APPENDIX I – HYDROLOGY ANALYSIS

HYDROLOGY ANALYSIS

for

EVERETT STREET CONDOMINIUMS

EVERETT STREET & WALNUT CANYON ROAD

MOORPARK, CA

by

HOLMES ENTERPRISES, INC.
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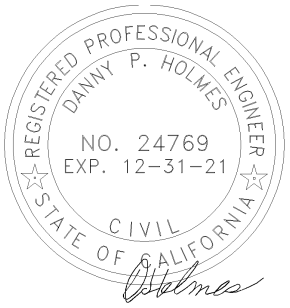

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INTRODUCTION:
The project consist of constructing 60 condominium terraced units with underground parking on 2.46 acres at the north side of the intersection of Everett Street and Walnut Canyon in Moorpark, California. Stormwater will be collected by pipes which will direct the stormwater to 44 inch detention chambers, then to biofiltration chambers and ultimately to an existing storm drain in Walnut Canyon Road.

SITE DESCRIPTION:
The subject property ("property") consists of 107,285 square feet (2.46 acres) with approximately 195 feet of frontage along the North side of Everett Street and 231 feet of frontage on the East side of Walnut Canyon Road and partially bounded by Wicks Road on the North as shown on **EXHIBIT A**. The prior use of the property consisted of approximately seven bungalows which were perilously removed. There is approximately 0.87 acres of private property north of Wicks Road draining onto the subject property. The southerly 70% of the property slopes from 2% to 10% southerly while the north 30% of the property slopes up to 60% southerly with a total elevation difference of 48 feet from north to south. It is proposed to construct a 60 condominiums units, terraced on three levels with two levels of underground parking.

OFF SITE DRAINAGE:
As shown in **EXHIBIT B** there is approximately 14.7 acres northeast of the property which drains on to Wicks Road, Wicks Road doe not contain a storm drain resulting in the runoff running down Wicks Road to Walnut Canyon Road. As shown in **EXHIBIT B** the upper portion of Wicks Road consisting of 3.2 acres of runoff enters a canyon on the south side of Wicks Road just below 180 Wicks Road. The remaining 11.5 acres draining onto Wicks Road flows along the north side of Wicks Road along a 6 inch asphalt curb (Wicks Road is only a partial width road with a cross slope 2% to the north). From Flow Data **Appendix A1**, the peak Q_{100} of the 11.5 acres is 42.91 cfs.
As shown by the arrows in **EXHIBIT B**, the runoff flows to the north side of Wicks Road. Additionally, there is a 6" curb on the south side of Wicks directly above the property that deflects any runoff to the north side of Wicks where Wicks is 24 feet wide. Using the equation for street flow of Q= 0.56*Sx^.167*S^.5*T^2.67/n or 0.56*.02^1.67*0.1*.5*24^2.67/ .015, the north side of Wicks (24 feet wide) can flow 83 cfs at a 10% slope and 53 cfs at a 4% slope which exceeds 42.9 cfs anticipated. Inspection of the south side of Wicks Road shows no sign of erosion, nor has it shown any erosion in the 22 years this author has lived on Wicks Road. This results in only that portion between the north property line and Wicks Road contributing to runoff onto the property. From Flow Data **A1 of Appendix A**, the peak Q_{100} of the .086 acres is 3.38 cfs. Using the formula of Q=1.486*A^1.67*S^.5/(n*p^.67) a v-ditch 1.5 feet wide and .675 feet deep with a slope of 5% and an n of 0.012 has a capacity of 4.02 cfs. To accomplish a 5% slope, four catch basins will be placed behind the north retaining wall at the four low points, one of which will be at the northwest corner of the property. The catch basins will be fitted with drainage pipes which will exit through the retaining wall footings and connect to building drainage system.

ON SITE DRAINAGE:
On site stormwater time of concentration (minutes) and peak flows (cfs) for Q_{10}, Q_{25}, Q_{50} and Q_{100}, for both pre-developed (**A3 to A6 Appendix A**) and pos-developed conditions were determined using Ventura County Hydrology Manual's VCRat are shown in **Appendix A (A7 through A10)**.

Since the pre-developed site consisted of seven bungalows, the undeveloped condition of 1/3 acre per acre was used with an impervious value of 20%.
For the developed site consisting of sixty units, a condition of CONDO was used with an impervious value of 76.3%. The results are summarized below:

TABLE 1	Q_{10}		Q_{25}		Q_{50}		Q_{100}	
	Tc	Peak Q	Tc	Peak Q	Tc	Peak Q	Tc	Peak Q
Tc UNDEVELOPED	6.43	4.34	5.57	6.62	5.03	8.70	5.01	9.37
Tc DEVELOPED	6.43	4.62	5.57	6.87	5.03	8.86	5.01	9.51
90% of UNDEVELOPED		3.90		5.95		7.83		8.43

POST CONSTRUCTION STORMWATER MANAGEMENT:
The Ventura County Guidelines for stormwater management require that the first 3/4 inch of stormwater be infiltrated back into the soil, if possible, and if not, be cleaned prior to leaving the property. Upon recent recommendations by the soils engineer it was determined infeasible to infiltrate the stormwater due to clayey soil conditions. Additionally, due to the density of development there is insufficient room to utilize the standard filtering systems prescribed by said guidelines such as grass swales and vegetated filter strips. Consequently, a proprietary system has been selected in the form of biofilter. It is required to filter to filtrate 1.5 times the standard 0.2 cfs of that portion not infiltrated (in this case 100%). Therefore the required flow (SQDF) of AxCx0.30 where A = area of site in acres, C = the site impervious coefficient and 0.3 is the amount of flow to be filtered. C = .95xI+c(1-I) where c = .1 and I = % impervious which is 76.3% for this site. Therefore, C=.95x.763+.1(0.763)=0.75 and SQDF = 2.47x.75x.3 = 0.556 cfs..
Due to limited space, two biofilters will be used requiring the site runoff to be split between the two biofilters as shown in **EXHIBIT E and F**. The two biofilters have a combined filtering capacity of 0.577cfs (0.231+0.346). The site runoff will be split into two sections as shown in **EXHIBIT C** with AREA1 consisting of 1.46 acres (=0.330 cfs) and AREA 2 consisting of 1.0 acres (=0.225 cfs).
In both AREAs 1 and 2, the runoff from roofs, planters and hardscape will be collected by catch basins leading to a main drain line suspended rom the garage ceiling and underground to the biofilters. The MWS-L-8-8-C is a curb inlet filter and will be placed at the southeast corner of the main driveway entrance and will collect the runoff from AREA 2 and the driveway. The MLS-L-8_12-V will be located southeasterly of the emergency driveway, accepts stormwater from a below grade pipe and will accept the runoff from AREA 1. A catch basin will be placed at the southeast corner of the emergency driveway to collect stormwater from the driveway and surrounding area and connect to the inlet pipe of the biofilter. Both biofilters are designed to internally bypass flows exceeding the filtering capacity via an outlet pipe which will connect the City/County/State storm drain system in Everett Street and Walnut Canyon Road.

As shown on **A11 of Appendix A**, the Q_{100} developed peak flow including the 0.86 acres to the north is 12.77 cfs, an increase of 3.26 cfs from the developed property. 80% of the increase will be directed to the east end of the property via a pipe, southerly along the east edge of the property to the main drain line for AREA 1. The remaining 20% will be directed similarly to the west to the main drain line for AREA 1. This results in AREA 1 flowing 9.51x1.46/2.46 + 0.2x3.26, or 6.29 cfs (and 6.48 cfs for AREA 2). This will require a 14" drain pipe at a 1.5% slope minimum.

Q_{100} DEVELOPED vs Q_{10} UNDEVELOPED:
The Ventura County Watershed Protection District requires new development to design a project so that the Q_{100} developed stormwater runoff from the site does not exceed 90% of the Q_{10} undeveloped condition. The 90% condition (see **TABLE 1**). In accordance with **EXHIBIT G** detaining 1936 cubic feet of stormwater will be required. Detention will be accomplished using 44 inch diameter pipes installed under the lower parking levels as shown in **EXHIBIT D**.
The area of a 44" pipe 75% full is 8.5 square feet, thus requiring 230 linear feet of pipe (we will add 20% for safety = 276 lf). The detention pipes lengths will be proportioned in relation to the biofilter filtration rates as shown on **EXHIBIT D**. AREA 2 will be proportioned with its respective areas 1A and 1B resulting in 42% (116 LF), 17% (47 LF) and 41% (113 LF), for AREAs 1A, 1B and 2, respectively.
Using the equation of minimum orifice area A=storage volume/(60.19xD^.5xT) where D is depth of water and T is 24 hours maximum drawdown time, the minimum area is 0.164 sq. in. (.46 diameter), 0.393 sq. in. (.707 diameter), 0.381 sq. in. (.697 diameter) for Areas 1A, 1B, and 2, respectively. Using the equation of Q= AxCxhxSQRT2g, and assuming a maximum head of 3.6 feet in the retention pipe, a maximum of 6.3 inch diameter outflow pipe is required to restrict the flow to 3.90 cfs, a 2" pipe will be used resulting in a maximum outflow of 0.16 cfs and a drawdown time of 4 hours. An overflow outlet will be placed at the top of the detention pipe. Using a pipe slope of 1.5% and Q_{100} of 3.98, 1.66 and 3.87cfs requires a 12", 10" and 12" diameter pipe for Areas 1A, 1B and 2, respectively. To include the runoff from the 0.86 acres north of the property, the maximum flows will be 1.85, 4.43 and 6.48 cfs, or 14", 10" and 14", for Areas A1, A2 and 2, respectively.

EXISTING CALLEGUAS EASEMENT:
There is a 10 foot wide water line easement running south to north between Areas 1 and 2 containing a 24 inch water line with approximately ten feet of cover. Although it is allowed to cross the easement with paving and utilities with adequate separation between utilities and the existing 24 inch water line, the easement must be kept from structures clear to the sky. The v-ditch mention in th off-ste portion of this report will collect stormwater from north of the property while the easement from the north property line to the south face of the proposed parking garages will be left natural and or landscaped.

FEMA FLOOD HAZARD:
Per the FEMA Map No. 06111C0817E (**EXHIBITS H and I**), the site is with a flood zone "AO" which indicates a 100 year flood depth of one foot. However, the City of Moorpark, in a letter dated November 9, 2011 (a portion of which is shown in **EXHIBIT J)** requested a change in the flood designation from "AO" to "X" (which included the subject site) thus removing the site from a 100 year flood zone. A conclusion by MRC LLC in the third and fourth paragraphs of page 5 of said letter states that "Results of the updated analysis of the study area indicate that the peak discharges are contained within the Walnut Canyon Channel. There is no left or right overbank flows that breakout from the main Walnut Canyon Channel system, eliminating the need for a left and right overbank effective HEC-RAS models. As a result, the flood plain mapping to the east of Walnut Canyon Road has been removed...

MRC LLC proposes that the above noted changes be incorporated into Panel No. 0817E as the 100 year peak discharges are contained within the Walnut Canyon Channel system. "Since the base flood event is contained within the channel banks we further recommend that BFE values be

removed and a zone designation changed to Zone A. If the zone designation is changed to Zone A. There is no need to publish BFE values on the map or to develop and publish profile panels." A map showing the change in flood zone designation is shown in **EXHIBIT K**. The attached **EXHIBIT L** shows the FEMA approval of the change dated 03/01/2012 with a caveat that FEMA will not revise the FIRM Map No. 06111C0817E at this time. **EXHIBIT M** shows the FEMA revised FIRM Map Panel 0817E depicting the subject area revised from "AO" to "X".

CONCLUSION:

The project can be built as shown on **EXHIBIT A** in accordance with the City of Moorpark and County of Ventura stormwater requirements.

APPENDIX A

Tc Calculator Data Sheet V6.1

Project Name and Number: EVERETT TERRACES 11.5 Ac.

USER INPUT IN BLUE FIELDS:		
Subarea Name =	PROPERTY NORTH	User Input
Watershed Area ac =	11.5	Calculated from flowpath data
% Imperviousness =	50	User Input
Land Use Description =	LowRes1	DropMenu
Storm Frequency	100	DropMenu
Storm Zone =	K	DropMenu
Zone ID =	K_100	Calculated
District Soil Number (1-7) =	1	DropMenu- Rev for Revised C Coefficients
Tc for Intensity Calc min =	8.00	Rounded, Use for Peak Flow Calc.
Intensity in/hr =	3.950	Calculated
C_undeveloped =	0.924	Calculated
C_composite =	0.937	Calculated
Peak cfs =	42.91	Calculated
Calculated Tc=	8.31	Calculated

Instructions:

1. Set to manual calculations with File->Options->Formulas
2. Set max iterative calculations to 50
3. Enter required subarea and flowpath data in blue fields
4. Use site-specific topo or District 2005 LiDAR data for elevations
5. LiDAR and rain zone data at: http://vcwatershed.net/publicMaps/data
6. Clear any unnessary flowpath data from blue fields
7. Manually calculate with F9 or Formulas->Calculate Now
8. If error or comments appear, revise input data accordingly
9. Tc's in cells C12 and C17 should converge to the nearest minute.
10. Use result in C12 for peak flow calculation.
11. Print area is set for printing this page on one sheet.

FLOWPATH DATA- UPSTREAM TO DOWNSTREAM

Flowpath Number	Type- Selected with DropMenus	Type#	Flowpath Area ac	Upper Elev. Ft	Bott. Elev. Ft	Length ft	Map Slope ft/ft	Mtn Chan. Eff. Slope ft/ft	Diam/ Width ft	n value	Side-slope X; XH:1V	% Area	Q cfs	Cum. Q cfs
1	Overland-Undeveloped	1	7.00	701	650	500	0.102					60.9%	26.1	26.1
2	Street-32'Wide8"Curbs	7	4.50	650	589	800	0.076					39.1%	16.8	42.9
3	None	0										0.0%	-	42.9
4	None	0										0.0%	-	42.9
5	None	0										0.0%	-	42.9
6	None	0										0.0%	-	42.9
7	None	0										0.0%	-	42.9
8	None	0										0.0%	-	42.9
9	None	0										0.0%	-	42.9
10	None	0										0.0%	-	42.9
Sum			11.5									100%	42.9	

VCRat Single Subarea Hydrograph, Mitigation, and Detention Basin Routing Calculations

Project Information: EVERETT 0.86 Ac. NORTH OF PROPERTY

DEVELOPED CONDITION INPUT DATA		
Watershed Area ac =	0.87	User Input
Time of Concentration Tc min =	5	User Input
% Imperviousness =	100	User Input
Land Use Description =	OPEN BREUS	User Input
Storm Zone =	Jp	Dropdown List
Storm Frequency =	100	Dropdown List
District Soil Number =	1	Dropdown List
NRCS Curve Number Yield in =	0.28	User Input
MITIGATION INPUT DATA		
Mitigation Level	100	User Input
Time of Concentration Tc min =	5	User Input
Storm Frequency =	100	Dropdown List
% Effective Imperviousness =	5	User Input
Land Use Description =	OPEN BRUSH	User Input
CALCULATION RESULTS		
Iteration Volume Difference cf =	0.142	
Dev. Subarea Outflow Peak cfs =	3.38	
FLOW THROUGH BASIN RESULTS		
Basin Inflow Peak cfs =	3.38	
Mitigated Hydrograph Peak cfs =	3.30	
Routed Hydrograph Peak cfs =	0.94	
Max Basin Storage af =	0.0152	
Max Basin Elevation ft =	0.76	
BYPASS BASIN RESULTS		
Inflow Hydrograph Peak cfs =	3.38	
Mitigation Hydrograph Peak cfs =	3.30	
Peak Flow into Bypass Basin cfs =	0.08	
Volume into Bypass Basin cf =	5	

INSTRUCTIONS

1. Under File-Options-Formulas
Check Iterative Calculations
200 iterations
0.001 tolerance
2. Input data in blue fields
3. Press F9 to manually
calculate the hydrology data
if Volume Difference in
B19 is not 0.
4. Choose rain zone at:
vcwatershed.net/publicMaps/data/

Flow-Through Basin Data

Elev. ft	Storage af	Disch. cfs
0.0	0.00	0.00
0.5	0.01	0.54
1.0	0.02	1.31
1.5	0.04	1.83
2.0	0.05	2.22
2.5	0.06	2.53
3.0	0.10	2.83
3.5	0.15	3.09
4.0	1.0	5.0

Tc Calculator Data Sheet V6.1

Project Name and Number: EVERETT Q10 UNDEVELOPED

USER INPUT IN BLUE FIELDS:		
Subarea Name =	2.46 AC PROP UND	User Input
Watershed Area ac =	2.5	Calculated from flowpath data
% Imperviousness =	20	User Input
Land Use Description =	LowRes1/3	DropMenu
Storm Frequency	10	DropMenu
Storm Zone =	Jp	DropMenu
Zone ID =	Jp_10	Calculated
District Soil Number (1-7) =	1	DropMenu- Rev for Revised C Coefficients
Tc for Intensity Calc min =	6.00	**Rounded, Use for Peak Flow Calc.**
Intensity in/hr =	2.010	Calculated
C_undeveloped =	0.851	Calculated
C_composite =	0.870	Calculated
Peak cfs =	4.34	Calculated
Calculated Tc=	6.43	**Calculated**

Instructions:

1. Set to manual calculations with File->Options->Formulas
2. Set max iterative calculations to 50
3. Enter required subarea and flowpath data in blue fields
4. Use site-specific topo or District 2005 LiDAR data for elevations
5. LiDAR and rain zone data at: http://vcwatershed.net/publicMaps/data
6. Clear any unnessary flowpath data from blue fields
7. Manually calculate with F9 or Formulas->Calculate Now
8. If error or comments appear, revise input data accordingly
9. Tc's in cells C12 and C17 should converge to the nearest minute.
10. Use result in C12 for peak flow calculation.
11. Print area is set for printing this page on one sheet.

FLOWPATH DATA- UPSTREAM TO DOWNSTREAM

Flowpath Number	Type- Selected with DropMenus	Type#	Flowpath Area ac	Upper Elev. Ft	Bott. Elev. Ft	Length ft	Map Slope ft/ft	Mtn Chan. Eff. Slope ft/ft	Diam/ Width ft	n value	Side-slope X; XH:1V	% Area	Q cfs	Cum. Q cfs
1	Overland-Undeveloped	1	2.46	565	525	322	0.124					100.0%	4.3	4.3
2	None	0					#VALUE!	#VALUE!				0.0%	-	4.3
3	None	0										0.0%	-	4.3
4	None	0										0.0%	-	4.3
5	None	0										0.0%	-	4.3
6	None	0										0.0%	-	4.3
7	None	0										0.0%	-	4.3
8	None	0										0.0%	-	4.3
9	None	0										0.0%	-	4.3
10	None	0										0.0%	-	4.3
Sum			2.5									100%	4.3	

Tc Calculator Data Sheet V6.1

Project Name and Number: EVERETT Q25 UNDEVELOPED

USER INPUT IN BLUE FIELDS:		
Subarea Name =	2.46 AC PROP UND	User Input
Watershed Area ac =	2.5	Calculated from flowpath data
% Imperviousness =	20	User Input
Land Use Description =	LowRes1/3	DropMenu
Storm Frequency	25	DropMenu
Storm Zone =	Jp	DropMenu
Zone ID =	Jp_25	Calculated
District Soil Number (1-7) =	1	DropMenu- Rev for Revised C Coefficients
Tc for Intensity Calc min =	**6.00**	**Rounded, Use for Peak Flow Calc.**
Intensity in/hr =	2.940	Calculated
C_undeveloped =	0.898	Calculated
C_composite =	0.908	Calculated
Peak cfs =	6.62	Calculated
Calculated Tc=	**5.57**	**Calculated**

Instructions:

1. Set to manual calculations with File->Options->Formulas
2. Set max iterative calculations to 50
3. Enter required subarea and flowpath data in blue fields
4. Use site-specific topo or District 2005 LiDAR data for elevations
5. LiDAR and rain zone data at: http://vcwatershed.net/publicMaps/data
6. Clear any unnessary flowpath data from blue fields
7. Manually calculate with F9 or Formulas->Calculate Now
8. If error or comments appear, revise input data accordingly
9. Tc's in cells C12 and C17 should converge to the nearest minute.
10. Use result in C12 for peak flow calculation.
11. Print area is set for printing this page on one sheet.

FLOWPATH DATA- UPSTREAM TO DOWNSTREAM

Flowpath Number	Type- Selected with DropMenus	Type#	Flowpath Area ac	Upper Elev. Ft	Bott. Elev. Ft	Length ft	Map Slope ft/ft	Mtn Chan. Eff. Slope ft/ft	Diam/ Width ft	n value	Side-slope X; XH:1V	% Area	Q cfs	Cum. Q cfs
1	Overland-Undeveloped	1	2.46	565	525	322	0.124					100.0%	6.6	6.6
2	None	0					#VALUE!	#VALUE!				0.0%	-	6.6
3	None	0										0.0%	-	6.6
4	None	0										0.0%	-	6.6
5	None	0										0.0%	-	6.6
6	None	0										0.0%	-	6.6
7	None	0										0.0%	-	6.6
8	None	0										0.0%	-	6.6
9	None	0										0.0%	-	6.6
10	None	0										0.0%	-	6.6
Sum			**2.5**									**100%**	**6.6**	

Tc Calculator Data Sheet V6.1

Project Name and Number: EVERETT Q50 UNDEVELOPED

USER INPUT IN BLUE FIELDS:		
Subarea Name =	2.46 AC PROP UND	User Input
Watershed Area ac =	2.5	Calculated from flowpath data
% Imperviousness =	20	User Input
Land Use Description =	LowRes1/3	DropMenu
Storm Frequency	50	DropMenu
Storm Zone =	Jp	DropMenu
Zone ID =	Jp_50	Calculated
District Soil Number (1-7) =	1	DropMenu- Rev for Revised C Coefficients
Tc for Intensity Calc min =	**5.00**	**Rounded, Use for Peak Flow Calc.**
Intensity in/hr =	3.790	Calculated
C_undeveloped =	0.920	Calculated
C_composite =	0.926	Calculated
Peak cfs =	8.70	Calculated
Calculated Tc=	**5.03**	**Calculated**

Instructions:

1. Set to manual calculations with File->Options->Formulas
2. Set max iterative calculations to 50
3. Enter required subarea and flowpath data in blue fields
4. Use site-specific topo or District 2005 LiDAR data for elevations
5. LiDAR and rain zone data at: http://vcwatershed.net/publicMaps/data
6. Clear any unnessary flowpath data from blue fields
7. Manually calculate with F9 or Formulas->Calculate Now
8. If error or comments appear, revise input data accordingly
9. Tc's in cells C12 and C17 should converge to the nearest minute.
10. Use result in C12 for peak flow calculation.
11. Print area is set for printing this page on one sheet.

FLOWPATH DATA- UPSTREAM TO DOWNSTREAM

Flowpath Number	Type- Selected with DropMenus	Type#	Flowpath Area ac	Upper Elev. Ft	Bott. Elev. Ft	Length ft	Map Slope ft/ft	Mtn Chan. Eff. Slope ft/ft	Diam/ Width ft	n value	Side-slope X; XH:1V	% Area	Q cfs	Cum. Q cfs
1	Overland-Undeveloped	1	2.46	565	525	322	0.124					100.0%	8.7	8.7
2	None	0					#VALUE!	#VALUE!				0.0%	-	8.7
3	None	0										0.0%	-	8.7
4	None	0										0.0%	-	8.7
5	None	0										0.0%	-	8.7
6	None	0										0.0%	-	8.7
7	None	0										0.0%	-	8.7
8	None	0										0.0%	-	8.7
9	None	0										0.0%	-	8.7
10	None	0										0.0%	-	8.7
Sum			2.5									100%	8.7	

Tc Calculator Data Sheet V6.1

Project Name and Number: EVERETT Q100 UNDEVELOPED

USER INPUT IN BLUE FIELDS:		
Subarea Name =	2.46 AC PROP UND	User Input
Watershed Area ac =	2.5	Calculated from flowpath data
% Imperviousness =	20	User Input
Land Use Description =	LowRes1/3	DropMenu
Storm Frequency	100	DropMenu
Storm Zone =	Jp	DropMenu
Zone ID =	Jp_100	Calculated
District Soil Number (1-7) =	1	DropMenu- Rev for Revised C Coefficients
Tc for Intensity Calc min =	5.00	Rounded, Use for Peak Flow Calc.
Intensity in/hr =	4.060	Calculated
C_undeveloped =	0.926	Calculated
C_composite =	0.931	Calculated
Peak cfs =	9.37	Calculated
Calculated Tc=	5.01	Calculated

Instructions:

1. Set to manual calculations with File->Options->Formulas
2. Set max iterative calculations to 50
3. Enter required subarea and flowpath data in blue fields
4. Use site-specific topo or District 2005 LiDAR data for elevations
5. LiDAR and rain zone data at: http://vcwatershed.net/publicMaps/data
6. Clear any unnessary flowpath data from blue fields
7. Manually calculate with F9 or Formulas->Calculate Now
8. If error or comments appear, revise input data accordingly
9. Tc's in cells C12 and C17 should converge to the nearest minute.
10. Use result in C12 for peak flow calculation.
11. Print area is set for printing this page on one sheet.

FLOWPATH DATA- UPSTREAM TO DOWNSTREAM

Flowpath Number	Type- Selected with DropMenus	Type#	Flowpath Area ac	Upper Elev. Ft	Bott. Elev. Ft	Length ft	Map Slope ft/ft	Mtn Chan. Eff. Slope ft/ft	Diam/ Width ft	n value	Side-slope X; XH:1V	% Area	Q cfs	Cum. Q cfs
1	Overland-Undeveloped	1	2.46	565	525	360	0.111					100.0%	9.4	9.4
2	None	0					#VALUE!	#VALUE!				0.0%	-	9.4
3	None	0										0.0%	-	9.4
4	None	0										0.0%	-	9.4
5	None	0										0.0%	-	9.4
6	None	0										0.0%	-	9.4
7	None	0										0.0%	-	9.4
8	None	0										0.0%	-	9.4
9	None	0										0.0%	-	9.4
10	None	0										0.0%	-	9.4
Sum			2.5									100%	9.4	

Tc Calculator Data Sheet V6.1

Project Name and Number: EVERETT Q10 DEVELOPED

USER INPUT IN BLUE FIELDS:		
Subarea Name =	2.46 AC PROP DEV	User Input
Watershed Area ac =	2.5	Calculated from flowpath data
% Imperviousness =	76.3	User Input
Land Use Description =	HiRes	DropMenu
Storm Frequency	10	DropMenu
Storm Zone =	Jp	DropMenu
Zone ID =	Jp_10	Calculated
District Soil Number (1-7) =	1	DropMenu- Rev for Revised C Coefficients
Tc for Intensity Calc min =	6.00	**Rounded, Use for Peak Flow Calc.**
Intensity in/hr =	2.010	Calculated
C_undeveloped =	0.851	Calculated
C_composite =	0.926	Calculated
Peak cfs =	4.62	Calculated
Calculated Tc=	6.43	**Calculated**

Instructions:

1. Set to manual calculations with File->Options->Formulas
2. Set max iterative calculations to 50
3. Enter required subarea and flowpath data in blue fields
4. Use site-specific topo or District 2005 LiDAR data for elevations
5. LiDAR and rain zone data at: http://vcwatershed.net/publicMaps/data
6. Clear any unnessary flowpath data from blue fields
7. Manually calculate with F9 or Formulas->Calculate Now
8. If error or comments appear, revise input data accordingly
9. Tc's in cells C12 and C17 should converge to the nearest minute.
10. Use result in C12 for peak flow calculation.
11. Print area is set for printing this page on one sheet.

FLOWPATH DATA- UPSTREAM TO DOWNSTREAM

Flowpath Number	Type- Selected with DropMenus	Type#	Flowpath Area ac	Upper Elev. Ft	Bott. Elev. Ft	Length ft	Map Slope ft/ft	Mtn Chan. Eff. Slope ft/ft	Diam/ Width ft	n value	Side-slope X; XH:1V	% Area	Q cfs	Cum. Q cfs
1	Overland-Undeveloped	1	2.46	565	525	322	0.124					100.0%	4.6	4.6
2	None	0					#VALUE!	#VALUE!				0.0%	-	4.6
3	None	0										0.0%	-	4.6
4	None	0										0.0%	-	4.6
5	None	0										0.0%	-	4.6
6	None	0										0.0%	-	4.6
7	None	0										0.0%	-	4.6
8	None	0										0.0%	-	4.6
9	None	0										0.0%	-	4.6
10	None	0										0.0%	-	4.6
Sum			2.5									100%	4.6	

Tc Calculator Data Sheet V6.1

Project Name and Number: EVERETT Q25 DEVELOPED

USER INPUT IN BLUE FIELDS:		
Subarea Name =	2.46 AC PROP DEV	User Input
Watershed Area ac =	2.5	Calculated from flowpath data
% Imperviousness =	76.3	User Input
Land Use Description =	HiRes	DropMenu
Storm Frequency	25	DropMenu
Storm Zone =	Jp	DropMenu
Zone ID =	Jp_25	Calculated
District Soil Number (1-7) =	1	DropMenu- Rev for Revised C Coefficients
Tc for Intensity Calc min =	6.00	**Rounded, Use for Peak Flow Calc.**
Intensity in/hr =	2.940	Calculated
C_undeveloped =	0.898	Calculated
C_composite =	0.938	Calculated
Peak cfs =	6.87	Calculated
Calculated Tc=	5.57	Calculated

Instructions:

1. Set to manual calculations with File->Options->Formulas
2. Set max iterative calculations to 50
3. Enter required subarea and flowpath data in blue fields
4. Use site-specific topo or District 2005 LiDAR data for elevations
5. LiDAR and rain zone data at: http://vcwatershed.net/publicMaps/data
6. Clear any unnessary flowpath data from blue fields
7. Manually calculate with F9 or Formulas->Calculate Now
8. If error or comments appear, revise input data accordingly
9. Tc's in cells C12 and C17 should converge to the nearest minute.
10. Use result in C12 for peak flow calculation.
11. Print area is set for printing this page on one sheet.

FLOWPATH DATA- UPSTREAM TO DOWNSTREAM

Flowpath Number	Type- Selected with DropMenus	Type#	Flowpath Area ac	Upper Elev. Ft	Bott. Elev. Ft	Length ft	Map Slope ft/ft	Mtn Chan. Eff. Slope ft/ft	Diam/ Width ft	n value	Side-slope X; XH:1V	% Area	Q cfs	Cum. Q cfs
1	Overland-Undeveloped	1	2.47	565	525	322	0.124					100.0%	6.9	6.9
2	None	0					#VALUE!	#VALUE!				0.0%	-	6.9
3	None	0										0.0%	-	6.9
4	None	0										0.0%	-	6.9
5	None	0										0.0%	-	6.9
6	None	0										0.0%	-	6.9
7	None	0										0.0%	-	6.9
8	None	0										0.0%	-	6.9
9	None	0										0.0%	-	6.9
10	None	0										0.0%	-	6.9
Sum			2.5									100%	6.9	

Tc Calculator Data Sheet V6.1

Project Name and Number: EVERETT Q50 DEVELOPED

USER INPUT IN BLUE FIELDS:		
Subarea Name =	2.46 AC PROP DEV	User Input
Watershed Area ac =	2.5	Calculated from flowpath data
% Imperviousness =	76.3	User Input
Land Use Description =	HiRes	DropMenu
Storm Frequency	50	DropMenu
Storm Zone =	Jp	DropMenu
Zone ID =	Jp_50	Calculated
District Soil Number (1-7) =	1	DropMenu- Rev for Revised C Coefficients
Tc for Intensity Calc min =	**5.00**	**Rounded, Use for Peak Flow Calc.**
Intensity in/hr =	3.790	Calculated
C_undeveloped =	0.920	Calculated
C_composite =	0.943	Calculated
Peak cfs =	8.86	Calculated
Calculated Tc=	**5.03**	**Calculated**

Instructions:

1. Set to manual calculations with File->Options->Formulas
2. Set max iterative calculations to 50
3. Enter required subarea and flowpath data in blue fields
4. Use site-specific topo or District 2005 LiDAR data for elevations
5. LiDAR and rain zone data at: http://vcwatershed.net/publicMaps/data
6. Clear any unnessary flowpath data from blue fields
7. Manually calculate with F9 or Formulas->Calculate Now
8. If error or comments appear, revise input data accordingly
9. Tc's in cells C12 and C17 should converge to the nearest minute.
10. Use result in C12 for peak flow calculation.
11. Print area is set for printing this page on one sheet.

FLOWPATH DATA- UPSTREAM TO DOWNSTREAM

Flowpath Number	Type- Selected with DropMenus	Type#	Flowpath Area ac	Upper Elev. Ft	Bott. Elev. Ft	Length ft	Map Slope ft/ft	Mtn Chan. Eff. Slope ft/ft	Diam/ Width ft	n value	Side-slope X; XH:1V	% Area	Q cfs	Cum. Q cfs
1	Overland-Undeveloped	1	2.46	565	525	322	0.124					100.0%	8.9	8.9
2	None	0					#VALUE!	#VALUE!				0.0%	-	8.9
3	None	0										0.0%	-	8.9
4	None	0										0.0%	-	8.9
5	None	0										0.0%	-	8.9
6	None	0										0.0%	-	8.9
7	None	0										0.0%	-	8.9
8	None	0										0.0%	-	8.9
9	None	0										0.0%	-	8.9
10	None	0										0.0%	-	8.9
Sum			**2.5**									**100%**	**8.9**	

Tc Calculator Data Sheet V6.1

Project Name and Number: EVERETT Q100 DEVELOPED

USER INPUT IN BLUE FIELDS:		
Subarea Name =	2.46 AC PROP DEV	User Input
Watershed Area ac =	2.5	Calculated from flowpath data
% Imperviousness =	76.3	User Input
Land Use Description =	HiRes	DropMenu
Storm Frequency	100	DropMenu
Storm Zone =	Jp	DropMenu
Zone ID =	Jp_100	Calculated
District Soil Number (1-7) =	1	DropMenu- Rev for Revised C Coefficients
Tc for Intensity Calc min =	**5.00**	**Rounded, Use for Peak Flow Calc.**
Intensity in/hr =	4.060	Calculated
C_undeveloped =	0.926	Calculated
C_composite =	0.944	Calculated
Peak cfs =	9.51	Calculated
Calculated Tc=	**5.01**	**Calculated**

Instructions:

1. Set to manual calculations with File->Options->Formulas
2. Set max iterative calculations to 50
3. Enter required subarea and flowpath data in blue fields
4. Use site-specific topo or District 2005 LiDAR data for elevations
5. LiDAR and rain zone data at: http://vcwatershed.net/publicMaps/data
6. Clear any unnessary flowpath data from blue fields
7. Manually calculate with F9 or Formulas->Calculate Now
8. If error or comments appear, revise input data accordingly
9. Tc's in cells C12 and C17 should converge to the nearest minute.
10. Use result in C12 for peak flow calculation.
11. Print area is set for printing this page on one sheet.

FLOWPATH DATA- UPSTREAM TO DOWNSTREAM

Flowpath Number	Type- Selected with DropMenus	Type#	Flowpath Area ac	Upper Elev. Ft	Bott. Elev. Ft	Length ft	Map Slope ft/ft	Mtn Chan. Eff. Slope ft/ft	Diam/ Width ft	n value	Side-slope X; XH:1V	% Area	Q cfs	Cum. Q cfs
1	Overland-Undeveloped	1	2.46	565	525	360	0.111					100.0%	9.5	9.5
2	None	0					#VALUE!	#VALUE!				0.0%	-	9.5
3	None	0										0.0%	-	9.5
4	None	0										0.0%	-	9.5
5	None	0										0.0%	-	9.5
6	None	0										0.0%	-	9.5
7	None	0										0.0%	-	9.5
8	None	0										0.0%	-	9.5
9	None	0										0.0%	-	9.5
10	None	0										0.0%	-	9.5
Sum			2.5									100%	9.5	

Tc Calculator Data Sheet V6.1

Project Name and Number: EVERETT Q100 DEVELOPED WITH NORTHERLY 0.86 Ac.

USER INPUT IN BLUE FIELDS:		
Subarea Name =	3.32 AC PROP DEV	User Input
Watershed Area ac =	3.3	Calculated from flowpath data
% Imperviousness =	56.6	User Input
Land Use Description =	HiRes	DropMenu
Storm Frequency	100	DropMenu
Storm Zone =	Jp	DropMenu
Zone ID =	Jp_100	Calculated
District Soil Number (1-7) =	1	DropMenu- Rev for Revised C Coefficients
Tc for Intensity Calc min =	5.00	**Rounded, Use for Peak Flow Calc.**
Intensity in/hr =	4.060	Calculated
C_undeveloped =	0.926	Calculated
C_composite =	0.940	Calculated
Peak cfs =	12.77	Calculated
Calculated Tc=	5.01	**Calculated**

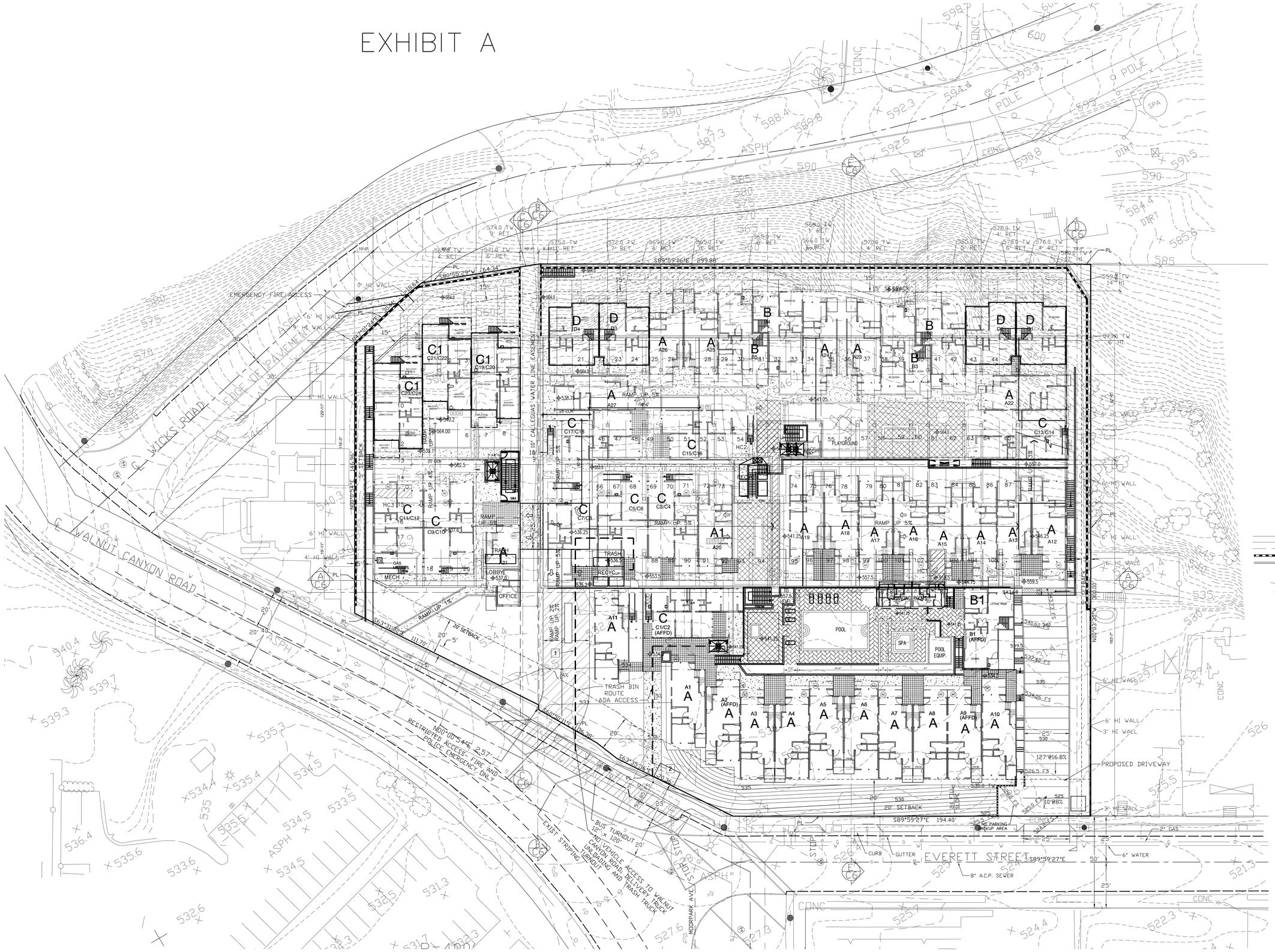
Instructions:

1. Set to manual calculations with File->Options->Formulas
2. Set max iterative calculations to 50
3. Enter required subarea and flowpath data in blue fields
4. Use site-specific topo or District 2005 LiDAR data for elevations
5. LiDAR and rain zone data at: http://vcwatershed.net/publicMaps/data
6. Clear any unnessary flowpath data from blue fields
7. Manually calculate with F9 or Formulas->Calculate Now
8. If error or comments appear, revise input data accordingly
9. Tc's in cells C12 and C17 should converge to the nearest minute.
10. Use result in C12 for peak flow calculation.
11. Print area is set for printing this page on one sheet.

FLOWPATH DATA- UPSTREAM TO DOWNSTREAM

Flowpath Number	Type- Selected with DropMenus	Type#	Flowpath Area ac	Upper Elev. Ft	Bott. Elev. Ft	Length ft	Map Slope ft/ft	Mtn Chan. Eff. Slope ft/ft	Diam/ Width ft	n value	Side-slope X; XH:1V	% Area	Q cfs	Cum. Q cfs
1	Overland-Undeveloped	1	3.32	565	525	360	0.111					100.0%	12.8	12.8
2	None	0					#VALUE!	#VALUE!				0.0%	-	12.8
3	None	0										0.0%	-	12.8
4	None	0										0.0%	-	12.8
5	None	0										0.0%	-	12.8
6	None	0										0.0%	-	12.8
7	None	0										0.0%	-	12.8
8	None	0										0.0%	-	12.8
9	None	0										0.0%	-	12.8
10	None	0										0.0%	-	12.8
Sum			3.3									100%	12.8	

EXHIBIT A



LEGEND

- EXISTING GAS LINE
- EXISTING SEWER LINE
- EXISTING WATER LINE
- PROPOSED 8" SLUMPSTONE BOUNDARY WALL
- PROPOSED 8" CONCRETE WALL
- PROPOSED EXITS STAIRS AND STAIR LADDER LANDING
- EXISTING 5' MAJOR CONTOURS
- EXISTING 1' MINOR CONTOURS
- EG EXISTING GRADE
- F.F. FINISH FLOOR
- FG FINISH GRADE
- FS FINISH SURFACE
- INV INVERT ELEVATION
- RET. RETAINED
- TG TOP OF GRATE
- TW TOP OF WALL
- 564.0 PROPOSED FINISH ELEVATION
- 698.1+ EXISTING SPOT ELEVATION
- 7622.10 PROPOSED FINISH ELEVATION
- EXISTING STORM DRAIN MANHOLE
- EXISTING SEWER MANHOLE
- EXISTING POWER POLE
- EXISTING STREET LIGHT
- 6'Ø x 25' DEEP SEEPAGE PIT

REGISTERED PROFESSIONAL ENGINEER
DANNY P. HOLMES
NO. 24769
EXP. 12-31-21
CIVIL
STATE OF CALIFORNIA

N
W E
S

GRAPHIC SCALE
0 10 20 60
SCALE: 1"=20'

6-1-20

Holmes Enterprises, inc.
Structural and Civil Engineering
200 Wicks Rd. Moorpark, CA. 93021
(805) 532-1571 (805) 532-1596

	REVISION	APP	DATE	RCE
1				
2				

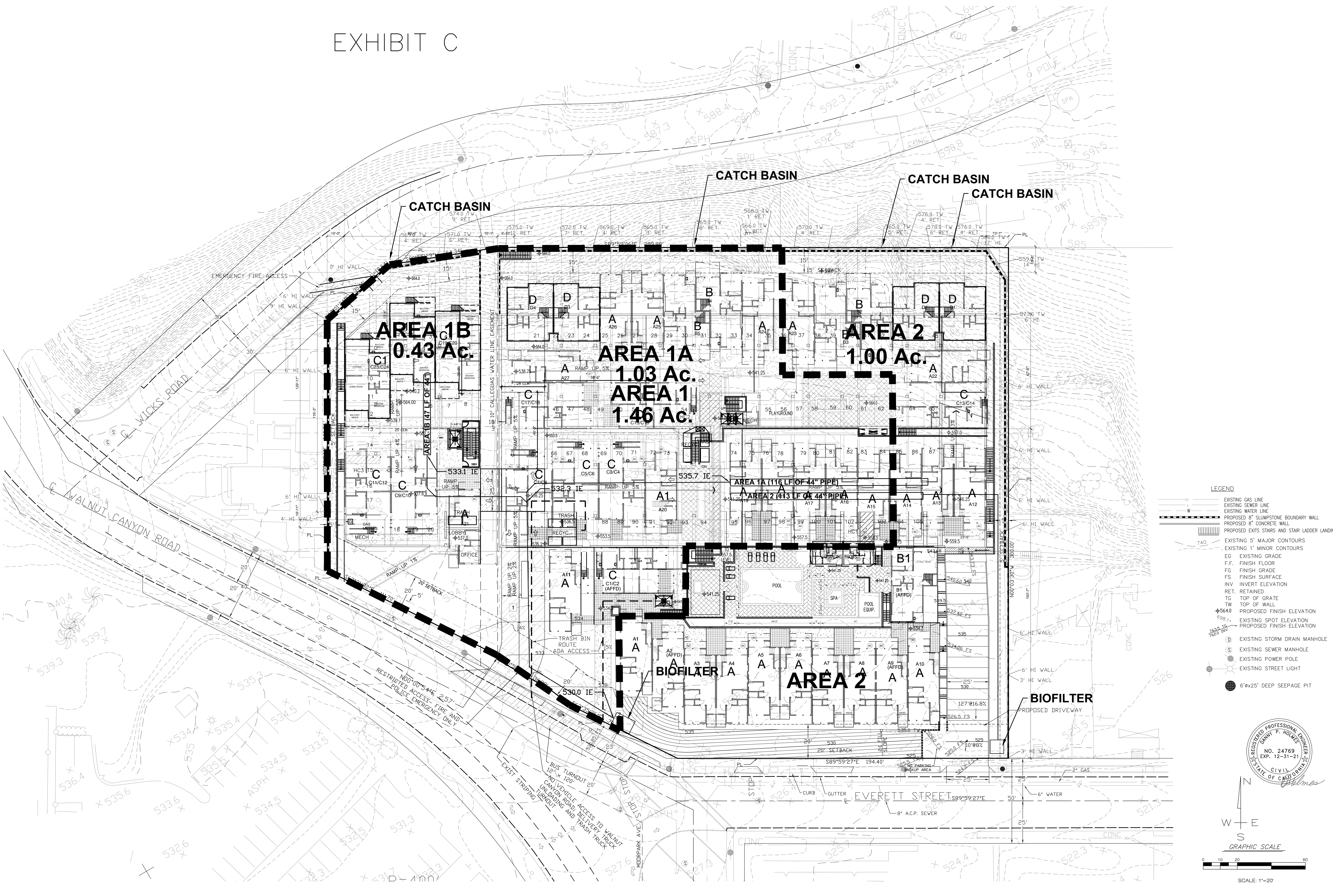
OWNER :
JOHN CHIU c/o NEWTON AND ASSOCIATES
P. O. BOX 471
MOORPARK, CA 91021
805 529 3494

LOWER LEVEL PLAN
EVERETT STREET TERRACES
MOORPARK, CA

C-3 OF C-6


EXHIBIT B
RIDGE
RIDGE
AREA 1
11.5 AC.
AREA 2
3.2 AC.
Walnut Canyon Rd
Cedar Bluff Dr
Oak Bluff Dr
Wicks Rd
6" CURB
160 WICKS
180 WICKS
Moorpark
Valley Rd
Google

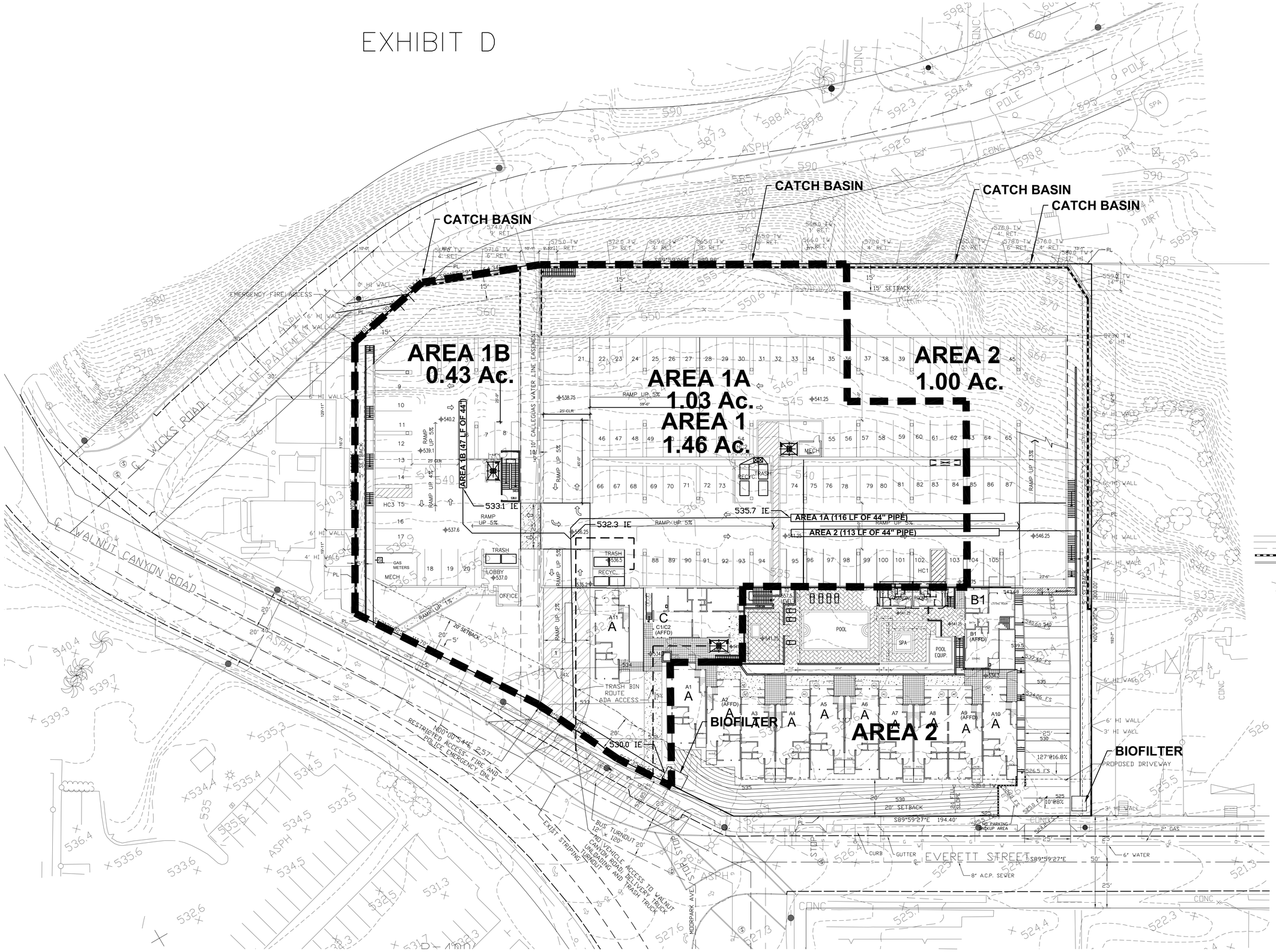
EXHIBIT C


CATCH BASIN
CATCH BASIN
CATCH BASIN
CATCH BASIN
AREA 1B
0.43 Ac.
AREA 1A
1.03 Ac.
AREA 1
1.46 Ac.
AREA 2
1.00 Ac.
AREA 2
BIOFILTER
BIOFILTER
AREA 1A (116 LF OF 44" PIPE)
AREA 2 (413 LF OF 44" PIPE)
AREA 1B (47 LF OF 44")
533.1 IE
532.3 IE
535.7 IE
530.0 IE
POOL
SPA
PLAYGROUND
EMERGENCY FIRE ACCESS
WICKS ROAD
WALNUT CANYON ROAD
EVERETT STREET
MOORPARK AVE.
PROPOSED DRIVEWAY
LEGEND
EXISTING GAS LINE
EXISTING SEWER LINE
EXISTING WATER LINE
PROPOSED 8" SLUMPSTONE BOUNDARY WALL
PROPOSED 8" CONCRETE WALL
PROPOSED EXITS STAIRS AND STAIR LADDER LANDING
EXISTING 5' MAJOR CONTOURS
EXISTING 1' MINOR CONTOURS
EG EXISTING GRADE
F.F. FINISH FLOOR
FG FINISH GRADE
FS FINISH SURFACE
INV INVERT ELEVATION
RET. RETAINED
TG TOP OF GRATE
TW TOP OF WALL
PROPOSED FINISH ELEVATION
EXISTING SPOT ELEVATION
PROPOSED FINISH ELEVATION
EXISTING STORM DRAIN MANHOLE
EXISTING SEWER MANHOLE
EXISTING POWER POLE
EXISTING STREET LIGHT
6"ø×25' DEEP SEEPAGE PIT
REGISTERED PROFESSIONAL ENGINEER
DANNY P. HOLMES
NO. 24769
EXP. 12-31-21
CIVIL
STATE OF CALIFORNIA
GRAPHIC SCALE
SCALE: 1"=20'

6-1-20

Holmes Enterprises, inc. Structural and Civil Engineering 200 Wicks Rd. Moorpark, CA. 93021 (805) 532-1571 (805) 532-1596	REVISION	APP	DATE	RCE	OWNER : JOHN CHIU c/o NEWTON AND ASSOCIATES P. O. BOX 471 MOORPARK, CA 91021 805 529 3494	LOWER LEVEL PLAN EVERETT STREET TERRACES MOORPARK, CA	C-3 OF C-6

EXHIBIT D



LEGEND

- EXISTING GAS LINE
- EXISTING SEWER LINE
- EXISTING WATER LINE
- PROPOSED 8" SLUMPSTONE BOUNDARY WALL
- PROPOSED 8" CONCRETE WALL
- PROPOSED EXITS STAIRS AND STAIR LADDER LANDING
- EXISTING 5' MAJOR CONTOURS
- EXISTING 1' MINOR CONTOURS
- EG EXISTING GRADE
- F.F. FINISH FLOOR
- FG FINISH GRADE
- FS FINISH SURFACE
- INV INVERT ELEVATION
- RET. RETAINED
- TG TOP OF GRATE
- TW TOP OF WALL
- 564.0 PROPOSED FINISH ELEVATION
- 698.7+ EXISTING SPOT ELEVATION
- 7633.15 / 7629.99 PROPOSED FINISH ELEVATION
- EXISTING STORM DRAIN MANHOLE
- EXISTING SEWER MANHOLE
- EXISTING POWER POLE
- EXISTING STREET LIGHT
- 6'ø x 25' DEEP SEEPAGE PIT

REGISTERED PROFESSIONAL ENGINEER
DANNY P. HOLMES
NO. 24769
EXP. 12-31-21
CIVIL
STATE OF CALIFORNIA

N
W E
S

GRAPHIC SCALE
0 10 20 60
SCALE: 1"=20'

6-1-20

Holmes Enterprises, inc.
Structural and Civil Engineering
200 Wicks Rd. Moorpark, CA. 93021
(805) 532-1571 (805) 532-1596

	REVISION	APP	DATE	RCE
1				
2				

OWNER :
JOHN CHIU c/o NEWTON AND ASSOCIATES
P. O. BOX 471
MOORPARK, CA 91021
805 529 3494

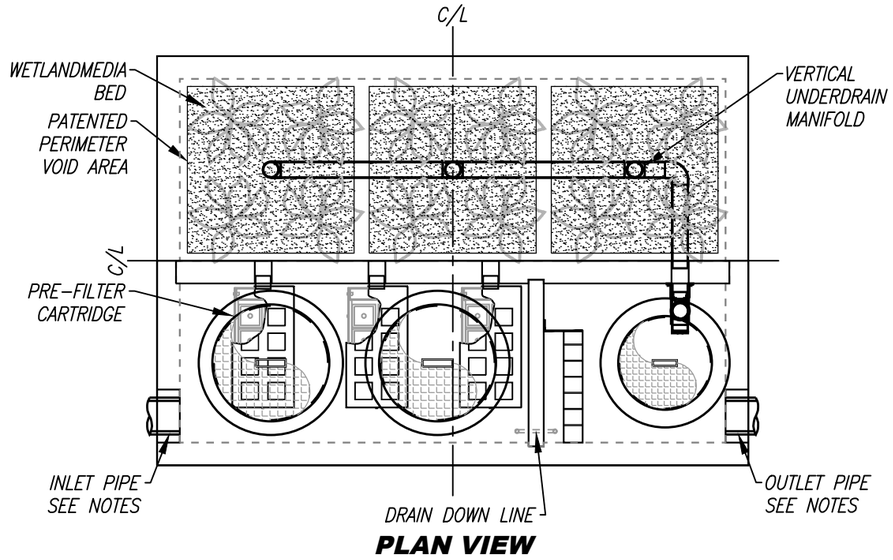
LOWER LEVEL PLAN
EVERETT STREET TERRACES
MOORPARK, CA

C-3 OF C-6

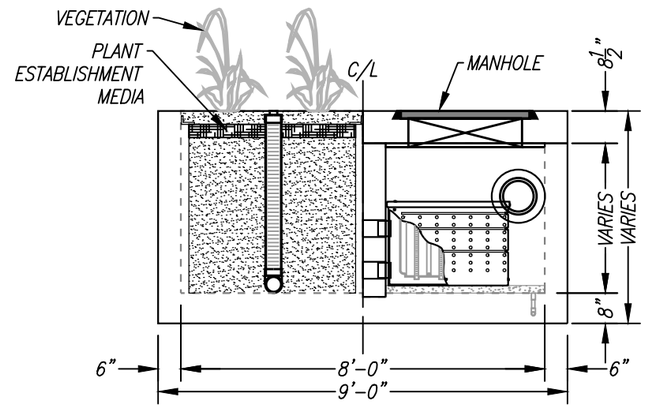
EXHIBIT E

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.346	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	2EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



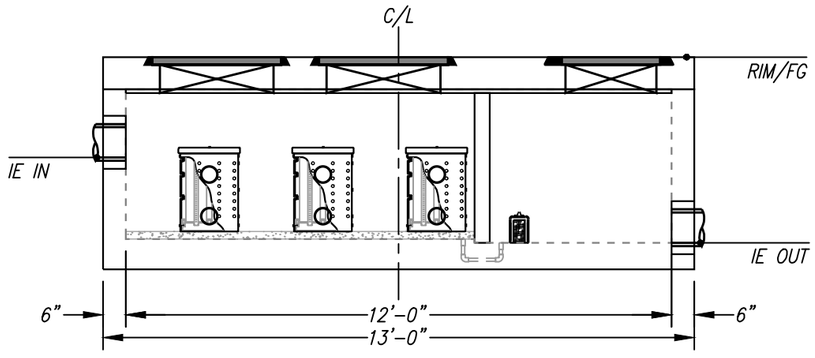
LEFT END VIEW

INSTALLATION NOTES

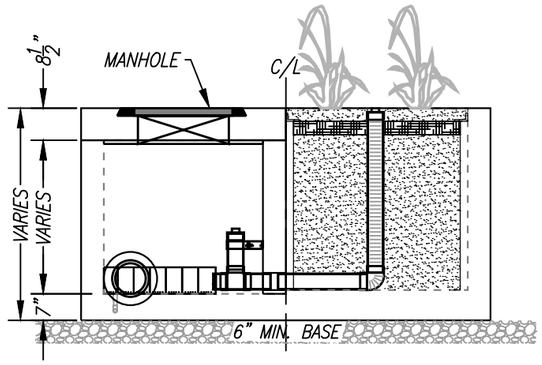
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



ELEVATION VIEW



RIGHT END VIEW

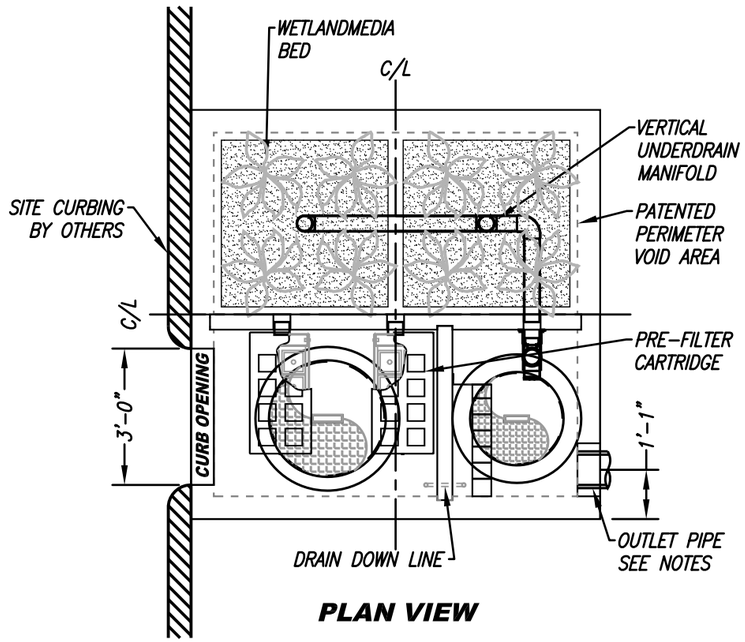
TREATMENT FLOW (CFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-8-12-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

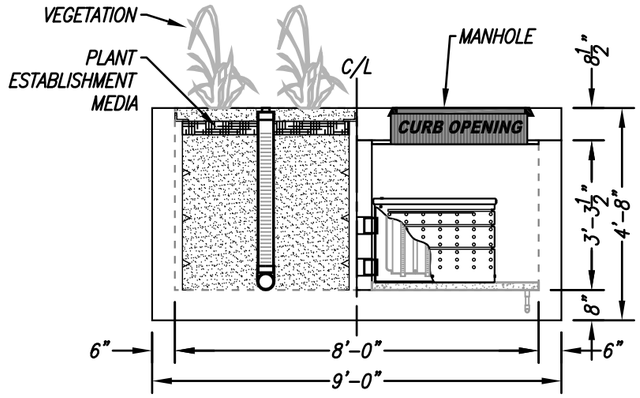
5/23/19 10 LEF

EXHIBIT F

SITE SPECIFIC DATA			
PROJECT NUMBER			
ORDER NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
TREATMENT HGL AVAILABLE (FT)			
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2			
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN	OPEN PLANTER	PEDESTRIAN
FRAME & COVER	ø30"	N/A	ø24"
WETLANDMEDIA VOLUME (CY)			TBD
ORIFICE SIZE (DIA. INCHES)			TBD
NOTES: PRELIMINARY NOT FOR CONSTRUCTION.			



PLAN VIEW



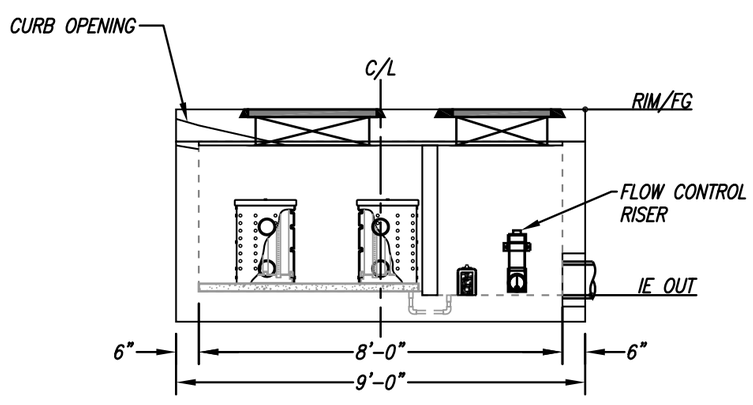
LEFT END VIEW

INSTALLATION NOTES

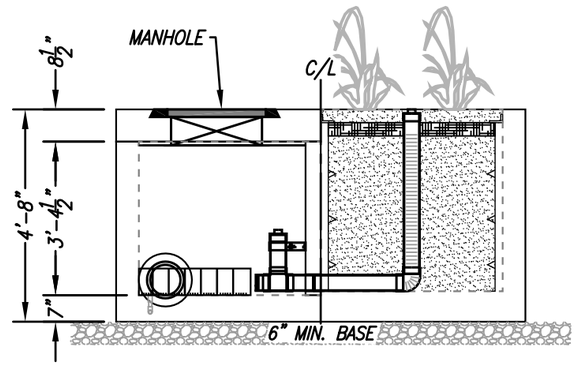
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.231
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-8-8-C
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

EXHIBIT G

Detention Volume for Attenuating Peak Runoff from Small Developed Areas

	Undeveloped	Developed
100-yr 1-d Rain in	6.3	6.3
Soil Type	1	1
Land Use	3 UNIT/ACRE	CONDO
CN Exhibit 14	86	93
S = 1000/CN-10	1.63	0.75
Yield in	4.70	5.48
Volume Calculation		
Yield Difference in		0.78
Surface Storage		0.50
Net Yield		0.28
Impervious Area ac		1.880
Vol Increase CF- Max Basin Size Req'd		1936.46
Basin Vol / acre		1,030

EXHIBIT H

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later.

This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to confirm to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://www.mcs.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.

LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
3776000mN	1000-meter Universal Transverse Mercator grid values, zone 11
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone V (FIPSZONE 0405), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
January 20, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0817E

FIRM

FLOOD INSURANCE RATE MAP

VENTURA COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 817 OF 1275
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MOORPARK, CITY OF	060712	0817	E
VENTURA COUNTY	060413	0817	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06111C0817E

EFFECTIVE DATE
JANUARY 20, 2010

Federal Emergency Management Agency

ZONE AE
564
EW4611
E
560
ZONE X
ZONE X
EXHIBIT I
K BLUFF DRIVE
WICKS ROAD
CHANCE FLOOD
NTAINED IN CULVERT
555
WALNUT CANYON ROAD
PROJECT AREA
E
549
EVERETT STREET
VALLEY ROAD
MAGNOLIA
540
ZONE AO
(DEPTH 1')
BONNIE V
534
531
ZONE
AE
524
ZONE X
ZONE X
517
W HIGH ST
ZONE AO
(DEPTH 1')
511
503
508
BARD STREET
ZONE X
Moorpark City Drain
ZONE X
ZONE X
POINDEXTER AVENUE
METROLINK
608
EN AVENUE
1ST STREET
EET
DOROTHY
AVENUE

EXHIBIT J

City of Moorpark

CITY ENGINEERING/PUBLIC WORKS DEPARTMENT
799 Moorpark Avenue, Moorpark, California 93021 (805) 517-6256 fax (805) 532-2555

November 9, 2011

Sheila Norlin, CFM
Michael Baker Corporation
3602 Eisenhower Avenue, #600
Alexandria, VA 22303

Subject: Request for Letter of Map Revision - Walnut Canyon Channel DFIRM Effective January 20, 2010

Dear Ms. Norlin:

We wish to inform you that the City has conducted a detailed review and analysis for a portion of Walnut Canyon Channel within City of Moorpark corporate limits. As a result of the study we have determined various revisions to the Digital Flood Insurance Rate Map (DFIRM) that would remove structures from the 100-year floodplain. As the study area is located within City corporate limits, community concurrence is not needed from the County of Ventura.

Please find the enclosed technical and scientific supporting documentation for a Letter of Map Revision to the DFIRM effective January 20, 2010.

The City would appreciate a speedy review of this study. Should you have any questions or need any clarifications, please contact me at (805) 517-6285, or our consultant, Mr. Massoud Rezakhani at (602) 317-4303.

Thank you,

David Klotzle, P.E.
City Engineer/Public Works Director

S:\Public Works\Everyone\Agencies\FEMA\Walnut Canyon Channel\Walnut Canyon LOMR\Walnut Canyon Channel Request.docx

TSDN

City of Moorpark
Walnut Canyon Channel

Request for Letter of Map Revision

OCTOBER 18th, 2011

Submitted by

MRC LLC
29830 North 78th Way
Scottsdale, AZ 85266

Prepared for:
City of Moorpark, CA

Summary of Report Revisions

Date	Summary of Changes	Notes
01/11/2012	Appendix F updated based upon coordination with FEMA dated January 11, 2012. Additionally, Exhibit 3 and 5 were updated.	
02/21/2012	Appendix G added to TSDN documenting correspondence with FEMA.	

TABLE OF CONTENTS

Appendices

Appendix A – Walnut Canyon Channel As-builts
Appendix B – Nolte Associates, Inc. Files
Appendix C – PACE Hydrology Analysis Files
Appendix D – MT-2 Forms
Appendix E – MRC LLC Additional Survey Data
Appendix F – Hydraulic Model Output

Exhibits

Exhibit 1 – Vicinity Map
Exhibit 2 – Effective FEMA Flood Insurance Rate Map (FIRM) Panel(s)
Exhibit 3 – Walnut Canyon Channel Workmap
Exhibit 4 – Annotated effective FIRM Panel
Exhibit 5 – Revised Flood Profile Panel(s)
Exhibit 6 – Site Photos

1. INTRODUCTION

1.1. Purpose of Study

The City of Moorpark, CA (Community No. 060712) retained the services of MRC LLC to obtain a Letter of Map Revision for the floodplain for a portion of Walnut Canyon Channel. The study area runs from the most upstream end of Walnut Canyon Channel (XS113446) to just upstream of the intersection of Walnut Canyon Road and the UPRR Trestle (XS 109444), based on stationing in the effective HEC-RAS model. Figure 1 is a Project Location Map showing the study area. A more detailed map is included on Exhibit 1.

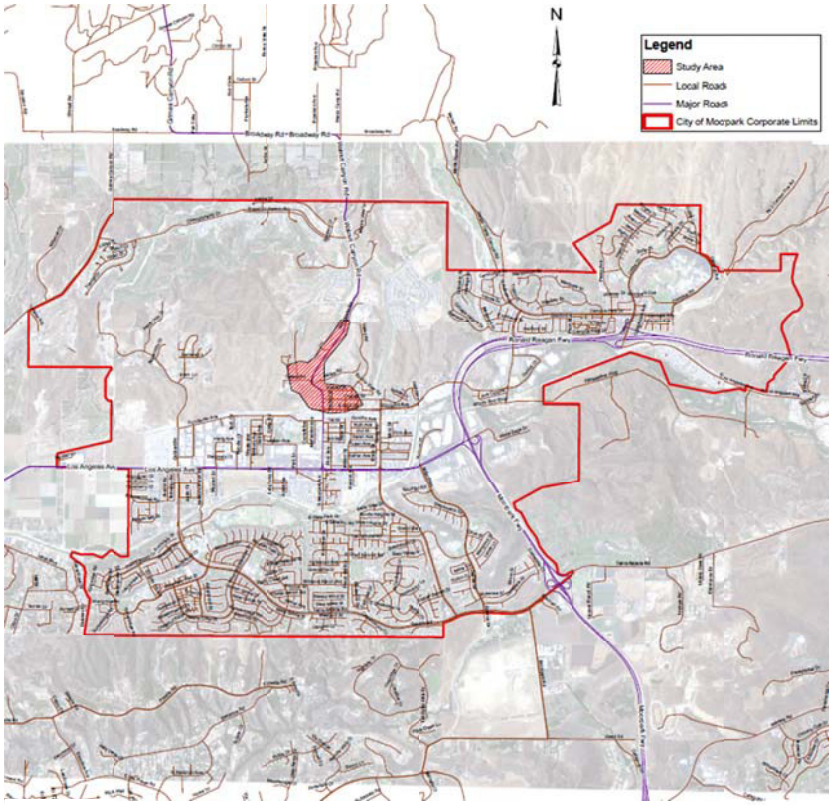


Figure 1 - Project Location Map

Portions of the study area are currently shown within the 1 percent annual chance (100-year) floodplain on the effective Digital Flood Insurance Rate Map (DFIRM) Panel No. 0817E for Ventura County and Incorporated Areas dated January 20, 2010.

The purpose of this Letter of Map Revision (LOMR) is to revise the effective floodplain along the above noted portion of Walnut Canyon Channel within City of Moorpark corporate limits. This LOMR request is based upon additional and more detailed HEC-RAS modeling, additional topographic information, updated hydrologic modeling by others, recognition of local drainage facilities and design intent, and site visits by MRC LLC.

1.2. Authority for Study

MRC LLC has been retained by the City of Moorpark to prepare this LOMR Request.

1.3. Location of Study Reach

The study reach is Walnut Canyon Channel which ultimately discharges into the Arroyo Simi. The first study area runs from the most upstream end of Walnut Canyon Channel (XS113446) to just upstream of the intersection of Walnut Canyon Road and the UPRR Trestle (XS 109444), based on stationing in the effective HEC-RAS model.

1.4. Methodology and Results

Walnut Canyon Channel is a reinforced concrete rectangular channel designed for supercritical flow. The channel was constructed in the 1960's by the U.S. Department of Agriculture, Soil Conservation Service (SCS). The basic modeling methodology was to incorporate more detailed hydrologic and hydraulic information into the effective HEC-RAS model, initially prepared by Nolte Associates, Inc. (Nolte). The effective HEC-RAS model was updated with revised hydrologic information, taking into account a coincident peak analysis, a refined analysis of the crossing at Casey Road and changing the flow regime from mixed to supercritical. HEC-RAS Version 4.1.0 was used for all updates to the effective hydraulic model.

Study Area

In analyzing the study area there are three effective HEC-RAS models; one for the main channel, one for the left overbank, and one for the right overbank. The effective HEC-RAS model for the main channel was run using the mixed flow regime method even though the channel was constructed to be in supercritical flow. The hydraulic capacity of Walnut Canyon Channel is limited at the crossing with Casey Road and the junction of two box culverts. The Walnut Canyon Channel crossing with Casey Road is an 8'x 6' concrete lined box culvert. The crossing to the west of the Walnut Canyon Channel crossing with Casey Road is an approximate 11' x 6' concrete lined box culvert. The box culverts are structurally connected just downstream of Casey Road and at their junction are approximately 15'x6' and gradually taper into a 6'x6' channel.

Figure 2 – Walnut Canyon Channel Box Culvert (on left), West Tributary Box Culvert (on right)

The western most box culvert is fed by a tributary canyon. The source of Walnut Canyon Channel and the tributary canyon have similar drainage areas (West Tributary ~276 acres & Walnut Canyon ~433 acres) and are considered to have coincident peaks.

Ventura County provided the initial hydrologic analysis to Nolte for their study in 2004. The hydrology was not reviewed by FEMA and took into account ultimate conditions as opposed to existing conditions hydrology, as required by FEMA. As a result, further studies indicated that the hydrology used in the Nolte study was in error and overestimated the peak discharge within Walnut Canyon Channel. PACE performed a restudy of the existing conditions hydrology in 2009. Not

taking into account detention basins constructed upstream of the study area, the existing condition peak discharges are significantly lower than those provided by Ventura County and used by Nolte in the effective HEC-RAS model. A more detailed description of hydrology is included in Section 4.

The effective hydraulic model was revised by MRC LLC using PACE hydrology and by taking into account a coincident peak analysis of all confluences. The revised hydraulic model was run using a supercritical flow regime. As the Nolte study did not model the confluence and junction of the two box culvert crossings at Casey Road, the lid function was added to correctly model the split flows and corresponding confluence downstream of Casey Road. Field reconnaissance and a field survey were performed in order to determine the upstream inverts of the Casey Road box culverts and to verify their sizes. The junction of the two box culverts was modeled according to Walnut Canyon Channel as-builts. More specifically, Sheet 14 and Sheet 28 of the Walnut Canyon Channel as-builts by SCS identify this area. These sheets have been included for reference in Appendix A.

Results of the updated analysis of the study area indicate that peak discharges are contained within the Walnut Canyon Channel. There is no left or right overbank flows that breakout from the main Walnut Canyon Channel system, eliminating the need for the left and right overbank effective HEC-RAS models. As a result, the floodplain mapping to the east of Walnut Canyon Road has been removed. This was previously mapped by Nolte and included on Panel No. 0817E as Zone AO, Depth 1'. Similarly, the floodplain mapping to the west of Walnut Canyon Channel (right overbank looking downstream) has been removed. This was previously mapped by Nolte and included on Panel No. 0817E as Zone AO, Depth 1'.

MRC LLC proposes that the above noted changes be incorporated onto Panel No. 0817E as the 100-year peak discharges are contained within the Walnut Canyon Channel system. Since the base flood event is contained within the channel banks we further recommend that BFE values be removed and the zone designation changed to Zone A. If the zone designation is changed to Zone A, there is no need to publish BFE values on the map or to develop and publish the profile panels.

2. FEMA FORMS

Form 1 – Overview & Concurrence Form, Form 2 – Riverine Hydrology & Hydraulics Form, Form 3 – Riverine Structures Form, and Form 7 – Payment Information Form are included within the TSDN. The forms are located in Appendix D.

Form 1 – Overview and Concurrence Form

The "Overview and Concurrence Form" is provided per FEMA requirements for submittals. The basis for this revision request is additional/refined hydraulic analysis along with updated hydrology. A form has been included for City concurrence since this project is located within the City of Moorpark. No changes are proposed outside of City of Moorpark Corporate Limits.

Form 2 – Riverine Hydrology and Hydraulics Form

The "Riverine Hydrology and Hydraulics Form" is provided per FEMA requirements for submittals.

Form 3 – Riverine Structures Form

The "Riverine Structures Form" is provided per FEMA requirements for LOMR submittals.

Please refer to Appendix D for additional bridge information.

3. SURVEY AND MAPPING INFORMATION

3.1. Field Survey Information

MRC LLC obtained the effective model and supporting documentation from Michael Baker Engineering Library and coordinated with Nolte Associates, Inc (Nolte). It should be noted that Nolte was the author of the effective hydraulic models for Walnut Canyon Channel.

MRC LLC made multiple site visits to Walnut Canyon Channel. These site visits included verification of channel sizes and box culvert crossings at Casey Road, analyzing the flooding source, and walking the entire study area.

3.2. Mapping

The topographic mapping used for the purpose of this study consists of two foot contour interval digital mapping from the effective model. LiDAR data was developed by Airborne1 under a contract with the County of Ventura and submitted to FEMA Study Contractors prior to the FIS in early 2000. Subsequently, TetraTech verified the model cross sections against new topographic DTM of 2005 LiDAR that was used in the FLO-2D simulation for Arroyo Simi and its overland flows. The mapping datum is NAVD88 for the project area.

Additional survey information was collected at Casey Road in order to update the culvert crossings and analyze hydraulic capacity of the culvert system. This survey information is included in Appendix E.

4. HYDROLOGY

The effective discharges from the Flood Insurance Study were not used for this submittal. Ventura County Watershed Protection District (VCWPD) provided hydrology to Nolte in a report entitled *Calleguas Creek Watershed Hydrology Study*, dated March 2003. This study utilized a hydrologic model known as VCRAT. After evaluation of hydrology used by Nolte in the effective HEC-RAS model, it appears that there were key over cites made in hydrologic evaluation of Walnut Canyon by VCWPD.

PACE analyzed the 2003 VCWPD hydrology study and provided updates to it in 2009 for existing, interim and ultimate conditions. Without getting into specific details, the 2003 VCWPD study included ultimate hydrologic conditions instead of existing hydrologic conditions as required with FEMA studies. The PACE study existing condition results were used for updating the effective HEC-RAS model for the study area after further considering a coincident peak analysis. A comparison of effective hydrology

(2003 VCWPD) and revised hydrology (PACE) is included in Table 1. Appendix C contains information form the PACE study.

Table 1 – Comparison of Peak Discharge Values without Coincident Peak Analysis

	2003 VCWPD Model		2009 PACE Model	
Location	Concentration Point	100-YR Peak Discharge (cfs)	Concentration Point	100-YR Peak Discharge (cfs)
Study Area 1	1566B	823	5A	391
Study Area 1	1567B	900	7A	431
Study Area 1	1574BC	1368	14AB	696

Study Area

According to *FEMA Appendix A, Guidelines and Specifications, 2003*, the assumption of coincident peaks is appropriate if all of the following conditions are met:

- The ratio of the drainage areas lies between 0.6 and 1.4;
- The arrival times of flood peaks are similar for the two combining watersheds; and
- The likelihood of both watersheds being covered by the storm being modeled is high.

Upstream of Casey Road flows are separated into two distinct watersheds; one which contains Walnut Canyon Channel and a tributary watershed to the west of Walnut Canyon Channel. The two watersheds confluence underneath Casey Road via box culverts and emerge (daylight) downstream of Casey Road, near the City Hall building. The two watersheds are considered to be coincident as they meet the above noted criteria. Using the PACE 2009 Existing Conditions Hydrology, at the confluence of the two watersheds the peak 100-year discharge is 696 cfs. The 2003 VCWPD study incorrectly established the peak 100-year discharge at this confluence as 1,368 cfs due to the over cites indicated above.

PACE Existing Condition hydrology was used in the revised hydraulic model up to XS 109794, at which point in time effective model hydrology was used to tie the study area into the effective model and associated DFIRM mapping.

5. HYDRAULICS

5.1. Effective Model

The basis for hydraulic calculations for Walnut Canyon Channel and its breakout flows were the following Nolte study effective HEC-RAS models:

1. "FEMA Ventura FIS", filename Calleguas_Drain2.prj;
2. "WalnutSpillROB1", filename WalnutSpillROB.prj; and
3. "110640lobspill", filename 110640LOBspill.prj

The "FEMA Ventura FIS" file was intended solely for analysis of the main channel. The "110640lobspill" file is intended to analyze the left overbank, looking downstream, of breakout flows upstream of Casey Road. The "WalnutSpillROB1" file was intended to analyze breakout flows stemming from a tributary canyon west of Walnut Canyon Channel and any right overbank flows occurring in the Walnut Canyon Channel downstream of Casey Road.

5.2. Duplicate Effective Model

The "FEMA Ventura FIS" model was truncated to the study area. The following is a listing of the study area's duplicate effective model.

1. "Walnut Canyon_SA1", filename WalnutCanyon_SA1.prj

Duplicate effective model file names and plan names are also indicated on MT-2 Form 2. A comparison between the Effective model and Duplicate effective model for the study area can be seen below in Table 2.

Table 2 Comparison of Effective vs. Duplicate Effective HEC-RAS results for Study Area

EFFECTIVE HEC-RAS MODEL			DUPLICATE EFFECTIVE HEC-RAS MODEL			COMPARISON
Station	Q Total	W.S. Elev	River Sta	Q Total	W.S. Elev	W.S. Difference
	(cfs)	(ft)		(cfs)	(ft)	Eff. - Dup. Eff (ft)
113446	823	645.25	113446	823	645.25	0.00
113345	823	642.52	113345	823	642.52	0.00
113290	Culvert		113290	Culvert		0.00
111910	900	594.32	111910	900	594.32	0.00
111496	900	577.10	111496	900	577.10	0.00
111188	900	567.45	111188	900	567.45	0.00
110890	900	562.12	110890	900	562.12	0.00
110788	900	560.15	110788	900	560.15	0.00
110640	530	555.65	110640	530	555.65	0.00
110635	Culvert		110635	Culvert		0.00
110422	530	549.20	110422	530	549.20	0.00
110263	530	540.08	110263	530	540.08	0.00
110091	530	533.94	110091	530	533.94	0.00
109794	530	515.67	109794	530	515.67	0.00
109646	530	512.13	109646	530	512.13	0.00
109444	300	509.20	109444	300	509.20	0.00

5.3. Revised Model

The Duplicate effective HEC-RAS model for the study area was revised as outlined in Section 1.4. The following is a listing of the study area's revised model.

1. "Walnut_SA1_withlid", filename Walnut_SA1_withlid.prj

A comparison of the Duplicate effective and Revised HEC-RAS models can be seen below in Table 3.

Table 3 Comparison of Duplicate Effective vs Revised HEC-RAS results for Study Area

DUPLICATE EFFECTIVE HEC-RAS			REVISED HEC-RAS MODEL			COMPARISON
River Sta	Q Total	W.S. Elev	River Sta	Q Total	W.S. Elev	W.S. Difference
	(cfs)	(ft)		(cfs)	(ft)	Eff. - Dup. Eff (ft)
113446	823	645.25	113446	891	643.66	1.59
113345	823	642.52	113345	891	640.92	1.60
113290	Culvert		113290	Culvert		
111910	900	594.32	111910	890	588.9	5.42
111496	900	577.10	111496	890	575.75	1.35
111188	900	567.45	111188	890	565.68	1.77
110890	900	562.12	110890	890	560.13	1.99
110788	900	560.15	110788	890	558.11	2.04
110640	530	555.65	110640	431	556.07	-0.42
			110585	431	550.92	N/A
			110545	431	549.59	N/A
			110488	696	547.96	N/A
			110366	696	548.56	N/A
110263	530	540.08	110263	696	541.79	-1.71
110091	530	533.94	110091	696	534.85	-0.91
109794	530	515.67	109794	696	516.17	-0.50
109646	530	512.13	109646	530	511.92	0.21
109444	300	509.20	109444	300	509.18	0.02

As can be seen above in Table 3, the revised hydraulic model generally showed a reduction in BFE values in Walnut Canyon Channel. The only increases occurred at the crossing with Casey Road until just before tie-in at the downstream limit of study; however, the base flood event was still contained within the channel. The increase in BFE values at these locations was in large part due to increased flow rates (from 530 cfs to 696 cfs) as can be seen in the table above. The revised model ties-in to the duplicate effective model at the downstream limit of study (XS 109444).

5.4. CHECK-RAS

CHECK-RAS output files were reviewed. Notes were resolved where applicable. CHECK-RAS output can be seen in Appendix F.

6. EROSION AND SEDIMENT TRANSPORT

No additional erosion and sediment transport information is used in this submittal.

7. DRAFT FIS REPORT DATA

7.1. Summary of Discharges

Peak discharge values were revised from the upstream limit of study (XS 113446) to just upstream of the downstream study limit (XS 109794). The peak discharge value at XS 109646 and XS 109444 remain as used in to the 2005 Nolte study so that the study area could tie-in to the effective model. Effective and revised discharges can be located in tables above in Section 4 and Section 5.

7.2. Floodway Data

There is no floodway data associated with Walnut Canyon Channel. As a result, no floodway was modeled.

7.3. Annotated Flood Insurance Rate Map

The floodplain boundaries were adjusted /relocated based on the updated maps and topographic information from the effective study. Exhibit 4 contains the Annotated FIRM map.

7.4. Flood Profiles

Flood Panels 198P and 199P were revised as a result of this study. The revised flood profile panel(s) is enclosed as Exhibit 5.

REFERENCES

1. Flood Insurance Study Report "Appeal of Preliminary Flood Insurance Study and Flood Insurance Rate Map (Dated September 16, 2005) In the City of Moorpark, California", Prepared for: City of Moorpark, CA; Prepared by: Tetra Tech, Inc.17770 Cartwright Road, Suite 500, Irvine, CA 92614, August 31, 2007.

2. Preliminary Flood Insurance Study (FIS) and Digital Flood Insurance Rate Map (DFIRM) for Ventura County, CA, and its incorporated areas, stamped 'Preliminary-September 16, 2005', Nolte Associates, Inc., San Diego, CA.

3. "Open-Channel Hydraulics", V.T. Chow, McGraw-Hill, 1959.

4. "City of Moorpark Master Plan of Drainage", Hawks and Associates, April 1995.

5. "Walnut Canyon Channel As-builts, Drawing No. 7-E-15518", U.S. Department of Agriculture, Soil Conservation Service, 1962.

6. "Gabbert/Walnut Canyon Channels Revised Flood Control Study", PACE, 2009.

PROVIDED TO FEMA ON JAN. 11, 2012. SUPERCEDES PREVIOUS WORKMAP(S).

EXHIBIT K

N

0 200 400 600 Feet

Legend

- Flowline
- Cross Sections
- Zone X Shaded from Case No. 10-09-2904P
- Revised Zone AE
- Revised Zone X Shaded
- Effective Flood Zones
- Lettered Cross Sections
- Revised BFE
- Major Roads
- Local Roads
- 2' Contours

NOTE:
TOPOGRAPHIC DATA: 2' CONTOUR INTERVAL
HORIZONTAL CONTROL: NORTH AMERICAN DATUM 1983 (NAD83), ZONE 5 CALIFORNIA, US SURVEY FEET
VERTICAL CONTROL: NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88)

XS113345
XS111910
XS111496
XS111188
XS110890
XS110788
XS110585 & XS110605
XS110640
XS110545
XS110488
XS110366
XS110263
XS110091
XS109794
XS109646
XS109444
XS109326
XS108948
XS108648
XS 108363

Walnut Canyon Rd
Wicks Rd
Casey Rd
Everett St
Bonnie View Rd
Valley Rd
Warren Ct
Lucille Ct
Lucille Cir
Hedyland Ct
Sir George Ct
Magnolia Ave
Walnut St
Bard St
Charles St
W High St
E High St
Princeton Ave
Reyes St
Poindexter Ave
1st St
Dorothy Ave
Fitch Ave
Ruth Ave
Denali Ct
Sierra Ave
Gister Rd
Cornell Ave
McFadden Ave
Moorpark Ave
Flory Ave
Miard St
Harry St
Spring Rd
Mingo St

WALNUT CANYON DRAIN

DOWNSTREAM TIE-IN AT XS 108363

AREA REVISED TO ZONE X (SHADED) WITH LOMR CASE NO. 10-09-2904P

PREPARED BY: CR
CHECKED BY: MR/IO
DATE: 10/2011

MR Consulting

WORKMAP

EXHIBIT L

Page 1 of 4	Issue Date: 03/01/2012	Effective Date: 07/18/2012	Case No.: 12-09-0985P	LOMR-APP

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City Of Moorpark Ventura County California	CHANNELIZATION CULVERT	HYDRAULIC ANALYSIS HYDROLOGIC ANALYSIS
	COMMUNITY NO.: 060712		
IDENTIFIER	Walnut Canyon---City Of Moorpark	APPROXIMATE LATITUDE & LONGITUDE: 34.287, -118.883 SOURCE: USGS QUADRANGLE DATUM: NAD 83	

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 06111C0817E DATE: January 20, 2010	DATE OF EFFECTIVE FLOOD INSURANCE STUDY: January 20, 2010 PROFILE(S): 198P and 199P SUMMARY OF DISCHARGES TABLE: 5

Enclosures reflect changes to flooding sources affected by this revision.
* FIRM - Flood Insurance Rate Map

FLOODING SOURCE(S) & REVISED REACH(ES)

Walnut Canyon Drain - From approximately 950 feet downstream of High Street to approximately 2,850 feet upstream of Casey Road

SUMMARY OF REVISIONS

Flooding Source	Effective Flooding	Revised Flooding	Increases	Decreases
Walnut Canyon Drain	Zone AE	Zone AE	NONE	YES
	BFEs	BFEs	YES	YES
	Zone X (shaded)	Zone X (shaded)	YES	NONE
	Zone AO	Zone X (shaded)	NONE	YES

* BFEs - Base Flood Elevations

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information Exchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 7390 Coca Cola Drive, Ste 204, Hanover, MD 21076. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Beth A Norton

Beth A. Norton, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

NFIP regulations Subparagraph 60.3(b)(7) requires communities to ensure that the flood-carrying capacity within the altered or relocated portion of any watercourse is maintained. This provision is incorporated into your community's existing floodplain management ordinances; therefore, responsibility for maintenance of the altered or relocated watercourse, including any related appurtenances such as bridges, culverts, and other drainage structures, rests with your community. We may request that your community submit a description and schedule of maintenance activities necessary to ensure this requirement.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance discharges computed in the submitted hydrologic model. Future development of projects upstream could cause increased discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on discharges and could, therefore, indicate that greater flood hazards exist in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information Exchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 7390 Coca Cola Drive, Ste 204, Hanover, MD 21076. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

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Beth A. Norton, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Ms. Sally M. Ziolkowski
Director, Mitigation Division
Federal Emergency Management Agency, Region IX
1111 Broadway Street, Suite 1200
Oakland, CA 94607-4052
(510) 627-7175

STATUS OF THE COMMUNITY NFIP MAPS

We will not physically revise and republish the FIRM and FIS report for your community to reflect the modifications made by this LOMR at this time. When changes to the previously cited FIRM panel(s) and FIS report warrant physical revision and republication in the future, we will incorporate the modifications made by this LOMR at that time.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information Exchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 7390 Coca Cola Drive, Ste 204, Hanover, MD 21076. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

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Beth A. Norton, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION
DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

PUBLIC NOTIFICATION

FLOODING SOURCE	LOCATION OF REFERENCED ELEVATION	BFE (FEET NAVD 88)		MAP PANEL NUMBER(S)
		EFFECTIVE	REVISED	
Walnut Canyon Drain	Just downstream of High Street	509	511	06111C0817E
	Approximately 1,300 feet upstream of Casey Road	594	589	06111C0817E

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below and through FEMA's Flood Hazard Mapping Website at https://www.floodmaps.fema.gov/fhm/Scripts/bfe_main.asp.

LOCAL NEWSPAPER Name: *The Ventura County Star*
Dates: **March 13, 2012 and March 20, 2012**

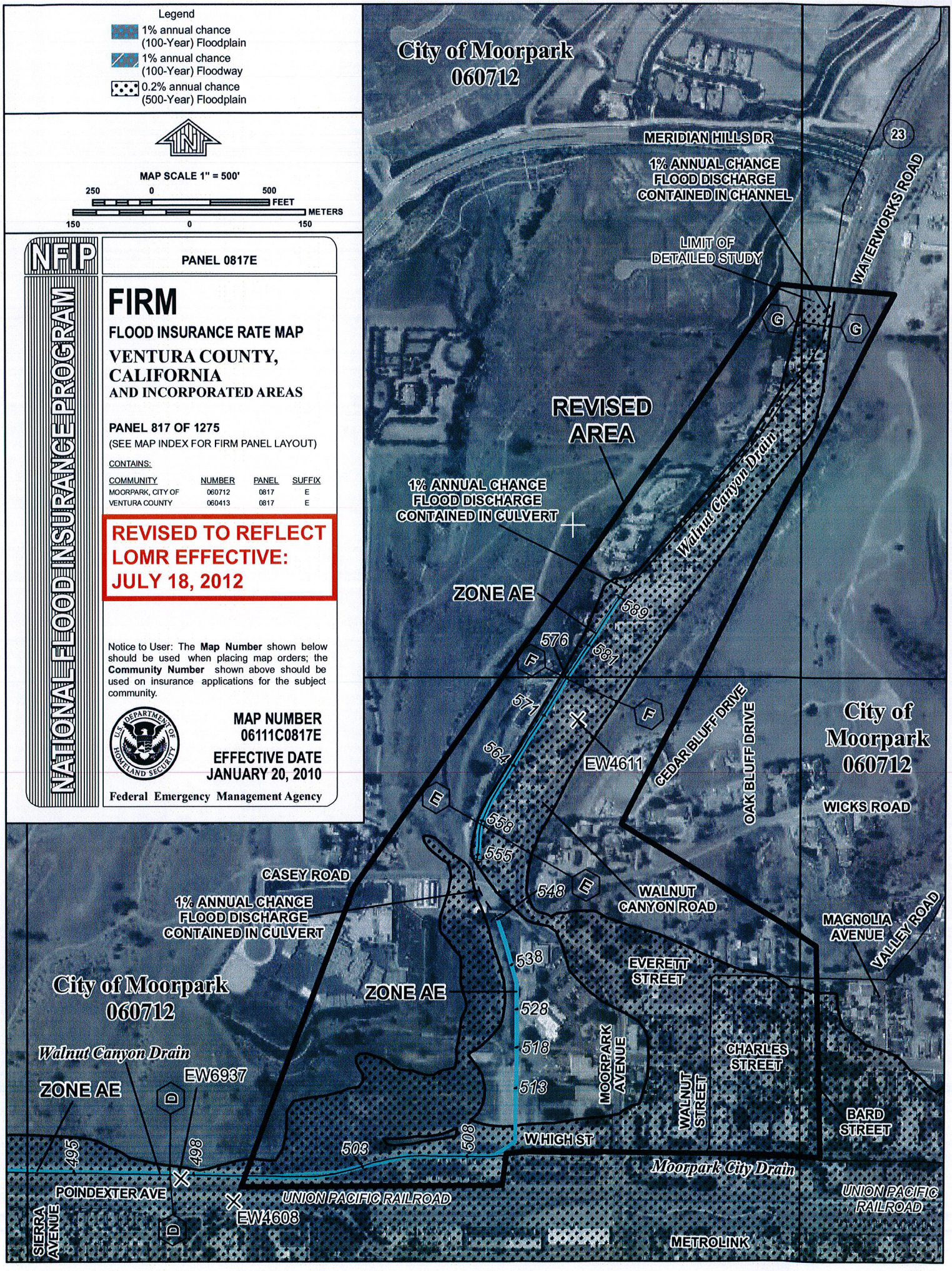
Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this period. Until this LOMR is effective, the revised floo hazard determination information presented in this LOMR may be changed.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Information Exchange (FMIX) toll free at 1-877-336-2627 (1-877-FEMA MAP) or by letter addressed to the LOMC Clearinghouse, 7390 Coca Cola Drive, Ste 204, Hanover, MD 21076. Additional Information about the NFIP is available on our website at http://www.fema.gov/nfip.

Beth A Norton

Beth A. Norton, Program Specialist
Engineering Management Branch
Federal Insurance and Mitigation Administration

EXHIBIT M


Legend
1% annual chance (100-Year) Floodplain
1% annual chance (100-Year) Floodway
0.2% annual chance (500-Year) Floodplain
MAP SCALE 1" = 500'
250 0 500 FEET
150 0 150 METERS
NFIP
NATIONAL FLOOD INSURANCE PROGRAM
PANEL 0817E
FIRM
FLOOD INSURANCE RATE MAP
VENTURA COUNTY, CALIFORNIA
AND INCORPORATED AREAS
PANEL 817 OF 1275
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
MOORPARK, CITY OF 060712 0817 E
VENTURA COUNTY 060413 0817 E
REVISED TO REFLECT LOMR EFFECTIVE: JULY 18, 2012
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.
MAP NUMBER 06111C0817E
EFFECTIVE DATE JANUARY 20, 2010
Federal Emergency Management Agency
City of Moorpark 060712
MERIDIAN HILLS DR
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CHANNEL
LIMIT OF DETAILED STUDY
WATERWORKS ROAD
23
REVISED AREA
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
Walnut Canyon Drain
ZONE AE
589
576
587
571
564
558
555
548
538
528
518
513
508
503
498
495
EW4611
EW6937
EW4608
CEDAR BLUFF DRIVE
OAK BLUFF DRIVE
WICKS ROAD
CASEY ROAD
WALNUT CANYON ROAD
MAGNOLIA AVENUE
VALLEY ROAD
EVERETT STREET
MOORPARK AVENUE
CHARLES STREET
WALNUT STREET
BARD STREET
WHICH ST
Moorpark City Drain
POINDEXTER AVE
SIERRA AVENUE
UNION PACIFIC RAILROAD
METROLINK