map

The property is bordered on all sides by commercial property, there is a single residential property across the road to the east. Adjoining property to the west is currently undeveloped.

C. Project Description

The project consists of 2.24-cares and is currently undeveloped. The entire development consists of bare soils with grass type vegetation. There are no trees or larger shrubs located on the property.

Proposed improvements will consist of:

- New 730 square foot single-story Weinerschnitzel restaurant with drive-thru service.
- New 2,200 square foot single-story restaurant with drive-thru service.
- New 5,215 square foot single-story Tommy's Express drive-thru carwash.
- 50 space asphalt parking for employees and customers
- Storm drain collection system with related piping and inlet boxes
- Miscellaneous utility improvements consistent with commercial site construction.
- Underground retention systems complying with Riverside County's WQMP requirements

D. Previous Investigations

The project is located within FEMA Map 06065C2730G (08/28/2008), which has not been printed. The area is located in Zone D – areas of undetermined flood zone.

Besides the FEMA floodplain study, there are no known drainage studies for the project property or neighboring properties.

2.0 DRAINAGE SYSTEM DESCRIPTION

A. Existing Drainage Conditions

The property grades to the west at around 3.3% slope. There is approximately a 9-foot drop in elevation from the east right-of-way line to the west property line, in about 275-feet.

There are no existing drainage facilities in Benton Road or Penfield Lane. Neighboring properties all discharge overland to a natural drainage way within undeveloped land to the west and then south.

Current drainage conditions flow overland to the west, across property lines through neighboring property. Runoff enters Warm Springs Creek located north of the French

Valley Airport and 0.6-miles southwest of the property. Warm Springs Creek flows southwest 5.6-miles to Murrieta Creek.

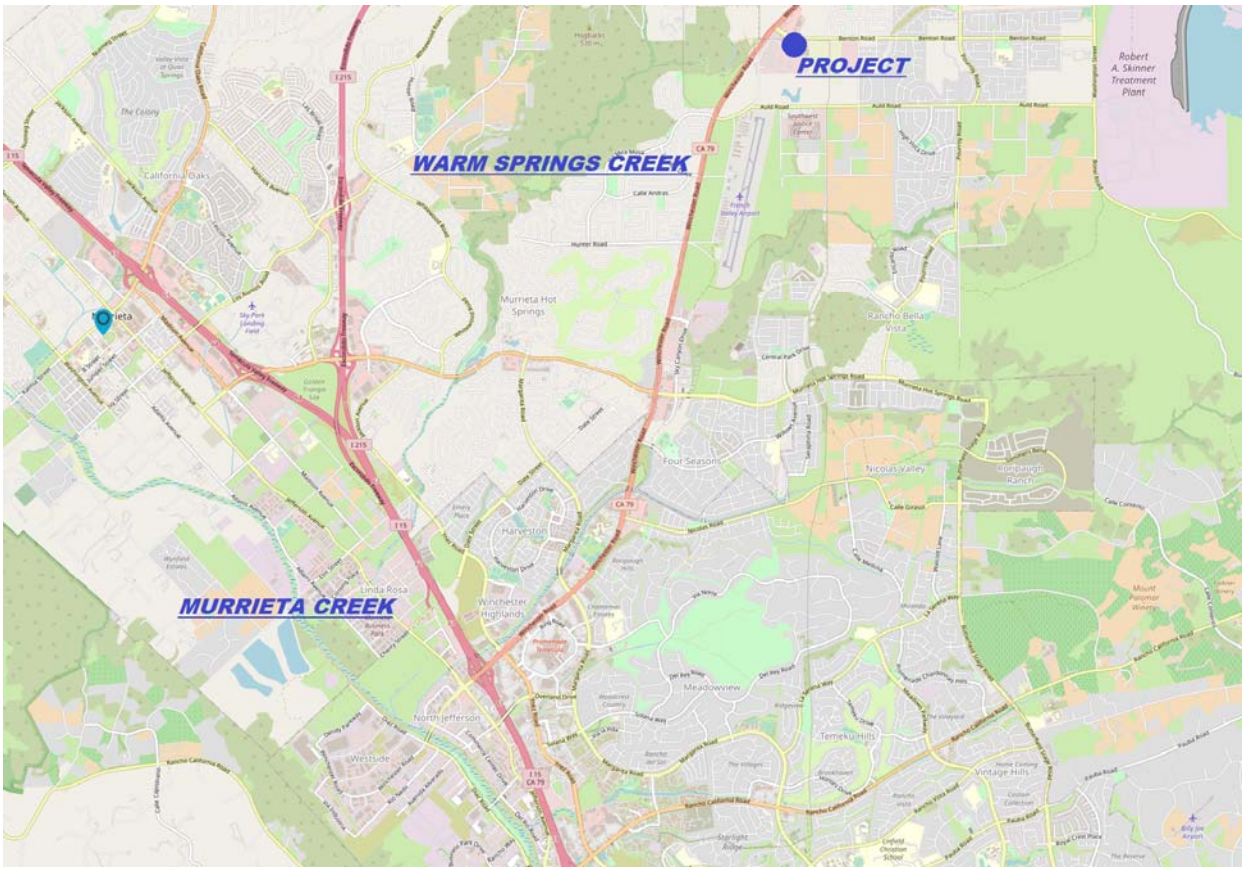


Figure 2 – Regional Drainage Patterns

Predeveloped drainage conditions versus post-developed drainage conditions are typical for commercial development. Prior to development, rainfall percolates into native bare soils or flows west into neighboring property. Post development will collect runoff, direct flow underground through a piping system, and retain the 85th percentile storm onsite.

Predevelopment runoff calculations for the 10-year storm event are shown below and in Appendix A.

- Storm water volume: 3,881-cubic-feet
- Peak flow: 0.42-cfs (189-gpm)
- Time of concentration: 13-min

B. SCS Soils

The Soil Conservation service shows soils in the southeast ½ of the property as AuC—Auld clay, 2 to 8 percent slopes with a typical profile consisting of:

- H1 - 0 to 28 inches: clay
- H2 - 28 to 44 inches: loam
- H3 - 44 to 48 inches: weathered bedrock
- Hydrologic Soil Group: C

The northwest ½ of the property consist of MmB—Monserate sandy loam, 0 to 5 percent slopes with a typical profile consisting of:

- H1 - 0 to 10 inches: sandy loam
- H2 - 10 to 28 inches: sandy clay loam
- H3 - 28 to 45 inches: indurated
- H4 - 45 to 57 inches: cemented
- H5 - 57 to 70 inches: loamy coarse sand
- Hydrologic Soil Group: C

Figure 5 – SCS Soils Map

C. Master Drainage Plans (N/A)

D. Offsite Tributary Area (N/A)

E. Proposed Drainage System Description

Figure 3 shown below shows proposed drainage patterns. Proposed construction will include storm drain inlets at a maximum of 300-feet, with piping directing runoff underground to retention basins. The retention system has been sized for each Drainage Management Area (DMA).

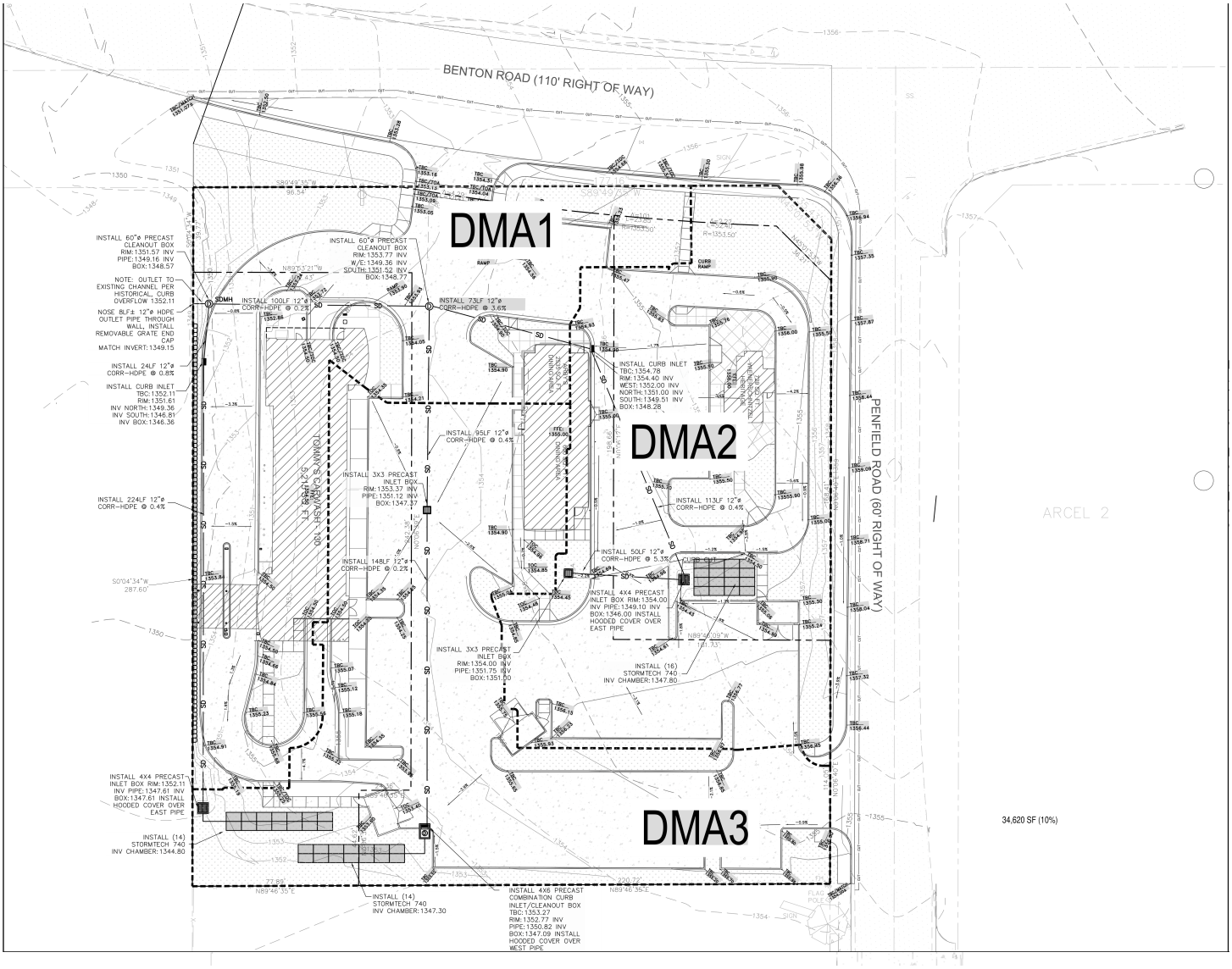


Figure 3 - Proposed Storm Drain System

The project has been split into three similar sized DMAs. Each DMA was analyzed using Riverside County Appendix F for the Santa Margarita Watershed – with an 85th percentile depth of 0.55-inches.

DMA1 Area:	30,734 sf (100%)
Landscape Area:	6,703 sf (21.1%)
Building Area:	4,490 sf (11.7%)
Hardscape Area:	19,541 sf (67.2%)
85% Depth:	0.55-inch
Runoff Coefficient:	0.89
BMP Volume:	981-cf
BMP Flow Rate:	0.1-cfs

DMA2 Area:	32,081 SF (100%)
Landscape Area:	9,437 SF (33.3%)
Building Area:	828 SF (0.0%)
Hardscape Area:	21,816 SF (66.7%)
85% Depth:	0.55-inch
Runoff Coefficient:	0.89
BMP Volume:	925-cf
BMP Flow Rate:	0.1-cfs

DMA3 Area:	34,620 SF (100%)
Landscape Area:	9,036 SF (26.1%)
Building Area:	2,811 SF (8.1%)
Hardscape Area:	22,773 SF (65.8%)
85% Depth:	0.55-inch
Runoff Coefficient:	0.89
BMP Volume:	1,045-cf
BMP Flow Rate:	0.1-cfs

Retention is provided for each DMA using underground arched chamber retention systems as shown below:

DMA1 required retention volume: 981-cf
DMA1 proposed retention volume: 1,048.6-cf - (14) StormTech SC740 Chambers

DMA2 required retention volume: 925-cf
DMA2 proposed retention volume: 973.7-cf - (13) StormTech SC740 Chambers

DMA3 required retention volume: 1,045-cf
DMA3 proposed retention volume: 1,048.6-cf - (14) StormTech SC740 Chambers

Piping for each DMA is sloped to the individual retention systems – with an overflow to the site outlet pipe. Runoff volume larger than the required volume will exit the property.

F. Drainage Facility Maintenance

This method of storm water treatment does pose a maintenance risk to the owner, i.e. silts and debris will need to be cleaned out regularly. The first 6-months to a year after construction is the most critical - while the site sustains vegetative stabilization. Once site stabilization is reached, cleaning silts and debris from the bottom of the system should be accomplished annually.

Hooded covers are placed over entrance to the retentions systems, and the box serving the retention system include a 3-foot deep sump – the majority of floating debris and silts will collect in these boxes and should be cleaned annually.

3.0 DRAINAGE ANALYSIS AND DESIGN CRITERIA

A. Regulations

Drainage calculations were prepared in accordance with Riverside County storm water management guidelines – using Appendix F for the Santa Margarita Watershed.

B. Development Criteria

Retention was chosen for this particular project due to inaccessible municipal storm drain adjacent to the property. The project includes available land for a retention system.

C. Hydrologic Criteria

The Rational method was used to determine predeveloped runoff volume and peak flow for the 2-year storm. Hydrological data was obtained from the National Oceanic and Atmospheric Administration (NOAA) website showing point precipitation frequency estimates. Rainfall intensity durations for the 2-year storm are shown in Table 1, next page.

Table 1 - 2-Year Storm Intensity

Interval (min.)	Rainfall (in.)
5	0.134
10	0.193
15	0.233
30	0.364
60	0.553
120	0.790
180	0.965
360	1.37
720	1.82
1440	2.39

Runoff calculations for the 2-year storm, are shown in Table 2.

Table 2 – 2-Year Storm Runoff Flow & Volume

	Undeveloped	Developed
Runoff Peak Flow (gpm)	0.42-cfs (189-gpm)	1.46-cfs (657-gpm)
Runoff Volume (cubic-feet)	3,881-cf	13,504-cf

D. Hydraulic Criteria

Ten-year hydrologic data was used for the hydraulic flow rate in the piping system. Storm drain pipe consists of 12-inch diameter corrugated HDPE pipe at a minimum 0.2% minimum slope, with a Manning's roughness of 0.009. Drainage inlets were included at a maximum of 300-feet spacing for capacity reasons. The peak flow for a 10-year storm is 2.44-cfs (1,098-gpm), with a 5.8-minute time-of-concentration. Full flow pipe capacity for a 12-inch diameter pipe is 3.64-cfs (1,637-gpm), with a velocity of 4.63 feet-per-second.

E. Final Proposed Storm Water System

The final drainage system consists of the following elements:

Drainage Management Area 1 (DMA1)
- (1) curb inlet
- (1) 3x3 landscape drain with hooded pipe cover and 3-foot deep sump
- 224-feet 12-inch diameter corrugated HDPE pipe
- 8-feet 8-inch diameter corrugated HDPE pipe
- (14) StormTech SC740 chambers - invert: 1346
- Overflow elev:1349.36

Drainage Management Area 2 (DMA2)
- (2) curb inlets
- (1) 2x2 landscape drains
- (2) 3x3 landscape drains with hooded pipe cover and 3-foot deep sumps
- 303-feet 12-inch diameter corrugated HDPE pipe
- 20-feet 8-inch diameter corrugated HDPE pipe
- (13) StormTech SC740 chambers - invert: 1349
- Overflow elev:1352

Drainage Management Area 3 (DMA3)

(1) combination curb inlet / cleanout box with hooded pipe cover and 3-foot deep sumps
(1) 2x2 asphalt drain
148-feet 12-inch diameter corrugated HDPE pipe
12-feet 8-inch diameter corrugated HDPE pipe
(14) StormTech SC740 chambers - invert: 1348.5
Overflow elev:1351.52

Site Overflow Piping

284-feet 12-inch diameter corrugated HDPE pipe
(1) 60-inch storm drain cleanout
(1) 12-inch end cap grate

4.0 POST CONSTRUCTION STORM WATER MANAGEMENT

A. Storm Water Quality Control Measures

When construction activities take place, erosion control features shall be in place to minimize potential sediment transport from the project site. The features include a stabilized construction entrance, inlet protection measures at storm water inlets, and silt fence located at strategic locations. The Erosion Control Plan shall be submitted as part of the overall site construction documents, as well as implementation of routine maintenance guidelines. Also included in the Erosion Control Plan are nonstructural control measures, such as reseeding and revegetation.

B. Calculations

When construction activities take place, erosion control features shall be in place to minimize potential sediment transport from the project site. The features include a stabilized construction entrance, inlet protection measures at storm water inlets, and silt fence located at strategic locations.

5.0 CONCLUSIONS

A. Design Effectiveness

The developed drainage plan closely follows Riverside County's storm water management requirements. The drainage plan mimics existing conditions by continuing to direct all runoff to the west and southwest. Storm water for the 85th percentile storm will be stored within underground retention basins, and will utilize percolation for storm water removal. The proposed drainage system will prevent runoff with high TSS from leaving the property.

B. Areas in Flood Zone Hazard

The property is not included within a FEMA designated flood plain – Zone D.

C. Variances from Manual

No variances proposed.

References

Riverside County: Appendix F – Santa Margarita Watershed

US Dept. of Commerce, National Oceanic and Atmospheric Association, 2014, Precipitation Frequency Estimates, http://www.nws.noaa.gov/oh/hdsc/noaaatlas2.htm

Appendix A – Pre-developed 2-Year Calculations

Job Description: TOMMY'S FRENCH VALLEY
Job Number: 20-11-13
Date: 11-Dec-21

Run-off using the Rational Method

Land Use	Area (acre)	Runoff Coef.	Area (sq. ft.)
Asphalt & Concrete	0.00	0.9	**0**
Roofs	0.00	0.9	**0**
Compacted Gravel/Roadbase	0.00	0.4	**0**
Undeveloped	2.24	0.2	**97436**
Interlocking Pavers / Porous Conc/Asph	0.00	0.4	**0**
Lawns (2%)	0.00	0.11	**0**
Lawns (2-7%)	0.00	0.15	**0**
Lawn (>7%)	0.00	0.3	**0**
Total Area	**2.24**		**97436**
Weighted Runoff Coef.	**0.20**		
Allowable Discharge (cfs\acre)	**0**	**(~00 GPM/ACRE)**	
Intensity (in/hr.) (Assume 15 min TOC)	**0.932**		
Peak Flow (cfs)	0.42	**(~189 GPM)**	
Total Allowable Discharge (cfs)	0.000	**(~00 GPM)**	

Design Storage - 2 Year 24-Hour Storm (NOAA ATLAS 14, LATITUDE: 33.590[illegible]°, LONGITUDE: -117.1222°)

Interval (min.)	Rainfall (in.)	Storage (ft^3)	Outfall (ft^3)	Req. Storage (ft^3)
5	**0.134**	217.61	0.00	217.61
10	**0.193**	313.42	0.00	313.42
15	**0.233**	378.38	0.00	378.38
30	**0.364**	591.11	0.00	591.11
60	**0.553**	898.04	0.00	898.04
120	**0.79**	1282.91	0.00	1282.91
180	**0.965**	1567.10	0.00	1567.10
360	**1.37**	2224.79	0.00	2224.79
720	**1.82**	2955.56	0.00	2955.56
1440	**2.39**	3881.20	0.00	3881.20
			Required Storage	**3881.20**
			Total Storage Capacity (ft^3)	**0.00**
			Storage Capacity Needed (ft^3)	**3881.20**

Appendix B – Developed 2-Year Calculations

Job Description: TOMMY'S FRENCH VALLEY
Job Number: 20-11-13
Date: 11-Dec-21

Run-off using the Rational Method

Land Use	Area (acre)	Runoff Coef.	Area (sq. ft.)
Asphalt & Concrete	1.47	0.9	**64116**
Roofs	0.19	0.9	**8144**
Compacted Gravel/Roadbase	0.00	0.4	**0**
Undeveloped	0.00	0.2	**0**
Interlocking Pavers / Porous Conc/Asph	0.00	0.4	**0**
Lawns (2%)	0.58	0.11	**25176**
Lawns (2-7%)	0.00	0.15	**0**
Lawn (>7%)	0.00	0.3	**0**
Total Area	**2.24**		**97436**
Weighted Runoff Coef.	**0.70**		
Allowable Discharge (cfs\acre)	**0**	**(~00 GPM/ACRE)**	
Intensity (in/hr.) (Assume 15 min TOC)	**0.932**		
Peak Flow (cfs)	1.46	**(~657 GPM)**	
Total Allowable Discharge (cfs)	0.000	**(~00 GPM)**	

Design Storage - 2 Year 24-Hour Storm (NOAA ATLAS 14, LATITUDE: 33.590[illegible]°, LONGITUDE: -117.1222°)

Interval (min.)	Rainfall (in.)	Storage (ft^3)	Outfall (ft^3)	Req. Storage (ft^3)
5	**0.134**	757.14	0.00	757.14
10	**0.193**	1090.50	0.00	1090.50
15	**0.233**	1316.52	0.00	1316.52
30	**0.364**	2056.70	0.00	2056.70
60	**0.553**	3124.60	0.00	3124.60
120	**0.79**	4463.72	0.00	4463.72
180	**0.965**	5452.52	0.00	5452.52
360	**1.37**	7740.88	0.00	7740.88
720	**1.82**	10283.51	0.00	10283.51
1440	**2.39**	13504.17	0.00	13504.17
			Required Storage	**13504.17**
			Total Storage Capacity (ft^3)	**0.00**
			Storage Capacity Needed (ft^3)	**13504.17**

Appendix C – Appendix F – San Margarita Watershed

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Cross Engineering Services	Date	12/8/2021
Designed by	B. Schmutz	County/City Case No	
Company Project Number/Name	Tommy's - French Valley		
Drainage Area Number/Name	DMA1		

Enter the Area Tributary to this Feature A_T = 0.552 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township: 7S

Range: 2W

Section: 6

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.55

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$

C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$

V_u = 0.49 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 981 ft^3

Notes:

Santa Margarita Watershed

BMP Design Flow Rate, Q_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

Company Name	Cross Engineering Services	Date	12/8/2021
Designed by	B. Schmutz	County/City Case No	
Company Project Number/Name			
Drainage Area Number/Name	DMA1		

Enter the Area Tributary to this Feature A_T = 0.552 acres

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$

C = 0.89

BMP Design Flow Rate

$Q_{BMP} = C \times I \times A_T$

Q_{BMP} = 0.1 ft^3/s

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Cross Engineering Services	Date	12/8/2021
Designed by	B. Schmutz	County/City Case No	
Company Project Number/Name	Tommy's - French Valley		
Drainage Area Number/Name	DMA2		

Enter the Area Tributary to this Feature A_T = 0.52 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township: 7S

Range: 2W

Section: 6

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.55

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$

C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$

V_u = 0.49 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 925 ft^3

Notes:

Santa Margarita Watershed

BMP Design Flow Rate, Q_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

Company Name	Cross Engineering Services	Date	12/8/2021
Designed by	B. Schmutz	County/City Case No	
Company Project Number/Name			
Drainage Area Number/Name	DMA2		

Enter the Area Tributary to this Feature A_T = 0.52 acres

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$

C = 0.89

BMP Design Flow Rate

$Q_{BMP} = C \times I \times A_T$

Q_{BMP} = 0.1 ft^3/s

Notes:

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)

Company Name	Cross Engineering Services	Date	12/8/2021
Designed by	B. Schmutz	County/City Case No	
Company Project Number/Name	Tommy's - French Valley		
Drainage Area Number/Name	DMA3		

Enter the Area Tributary to this Feature A_T = 0.587 acres

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

Site Location

Township 7S

Range 2W

Section 6

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.55

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.89

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.49 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 1,045 ft^3

Notes:

Santa Margarita Watershed

BMP Design Flow Rate, Q_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

Company Name	Cross Engineering Services	Date	12/8/2021
Designed by	B. Schmutz	County/City Case No	
Company Project Number/Name			
Drainage Area Number/Name	DMA3		

Enter the Area Tributary to this Feature A_T = 0.587 acres

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Concrete or Asphalt

Effective Impervious Fraction I_f = 1.00

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$

C = 0.89

BMP Design Flow Rate

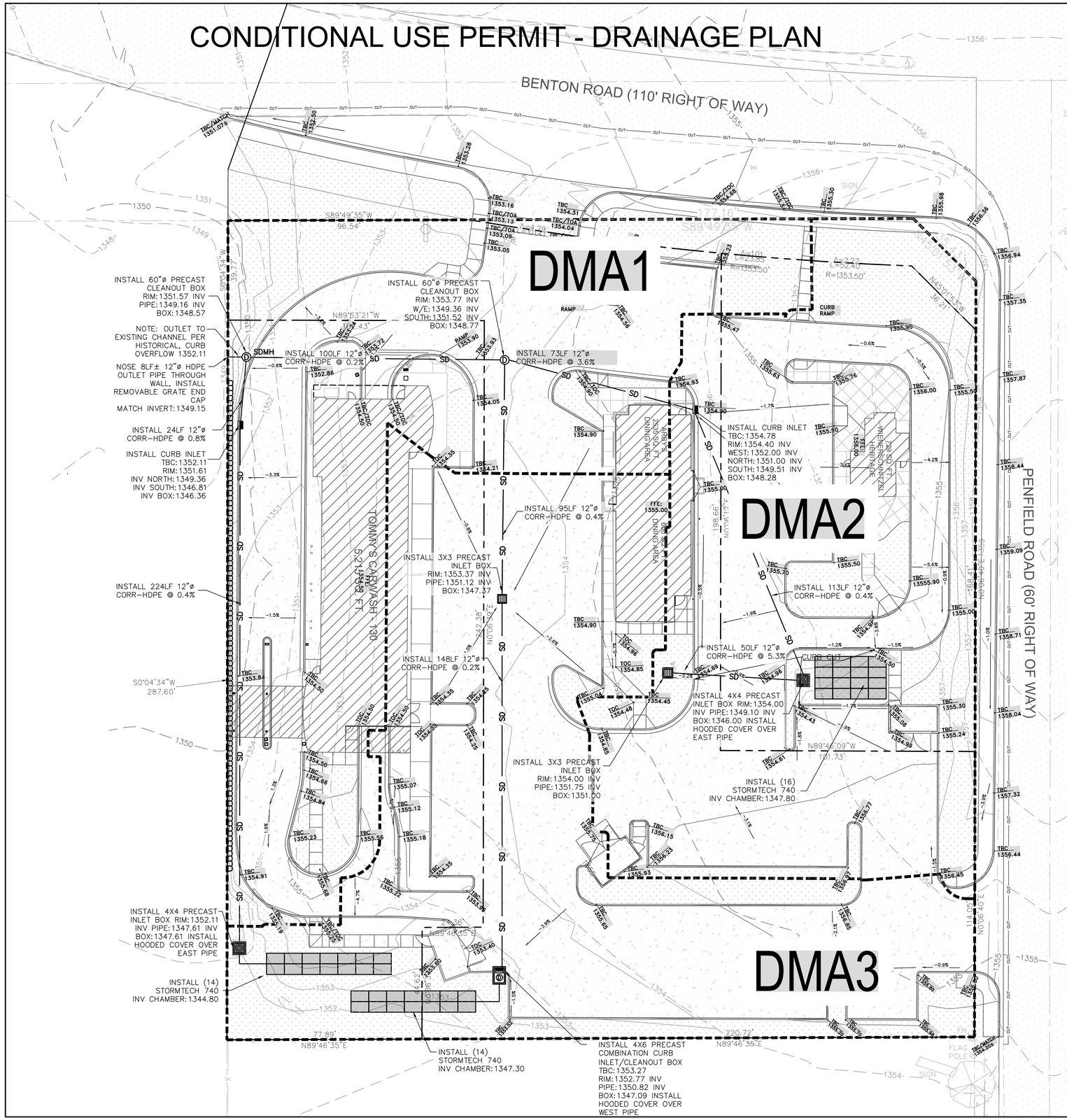
$Q_{BMP} = C \times I \times A_T$

Q_{BMP} = 0.1 ft^3/s

Notes:

Appendix D – Storm Drain Plan

CONDITIONAL USE PERMIT - DRAINAGE PLAN



DMA1

TOTAL SITE AREA:	30,734 SF (100%)
LANDSCAPE:	6,703 SF (21.1%)
BUILDING:	4,490 SF (11.7%)
HARDSCAPE:	19,541 SF (67.2%)
D85:	0.55-INCH
C:	0.89
VBMP:	981-CF
QBMP:	0.1-CFS

DMA2

TOTAL SITE AREA:	32,081 SF (100%)
LANDSCAPE:	9,437 SF (33.3%)
BUILDING:	828 SF (0.0%)
HARDSCAPE:	21,816 SF (66.7%)
D85:	0.55-INCH
C:	0.89
VBMP:	925-CF
QBMP:	0.1-CFS

DMA3

TOTAL SITE AREA:	34,620 SF (100%)
LANDSCAPE:	9,036 SF (26.1%)
BUILDING:	2,811 SF (8.1%)
HARDSCAPE:	22,773 SF (65.8%)
D85:	0.55-INCH
C:	0.89
VBMP:	1,045-CF
QBMP:	0.1-CFS

2-YEAR UNDEVELOPED

Job Description: TOMMY'S FRENCH VALLEY
Job Number: 20-11-13
Date: 11-Dec-21

Run-off using the Rational Method

Land Use	Area (acre)	Runoff Coef.	Area (sq. ft.)
Asphalt & Concrete	0.00	0.9	0
Roofs	0.00	0.9	0
Compacted Gravel/Roadbase	0.00	0.4	0
Undeveloped	2.24	0.2	97436
Interlocking Pavers / Porous Conc/Asph	0.00	0.4	0
Lawns (2%)	0.00	0.11	0
Lawns (2-7%)	0.00	0.15	0
Lawn (>7%)	0.00	0.3	0
Total Area	2.24		97436
Weighted Runoff Coef.	0.20		
Allowable Discharge (cfs\acre)	0	(~00 GPM/ACRE)	
Intensity (in/hr.) (Assume 15 min TOC)	0.932		
Peak Flow (cfs)	0.42	(~189 GPM)	
Total Allowable Discharge (cfs)	0.000	(~00 GPM)	

Design Storage - 2 Year 24-Hour Storm (NOAA ATLAS 14, LATITUDE: 33.5905°, LONGITUDE: -117.1222°)

Interval (min.)	Rainfall (in.)	Storage (ft^3)	Outfall (ft^3)	Req. Storage (ft^3)
5	0.134	217.61	0.00	217.61
10	0.193	313.42	0.00	313.42
15	0.233	378.38	0.00	378.38
30	0.364	591.11	0.00	591.11
60	0.553	898.04	0.00	898.04
120	0.79	1282.91	0.00	1282.91
180	0.965	1567.10	0.00	1567.10
360	1.37	2224.79	0.00	2224.79
720	1.82	2955.56	0.00	2955.56
1440	2.39	3881.20	0.00	3881.20
			Required Storage	3881.20
			Total Storage Capacity (ft^3)	0.00
			Storage Capacity Needed (ft^3)	3881.20

2-YEAR DEVELOPED

Job Description: TOMMY'S FRENCH VALLEY
Job Number: 20-11-13
Date: 11-Dec-21

Run-off using the Rational Method

Land Use	Area (acre)	Runoff Coef.	Area (sq. ft.)
Asphalt & Concrete	1.47	0.9	64116
Roofs	0.19	0.9	8144
Compacted Gravel/Roadbase	0.00	0.4	0
Undeveloped	0.00	0.2	0
Interlocking Pavers / Porous Conc/Asph	0.00	0.4	0
Lawns (2%)	0.58	0.11	25176
Lawns (2-7%)	0.00	0.15	0
Lawn (>7%)	0.00	0.3	0
Total Area	2.24		97436
Weighted Runoff Coef.	0.70		
Allowable Discharge (cfs\acre)	0	(~00 GPM/ACRE)	
Intensity (in/hr.) (Assume 15 min TOC)	0.932		
Peak Flow (cfs)	1.46	(~657 GPM)	
Total Allowable Discharge (cfs)	0.000	(~00 GPM)	

Design Storage - 2 Year 24-Hour Storm (NOAA ATLAS 14, LATITUDE: 33.5905°, LONGITUDE: -117.1222°)

Interval (min.)	Rainfall (in.)	Storage (ft^3)	Outfall (ft^3)	Req. Storage (ft^3)
5	0.134	757.14	0.00	757.14
10	0.193	1090.50	0.00	1090.50
15	0.233	1316.52	0.00	1316.52
30	0.364	2056.70	0.00	2056.70
60	0.553	3124.60	0.00	3124.60
120	0.79	4463.72	0.00	4463.72
180	0.965	5452.52	0.00	5452.52
360	1.37	7740.88	0.00	7740.88
720	1.82	10283.51	0.00	10283.51
1440	2.39	13504.17	0.00	13504.17
			Required Storage	13504.17
			Total Storage Capacity (ft^3)	0.00

LEGEND
FH = FIRE HYDRANT
RDO = ROOF DRAIN
RO = ROOF VENT

GRAPHIC SCALE
0 10 20 40
1 inch = 20 ft.

CROSS ENGINEERING SERVICES
203 W. Main Street Ste. F3
Lexington, SC 29072
Office: (803) 236-7123 Cell: (801) 391-2391

DRAFTED BY:
DESIGNED BY: BKS
CHECKED BY: JWC

NO.	REVISION DESCRIPTION	DATE

GRADING & DRAINAGE PLAN
TOMMYS COMMERCIAL CENTER
11/01/2022

FRENCH VALLEY - RIVERSIDE COUNTY, CALIFORNIA
APN: 963-07-0018

PROJECT NO.
XXX

SHEET NUMBER
C102