3.7-3 Downstream Pre-Project and Post Project Velocities

Technical Memorandum

Date: **January 3, 2012**

To: **Gwen Owens, Supervising Engineer, Interwest Consulting**

From: **Joseph L. Castaneda, P.E.**

Re: **Tentative Tract Map 36388 Downstream Pre-Project and Post-Project Velocities**

JLC Engineering performed an analyses for the pre-project and post-project velocities for the four downstream tributary areas, Areas A, B, C and D (see Figure A). The velocities were calculated by normal depth using the Bentley Flowmaster program for the 2-year, 24-hour and 10-year, 24-hour storm durations. A table has been included to summarize the flow rates used in the normal depth analyses.

Several of the areas had a resulting outflow of 0 ft^3/s due to the post-project flow rates being slightly less than the pre-project flow rates. In order to be conservative, the existing condition flow rate was utilized for these areas. During final engineering, detailed basin routing analyses will be performed and will insure that flows for these areas are less than the pre-project levels.

Using the calculated flow rates, normal depth calculations were performed. For Areas A and B, irregular sections were utilized to model the existing channel. For Area C, the existing downstream 36” pipe was utilized to determine the velocities. For Area D, the existing 72” pipe was utilized for the analysis. The offsite flow rates were not considered, there is no change in the offsite area. Flows from the offsite areas are routed through storm drain systems, and do not enter the basin areas. Therefore only the onsite pre-project and post-project flow rates were utilized.

Area A Flow Rates

Storm Duration	Pre-Project Flow Rate (ft^3/s)	Post-Project Flow Rate (ft^3/s)
2-year, 24-hour	0.62	0.61
10-year, 24-hour	1.41	1.41*

* - Flows will not exceed 1.41 ft^3/s.

Area B Flow Rates

Area B1

Storm Duration	Pre-Project Flow Rate (ft^3/s)	Post-Project Flow Rate (ft^3/s)
2-year, 24-hour	3.3	3.29
10-year, 24-hour	14.55	14.55*

* - Flows will not exceed 14.55 ft^3/s.

Area B2

Storm Duration	Pre-Project Flow Rate (ft^3/s)	Post-Project Flow Rate (ft^3/s)
2-year, 24-hour	7.75	6.22
10-year, 24-hour	17.86	17.56

Total Area B Flow Rates

Storm Duration	Pre-Project Flow Rate (ft^3/s)	Post-Project Flow Rate (ft^3/s)
2-year, 24-hour	11.05	9.51
10-year, 24-hour	32.41	32.11

Area C Flow Rates

Storm Duration	Pre-Project Flow Rate (ft^3/s)	Post-Project Flow Rate (ft^3/s)
2-year, 24-hour	2.47	2.16
10-year, 24-hour	6.2	6.17

Area D Flow Rates

Area D1

Storm Duration	Pre-Project Flow Rate (ft^3/s)	Post-Project Flow Rate (ft^3/s)
2-year, 24-hour	0.5	0.5*
10-year, 24-hour	1.18	1.18*

Area D2

Storm Duration	Pre-Project Flow Rate (ft^3/s)	Post-Project Flow Rate (ft^3/s)
2-year, 24-hour	0.31	0.31*
10-year, 24-hour	0.71	0.71*

Area D3

Storm Duration	Pre-Project Flow Rate (ft^3/s)	Post-Project Flow Rate (ft^3/s)
2-year, 24-hour	1.16	0.99
10-year, 24-hour	2.63	2.58

Total Area D Flow Rates

Storm Duration	Pre-Project Flow Rate (ft^3/s)	Post-Project Flow Rate (ft^3/s)
2-year, 24-hour	1.97	1.8
10-year, 24-hour	4.52	4.47

* - Flows will not exceed pre-project levels

Velocities Summary Table

Area A

Storm Duration	Pre-Project Velocity (ft/s)	Post-Project Velocity (ft/s)
2-year, 24-hour	1.95	1.94
10-year, 24-hour	2.38	2.38

Area B

Storm Duration	Pre-Project Velocity (ft/s)	Post-Project Velocity (ft/s)
2-year, 24-hour	3.12	2.98
10-year, 24-hour	4.18	4.17

Area C

Storm Duration	Pre-Project Velocity (ft/s)	Post-Project Velocity (ft/s)
2-year, 24-hour	7.03	6.75
10-year, 24-hour	9.26	9.24

Area D

Storm Duration	Pre-Project Velocity (ft/s)	Post-Project Velocity (ft/s)
2-year, 24-hour	5.22	5.07
10-year, 24-hour	6.72	6.7

Worksheet for Area A Outlet Section-pre 2-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.04800	ft/ft
Discharge	0.62	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
10+00.00	1746.00
10+09.25	1745.00
10+15.10	1744.60
10+20.24	1745.00
10+41.55	1746.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(10+00.00, 1746.00)	(10+41.55, 1746.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.15	ft
Elevation Range	1744.60 to 1746.00 ft	
Flow Area	0.32	ft²
Wetted Perimeter	4.19	ft
Hydraulic Radius	0.08	ft
Top Width	4.18	ft
Normal Depth	0.15	ft
Critical Depth	0.17	ft

Worksheet for Area A Outlet Section-pre 2-24

Results

Critical Slope		0.03015	ft/ft
Velocity		1.95	ft/s
Velocity Head		0.06	ft
Specific Energy		0.21	ft
Froude Number		1.25	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.15	ft
Critical Depth	0.17	ft
Channel Slope	0.04800	ft/ft
Critical Slope	0.03015	ft/ft

Worksheet for Area A Outlet Section-pre 10-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.04800	ft/ft
Discharge	1.41	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
10+00.00	1746.00
10+09.25	1745.00
10+15.10	1744.60
10+20.24	1745.00
10+41.55	1746.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(10+00.00, 1746.00)	(10+41.55, 1746.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.21	ft
Elevation Range	1744.60 to 1746.00 ft	
Flow Area	0.59	ft²
Wetted Perimeter	5.71	ft
Hydraulic Radius	0.10	ft
Top Width	5.70	ft
Normal Depth	0.21	ft
Critical Depth	0.23	ft

Worksheet for Area A Outlet Section-pre 10-24

Results

Critical Slope		0.02704	ft/ft
Velocity		2.38	ft/s
Velocity Head		0.09	ft
Specific Energy		0.30	ft
Froude Number		1.31	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.21	ft
Critical Depth	0.23	ft
Channel Slope	0.04800	ft/ft
Critical Slope	0.02704	ft/ft

Worksheet for Area A Outlet Section-post 2-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.04800	ft/ft
Discharge	0.61	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
10+00.00	1746.00
10+09.25	1745.00
10+15.10	1744.60
10+20.24	1745.00
10+41.55	1746.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(10+00.00, 1746.00)	(10+41.55, 1746.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.15	ft
Elevation Range	1744.60 to 1746.00 ft	
Flow Area	0.31	ft²
Wetted Perimeter	4.17	ft
Hydraulic Radius	0.08	ft
Top Width	4.16	ft
Normal Depth	0.15	ft
Critical Depth	0.16	ft

Worksheet for Area A Outlet Section-post 2-24

Results

Critical Slope		0.03024	ft/ft
Velocity		1.94	ft/s
Velocity Head		0.06	ft
Specific Energy		0.21	ft
Froude Number		1.24	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.15	ft
Critical Depth	0.16	ft
Channel Slope	0.04800	ft/ft
Critical Slope	0.03024	ft/ft

Worksheet for Area A Outlet Section-post 10-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.04800	ft/ft
Discharge	1.41	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
10+00.00	1746.00
10+09.25	1745.00
10+15.10	1744.60
10+20.24	1745.00
10+41.55	1746.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(10+00.00, 1746.00)	(10+41.55, 1746.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.21	ft
Elevation Range	1744.60 to 1746.00 ft	
Flow Area	0.59	ft²
Wetted Perimeter	5.71	ft
Hydraulic Radius	0.10	ft
Top Width	5.70	ft
Normal Depth	0.21	ft
Critical Depth	0.23	ft

Worksheet for Area A Outlet Section-post 10-24

Results

Critical Slope		0.02704	ft/ft
Velocity		2.38	ft/s
Velocity Head		0.09	ft
Specific Energy		0.30	ft
Froude Number		1.31	
Flow Type	Supercritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.21	ft
Critical Depth	0.23	ft
Channel Slope	0.04800	ft/ft
Critical Slope	0.02704	ft/ft

Worksheet for Area B Outlet Section-pre 2-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01160	ft/ft
Discharge	11.05	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
10+00.00	1685.00
10+10.98	1684.00
10+19.21	1683.00
10+23.20	1682.00
10+26.47	1681.41
10+29.17	1682.00
10+32.06	1683.00
10+35.29	1684.00
10+38.87	1685.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(10+00.00, 1685.00)	(10+38.87, 1685.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.85	ft
Elevation Range	1681.41 to 1685.00 ft	
Flow Area	3.55	ft^2
Wetted Perimeter	7.95	ft

Worksheet for Area B Outlet Section-pre 2-24

Results

Hydraulic Radius		0.45	ft
Top Width		7.76	ft
Normal Depth		0.85	ft
Critical Depth		0.78	ft
Critical Slope		0.01813	ft/ft
Velocity		3.12	ft/s
Velocity Head		0.15	ft
Specific Energy		1.00	ft
Froude Number		0.81	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.85	ft
Critical Depth	0.78	ft
Channel Slope	0.01160	ft/ft
Critical Slope	0.01813	ft/ft

Worksheet for Area B Outlet Section-pre 10-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01160	ft/ft
Discharge	32.41	ft³/s

Section Definitions

Station (ft)	Elevation (ft)
10+00.00	1685.00
10+10.98	1684.00
10+19.21	1683.00
10+23.20	1682.00
10+26.47	1681.41
10+29.17	1682.00
10+32.06	1683.00
10+35.29	1684.00
10+38.87	1685.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(10+00.00, 1685.00)	(10+38.87, 1685.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.30	ft
Elevation Range	1681.41 to 1685.00 ft	
Flow Area	7.76	ft²
Wetted Perimeter	11.19	ft

Worksheet for Area B Outlet Section-pre 10-24

Results

Hydraulic Radius		0.69	ft
Top Width		10.87	ft
Normal Depth		1.30	ft
Critical Depth		1.23	ft
Critical Slope		0.01555	ft/ft
Velocity		4.18	ft/s
Velocity Head		0.27	ft
Specific Energy		1.57	ft
Froude Number		0.87	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.30	ft
Critical Depth	1.23	ft
Channel Slope	0.01160	ft/ft
Critical Slope	0.01555	ft/ft

Worksheet for Area B Outlet Section-post 2-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01160	ft/ft
Discharge	9.51	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
10+00.00	1685.00
10+10.98	1684.00
10+19.21	1683.00
10+23.20	1682.00
10+26.47	1681.41
10+29.17	1682.00
10+32.06	1683.00
10+35.29	1684.00
10+38.87	1685.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(10+00.00, 1685.00)	(10+38.87, 1685.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	0.80	ft
Elevation Range	1681.41 to 1685.00 ft	
Flow Area	3.19	ft^2
Wetted Perimeter	7.61	ft

Worksheet for Area B Outlet Section-post 2-24

Results

Hydraulic Radius		0.42	ft
Top Width		7.43	ft
Normal Depth		0.80	ft
Critical Depth		0.73	ft
Critical Slope		0.01854	ft/ft
Velocity		2.98	ft/s
Velocity Head		0.14	ft
Specific Energy		0.94	ft
Froude Number		0.80	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.80	ft
Critical Depth	0.73	ft
Channel Slope	0.01160	ft/ft
Critical Slope	0.01854	ft/ft

Worksheet for Area B Outlet Section-post 10-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Channel Slope	0.01160	ft/ft
Discharge	32.11	ft^3/s

Section Definitions

Station (ft)	Elevation (ft)
10+00.00	1685.00
10+10.98	1684.00
10+19.21	1683.00
10+23.20	1682.00
10+26.47	1681.41
10+29.17	1682.00
10+32.06	1683.00
10+35.29	1684.00
10+38.87	1685.00

Roughness Segment Definitions

Start Station	Ending Station	Roughness Coefficient
(10+00.00, 1685.00)	(10+38.87, 1685.00)	0.030

Options

Current Roughness Weighted Method	Pavlovskii's Method
Open Channel Weighting Method	Pavlovskii's Method
Closed Channel Weighting Method	Pavlovskii's Method

Results

Normal Depth	1.30	ft
Elevation Range	1681.41 to 1685.00 ft	
Flow Area	7.70	ft^2
Wetted Perimeter	11.16	ft

Worksheet for Area B Outlet Section-post 10-24

Results

Hydraulic Radius		0.69	ft
Top Width		10.84	ft
Normal Depth		1.30	ft
Critical Depth		1.22	ft
Critical Slope		0.01557	ft/ft
Velocity		4.17	ft/s
Velocity Head		0.27	ft
Specific Energy		1.57	ft
Froude Number		0.87	
Flow Type	Subcritical		

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.30	ft
Critical Depth	1.22	ft
Channel Slope	0.01160	ft/ft
Critical Slope	0.01557	ft/ft

Worksheet for Area C Outlet Pipe-pre 2-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.04770	ft/ft
Diameter	3.00	ft
Discharge	2.47	ft^3/s

Results

Normal Depth	0.29	ft
Flow Area	0.35	ft^2
Wetted Perimeter	1.90	ft
Hydraulic Radius	0.19	ft
Top Width	1.78	ft
Critical Depth	0.49	ft
Percent Full	9.7	%
Critical Slope	0.00550	ft/ft
Velocity	7.03	ft/s
Velocity Head	0.77	ft
Specific Energy	1.06	ft
Froude Number	2.78	
Maximum Discharge	135.80	ft^3/s
Discharge Full	126.24	ft^3/s
Slope Full	0.00002	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	9.70	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area C Outlet Pipe-pre 2-24

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.29	ft
Critical Depth	0.49	ft
Channel Slope	0.04770	ft/ft
Critical Slope	0.00550	ft/ft

Worksheet for Area C Outlet Pipe-pre 10-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.04770	ft/ft
Diameter	3.00	ft
Discharge	6.20	ft^3/s

Results

Normal Depth	0.45	ft
Flow Area	0.67	ft^2
Wetted Perimeter	2.39	ft
Hydraulic Radius	0.28	ft
Top Width	2.15	ft
Critical Depth	0.78	ft
Percent Full	15.1	%
Critical Slope	0.00520	ft/ft
Velocity	9.26	ft/s
Velocity Head	1.33	ft
Specific Energy	1.78	ft
Froude Number	2.92	
Maximum Discharge	135.80	ft^3/s
Discharge Full	126.24	ft^3/s
Slope Full	0.00012	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	15.08	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area C Outlet Pipe-pre 10-24

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.45	ft
Critical Depth	0.78	ft
Channel Slope	0.04770	ft/ft
Critical Slope	0.00520	ft/ft

Worksheet for Area C Outlet Pipe-post 2-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.04770	ft/ft
Diameter	3.00	ft
Discharge	2.16	ft^3/s

Results

Normal Depth	0.27	ft
Flow Area	0.32	ft^2
Wetted Perimeter	1.84	ft
Hydraulic Radius	0.17	ft
Top Width	1.73	ft
Critical Depth	0.46	ft
Percent Full	9.1	%
Critical Slope	0.00557	ft/ft
Velocity	6.75	ft/s
Velocity Head	0.71	ft
Specific Energy	0.98	ft
Froude Number	2.76	
Maximum Discharge	135.80	ft^3/s
Discharge Full	126.24	ft^3/s
Slope Full	0.00001	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	9.10	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area C Outlet Pipe-post 2-24

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.27	ft
Critical Depth	0.46	ft
Channel Slope	0.04770	ft/ft
Critical Slope	0.00557	ft/ft

Worksheet for Area C Outlet Pipe-post 10-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.04770	ft/ft
Diameter	3.00	ft
Discharge	6.17	ft^3/s

Results

Normal Depth	0.45	ft
Flow Area	0.67	ft^2
Wetted Perimeter	2.39	ft
Hydraulic Radius	0.28	ft
Top Width	2.14	ft
Critical Depth	0.78	ft
Percent Full	15.0	%
Critical Slope	0.00520	ft/ft
Velocity	9.24	ft/s
Velocity Head	1.33	ft
Specific Energy	1.78	ft
Froude Number	2.92	
Maximum Discharge	135.80	ft^3/s
Discharge Full	126.24	ft^3/s
Slope Full	0.00011	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	15.04	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area C Outlet Pipe-post 10-24

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.45	ft
Critical Depth	0.78	ft
Channel Slope	0.04770	ft/ft
Critical Slope	0.00520	ft/ft

Worksheet for Area D Outlet Pipe-pre 2-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.03290	ft/ft
Diameter	6.00	ft
Discharge	1.97	ft^3/s

Results

Normal Depth	0.24	ft
Flow Area	0.38	ft^2
Wetted Perimeter	2.41	ft
Hydraulic Radius	0.16	ft
Top Width	2.35	ft
Critical Depth	0.36	ft
Percent Full	4.0	%
Critical Slope	0.00553	ft/ft
Velocity	5.22	ft/s
Velocity Head	0.42	ft
Specific Energy	0.66	ft
Froude Number	2.29	
Maximum Discharge	716.11	ft^3/s
Discharge Full	665.72	ft^3/s
Slope Full	0.00000	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	3.99	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area D Outlet Pipe-pre 2-24

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.24	ft
Critical Depth	0.36	ft
Channel Slope	0.03290	ft/ft
Critical Slope	0.00553	ft/ft

Worksheet for Area D Outlet Pipe-pre 10-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.03290	ft/ft
Diameter	6.00	ft
Discharge	4.52	ft^3/s

Results

Normal Depth	0.35	ft
Flow Area	0.67	ft^2
Wetted Perimeter	2.94	ft
Hydraulic Radius	0.23	ft
Top Width	2.82	ft
Critical Depth	0.55	ft
Percent Full	5.9	%
Critical Slope	0.00495	ft/ft
Velocity	6.72	ft/s
Velocity Head	0.70	ft
Specific Energy	1.06	ft
Froude Number	2.43	
Maximum Discharge	716.11	ft^3/s
Discharge Full	665.72	ft^3/s
Slope Full	0.00000	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	5.88	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area D Outlet Pipe-pre 10-24

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.35	ft
Critical Depth	0.55	ft
Channel Slope	0.03290	ft/ft
Critical Slope	0.00495	ft/ft

Worksheet for Area D Outlet Pipe-post 2-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.03290	ft/ft
Diameter	6.00	ft
Discharge	1.80	ft^3/s

Results

Normal Depth	0.23	ft
Flow Area	0.36	ft^2
Wetted Perimeter	2.36	ft
Hydraulic Radius	0.15	ft
Top Width	2.30	ft
Critical Depth	0.35	ft
Percent Full	3.8	%
Critical Slope	0.00561	ft/ft
Velocity	5.07	ft/s
Velocity Head	0.40	ft
Specific Energy	0.63	ft
Froude Number	2.28	
Maximum Discharge	716.11	ft^3/s
Discharge Full	665.72	ft^3/s
Slope Full	0.00000	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	3.83	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area D Outlet Pipe-post 2-24

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.23	ft
Critical Depth	0.35	ft
Channel Slope	0.03290	ft/ft
Critical Slope	0.00561	ft/ft

Worksheet for Area D Outlet Pipe-post 10-24

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.015	
Channel Slope	0.03290	ft/ft
Diameter	6.00	ft
Discharge	4.47	ft^3/s

Results

Normal Depth	0.35	ft
Flow Area	0.67	ft^2
Wetted Perimeter	2.93	ft
Hydraulic Radius	0.23	ft
Top Width	2.82	ft
Critical Depth	0.55	ft
Percent Full	5.9	%
Critical Slope	0.00495	ft/ft
Velocity	6.70	ft/s
Velocity Head	0.70	ft
Specific Energy	1.05	ft
Froude Number	2.43	
Maximum Discharge	716.11	ft^3/s
Discharge Full	665.72	ft^3/s
Slope Full	0.00000	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	5.85	%
Downstream Velocity	Infinity	ft/s

Worksheet for Area D Outlet Pipe-post 10-24

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	0.35	ft
Critical Depth	0.55	ft
Channel Slope	0.03290	ft/ft
Critical Slope	0.00495	ft/ft

TENTATIVE TRACT MAP NO. 36388

IN THE CITY OF WILDOMAR, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

TRIBUTARY AREAS FOR DOWNSTREAM VELOCITY ANALYSIS

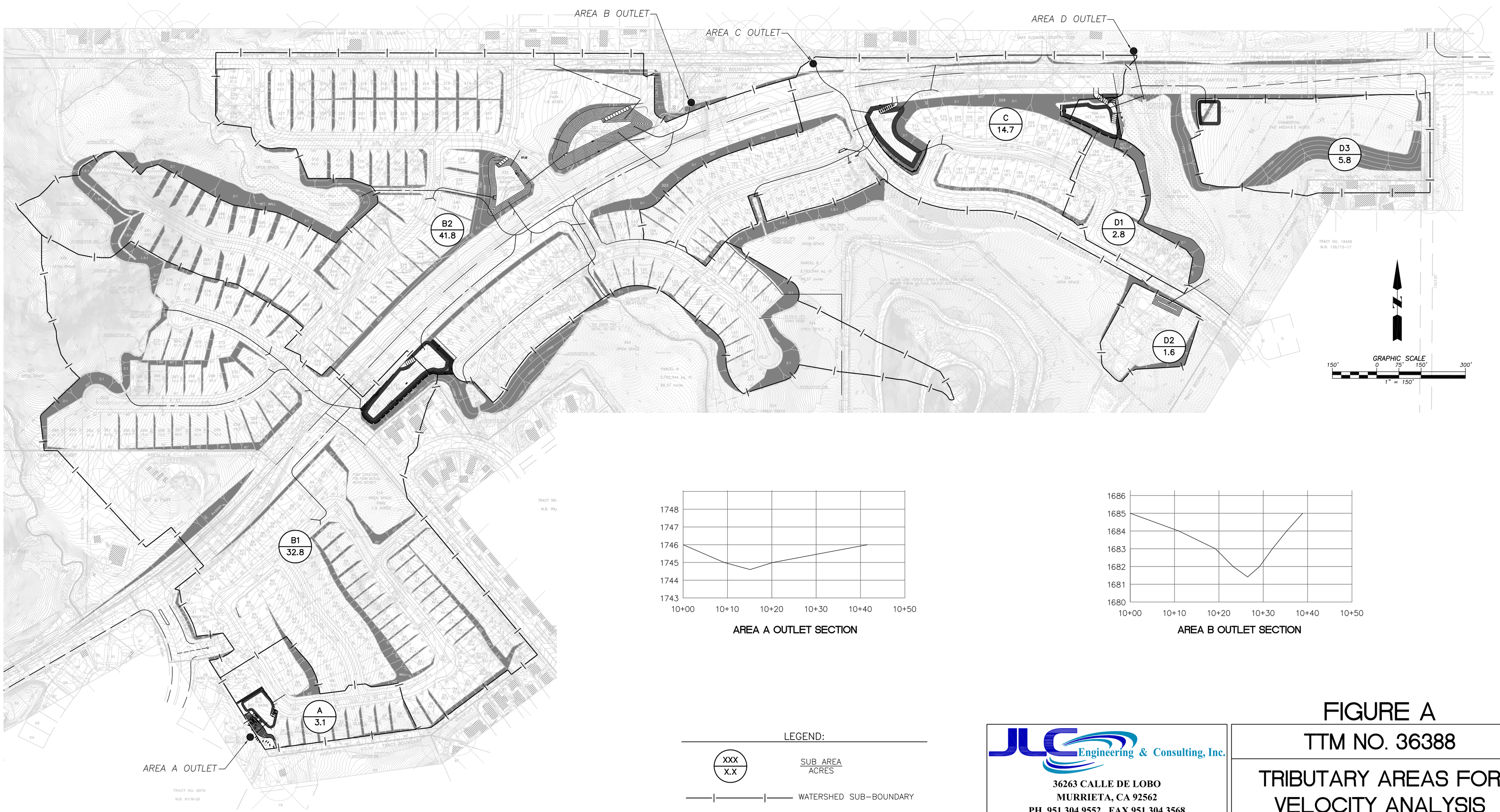

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FIGURE A

TTM NO. 36388

TRIBUTARY AREAS FOR VELOCITY ANALYSIS

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Last Opened: Jan 03, 2012 – 12:05pm by jcarver