

Stormwater Control Plan  
Date Received July 5, 2016



# HUMANN COMPANY INC.

ENGINEERING ♦ SURVEYING

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## PRELIMINARY

### STORM WATER CONTROL PLAN

FOR

### GLORIA TERRACE

APN 166-200-032 & 166-210-008

3198 GLORIA TERRACE

Lafayette, CA 94549

June, 2016

Owner/Developer:

### GLORIA TERRACE, LLC

C/O David Langon

3189 Danville Blvd Suite 245

Alamo, CA 94507

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Prepared by:

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*This Stormwater Control Plan was prepared using the template dated February 15, 2012.*

**I. PROJECT DATA**

**Table 1. Project Data**

Project Name/Number	Gloria Terrace
Application Submittal Date	July 2016
Project Location	3198 Gloria Terrace, APN 166-200-032 & 166-210-008
Name of Developer	David Langon Construction, Inc
Project Phase No.	N/A
Project Type and Description	Nine (9) Lot Residential Custom Homes Subdivision
Project Watershed	Grayson Creek
Total Project Site Area (acres)	7.68± acres
Total Area of Land Disturbed (acres)	3.3± acres
Total New Impervious Surface Area (sq. ft.)	71,334± sq. ft.
Total Replaced Impervious Surface Area	4,000± sq. ft.
Total Pre-Project Impervious Surface Area	4,000± sq. ft.
Total Post-Project Impervious Surface Area	75,334± sq. ft.
50% Rule[*]	Applied
Project Density	1.2 DU/Acre
Applicable Special Project Categories [Complete even if all treatment is LID]	None
Percent LID and non LID treatment	100% LID
HMP Compliance [†]	Apply as part of Common Plan of Development

[\*50% rule applies if:

Total Replaced Impervious Surface Area > 0.5 x Pre-Project Impervious Surface Area]

[†HMP applies if:

(Total New Impervious Surface Area + Total Replaced Impervious Surface Area) ≥ 1 acre]

## **II. SETTING**

### **II.A. Project Location and Description**

The “GLORIA TERRACE” project is a proposed single family residential 9 custom home lots subdivision located at 3198 Gloria Terrace, near its intersection with Surmont Drive, Lafayette, California as shown on the vicinity map attached hereto under appendix A. The Project site occupies approximately 7.68 acres. GLORIA TERRACE project is located within R-20 zone.

### **II.B. Existing Site Features and Conditions**

The site is a roughly rectangular parcel, located at the western end of a southwest-trending subsidiary ridgeline, in the hills immediately west of Pleasant Hill. The major portion of the site is a rough rectangle approximately 900 feet long by 400 feet wide, which straddles the top and steep sides of a natural ridgeline. The top of the ridge has an elevation of about 460 feet and moderate to steep natural slopes are present on the northwest, southwest and southeast sides of the ridge. Three residential houses are located along Gloria Terrace immediately west of the site. Several large residential parcels are also located along the south, east, and north sides of the site. A linear valley approximately 60 feet wide is located along the base of the southeastern slope. This valley begins at an elevation of approximately 330 feet and extends up to an elevation of about 370 feet. Finally, a small panhandle about 200 feet long by 50 feet wide is located on the southwest corner of the site and provides access to Gloria Terrace. The site is covered by natural weeds and grasses, numerous large to small trees are scattered across the site and a few large clumps of brush are present as well.

The grading pattern of the development part of the property will follow the existing drainage pattern and will ultimately connects to an existing drainage system located along Gloria Terrace.

The preliminary Geologic and Geotechnical Investigation entitled “Proposed 9-Lot Residential Subdivision, APNs 166-200-032 and 166-210-008, Gloria Terrace, California”, and prepared by GFK & Associates, Inc., dated February 4, 2016 shall be consulted for all additional site soils information. It indicates that the property surficial soils correspond to type D soils as defined by the U.S. Department of Agriculture, National Resources Conservation Services (NRCS). Groundwater was not encountered during excavation of the test pits, however, groundwater encountered at two borings located in the proximity of Lot 1 at depth between 9 and 10.5 feet below ground surface. It should be noted that groundwater levels can fluctuate seasonally and/or over a period of years.

### **II.C. Opportunities and Constraints for Stormwater Control**

The site has been designed to maximize opportunities to utilize landscape and open space areas to minimize the impervious areas and treat the runoff generated from the project impervious areas in addition to maintaining the existing natural and hydrologic features as shown on attached Storm Water Control Plan Exhibit.

While, as mentioned before, the project’s Geotechnical Report to be consulted for more details regarding the nature of the site soils, the design of the site drainage has taken into consideration the following practices and constrains:

- Ponding of water under floors or seepage toward foundation systems or nearby paved driveways at any time must be prevented.
- Storm water from roof downspouts should be conveyed in a manner to insure that it discharges away from structures.
- The near-surface soils nature as discussed under “Existing Site Conditions” will necessitate the use of sub-drains within the proposed bioretention basin.

### III. LOW IMPACT DEVELOPMENT DESIGN STRATEGIES

#### III.A. Optimization of Site Layout

III.A.1. *Limitation of development envelope:* The site is developed to its maximum practicable density, which maximizes the use of access roads and driveways

III.A.2. *Preservation of natural drainage features:* No natural drainage features within the project site.

III.A.3. *Setbacks from creeks, wetlands, and riparian habitats:* N/A.

III.A.4. *Minimization of imperviousness:* The site is developed to its maximum practicable density, which maximizes the use of access roads and driveways

III.A.5. *Use of drainage as a design element:* Open space, landscape areas and bioretention facility are utilized throughout the site to the maximum extent practicable.

III.B. **Use of Permeable Pavements:** The use of permeable pavement was not utilized based on the presence of high swell-shrink surficial soils as mentioned in the geotechnical report.

III.C. **Dispersal of Runoff to Pervious Areas:** To the extent practicable within the layout design of the site all impervious areas will be designed to drain into treatment facilities in the form of Bioretention basins before conveyed to the offsite storm drain system.

#### III.D. Feasibility Assessment of Harvesting and Use for Treatment and Flow-Control

##### III.D.1. Permeability of Site Soils

Site soils as mentioned before are clayey in nature and that leads to a saturated hydraulic permeability of less than 1.6 inches/hour.

##### III.D.2. Potential Opportunities for Harvesting and Use

No contiguous roof areas of 10,000 square feet and larger within the proposed project.

#### Harvesting and Use Feasibility Calculations

Table 2. Harvesting and Use Feasibility

A	B	C	D	E	F	G	H	I	J
<i>Building or other Impervious Area Description</i>	<i>Square feet of impervious surface</i>	<i>Acres</i>	<i>Uses and User Units</i>	<i>Toilet and Urinal Water Usage (gal/ day)</i>	<i>Water Use per Acre (gal/ day/ acre)</i>	<i>Required demand (gal/ day / acre).</i>	<i>Is Projected Use &gt; Required Demand? (Column F &gt; Column G?)</i>	<i>Can runoff be piped to an irrigated area 2.5x the impervious area (Column B)?</i>	<i>Is there any other consistent, reliable demand for the quantity in Column G?</i>
Roofs/paving	75,334	1.73	2.8	216.7	125	5900	No	No	No

### III.E. Integrated Management Practices

The project is subject to “Treatment and Flow Control” requirements as the total impervious surfaces created or replaced within this project exceeds the one acre threshold as mentioned in the “C.3 Stormwater Guidebook” Sixth edition.

Table 4-9 of the “C.3 Stormwater Guidebook” Sixth edition have been utilized in determining the type of IMP/BMP best fit the stormwater control design for this particular site. The project site’s clayey native soils have deemed the use of dry wells and cisterns with bioretention inappropriate. Bioretention facilities equipped with sub-drain has been found to be the most suitable form of treatment IMP for this project site for its cost effectiveness, availability of the required hydraulic head and the natural blinding with the proposed improvements. The design utilizes the lowest portion of each of the DMAs that are also farthest from the structures, for use as the Bioretention facility. Consideration has been given to the most cost effective facility (construction and long term maintenance) in comparison to the other available facilities.

## IV. DOCUMENTATION OF DRAINAGE DESIGN

### IV.A. Descriptions of each Drainage Management Area

#### IV.A.1. Table of Drainage Management Areas

<i>DMA Name</i>	<i>Surface Type</i>	<i>Area (square feet)</i>
<i>DMA-0:</i>	<i>Constraint Area</i>	<i>798</i>
<i>DMA1-LS</i>	<i>Self-treating Landscape Area</i>	<i>119,828</i>
<i>DMA2-LS</i>		<i>30,962</i>
<i>DMA3-LS</i>		<i>19,415</i>
<i>DMA4-LS</i>		<i>60,488</i>
<i>DMA5-LS</i>		<i>28,767</i>
<b><u>DMA1:</u></b> <i>DMA1-Roof &amp; Driveway</i> <i>DMA1-Pav</i>	<i>Roofs &amp; Concrete Paving</i> <i>AC paving</i>	<b><u>24,626 Total</u></b> <i>20,000</i> <i>4,626</i>
<b><u>DMA2:</u></b> <i>DMA2-Roof &amp; Driveway</i> <i>DMA2-Pav</i>	<i>Roofs</i> <i>AC Paving</i>	<b><u>31,840 Total</u></b> <i>10,000</i> <i>21,840</i>
<b><u>DMA-3:</u></b> <i>DMA3-Roof &amp; Driveway</i>	<i>Roofs &amp; Concrete Paving</i>	<i>5,000</i>



<b><u>DMA-4:</u></b> <i>DMA4-Roof &amp; Driveway</i>	<i>Roofs &amp; Concrete Paving</i>	<i>5,000</i>
<b><u>DMA-5:</u></b> <i>DMA5-Roof &amp; Driveway</i>	<i>Roofs &amp; Concrete Paving</i>	<i>3,000</i>
<b><u>DMA-6:</u></b> <i>DMA6-Roof</i>	<i>Roofs &amp; Concrete Paving</i>	<i>2,000</i>
<b><u>DMA-7:</u></b> <i>DMA7- Pav</i>	<i>AC Paving</i>	<i>3,070</i>

*IV.A.2. Drainage Management Area Descriptions*

**DMA-0**, totaling 798 square feet, Constraint area consists of portion of the main entry roadway; drains directly offsite toward Gloria Terrace frontage.

**DMA1-LS through 5-LS**: totaling 258,870 square feet, consists of:

Undisturbed open space follows the unaltered existing surface drainage pattern or Landscape areas connected directly to the proposed drainage system.

**DMA 1**: totaling approximately 24,626 sf consists of:

DMA1-Roof: Contain 20,000 sf of roof and driveway allocated areas of lots 1 and Lots 7 through 9;

DMA1-Pav: Contain 4,626 sf portion of the access roadway impervious AC/Concrete paving;

**DMA1** drains to an Integrated Management Practice “**IMP 1**” in the form of bioretention basin having an area of 1,250 sf as shown on the attached IMP sizing calculations.

**DMA 2**: totaling approximately 31,840 sf consists of:

DMA2-Roof: Contain 10,000 sf of roof and driveway allocated areas of Lots 2 & 3;

DMA2-Pav.: Contain 21,840 sf portion of the access roadway impervious AC/Concrete paving;

**DMA2** drains to Integrated Management Practice “**IMP 2**” in the form of bioretention basin having an area of 1,486 sf as shown on the attached IMP sizing calculations.

**DMA 3 and DMA 4**: each totaling 5,000 sf of roof and driveway allocated areas of Lots 4 & 6 respectively. Each of the DMA areas drains to Integrated Management Practice “**IMP 3 & 4**” respectively in the form of bioretention basin having an area of 255 sf as shown on the attached IMP sizing calculations.

**DMA 5**: totaling 3,000 sf being the driveway and a portion of the roof allocated area of Lots 5. This DMA drains to Integrated Management Practice “**IMP 5**” of bioretention basin having an area of 155 sf as shown on the attached IMP sizing calculations.

**DMA 6**: totaling 2,000 sf being the remainder portion of the roof area allocated of Lots 5. This DMA drains to Integrated Management Practice “**IMP 6**” of flow-through planter having an area of 110 sf as shown on the attached IMP sizing calculations.

**DMA 7:** totaling 3,070 sf portion of the access roadway impervious AC/Concrete paving. This DMA drains to “IMP 7” being a bioretention basin having an area of 150 sf as shown on the attached IMP sizing calculations.

**IV.B. Tabulation and Sizing Calculations**

*IV.B.1. Information Summary for IMP Design*

Total Project Area (Square Feet)	334,645± sf
Mean Annual Precipitation	22 inches
IMPs Designed For:	Treatment and Flow Control

*IV.B.2. Self-Treating Areas*

Refer to attached table generated using the County Program’s IMP Sizing Calculator.

*IV.B.3. Areas Draining to IMPs*

Refer to attached table generated using the County Program’s IMP Sizing Calculator.

**V. SOURCE CONTROL MEASURES**

**V.A. Site activities and potential sources of pollutants**

The construction of this project will create few potential sources of storm water pollutants. All areas that receive these pollutants will drain to the stormwater treatment Best Management Practices (BMPs). To further reduce the potential for pollutants to enter runoff, permanent and operational BMPs will be implemented as described below. The table lists potential pollutant sources on the development site and the corresponding source control measures specified in the Stormwater C.3 Guidebook, sixth Edition, Appendix D.

**V.B. Source Control Table**

Potential Source	Permanent BMPs	Operational BMPs
On-site storm drain inlets	Use of inlets for treatment facilities have been minimized, reducing the potential for dumping.  All inlets that could be accessed from sidewalks and driveways will be marked with a <b>“No Dumping – Drains to Bay”</b>	<ul style="list-style-type: none"> <li>▪ Inlet markings will be inspected annually and replaced or renewed as needed.</li> <li>▪ Inlets and pipes conveying stormwater to BMPs will be inspected and maintained as part of BMP Operation and Maintenance Plan.</li> </ul>
Need for future indoor and structural pest control.	Standard building design minimizes potential needs for future pest control	Integrated Pest Management (IPM) information will be provided to new owners.

Landscape/outdoor pesticide use	<ul style="list-style-type: none"> <li>▪ Landscaping will be designed to minimize required irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to storm water pollution.</li> <li>▪ Plantings for vegetated filters, and landscape areas used to retain stormwater, will be selected to be appropriate to anticipated soil and moisture conditions. (Refer to Landscape Plan)</li> <li>▪ Where possible, pest-resistant plants will be selected, especially for locations adjacent to hardscape.</li> <li>▪ Plants will be selected appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Landscape will be maintained using minimum or no pesticides.</li> <li>▪ IPM information will be provided to new owners.</li> </ul>
Vehicle and equipment cleaning		<ul style="list-style-type: none"> <li>▪ No onsite car washing will be provided.</li> <li>▪ Stormwater pollution prevention information will be provided to any new owners.</li> </ul>
Vehicle maintenance		Vehicle maintenance or repair onsite is prohibited.
Refuse Areas	<ul style="list-style-type: none"> <li>▪ Site refuse and recycled materials will be located in suitable designated locations, and stored for pickup. These refuse areas will be sized and detailed per the local municipal requirements.</li> <li>▪ Dumpsters and receptacles will be covered, graded and paved to prevent run-on and runoff.</li> </ul>	<p>See applicable operational BMP's in Fact Sheet SC-34, "Waste Handling and Disposal," in the CASQA Stormwater Quality Handbooks at <a href="http://www.cabmphandbooks.com">www.cabmphandbooks.com</a></p> <ul style="list-style-type: none"> <li>▪ Receptacles will be inspected regularly. Leaky receptacles will be repaired or replaced.</li> <li>▪ Receptacles shall remain covered.</li> <li>▪ Dumping of liquid or hazardous waste is prohibited.</li> <li>▪ Litter will be inspected and picked up daily and spills cleaned up immediately.</li> </ul>

Roofing material	No roofing gutters and trim made of copper or unprotected metals that may leach into runoff.	
Roofing	Rooftop mounted equipment to be roofed or covered to prevent pollutants from entering runoff.	

**V.C. Features, Materials, and Methods of Construction of Source Control BMPs**

Refer to table above.

**VI. STORMWATER FACILITY MAINTENANCE**

**VI.A. Ownership and Responsibility for Maintenance in Perpetuity**

All storm water treatment facilities in this plan will be maintained in perpetuity. The applicant accepts responsibility for the operation and maintenance of the Bioretention facility, landscape and open space areas constructed in connection with this project until the responsibility is formally transferred to another legal owner(s) or other private entity(ies). The current owner and the future owners will provide and pay for maintenance of stormwater Best Management Practices (BMPs), and execution of a Stormwater Management Facilities Operation and Maintenance Agreement and Right of Entry in the form provided by the Contra Costa County.

The applicant, or the property owner(s), will provide a Stormwater Treatment Facilities Operation and Maintenance (O&M) Plan, detailing maintenance requirements and a maintenance schedule for all treatment and control BMPs. This O & M Plan shall be submitted for the review of the Contra Costa County, and an Operation and Maintenance Agreement will be recorded on the property, including any necessary rights-of entry, prior to final occupancy.

Additionally, the property owner(s) will pay for all required Contra Costa County Fees associated with the long term O&M of these water quality features.

**VI.B. Summary of Maintenance Requirements for Each Stormwater Facility**

❖ **Bioretention facility area**

The Bioretention facility area treats flow runoff by removing pollutants primarily by filtering runoff slowly through an active layer of soil. Routine maintenance is needed to ensure that flow is unobstructed, that erosion is prevented, and that soils are held together by plant roots and are biologically active. Typical maintenance consists of the following:

- Inspect surface for exposure of soils, or other evidence of erosion. Clear any obstructions and remove any accumulation of sediment. Examine rock, splash blocks or other material used as a protective splash pad and replace or replenish if necessary.
- Observe the active layer of the soil filter for uniform percolation throughout. If portions of the filter do not drain within 48 hours after the end of a storm, the soil should be tilled and replanted. Remove any debris or accumulations of sediment.

- Examine the vegetation to ensure that it is healthy and dense enough to provide filtering and to protect soils from erosion. Replenish mulch as necessary, remove fallen leaves and debris, prune large shrubs or trees, and mow turf areas if required. When mowing, remove no more than  $\frac{1}{3}$  height of grasses. Confirm that irrigation is adequate and not excessive. Replace dead plants and remove noxious and invasive vegetation.
- Abate any potential vectors by filling holes in the ground in and around the filter and by ensuring that there are no areas where water stands more than 48 hours following a storm. If mosquito larvae are present and persistent, contact the Contra Costa County Mosquito and Vector Control District for information and advice. Mosquito larvicides should be applied only when absolutely necessary and then only by a licensed individual or contractor.

#### ❖ **Paved Surfaces**

Paved areas such as patios and access walkways shall be swept as necessary to keep the areas clean of any solids, sediments and pollutants.

**VII. CONSTRUCTION PLAN C.3 CHECKLIST**

*Stormwater Control Plan*

*Page #*

*BMP Description*

*See Plan Sheet #s*

Section IV.	Treatment facilities <b>IMP 1 thru IMP 7</b> sized as specified and designed to capture and route runoff from <b>DMA1 thru DMA 7</b> respectively as delineated on the Storm Water Control Plan Exhibit.	SWCP Sheets C.3-1 & 2
Table V.B., Section V	Plant selection to minimize use fertilizers and pesticides.	
Section IV & Storm Water Control Plan Exhibit	The final grading plan conforms to the delineation of drainage areas in the SWCP.	SWCP Sheets C.3-1 & 2 and VTM-2
Section IV & Storm Water Control Plan Exhibit	The final drainage plan conforms to the SWCP; drainage from impervious areas, including building roofs, is routed to treatment facilities, as shown in the SWCP.	SWCP Sheet C.3-1 & 2 and VTM-1
Section IV & Storm Water Control Plan Exhibit	IMPs/BMPs details on the construction plan (e.g. connections between stormdrains and bioretention areas, etc.)	SWCP Sheet C.3-1 & 2 and VTM-1

**VIII. CERTIFICATIONS**

**ENGINEER'S CERTIFICATION:**

The selection, sizing, and preliminary design of stormwater treatment and other control measures in this plan meet the requirements of Regional Water Quality Control Board Order R2-2009-0074 and Order R2-2011-0083.

Signature Izzat Nashashibi Date 6/24/16

Print Name Izzat Nashashibi Position: Civil Engineer

Humann Company, Inc.  
1021 Brown Avenue  
Lafayette, CA 94549

# IMP SIZING CALCULATIONS



**Project Name:** Gloria Terrace  
**Project Type:** Treatment and Flow Control  
**Location:** 3198 Gloria Terrace, Lafayette, CA  
**APN:** 166-20-032 & 166-210-008  
**Drainage Area:** 337865 sf  
**Mean Annual Precipitation:** 22 in

### I. Self-Treating Areas

DMA Name	Area (sq ft)
DMA0-Constraint	798
DMA1-LS	119248
DMA2-LS	30962
DMA3-LS	19415
DMA4-LS	60488
DMA5-LS	28757

### IV. Areas Draining to IMPs

#### IMP Name: IMP1 (Soil Type: D)

IMP Type: Bioretention Facility  
 Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA1-Roof&Dway	20,000	Conventional Roof	1.00	20,000				
DMA1-pavement	4,626	Concrete or Asphalt	1.00	4,626				
<b>Total</b>				24,626				
				<b>Area</b>	0.050	0.921	1,134	1,250
				<b>Surface Volume</b>	0.042	0.921	952	1,000
				<b>Subsurface Volume</b>	0.055	0.921	1,247	1,250
				<b>Maximum Underdrain Flow (cfs)</b>				0.05
				<b>Orifice Diameter (in)</b>				1.46

#### IMP Name: IMP2 (Soil Type: D)

IMP Type: Bioretention Facility  
 Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA2-								

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
Roof&Dway	10,000	Conventional Roof	1.00	10,000	0.050	0.921		1,466
DMA2-pavement	21,840	Concrete or Asphalt	1.00	21,840				
<b>Total</b>				31,840				
<b>Area</b>								
<b>Surface Volume</b>					0.042	0.921	1,231	1,238
<b>Subsurface Volume</b>					0.055	0.921	1,613	1,664
<b>Maximum Underdrain Flow (cfs)</b>								0.07
<b>Orifice Diameter (in)</b>								1.65

**IMP Name: IMP3 (Soil Type: D)**

IMP Type: Bioretention Facility

Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA3-Roof&Dway	5,000	Conventional Roof	1.00	5,000	0.050	0.921	230	255
<b>Total</b>				5,000				
<b>Area</b>								
<b>Surface Volume</b>								
<b>Subsurface Volume</b>					0.055	0.921	253	255
<b>Maximum Underdrain Flow (cfs)</b>								0.01
<b>Orifice Diameter (in)</b>								0.66

**IMP Name: IMP4 (Soil Type: D)**

IMP Type: Bioretention Facility

Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA4-Roof&Dway	5,000	Conventional Roof	1.00	5,000	0.050	0.921	230	255
<b>Total</b>				5,000				
<b>Area</b>								
<b>Surface Volume</b>								
<b>Subsurface Volume</b>					0.055	0.921	253	255
<b>Maximum Underdrain Flow (cfs)</b>								0.01
<b>Orifice Diameter (in)</b>								0.66

**IMP Name: IMP5 (Soil Type: D)**

IMP Type: Bioretention Facility

Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor

DMA Name	Area (sq ft)	Project Surface Type	Runoff Factor	x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA5-Roof&Dway	3,000	Conventional Roof	1.00	3,000				
<b>Total</b>				3,000				
<b>Area</b>					0.050	0.921	138	155
<b>Surface Volume</b>					0.042	0.921	116	124
<b>Subsurface Volume</b>					0.055	0.921	152	155
<b>Maximum Underdrain Flow (cfs)</b>								0.01
<b>Orifice Diameter (in)</b>								0.51

**IMP Name: IMP6 (Soil Type: D)**

IMP Type: Flow-Through Planter

Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA6-Roof	2,000	Conventional Roof	1.00	2,000				
<b>Total</b>				2,000				
<b>Area</b>					0.050	0.921	92	110
<b>Surface Volume</b>					0.042	0.921	77	88
<b>Subsurface Volume</b>					0.055	0.921	101	110
<b>Maximum Underdrain Flow (cfs)</b>								0.00
<b>Orifice Diameter (in)</b>								0.39

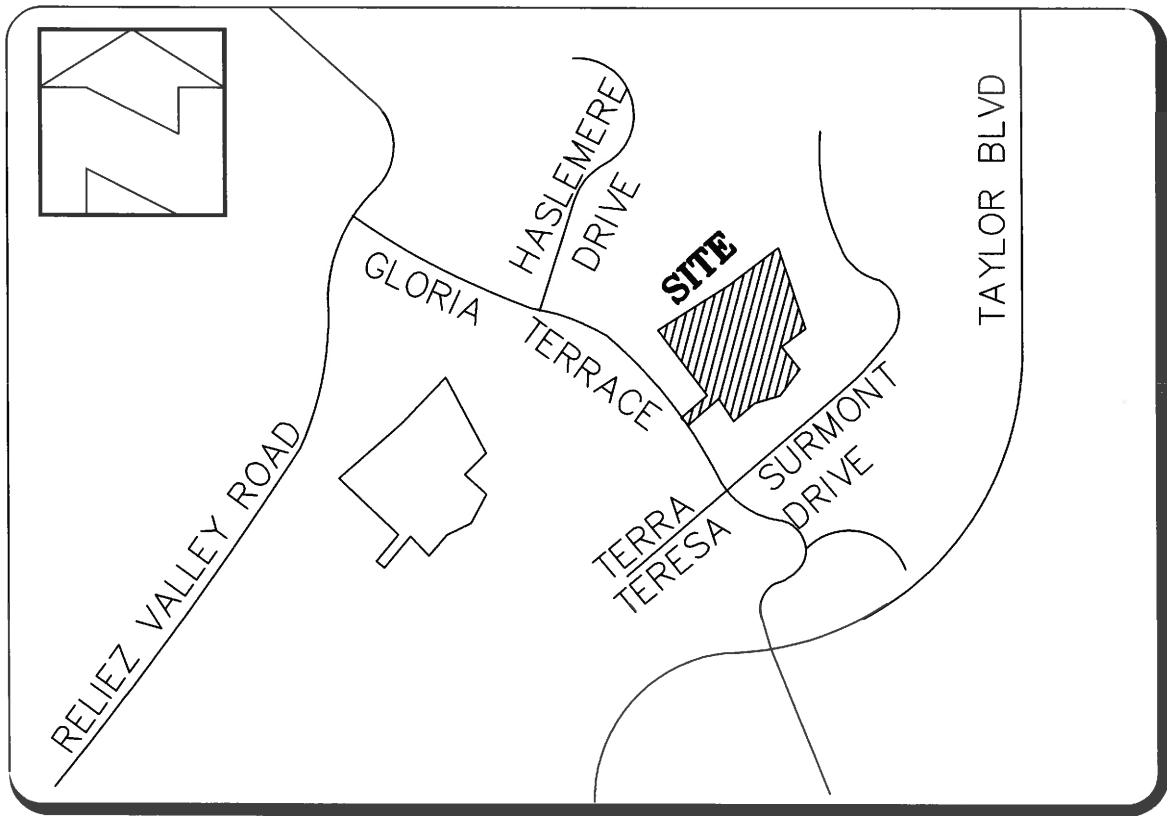
**IMP Name: IMP7 (Soil Type: D)**

IMP Type: Bioretention Facility

Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing			
					IMP Sizing Factor	Rain Adjustment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA7-pavement	3,070	Concrete or Asphalt	1.00	3,070				
<b>Total</b>				3,070				
<b>Area</b>					0.050	0.921	141	150
<b>Surface Volume</b>					0.042	0.921	119	125
<b>Subsurface Volume</b>					0.055	0.921	155	162
<b>Maximum Underdrain Flow (cfs)</b>								0.01
<b>Orifice Diameter (in)</b>								0.51

# VICINITY MAP



VICINITY MAP N.T.S.

# ATTACHMENTS



**SITE STATISTICS:**

GROSS PROPERTY AREA	= ±334,645 SF (±7.662 ACRES)
EXISTING IMPERVIOUS SURFACE AREA	= ±4,000 SF
EXISTING IMPERVIOUS SURFACE AREA REMOVED	= ±4,000 SF
IMPERVIOUS SURFACE AREA WITHIN DMA'S	= ±74,536 SF
CONSTRAINT AREAS TOTAL	= ±798 SF
TOTAL IMPERVIOUS SURFACE AREA (NEW & REPLACE)	= ±75,334 SF
SELF TREATING LANDSCAPE AREAS DRAIN DIRECTLY OFFSITE C-3 FACILITIES	= ±258,870 SF
	= ±3,661 SF

GLORIA TERRACE

DAMS  
3234 GLORIA TERRACE  
APN 166-210-009

OLIVER  
3230 GLORIA TERRACE  
APN 166-210-006

OLIVER  
3236 GLORIA TERRACE  
APN 166-210-012

MAHER  
3194 GLORIA TERRACE  
APN 166-200-028

C-3 BASIN AREA=1,250 SF  
(LOTS 1, 7, 8 & 9)  
TW 334.5± GR 334.2  
TOS 333.4 BOP 329.4  
FL 328.4  
ORIFICE DIA. 1.46 in

C-3 BASIN AREA=150 SF  
(PORTION OF THE ROAD)  
TW 302.5± GR 302.3±  
TOS 301.5± BOP 297.3±  
FL 297.3±  
ORIFICE DIA. 0.51 in

**ON-SITE INTEGRATED MANAGEMENT PRACTICES CALCULATIONS:**

RAINFALL ADJUSTMENT: (UTILIZING EQUATION 4-9, TABLE 4-12)

SITE IS IN NRCS HYDROLOGIC SOIL GROUP D  
-0.0022x(MAP @ PROJECT SITE-20.2)+0.05  
0.05

FOR (MAP @ PROJECT SITE) = 22 IN, RAINFALL ADJUSTMENT=0.92

SIZING: (UTILIZING TABLE 4-11)

REQUIRED (A) FACTOR = 0.05 x 0.92 = 0.046  
REQUIRED V1 FACTOR = 0.042 x 0.92 = 0.0387 use 0.04 min.  
REQUIRED V2 FACTOR = 0.055 x 0.92 = 0.0506

CONTRACOSTA  
2017 MAR 23 AM 9:45

ERICKSON FAMILY LLC  
3175 SURMONT DRIVE  
APN 166-200-031

CIMINO  
3254 GLORIA TERRACE  
APN 166-210-015

CIMINO  
3253 SURMONT DRIVE  
APN 166-342-006

CIMINO DRIVE  
3253 SURMONT DRIVE  
APN 166-342-006

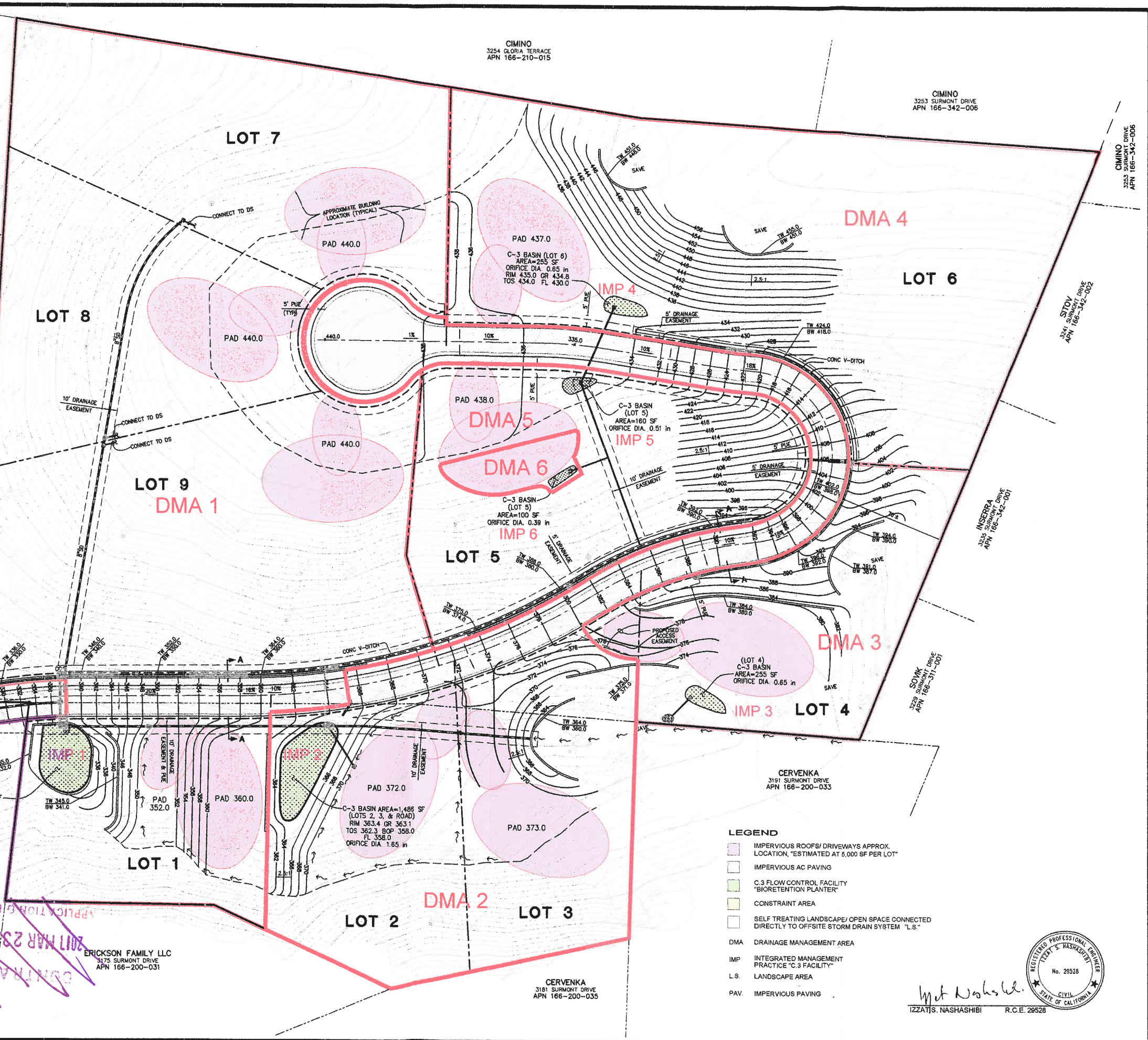
STOV  
324 SURMONT DRIVE  
APN 166-342-002

INSERRA  
3235 SURMONT DRIVE  
APN 166-342-001

SOVIK  
3224 SURMONT DRIVE  
APN 166-342-001

CERVENKA  
3191 SURMONT DRIVE  
APN 166-200-033

CERVENKA  
3181 SURMONT DRIVE  
APN 166-200-035



**LEGEND**

- IMPERVIOUS ROOFS/ DRIVEWAYS APPROX. LOCATION, "ESTIMATED AT 5,000 SF PER LOT"
- IMPERVIOUS AC PAVING
- C-3 FLOW CONTROL FACILITY "BIORETENTION PLANTER"
- CONSTRAINT AREA
- SELF TREATING LANDSCAPE/ OPEN SPACE CONNECTED DIRECTLY TO OFFSITE STORM DRAIN SYSTEM "L.S."
- DMA DRAINAGE MANAGEMENT AREA
- IMP INTEGRATED MANAGEMENT PRACTICE "C-3 FACILITY"
- L.S. LANDSCAPE AREA
- PAV. IMPERVIOUS PAVING



Izzat S. Nashashibi  
R.C.E. 29528

REVISIONS

SCALE	1" = 20'
DATE	06/24/2016
ENGINEER	H.N.
JOB NO.	15012

**STORM WATER CONTROL PLAN EXHIBIT**

A RESUBDIVISION OF PARCEL C OF 24 PM 16 AND A PORTION OF LOT 6 OF 9 M 217  
APN 166-200-032 AND 166-210-008

LAFAYETTE

CALIFORNIA

HUMANN COMPANY, INC.

SURVEYING CA 04549  
ENGINEERING CA 00000  
PH (925)263-5000 FAX (925)263-3076

SHEET C-3-1  
OF 2 SHEETS

JOB NO. 15012

Project Name: Gloria Terrace  
 Project Type: Treatment and Flow Control  
 Location: 3198 Gloria Terrace, Lafayette, CA  
 APN: 166-20-032 & 166-210-008  
 Drainage Area: 337865 sf  
 Mean Annual Precipitation: 22 in

I. Self-Treating Areas

DMA Name	Area (sq ft)
DMA0-Concrete	788
DMA1-LS	1,19248
DMA2-LS	30992
DMA3-LS	19412
DMA4-LS	96482
DMA5-LS	28787

IV. Areas Draining to IMPs

IMP Name: IMP1 (Soil Type: D)  
 IMP Type: Bioretention Facility  
 Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing Factor	Rain Adjust-ment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA1-Road/Dwv	20,000	Conventional Roof	1.00	20,000	0.850	0.921	1,134	1,250
DMA1-pavement	4,528	Concrete or Asphalt	1.00	4,528	0.850	0.921	950	1,000
Total				24,528	0.850	0.921	2,084	2,250
Area				0.050	0.921	1,469	1,485	
Surface Volume				0.042	0.921	1,231	1,230	
Subsurface Volume				0.065	0.921	1,613	1,964	
Maximum Underdrain Flow (cfs)						0.05		
Orifice Diameter (in)						1.46		

IMP Name: IMP2 (Soil Type: D)  
 IMP Type: Bioretention Facility  
 Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing Factor	Rain Adjust-ment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA2-Pool/Dwv	10,000	Conventional Roof	1.00	10,000	0.050	0.921	1,469	1,485
DMA2-pavement	31,840	Concrete or Asphalt	1.00	31,840	0.042	0.921	1,231	1,230
Total				41,840	0.055	0.921	1,613	1,964
Area				0.050	0.921	1,469	1,485	
Surface Volume				0.042	0.921	1,231	1,230	
Subsurface Volume				0.055	0.921	1,613	1,964	
Maximum Underdrain Flow (cfs)						0.07		
Orifice Diameter (in)						1.65		

IMP Name: IMP3 (Soil Type: D)  
 IMP Type: Bioretention Facility  
 Soil Type: D

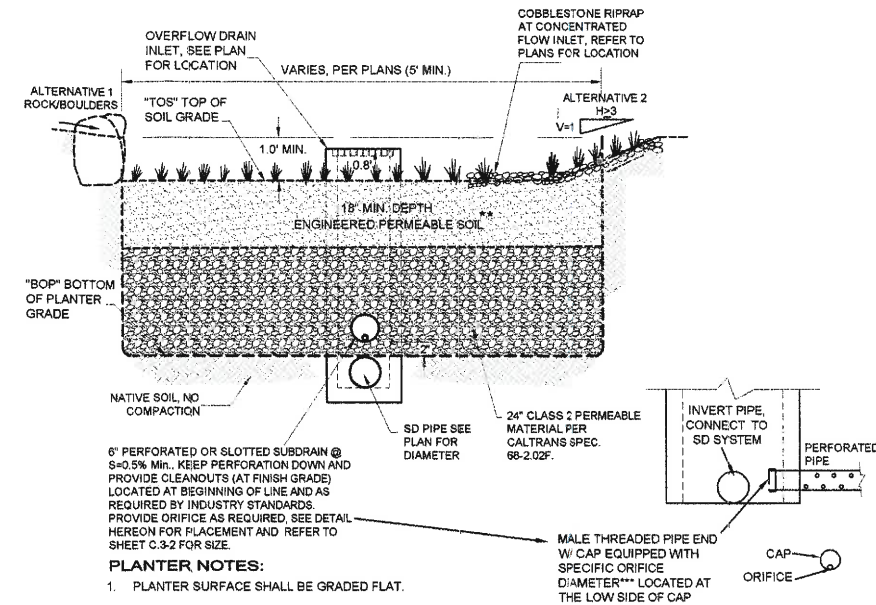
DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing Factor	Rain Adjust-ment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA3-Road/Dwv	5,000	Conventional Roof	1.00	5,000	0.050	0.921	1,469	1,485
Total				5,000	0.042	0.921	1,231	1,230
Area				0.050	0.921	1,469	1,485	
Surface Volume				0.042	0.921	1,231	1,230	
Subsurface Volume				0.065	0.921	1,613	1,964	
Maximum Underdrain Flow (cfs)						0.07		
Orifice Diameter (in)						0.66		

IMP Name: IMP4 (Soil Type: D)  
 IMP Type: Bioretention Facility  
 Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing Factor	Rain Adjust-ment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA4-Road/Dwv	5,000	Conventional Roof	1.00	5,000	0.050	0.921	1,469	1,485
Total				5,000	0.042	0.921	1,231	1,230
Area				0.050	0.921	1,469	1,485	
Surface Volume				0.042	0.921	1,231	1,230	
Subsurface Volume				0.065	0.921	1,613	1,964	
Maximum Underdrain Flow (cfs)						0.07		
Orifice Diameter (in)						0.66		

IMP Name: IMP5 (Soil Type: D)  
 IMP Type: Bioretention Facility  
 Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing Factor	Rain Adjust-ment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA5-Road/Dwv	3,000	Conventional Roof	1.00	3,000	0.050	0.921	1,469	1,485
Total				3,000	0.042	0.921	1,231	1,230
Area				0.050	0.921	1,469	1,485	
Surface Volume				0.042	0.921	1,231	1,230	
Subsurface Volume				0.055	0.921	1,613	1,964	
Maximum Underdrain Flow (cfs)						0.07		
Orifice Diameter (in)						0.67		



- 6\"/>
  - PLANTER SURFACE SHALL BE GRADED FLAT.
  - ADDITIONAL ATTENTION SHOULD BE DIRECTED TO ENSURE ALL LANDSCAPED AREAS ARE VEGETATED AND STABILIZED BEFORE THE BIORETENTION FACILITIES ARE BROUGHT ON-LINE.
  - ALL PERFORATED PIPE SHALL HAVE A MINIMUM DIAMETER OF 6\"/>

REFER TO LANDSCAPE PLANS AND TO C.C.Co. CLEAN WATER PROGRAM STORMWATER (C.3) GUIDEBOOK, 6TH EDITION, APPENDIX B, ATTACHMENT L, FOR THE ENGINEERED SOIL MIX SPECIFICATIONS PRIOR TO ORDERING THE MIX.

BIORETENTION BASIN TYPICAL SECTION N.T.S.

IMP Name: IMP6 (Soil Type: D)  
 IMP Type: Flow-Through Planter  
 Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing Factor	Rain Adjust-ment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA6-Road	2,000	Conventional Roof	1.00	2,000	0.050	0.921	1,469	1,485
Total				2,000	0.042	0.921	1,231	1,230
Area				0.050	0.921	1,469	1,485	
Surface Volume				0.042	0.921	1,231	1,230	
Subsurface Volume				0.065	0.921	1,613	1,964	
Maximum Underdrain Flow (cfs)						0.00		
Orifice Diameter (in)						0.36		

IMP Name: IMP7 (Soil Type: D)  
 IMP Type: Bioretention Facility  
 Soil Type: D

DMA Name	DMA Area (sq ft)	Post-Project Surface Type	DMA Runoff Factor	DMA Area x Runoff Factor	IMP Sizing Factor	Rain Adjust-ment Factor	Minimum Area or Volume	Proposed Area or Volume
DMA7-pavement	3,070	Concrete or Asphalt	1.00	3,070	0.050	0.921	1,469	1,485
Total				3,070	0.042	0.921	1,231	1,230
Area				0.050	0.921	1,469	1,485	
Surface Volume				0.042	0.921	1,231	1,230	
Subsurface Volume				0.055	0.921	1,613	1,964	
Maximum Underdrain Flow (cfs)						0.01		
Orifice Diameter (in)						0.51		



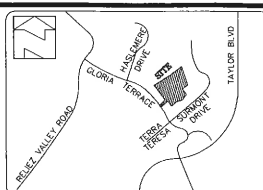
*Izzat S. Nashashibi*  
 IZZAT S. NASHASHIBI R.C.E. 29528

REVISIONS	SCALE	AS NOTED
	DATE	06/24/2016
	ENGINEER	H.N.
	JOB NO.	15012

**STORM WATER CONTROL PLAN EXHIBIT**  
 A RESUBDIVISION OF PARCEL C OF 24 PM 16 AND A PORTION OF LOT 6 OF 9 M 217  
 LAFAYETTE CALIFORNIA  
 APN 166-200-032 AND 166-210-008

**HUMANN COMPANY INC.**  
 ENGINEERING - SURVEYING  
 1021 BROWN AVE. LAFAYETTE, CA 94549  
 PH (925) 283-3000 FAX (925) 283-3576





VICINITY MAP N.T.S.

**OWNERS**  
 APN: 166-200-032  
 GLORIA TERRACE LLC  
 3199 DANVILLE BLVD #245  
 ALAMO, CA 94507  
 PH: (925) 984-2289  
 FAX:

APN: 166-210-008  
 H. F. LAYTON  
 191 SAND CREEK ROAD # 220  
 BRENTWOOD, CA 94513  
 PH:  
 FAX:

**DEVELOPER**  
 GLORIA TERRACE LLC  
 3199 DANVILLE BLVD #245  
 ALAMO, CA 94507  
 PH: (925) 984-2289  
 FAX:

**CIVIL ENGINEER**  
 HUMANN COMPANY, INC.  
 1021 BROWN AVENUE  
 LAFAYETTE, CA 94549  
 PH: (925) 285-5000  
 FAX: (925) 283-3578

**GEOTECHNICAL ENGINEER**  
 GPK & ASSOCIATES  
 11828 DUBLIN BOULEVARD, SUITE D  
 DUBLIN, CA 94568  
 PH: (925) 829-0428  
 FAX:

**EARTH QUANTITIES**  
 EARTH QUANTITIES TO BE VERIFIED BY CONTRACTOR

**SITE GRADING:**  
 MASS GRADING: CUT: 15,000± CU. YARDS  
 REMEDIAL GRADING: SLIDE AREA # 2 CUT: 750± CU. YARDS  
 TOTAL GRADING: CUT: 18,000± CU. YARDS  
 FILL: 15,000± CU. YARDS  
 FILL: 750± CU. YARDS  
 FILL: 18,000± CU. YARDS

KEYWAY AND OVER-EXCAVATION  
 CUT: 2,200± CU. YARDS  
 FILL: 2,200± CU. YARDS

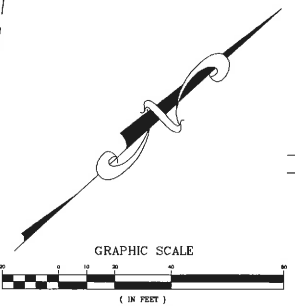
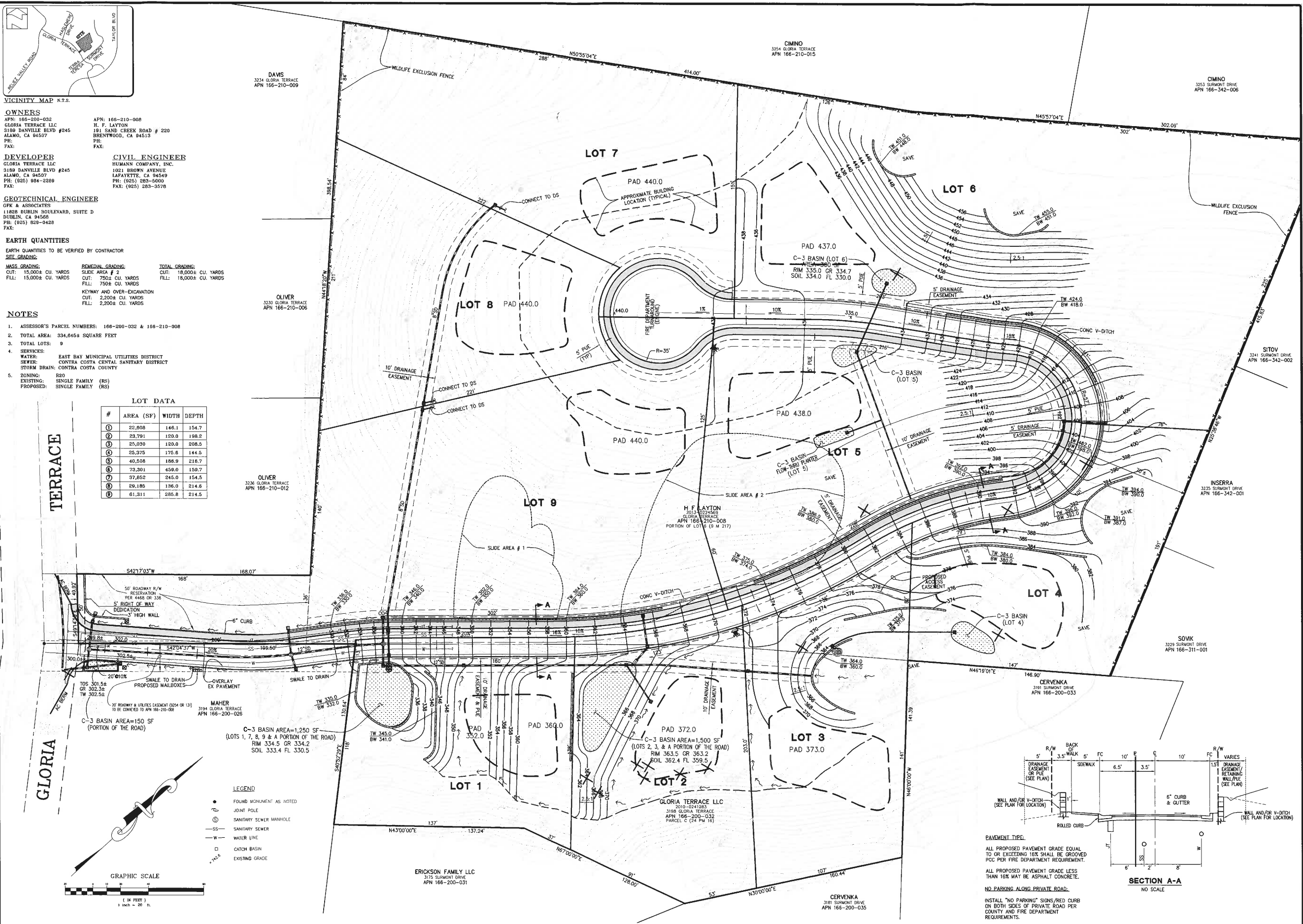
- NOTES**
- ASSESSOR'S PARCEL NUMBERS: 166-200-032 & 166-210-008
  - TOTAL AREA: 334,645± SQUARE FEET
  - TOTAL LOTS: 9
  - SERVICES:  
 WATER: EAST BAY MUNICIPAL UTILITIES DISTRICT  
 SEWER: CONTRA COSTA CENTRAL SANITARY DISTRICT  
 STORM DRAIN: CONTRA COSTA COUNTY
  - ZONING: R20  
 EXISTING: SINGLE FAMILY (RS)  
 PROPOSED: SINGLE FAMILY (RS)

**LOT DATA**

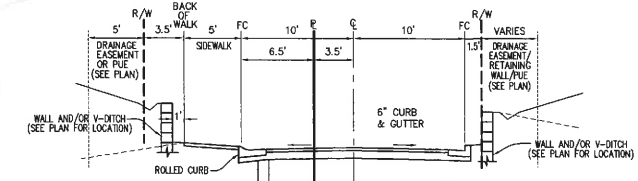
#	AREA (SF)	WIDTH	DEPTH
①	22,808	146.1	154.7
②	23,791	103.0	198.2
③	25,030	120.0	208.5
④	25,375	175.8	144.5
⑤	40,506	186.9	218.7
⑥	79,301	459.0	159.7
⑦	37,852	245.0	154.5
⑧	29,185	186.0	214.6
⑨	61,311	286.8	214.5

TERRACE

GLORIA



- LEGEND**
- FOUND MONUMENT AS NOTED
  - JOINT POLE
  - SANITARY SEWER MANHOLE
  - SANITARY SEWER
  - WATER LINE
  - CATCH BASIN
  - EXISTING GRADE



**PAVEMENT TYPE:**  
 ALL PROPOSED PAVEMENT GRADE EQUAL TO OR EXCEEDING 1% SHALL BE GROoved PCC PER FIRE DEPARTMENT REQUIREMENT.  
 ALL PROPOSED PAVEMENT GRADE LESS THAN 1% MAY BE ASPHALT CONCRETE.

**NO PARKING ALONG PRIVATE ROAD.**  
 INSTALL "NO PARKING" SIGNS/RED CURB ON BOTH SIDES OF PRIVATE ROAD PER COUNTY AND FIRE DEPARTMENT REQUIREMENTS.

**SECTION A-A**  
 NO SCALE

NO.	DATE	BY	REVISIONS

SCALE 1" = 80'

DATE 04/11/16

DRAWN JHC/PR

CHECKED DH

JOB NO. 15012

M. H. Washburn  
 LICENSED PROFESSIONAL ENGINEER  
 STATE OF CALIFORNIA  
 NO. 21538

**VESTING TENTATIVE MAP SD 16-9429**  
**GLORIA TERRACE ESTATES**  
 A RESUBDIVISION OF APN 166-200-032 AND 166-210-008  
 PARCEL C OF 24 PM 16 AND A PORTION OF LOT 6 OF 9 M 217  
**LAFAYETTE CONTRA COSTA COUNTY CALIFORNIA**

**HUMANN COMPANY, INC.**  
 ENGINEERING - SURVEYING  
 1021 BROWN AVE. LAFAYETTE, CA 94549  
 PH (925) 283-5000 FAX (925) 283-3578

**SHEET 1**  
 OF 1 SHEET

**JOB NO. 15012**