# **PROJECT BRUIN PRELIMINARY ENGINEERING SEWER STUDY**

### **1. INTRODUCTION & PURPOSE**

Project Bruin (Project or Proposed Project) is proposing to develop 65-acres of existing agricultural land into an 857,173 SF "light-industrial" facility. The Project is located in Oxnard, CA and is part of the Sakioka Farms Specific Plan (Specific Plan). The Specific Plan area is approximately 430-acres and is bounded by U.S. 101 to the north, Rice Avenue to the west, North Del Norte Boulevard to the east, and Latigo Avenue to the south. The Specific Plan area is shown in **Figure 1** below. There is some additional area east of North Del Norte Boulevard that is included in the Specific Plan, which is shown in **Figure 1**.



Figure 1: Sakioka Farms Specific Plan Area

Project Bruin is situated along North Del Norte Boulevard, approximately 2,500-feet south of U.S. 101. A proposed road (as described in the Specific Plan) will allow for access to the site from North Del Norte Boulevard.

This technical memorandum determined the required pipe size(s) for the on-site sanitary sewer.

# 2. PROJECT ANALYSIS

The proposed on-site sanitary sewer will convey sewage from various stub out locations as shown on the prototypical plans. At these locations, a Drainage Fixture Unit (DFU) value is given. The DFU value is then converted to Gallons per Minute (GPM) by using Chart A 103.1(1) from California Plumbing Code. This chart is included as an attachment. Below is a table summarizing the DFU to GPM conversions for the Project.

Table T. Conversion Summary		
DFU Value	Flowrate (GPM)	
24	35	
240	95	
428	200	

#### Table 1: Conversion Summary

The design criteria for the sanitary sewer are listed on the City of Oxnard standards drawings Plate 40 and Plate 41. Bentley's Flowmaster program was utilized to size the on-site sanitary sewer. The program's inputs consist of pipe slope, pipe diameter, pipe roughness coefficient, and flowrate. The Flowmaster worksheets are included as an attachment.

# 3. RECOMMENDATIONS & CONCLUCSIONS

A series of 4", 6", 8" and 10" PVC pipe are recommended to meet the City of Oxnard's design criteria. Pipe size locations are shown on **Exhibit A**.



Samuel Lake Mellhoit

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# **EXHIBITS**





# **ATTACHMENTS**

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For SI units: 1 gailon per minute = 0.06 L/s



FIXTURE UNITS

For SI units: 1 gallon per minute = 0.06 L/s

**>>** 

Project Description		
Friction Method	Manning	
	Formula	
Solve For	Normal Depth	
Input Data		
Roughness Coefficient	0.013	
Channel Slope	2.000 %	
Diameter	10.0 in	
Discharge	330.00 gal/min	
Results		
Normal Depth	3.3 in	
Flow Area	0.2 ft <sup>2</sup>	
Wetted Perimeter	1.0 ft	
Hydraulic Radius	1.9 in	
Top Width	0.78 ft	
Critical Depth	4.5 in	
Percent Full	33.1 %	
Critical Slope	0.630 %	
Velocity	4.66 ft/s	
Velocity Head	0.34 ft	
Specific Energy	0.61 ft	
Froude Number	1.830	
Maximum Discharge	1,495.93 gal/min	
Discharge Full	1,390.65 gal/min	
Slope Full	0.113 %	
Flow Type	Supercritical	
GVF Input Data		
Downstream Depth	0.0 in	
Length	0.0 ft	
Number Of Steps	0	
GVF Output Data		
Upstream Depth	0.0 in	
Profile Description	N/A	
Profile Headloss	0.00 ft	
Average End Depth Over Rise	0.0 %	
Normal Depth Over Rise	33.1 %	
Downstream Velocity	Infinity ft/s	
Upstream Velocity	Infinity ft/s	
Normal Depth	3.3 in	
Critical Depth	4.5 in	
Channel Slope	2.000 %	
Critical Slope	0.630 %	

### **Worksheet for Lift Station to POC**

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Project Description		
Friction Method	Manning	
	Formula	
Solve For	Normal Depth	
Input Data		
Roughness Coefficient	0.013	
Channel Slope	0.500 %	
Diameter	10.0 in	
Discharge	330.00 gal/min	
Results		
Normal Depth	4.8 in	
Flow Area	0.3 ft <sup>2</sup>	
Wetted Perimeter	1.3 ft	
Hydraulic Radius	2.5 in	
Top Width	0.83 ft	
Critical Depth	4.5 in	
Percent Full	48.5 %	
Critical Slope	0.630 %	
Velocity	2.80 ft/s	
Velocity Head	0.12 ft	
Specific Energy	0.53 ft	
Froude Number	0.881	
Maximum Discharge	747.96 gal/min	
Discharge Full	695.32 gal/min	
Slope Full	0.113 %	
Flow Type	Subcritical	
GVF Input Data		
Downstream Depth	0.0 in	
Length	0.0 ft	
Number Of Steps	0	
GVF Output Data		
Upstream Depth	0.0 in	
Profile Description	N/A	
Profile Headloss	0.00 ft	
Average End Depth Over Rise	0.0 %	
Normal Depth Over Rise	24.0 %	
Downstream Velocity	Infinity ft/s	
Upstream Velocity	Infinity ft/s	
Normal Depth	4.8 in	
Critical Depth	4.5 in	
Channel Slope	0.500 %	
Critical Slope	0.630 %	

### Worksheet for 10" @ 0.5%

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Project Description		
Friction Method	Manning	
Coluz For	Formula	
Solve For	Normal Depth	
Input Data		
Roughness Coefficient	0.013	
Channel Slope	2.000 %	
Diameter	6.0 in	
Discharge	35.00 gal/min	
Results		
Normal Depth	1.3 in	
Flow Area	0.0 ft <sup>2</sup>	
Wetted Perimeter	0.5 ft	
Hydraulic Radius	0.8 in	
Top Width	0.41 ft	
Critical Depth	1.6 in	
Percent Full	21.2 %	
Critical Slope	0.708 %	
Velocity	2.57 ft/s	
Velocity Head	0.10 ft	
Specific Energy	0.21 ft	
Froude Number	1.663	
Maximum Discharge	383.10 gal/min	
Discharge Full	356.14 gal/min	
Slope Full	0.019 %	
Flow Type	Supercritical	
GVF Input Data		
Downstream Depth	0.0 in	
Length	0.0 ft	
Number Of Steps	0	
GVF Output Data		
Upstream Depth	0.0 in	
Profile Description	N/A	
Profile Headloss	0.00 ft	
Average End Depth Over Rise	0.0 %	
Normal Depth Over Rise	21.2 %	
Downstream Velocity	Infinity ft/s	
Upstream Velocity	Infinity ft/s	
Normal Depth	1.3 in	
Critical Depth	1.6 in	
Channel Slope	2.000 %	
Critical Slope	0.708 %	

#### Worksheet for 6" @ 2%

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