HOGAN LAND SERVICES

Drainage Analysis – 2960 Foothill Blvd

Prepared June 23, 2014

Site:
2960 Foothill Blvd
Calistoga, California
APN: 011-400-003
HLS Project # 1607

Owner:
RKMS Investments
2960 Foothill Blvd
Calistoga, California

Analysis Prepared by:
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PRELIMINARY
NOT FOR
CONSTRUCTION

HOGAN LAND SERVICES

June 23, 2014

SUBJECT: Drainage Analysis

Pre-development vs. Post-development Hydrology Calculations for the 85th Percentile 24 Hour Storm Event

10-Year event hydrology calculations and reasoning for drainage network sizing, capacity and velocity

PROJECT: 2960 Foothill Blvd Project – Site work includes future grading for driveway and new single family dwelling

ADDRESS: 2960 Foothill Blvd, Calistoga, California

APN: 011-400-003

REFERENCES:

1. Flood Control Design Criteria, by the Sonoma County Water Agency, Revised August 1983.
2. Low Impact Development Technical Design Manual, August 2011

PROJECT DESCRIPTION:

The subject parcel is located at 2960 Foothill Blvd in Calistoga, California. The site currently is a 2.16 parcel but ultimately will be subdivided into Lot 1, 1.0 acre and Lot 2, 1.16 acre. This drainage analysis will review Lot 2 for delta stormwater retention and sizing of onsite drainage features. Currently Lot 2 is undeveloped with scattered walnut and oaks trees along with native grass. Topography of the site consists of shallow slopes range from 1-3%. The USDA existing soils classifications for the site is Bale Loam. This soil type was taken as hydrologic soil group B based on the attached web soil survey.

The proposed development consists of a future 1500 sf gravel driveway and 2500 sf single family dwelling. The future gravel driveway will be approximately 100 feet long. Currently the site is access by Blossom Creek lane.

The parcel is not subjected to the provisions of City of Calistoga MS4 Phase II permit because it this project does not trigger any of the stormwater requirements for permit. This project utilized the Napa County Grading Ordinance which includes no increase in post development stormwater levels & no increase in pollution levels. The increase runoff due to the new impervious area will be mitigated within the infiltration area and no increase in stormwater flows off site is proposed for the 85th % 24 hour storm.

EXISTING ON-SITE AND OFF-SITE CONDITIONS & IMPACTS OF DEVELOPMENT:

Current runoff from the development area sheet flows into the existing drainage course on the property before discharging into Napa River 1100 ft away. The proposed development improvements will maintain the existing overall watershed, and attempt to minimize impacts of development. No negative impacts of development are expected due to the proposed development.

DESIGN CRITERIA & ASSUMPTIONS:

The hydraulic design of the individual drainage improvements was based on the rational formula (Q = C i A K) and is based on the 10-year, 15-minute initial time of concentration storm. Volume capture & treatment requirements were based on the 85th percentile 24 hour storm event and was generated using the stormwater calculator and the NRCS Curve Number method. The drainage course on a global scale remains unchanged from the pre to post development conditions with all runoff eventually return to its natural drainage course. A mean annual precipitation of 45 was used resulting in a k-factor of 1.50 (refer to Isohyetal Chart on Map 3-2)

METHODOLOGIES USED:

A volume equal to the increased runoff from the proposed impervious surfaces will be retained within the proposed infiltration trenches. A pre development composite curve number of 69 was calculated based on Hydrologic Soil Group B and existing conditions. A post development composite curve number of 70.9 was calculated based on HSG B and proposed conditions. The land surfaces used for the composite CN's included impervious surfaces (CN=98), native grass (CN=69), and gravel (CN=85). The calculated increase in runoff volume due to development is 87ft^3. A 2' x 3' x 33' infiltration trench is proposed to retain the increase storm water volume.

Composite C values for the individual 10 year tributary were based on the contributing surface types of vegetated (C=0.4), gravel (C=0.7), and impervious surfaces (C=0.9). A composite C value (not less than 0.4, residential minimum) was assigned to the tributary area. Rational Formula calculations for the 10 yr 15 min. storm have been included based on the composite runoff coefficients for each tributary for sizing of the individual drainage improvements. The calculation spreadsheets have been attached with this submittal. This analysis has determined that the existing onsite swale will not be over capacity due to future development. Future developments assumed are 2500 sf single family dwelling and 1500 sf gravel driveway.

AutoCAD Hydraflow software was used to computationally confirm the adequate pipe and swale sizes for this development.

100 YEAR STORM IMPACT AND FLOODING CONCERNS:

These improvements are outside of the 0.2% annual chance floodplain per FEMA Flood Map 06055CO228E and therefore flooding during the 100-year storm event is unlikely.

CONCLUSIONS:

Stormwater:
The evaluations for pre & post-development (85th percentile 24 hour storm) have been provided in the form of the enclosed Storm Water Calculations and Rational Formula Spreadsheet. Based on the evaluation of the new gravel driveway and residence, we have designed adequate swales based on the 10 year storm event and requirements under the Napa County Grading Ordinance.

ATTACHEMENTS:

- Referenced Attachments: Hydraulic Soil Groups, NRCS Curve Tables, Storm Water Calculator
- Rational Method Spreadsheet with Composite Runoff Coefficient Calculations
- Swale Hydraulic Calculations
- 85th Percentile 24 Hour Storm Pre & Post-Development Map
- 10-Yr Post-Development Map

Runoff Curve Number Trib 1 - Post Development

Project	1607		By	VL	Date	5/6/2014
Location	2960 FOOTHILL BLVD		Checked	KCC	Date	
Check one:	Existing ☐	Proposed ☑	Tributary:	1	Acres:	1.16

Runoff Curve Number

Soil Name and Hydrologic Group	Cover Description	Runoff-C_2 yr	CN	Area (sf)	Area (ac)	Area %	Product of C_2 x Area %	Product of CN x Area %
HSG-B	2500 S.F. SFD (IMPERVIOUS)	0.8	98	2500	0.06	5%	0.04	4.86
	GRAVEL DRIVEWAY (SEMI-IMPERVIOUS)	0.7	85	1500	0.03	3%	0.02	2.53
	GRASLAND-FAIR (GRASSLAND)	0.1	69	46379	1.06	92%	0.09	63.52
				Total	1.16	100%		
					Composite C & CN		0.15	70.9

Runoff Curve Number Trib 1 - Pre Development

Project	1607		By	VL	Date	5/6/2014
Location	2960 FOOTHILL BLVD		Checked	KCC	Date	
Check one:	Existing ☑	Proposed ☐	Tributary:	1	Acres:	1.16

Runoff Curve Number

Soil Name and Hydrologic Group	Cover Description	Runoff-C_2 yr	CN	Area (sf)	Area (ac)	Area %	Product of C_2 x Area %	Product of CN x Area %
HSG-B	GRASSLAND (GRASSLAND-FAIR)	0.1	69	50379	1.16	100.00%	0.100	69.00
				Total	1.16	100%		
					Composite C & CN		0.10	69.00

STORM WATER CALCULATOR*

*Go to www.srcity.org/stormwaterlid for the latest version of the calculator

Project: 2960 Foothill Blvd Project
Address/Location: 2960 Foothill Blvd
Designer: Vinh Le
Date: June 23, 2014
Inlet Number/Tributary Area/BMP: 100% Delta Volume Capture, Tribriutary 1

NOTE: In order for this calculator to function properly macros must be enabled

Physical Tributary Area that drains to Inlet/BMP = 50,378 ft²

This portion of the Storm water Calculator is designed to account for pollution prevention measures implemented on site. Additional information and description of these measures can be found in the Fact Sheets in Appendix F and in Chapter 4 of the narrative.

Disconnected Roof Drains [1]

Input:

Select disconnection condition: Runoff is directed across landscape; Width of area: 5' to 9'
Condition Factor = 0.25

Method 1: Based on the total rooftop drainage area - to be used if rooftop information is known.

Input:

Enter amount of rooftop area that drain to disconnected downspouts = 0 ft²
Rooftop Area Factor = 0.00 Rooftop Area Factor= (Total Rooftop Disconnected Area/Tributary Area)

Solution:

Area reduction = (Physical Tributary Area x Conditional Factor x Rooftop Area Factor)

(50,378 x 0.25 x 0.00) = 0.00 ft² **Rooftop Drainage Area Reduction**

Method 2: Based on density (units per acre) - to be used if rooftop information is unknown.

Input:

Enter percent of rooftop area to be disconnected from downspouts: 0 %

Select Density: 3-4 Units per Acre
Density Reduction Factor= 0.19

Solution:

Area reduction = (Physical Tributary Area x Conditional Factor x Percent Disconnected x Density Factor)

(50,378 x 0.25 x 0.00 x 0.19) = 0.00 ft² **Density Reduction**

NOTE:
Either Method 1 (rooftop area) or Method 2 (density) can be used. Providing input for both methods will cause an error. If rooftop area information is available, Method 1 should be used.

[1] *See "Impervious Area Disconnection" Fact Sheet in Appendix E for further details.*

[2] See "Interceptor Trees" Fact Sheet in Appendix E for further details and see "Plant and Tree List" in Appendix G for approved trees.

[3] See "Vegetated Buffer Strip" and "Bovine Terrace" Fact Sheets in Appendix E for further details.

[4] *Total area reductions due to pollution Prevention Measures cannot exceed 50% of the physical Tributary Area.*

[5] *Per the "Urban Hydrology For Small Watersheds" TR-55 manual.*

[6] *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

[7] *From Sonoma County Water Agency Flood Control Design Criteria.*

[8] *Hydrologic soil type based of infiltration rate of native soil as defined by "Urban Hydrology For Small Watersheds" TR-55 Manual.*

[9] *Composite CN calculated per "Worksheet 2 Part 1 of the Urban Hydrology For Small Watersheds" TR-55 manual.*

[10] *From "Using Site Design to Meet Development Standards For Storm water Quality" by the Bay Area Storm water Management Agencies Association (BASMAA).*

City of Santa Rosa

APPENDIX C
STORM WATER CALCULATOR

2960 Foothill Blvd Project
2960 Foothill Blvd, Calisloga
Vinh Le
TRIB 1

Paved Area Disconnection [1]

Paved Area Type (select from drop down list): Not Directly-connected Paved Area
Multiplier = 1

Enter area of alternatively designed paved area: 0 ft²

Area Reduction = 0.00 ft²

INSTRUCTIONS:
Calculates the area reduction credit for driveways designed to minimize runoff. Enter type and area of alternate design.

Interceptor Trees [2]

Number of new *Evergreen Trees* that qualify as interceptor trees= 0 New Evergreen Trees

Area Reduction due to new Evergreen Trees= 0 ft² (200 ft²/tree)

NOTE:
Total Interceptor Area Reduction is limited to 50% of the physical tributary area.

Number of new *Deciduous Trees* that qualify as interceptor trees= 0 New Deciduous Trees

Area Reduction due to new Deciduous Trees= 0 ft² (100 ft²/tree)

Enter square footage of qualifying existing tree canopy = 0 Existing Tree Canopy

Allowed reduction credit for existing tree canopy= 0 ft² Allowed credit for existing tree canopy = 50 % of actual canopy square footage

Area Reduction = 0 ft² = Sum of areas managed by evergreen + deciduous + existing canopy

INSTRUCTIONS:
Calculates the area reductions credit due to interceptor trees. Includes both new and existing trees. Enter the number of new deciduous and evergreen trees and the canopy area of existing trees.

Buffer Strips & Bovine Terraces [3]

Enter area draining to a Buffer Strip or Bovine Terrace = 0 ft²

Buffer Factor = 0.7

Solution:

Area Reduction = (Area draining to Buffer Strip or Bovine Terrace) x (Buffer Factor) =

Area Reduction = 0.00 ft²

INSTRUCTIONS:
Calculates the area reduction credit due to buffer strips and/or bovine terraces. Runoff Must be direct to these features as sheet flow. Enter the area draining to these features.

City of Santa Rosa

APPENDIX C
STORM WATER CALCULATOR

2960 Foothill Blvd Project
2960 Foothill Blvd, Calistoga
Vinh Le
TRIB 1

Revised Tributary Area due to Pollution Prevention Measures

Physical Tributary Area =	50,378	ft²
Tributary Area Reduction due to Pollution Prevention Measures [4] =	0.00	ft²
Reduced Tributary Area to be used for Calculations =	50,378	ft²

This worksheet calculates the quantity of storm water that needs to be addressed (captured and/or treated) to comply with the NPDES Storm Water Permit issued to the City of Santa Rosa and County of Sonoma by the North Coast Regional Water Quality Control Board.

Design Goal: 100% Volume Capture

Capture (infiltration and/or reuse) of 100% of the volume of runoff generated by the 85th percentile 24 hour storm event.

Formulas:

$$S = \frac{1000}{CN} - 10$$

Where:
S= Potential maximum retention after runoff (in)[5]
CN= Curve Number [5]

$$Q = \frac{[(P \cdot K)-(0.2 \cdot S)]^2}{[(P \cdot K)+(0.8 \cdot S)]} \times \frac{1ft}{12"}$$

Where:
Q= Runoff depth (ft) [6]
P= Precipitation (in) = 0.92
K= Seasonal Precipitation Factor [7]

0.92 inches in the Santa Rosa area, based on local historical data.

$$V = (Q)(A_r)$$

Where:
V= Volume of Storm Water to be Retained (ft^3)
A_r= Reduced Tributary Area including credit for Pollution Prevention Measures (ft^2)

Input: (Pick data from drop down lists or enter calculated values)

A_r =	50,378	ft²
K [7] =	1.50	

Drop down Lists

Select post development hydrologic soil type within tributary area [8] = B: 0.15 - 0.30 in/hr infiltration (transmission) rate

Select post development ground cover description [5] = Woods, No Grass - Fair (grazed and some forest litter)

OR:

CN_{POST} =	60
Composite post development CN [9] =	71

NOTE:
Entering a calculated composite CN will override selections made from the pull down menu above. Calculation worksheet should be used for all composite calculations and included with submittal.

Solution:

Volume of storm water - Post Development

S_{POST}= 4.10 in

$$S_{POST} = \frac{1000}{71} - 10$$

Where:
S_{POST}= Post development potential maximum retention after runoff (in).

Q_{POST}= 0.00561 ft

$$Q_{POST} = \frac{[(0.92 * 1.50)-(0.2 * 4.10)]^2}{[(0.92 * 1.50)+(0.8 * 4.10)]} \times \frac{1ft}{12in}$$

Q_{POST}= *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

V_{GOAL}= 282.62 ft³

$V_{GOAL} = (0.00561)(50,378)$

V_{GOAL}= Post Development Volume of Storm Water to be Retained (ft^3)

INSTRUCTIONS:
This Design Goal of 100% Capture is the ideal condition and if achieved satisfies all requirements so that no additional treatment is required and pages 4 and 5 of this calculator do not need to be completed.

NOTE:
If the Design Goal of 100% Capture is not achieved, 100% Treatment AND Volume Capture must be achieved and both pages 4 and 5 of this calculator need to be completed.

Requirement 1: 100% Treatment

Treatment of 100% of the flow generated by 85th percentile 24 hour mean annual rain event (0.2 in/hr).

Formula:

$Q_{TREATMENT}$= (0.2 in/hr)(A_T)(C_{POST})(K) cfs

Where:

$Q_{TREATMENT}$= Design flow rate required to be treated (cfs)

C_{POST} = Rational method runoff coefficient for the developed condition [10]

A_T = Reduced Tributary Area including credit for Pollution Prevention Measures (in Acres)

K = Seasonal Precipitation Factor [7]

Input:

A_T =	50,378	ft^2 =	1.16 Acres
C_{POST} [10] =	0.15		
K [7] =	1.5		

Solution:

$Q_{TREATMENT}$= 0.05204 cfs

$Q_{TREATMENT}$= (0.2)(1.16)(0.15)(1.50)

C value note:

The C value used for this calculation is smaller than the value used for hydraulic Flood Control design.

The table of values can be found here.

This smaller value should not be used to size the overflow bypass.

NOTE:

The Flow Rate calculated here should only be used to size the appropriate BMP. All associated overflow inlets and systems should be sized for the Flood Control event.

INSTRUCTIONS:

If the Design Goal of 100% Capture on page 3 of this calculator is not achieved; then Requirement 1-100% Treatment, this page of the calculator, AND Requirement 2- Volume Capture, page 5 of the calculator, must be achieved.

City of Santa Rosa

APPENDIX C
STORM WATER CALCULATOR

2980 Foothill Blvd Project
2960 Foothill Blvd, Calistoga
Vinh Le
TRIB 1

Requirement 2: Delta Volume Capture

No increase in volume of runoff leaving the site due to development for the 85th percentile 24 hour storm event.

INSTRUCTIONS:
If the Design Goal of 100% Capture on page 3 of this calculator is not achieved; then Requirement 1-100% Treatment, page 4 of the calculator, AND Requirement 2- Volume Capture, this page of the calculator, **must be achieved.**

NOTE:
If the amount of volume generated after development is less than or equal to that generated before development, Requirement 2-Volume Capture is not required.

($C_{POST} \leq C_{PRE}$ or $CN_{POST} \leq CN_{PRE}$)

Formulas:

$$S = \frac{1000}{CN} - 10$$

Where:
S= Potential maximum retention after runoff (in)[5]
CN= Curve Number [5]

$$Q = \frac{[(P-K)-(0.2 \cdot S)]^2}{[(P-K)+(0.8 \cdot S)]} \times \frac{1ft}{12in}$$

Where:
Q= Runoff depth (ft) [6]
P= Precipitation (in) = 0.92 *0.92 inches in the Santa Rosa area, based on local historical data.*
K= Seasonal Precipitation Factor [7]

$$V = (Q)(A_r)$$

Where:
V= Volume of Storm Water to be Retained (ft^3)
A_r= Reduced Tributary Area including credit for Pollution Prevention Measures (ft^2)

Input: (Pick data from drop down lists or enter calculated values)

A_r =	50,378	ft^2
K [7] =	1.5	

Drop down Lists

Select hydrologic soil type within tributary area [8] =	B: 0.15 - 0.30 in/hr infiltration (transmission) rate
Select predevelopment ground cover description [5] =	Woods, No Grass - Fair (grazed and some forest litter)
Select post development ground cover description [5] =	Woods, No Grass - Fair (grazed and some forest litter)
CN_{PRE} =	60
CN_{POST} =	60
OR Composite Predevelopment CN [6] =	69
Composite Post development CN [9] =	71

Solution:

Pre Development Storm Water Runoff Volume

S_{PRE}= 4.49 in

$$S_{PRE} = \frac{1000}{69} - 10$$

Where:
S_{PRE}= Pre development potential maximum retention after runoff (in).

Q_{PRE}= 0.00389 ft

$$Q_{PRE} = \frac{[(0.92*1.50)-(0.2*4.49)]^2}{[(0.92*1.50)+(0.8*4.49)]} \times \frac{1ft}{12in}$$

Q_{PRE}= *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

V_{PRE}= 195.97 ft^3

V_{PRE}= (0.00389)(50,378)

V_{PRE}= Pre Development Volume of Storm Water Generated (ft^3)

Post Development Storm Water Runoff Volume

S_{POST}= 4.10 in

$$S_{POST} = \frac{1000}{71} - 10$$

Where:
S_{POST}= Post development potential maximum retention after runoff (in).

Q_{POST}= 0.00561 ft

$$Q_{POST} = \frac{[(0.92*1.50)-(0.2*4.10)]^2}{[(0.92*1.50)+(0.8*4.10)]} \times \frac{1ft}{12in}$$

Q_{POST}= *Q in feet of depth as defined by the "Urban Hydrology For Small Watersheds" TR-55 Manual.*

V_{POST}= 282.62 ft^3

V_{POST}= (0.00561)(50,378)

V_{POST}= Post Development Volume of Storm Water Generated (ft^3)

Solution: Volume Capture Requirement

Increase in volume of storm water that must be retained onsite (may be infiltrated or reused).

Delta Volume Capture= $(V_{POST}-V_{PRE})$

Delta Volume Capture= (282.62) - (195.97)

V_{DELTA}= 86.65 ft^3

Where:
Delta Volume Capture= The increase in volume of storm water generated by the 85th percentile 24 hour storm event due to development that must be retained onsite (may be infiltrated or reused).

LID BMP Sizing Tool: 100% Volume Capture Goal; V_{GOAL}

NOTE:
LID Sizing Tool only applicable for volume based BMPs. Not required if site requires treatment only.

Formulas:

$V_{LID\ GOAL}=((V_{GOAL}))/(P)$ = 642.32 ft^3

$A_{LID\ GOAL}=(W)(L)$ = 99.00 ft^2

Where:
$V_{LID\ GOAL}$ = Required volume of soil in LID BMP.
$A_{LID\ GOAL}$ = Footprint of LID BMP area for a given depth (below perforated pipe if present).

V_{GOAL} = 283 ft^3

$$\text{Percent of Goal Achieved} = \frac{(D)(A_{LID\ GOAL})}{V_{LID\ GOAL}} \times 100$$

Where:
P= Porosity (enter as a decimal)
D= Depth below perforated pipe if present (in decimal feet)
W= Width (in decimal feet)
L= Length (in decimal feet)

Input:

P =	0.4	as a decimal
D =	2.0 ft	Below perforated pipe if present
W =	3.0 ft	
L =	33.0 ft	

Solution:

Percent of Goal Achieved = 30.83 % = [(2.0 x 99) / 642] x 100

INSTRUCTIONS:
The 100% volume capture sizing tool helps the designer appropriately size a LID BMP to achieve the design goal of 100% volume capture of the post development condition. Enter the percent porosity of the specified soil and depth below perforated pipe (if present). The width and length entries will need to be interactively adjusted until "Percent of Goal" equals 100%.

LID BMP Sizing Tool Delta Volume Capture Requirement: V_{DELTA}

NOTE:
LID Sizing Tool only applicable for volume based BMPs. Not required if site requires treatment only.

Formulas:

$V_{LID\ DELTA}=((V_{DELTA}))/(P)$ = 196.93 ft^3

$A_{LID\ DELTA}=(W)(L)$ = 99.00 ft^2

Where:
$V_{LID\ DELTA}$ = Required volume of soil in LID BMP
$A_{LID\ DELTA}$ = Footprint of LID BMP area for a given depth (below perforated pipe if present).

V_{DELTA} = 86.65 ft^3

$$\text{Percent of Requirement Achieved} = \frac{(D)(A_{LID\ DELTA})}{V_{LID\ DELTA}} \times 100$$

Where:
P= Porosity (enter as a decimal)
D= Depth below perforated pipe if present (in decimal feet)
W= Width (in decimal feet)
L= Length (in decimal feet)

Input:

P =	0.4	as a decimal
D =	2.0 ft	Below perforated pipe if present
W =	3.0 ft	
L =	33.0 ft	

Solution:

Percent of Requirement Achieved = 100.54 % = [(2.0 x 99) / 197] x 100

INSTRUCTIONS:
The Delta Volume Capture sizing tool helps the designer appropriately size a LID BMP to achieve the design requirement of the delta volume capture. Enter the percent of porosity of the specified soil and depth below perforated pipe (if present). The width and length entries will need to be interactively adjusted until "Percent of Requirement achieved" reaches 100%.

Storm Frequency	10

Post-Development							Time of Concentration		Intensity	K-Factor	Runnoff Coefficient				Flow
				Overland											
Tributary	Origin	Point of Conc.	Area (ac.)	Avg. Slope %	Length	Velocity fps	Travel Time	Total Time	I	K	C	A	KAC	ΣKΔAC	Q (cfs)
1	SHEET FLOW	(E) SWALE	3.89	1	800	0.46	-	15.0	1.70	1.50	0.5	3.89	2.92	2.92	4.97

Point of Concentration Design	Q 10 (cfs)	Type	N-Value	Bottom / Side (ft)	Length (ft)	Channel Depth (in)	Top Width (ft)
(E) EARTH SWALE	4.97	EARTH	0.035	95.27 / 93.13	375	2.60	0.5%

Channel Report

Hydraflow Express Extension for AutoCAD® Civil 3D® 2009 by Autodesk, Inc. Monday, Jun 23 2014

(E) EARTH SWALE

Trapezoidal

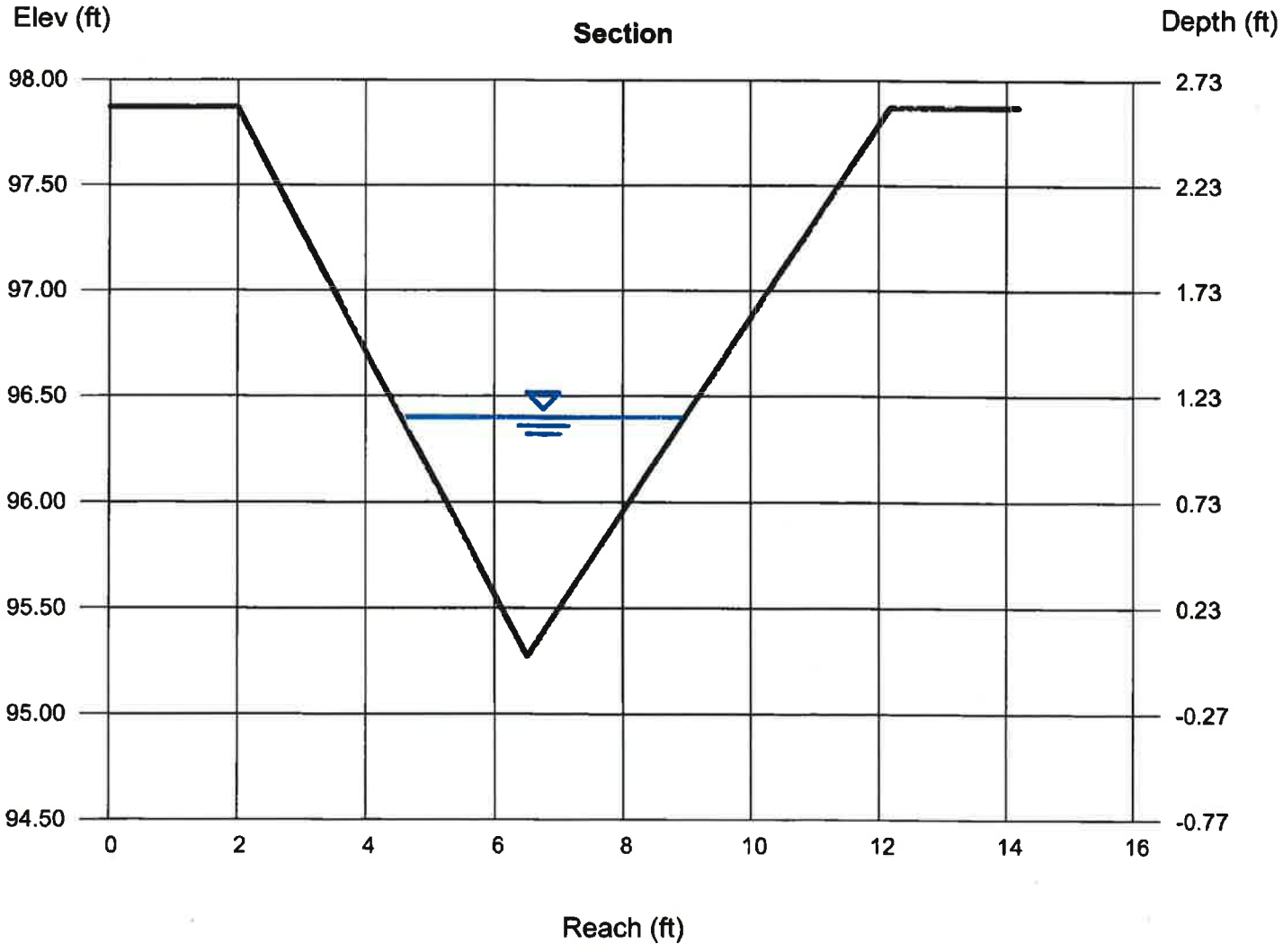
Bottom Width (ft)	= 0.01
Side Slopes (z:1)	= 1.73, 2.18
Total Depth (ft)	= 2.60
Invert Elev (ft)	= 95.27
Slope (%)	= 0.57
N-Value	= 0.035

Calculations

Compute by:	Known Q
Known Q (cfs)	= 4.97

Highlighted

Depth (ft)	= 1.13
Q (cfs)	= 4.970
Area (sqft)	= 2.51
Velocity (ft/s)	= 1.98
Wetted Perim (ft)	= 4.98
Crit Depth, Yc (ft)	= 0.84
Top Width (ft)	= 4.43
EGL (ft)	= 1.19



QUITA DEVELOPMENT
SITE PLAN
2960 FOOTHILL BLVD, CALISTOGA
APN: 011-400-003

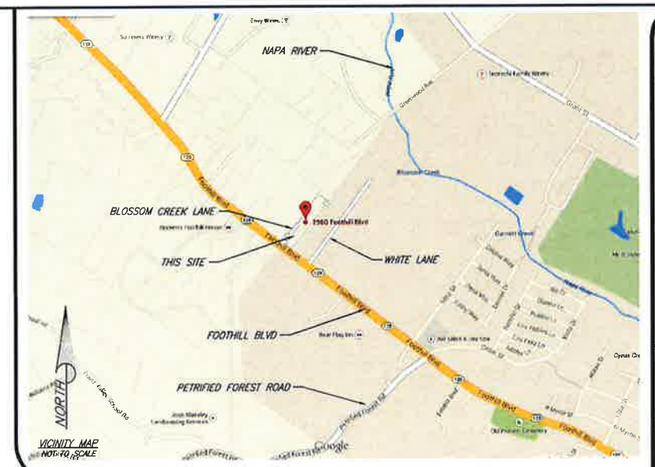
LEGEND

- RECORD BOUNDARY LINE
- (E) FLOWLINE
- (E) EDGE OF ASPHALT CONCRETE
- EDGE OF GRAVEL ROAD
- WOOD FENCE
- WIRE FENCE
- FIBER ROLL BARRIER
- EXISTING MINOR CONTOUR
- 100 EXISTING MAJOR CONTOUR
- GRAVEL SURFACE
- INFILTRATION TRENCH
- △3 RANDOM CONTROL POINT W/#
- SPOT ELEVATION
- TREE: TYPE & DIA.
- TREE TO BE REMOVED

ABBREVIATIONS

STMP	STUMP	RCP	REINFORCED CONCRETE PIPE INVERT
OAK	OAK TREE	FG	FINISH GRADE
LO	LIVE OAK TREE	FF	FINISH FLOOR
FIR	FIR TREE	FS	FINISH SLAB
RD	REDWOOD TREE	DI	DROP INLET
PN	PINE TREE	SS	SANITARY SEWER
BAY	BAY TREE	GM	GRAVITY MAIN
MNZ	MANZANITA TREE	PM	PRESSURE MAIN
LDS	LANDSCAPE TREE	CO	CLEAN OUT
CLST	CLUSTER	TB	TOP OF BANK
SPP	SMOOTH PLASTIC PIPE	CL	CENTERLINE
SMP	SMOOTH METAL PIPE	TW	TOP OF WALL
CMP	CORRUGATED METAL PIPE	BW	BOTTOM OF WALL
TG	TOP OF GRADE	AC	ASPHALT CONCRETE
AD	AREA DRAIN	VB	VAPOR BARRIER
TBR	TO BE REMOVED	SAD	SEE ARCHITECTURAL DRAWINGS
FSS	FIRE SAFE STANDARDS	(E)	EXISTING
		(P)	PROPOSED
		(F)	FUTURE

SHEET INDEX



PROJECT INFORMATION

PROJECT STATEMENT:
THIS PRELIMINARY SITE PLAN WAS CREATED TO FACILITATE THE DEVELOPMENT OF THE FUTURE GRAVEL DRIVEWAY AND SINGLE FAMILY DWELLING. THE EXISTING PARCEL WILL BE SUBDIVIDED INTO LOTS 1 AND 2. LOT 1 WILL REMAIN AS IT AND NO DEVELOPMENT IS PROPOSED. LOT 2 WILL PROPOSED FUTURE GRAVEL DRIVEWAY AND SINGLE FAMILY RESIDENCE. GRADING AND DRAINAGE IMPROVEMENTS ONSITE ARE EXPECTED TO BE MINOR AS THE DEVELOPMENT AREA IS RELATIVITY FLAT AND DRAINAGE FEATURES ALREADY EXIST ONSITE. THIS SITE HAS A SMALL TRIBUTARY AREA WHICH BEGINS ON FOOTHILL BLVD.

PROPERTY OWNERS:
RKMS INVESTMENTS
2960 FOOTHILL BLVD
CALISTOGA, CA 94515

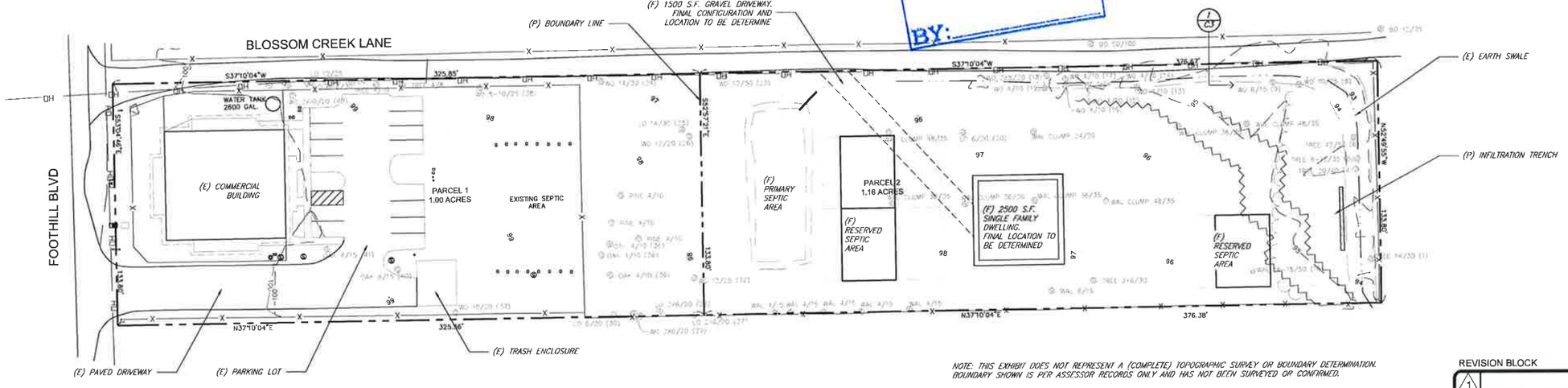
DESIGNER INFORMATION:
HOGAN LAND SERVICES
1702 4TH STREET
SANTA ROSA, CA 95404
(707) 544-2104

TOPOGRAPHIC INFORMATION PROVIDED BY:
ALBION SURVEYS, INC

PROJECT DATUM & BENCHMARK:
1) THIS MAP DOES NOT CONSTITUTE A BOUNDARY SURVEY. BOUNDARY INFORMATION SHOWN IS PER RECORD DATA ONLY.
2) HORIZONTAL CONTROL: RECORD DATA
3) VERTICAL CONTROL: ASSUMED

NORTH

GRAPHIC SCALE
(IN FEET)
1 inch = 30 ft.



NOTE: THIS EXHIBIT DOES NOT REPRESENT A (COMPLETE) TOPOGRAPHIC SURVEY OR BOUNDARY DETERMINATION. BOUNDARY SHOWN IS PER ASSESSOR RECORDS ONLY AND HAS NOT BEEN SURVEYED OR CONFIRMED.

REVISION BLOCK

1			
2			
3			

THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECTION AT THE REQUEST OF JIMMY QUITA IN MAY 2014

REGISTERED PROFESSIONAL ENGINEER · KENNETH E. CARR · No. 21184 · Exp. 9-30-15 · CIVIL · STATE OF CALIFORNIA

PRELIMINARY

KENNETH E. CARR R.C.E. 21184

DRN:	VL	CHK:	KCC	PM:	KEC
DATE:		JOB #:	1607		

HOGAN LAND SERVICES
A CALIFORNIA CORPORATION
TEL: (707) 544-2104
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1702 4TH STREET
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QUITA DEVELOPMENT
TITLE SHEET
2960 FOOTHILL BLVD
CALISTOGA, CALIFORNIA
APN: 011-400-003

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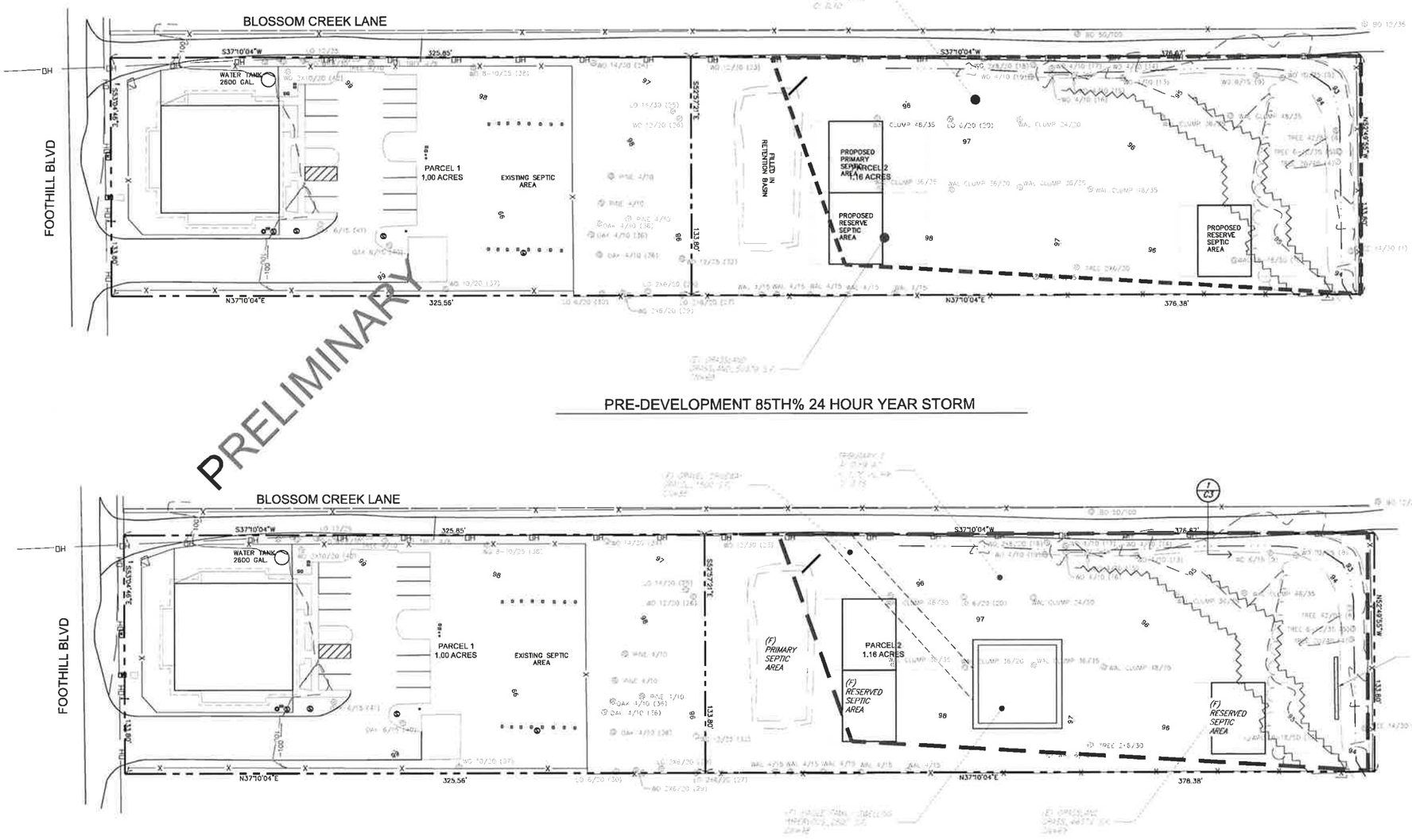

PRE-DEVELOPMENT 85TH% 24 HOUR YEAR STORM

POST-DEVELOPMENT 85TH% 24 HOUR YEAR STORM

NORTH

GRAPHIC SCALE

20 20 0 40

(IN FEET)
1 inch = 20 ft.

LEGEND

- RECORD BOUNDARY LINE
- (E) FLOWLINE
- EDGE OF GRAVEL ROAD
- 85TH% 24 HOUR STORM TRIBUTARY
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- 12" CMP — (E) CULVERT/STORMDRAIN W/SIZE & TYPE
- INFILTRATION TRENCH
- GRAVEL SURFACE
- SPOT ELEVATION

REVISION BLOCK

1		
2		
3		

REGISTERED PROFESSIONAL ENGINEER — KENNETH E. CARR — No. 21184 — Exp. 9-30-15 — Civil — STATE OF CALIFORNIA

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PRELIMINARY

KENNETH E. CARR R.C.E. 21184

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PM:	KEC
DATE:	
JOB #	1607

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SANTA ROSA, CA 95404

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QUITA DEVELOPMENT
85TH % STORM EVENT

2960 FOOTHILL BLVD
CALISTOGA, CALIFORNIA

APN: 011-400-003

2 OF 3

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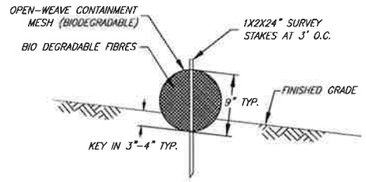
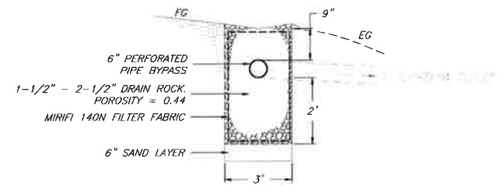


4 FIBER ROLL BARRIER

NOTE: INSTALL FIBER ROLL ON CONTOUR.

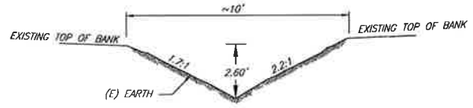
NOT TO SCALE



3 INFILTRATION TRENCH

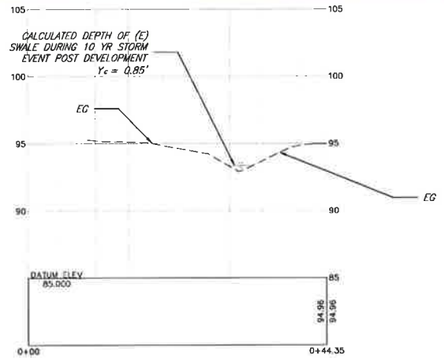
MUST BE INSTALLED ON CONTOUR

NOT TO SCALE



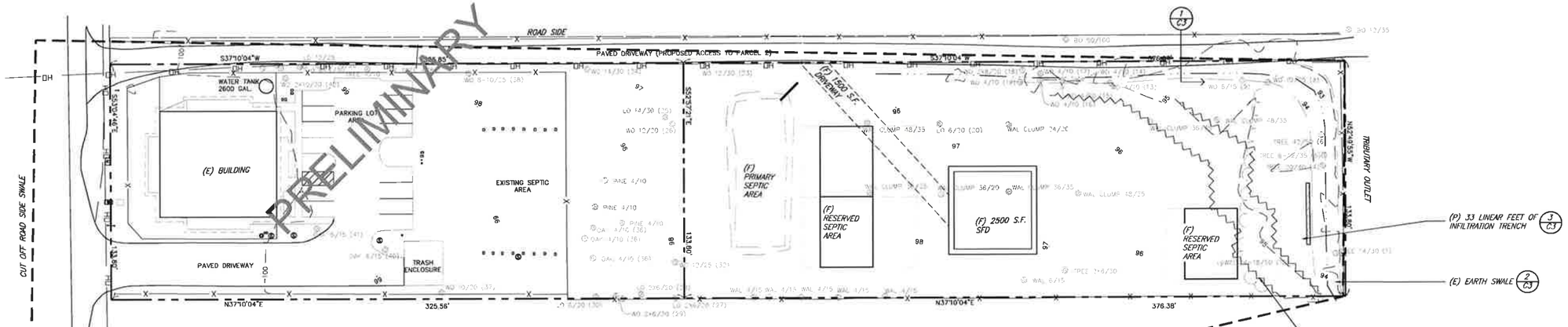
2 (E) ONSITE EARTH SWALE

NOT TO SCALE



1 (E) ONSITE SWALE SECTION

NOT TO SCALE



TRIBUTARY 1
A: 0.03 AC
I: 1.70 IN/HR
C: 0.9
K: 1.17
Q: 0.05 CFS

POST-DEVELOPMENT 10 YEAR STORM

LEGEND

- RECORD BOUNDARY LINE
- (E) FLOWLINE
- EDGE OF GRAVEL ROAD
- 10 YR STORM TRIBUTARY
- EXISTING MINOR CONTOUR
- EXISTING MAJOR CONTOUR
- 12" CMP (E) CULVERT/STORMDRAIN W/SIZE & TYPE
- INFILTRATION TRENCH
- GRAVEL SURFACE
- SPOT ELEVATION

NORTH

GRAPHIC SCALE

60 30 0 60

(IN FEET)

1 inch = 30 ft.

Point of Concentration / Design	Q_10 (cfs)	Type	N-Value	Invert In/Out (ft)	Length(ft)	Diameter/ Depth (in)	Typ. Slope (%)
(E) EARTH SWALE	4.97	EARTH	0.035	95.27 / 93.13	375	2.60	0.5%

REVISION BLOCK

1		
2		
3		

PRELIMINARY

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECTION AT THE REQUEST OF JIMMY QUITA IN MAY 2014

KENNETH E. CARR R.C.E. 21184

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DATE:		
JOB #:	1607	

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QUITA DEVELOPMENT
10 YR STORM EVENT

APN: 011-400-003

2960 FOOTHILL BLVD
CALISTOGA, CALIFORNIA

3 OF 3

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