2125 Milvia Street, Berkeley, CA 94704

Property Finder / SEARCH

○ MAIN
○ Unit Directory ◉ Unit History
○ Acct Recv Drilldown ○ Rent Ceiling Drilldc
○ Owner History ○ TBD

1157 Hearst Ave

1157 HEARST AVE (1 unit found) is a main property (6 units, all addresses combined) also associated with: 1155 HEARST AVE (1 unit), 1159 HEARST AVE (2 units), 1161 HEARST AVE (1 unit), 1163 HEARST AVE (1 unit).

Unit History @ 1155 HEARST AVE (Compliant)

1157 HEARST AVE [MAIN/acct recv /own hist] >> Unit Directory [6 (6/0)] >> 1155 HEARST AVE [history] : (unit status...) Tenant Names ON

Unit Address	Unit Status Change	Effective Date	Rent Ceiling	Housing Services	Tenancy (Tenant Names ON)
1155 HEARST AVE	RENTED - Rented or Available	8/10/2011	Rent Ceiling Drilldown shows all adjustment line item details dating back to 5/31/1980. Current rent ceiling @1155 HEARST AVE = **$1,144.58**. 1/1/2017 / AGA [20.24] / $1,144.58 1/1/2016 / AGA [16.62] / $1,124.34 1/1/2015 / AGA [21.72] / $1,107.72 1/1/2014 / AGA [18.15] / $1,086.00 1/1/2013 / AGA [17.85] / $1,067.85 **1/1/2012 / -- / $1,050.00** 8/10/2011 / VAC [55.00] / $1,050.00	Garbage	VR No. 86439 # Bedrooms: 1 # Occ reported: 1 # Occ names: 1 PI TE
1155 HEARST AVE	RENTED - Rented or Available	2/1/2010	**1/1/2011 / -- / $995.00** 2/1/2010 / VAC [-50.39] / $995.00	(data temporarily not available as of Sep 2015)	VR No. 69716 # Bedrooms: 1 # Occ reported: 0 # Occ names: 1 JORGE RAMIREZ End reason: VOLVAC - Voluntary Vacancy.
1155 HEARST AVE	RENTED - Rented or Available	10/1/2006	1/1/2010 / AGA [1.04] / $1,045.39 1/1/2009 / AGA [27.46] / $1,044.35 1/1/2008 / AGA [21.89] / $1,016.89 **1/1/2007 / -- / $995.00** 10/1/2006 / VAC [80.54] / $995.00	(data temporarily not available as of Sep 2015)	VR No. 51689 # Bedrooms: 1 # Occ reported: 0 # Occ names: 1 BHAVANA MODY End reason: VOLVAC - Voluntary Vacancy.
1155 HEARST AVE	RENTED - Rented or Available	11/22/2003	1/1/2006 / AGA [6.36] / $914.46 1/1/2005 / AGA [8.10] / $908.10 **1/1/2004 / -- / $900.00** 11/22/2003 / VAC [363.21] / $900.00	(data temporarily not available as of Sep 2015)	VR No. 36648 # Bedrooms: 1 # Occ reported: 0 # Occ names: 2 JOSHUA WYATT RACHEL AVILLA End reason: VOLVAC - Voluntary Vacancy.
1155 HEARST AVE	RENTED - Rented or Available	12/14/1993	**1/1/2003 / -- / $536.79** (p)(/t) 12/1/2002 / CAP [-11.00] / $536.79 1/1/2002 / AGA [18.15] / $547.79 (p) 2/1/2001 / HLR [2.44] / $529.64 1/1/2001 / AGA [10.00] / $527.20 1/1/2000 / AGA [6.00]	(data temporarily not available as of Sep 2015)	# Bedrooms: 1

				/ $517.20	
			1/1/1999 / AGA [4.55]	/ $511.20	
			1/1/1998 / AGA [3.93]	/ $506.65	
			(p)(t)(/t) 11/1/1997 / Misc (2) [-41.00]	**/ $502.72**	
			1/1/1997 / AGA [5.59]	/ $543.72	
			1/1/1996 / AGA [4.81]	/ $538.13	
			(p)(t)(/t) 11/1/1995 / Misc (2) [-1.00]	**/ $533.32**	
			1/1/1995 / AGA [7.11]	/ $534.32	
			(p)(t)(/t) 9/1/1994 / Misc (2) [-6.00]	**/ $527.21**	
			(/t) 1/1/1994 / Misc (2) [37.82]	/ $533.21	
			12/14/1993 / --	**/ $495.39**	
			(p) = Landlord Petition L-449 or Landlord Petition L-3626.		
1155 HEARST AVE		5/31/1980	(t)(/t) 1/1/1993 / Misc (3) [55.58]	/ $495.39	(data temporarily not available as of Sep 2015)
			1/1/1992 / AG1 [26.00]	/ $439.81	
			(p)(t)(/t) 12/1/1991 / Misc (2) [-17.00]	**/ $413.81**	
			(t) 11/1/1991 / Misc (2) [32.35]	/ $430.81	
			1/1/1991 / AG1 [17.00]	/ $398.46	
			1/1/1990 / AG1 [16.00]	/ $381.46	
			1/1/1989 / AG1 [8.46]	/ $365.46	
			1/1/1988 / AG1 [25.00]	/ $357.00	
			12/1/1987 / Misc (2) [-0.71]	**/ $332.00**	
			(p)(t) 11/1/1987 / CAP [76.00]	/ $332.71	
			1/1/1987 / ZA1 [7.71]	/ $256.71	
			1/1/1986 / ZA1 [10.00]	/ $249.00	
			1/1/1985 / ZA1 [5.00]	/ $239.00	
			1/1/1984 / --	**/ $234.00**	
			1/1/1983 / ZA1 [1.00]	/ $234.00	
			1/1/1982 / ZA1 [28.00]	/ $233.00	
			1/1/1981 / ZA1 [10.00]	/ $205.00	
			5/31/1980 / ZB1 [195.00]	**/ $195.00**	
			(p) = Landlord Petition L-449.		
			Base Rent = $195.00 established 5/31/1980.		

Bedrooms: 1
Occ reported: 0
Occ names: 1
RENTED

End reason: VOLVAC - Voluntary Vacancy.

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1157 Hearst Ave

1157 HEARST AVE (1 unit found) is a main property (6 units, all addresses combined) also associated with: 1155 HEARST AVE (1 unit), 1159 HEARST AVE (2 units), 1161 HEARST AVE (1 unit), 1163 HEARST AVE (1 unit).

Unit History @ 1157 HEARST AVE (Compliant)

1157 HEARST AVE [MAIN/acct recv /own hist] >> Unit Directory [6 (6/0)] >> 1157 HEARST AVE [history] : (unit status...) (tenants...)

Unit Address	Unit Status Change	Effective Date	Rent Ceiling	Housing Services	Tenancy
1157 HEARST AVE	RENTED - Rented or Available	7/1/2009	Rent Ceiling Drilldown shows all adjustment line item details dating back to 5/31/1980. Current rent ceiling @1157 HEARST AVE = **$1,109.70**. 1/1/2017 / AGA [19.62] / $1,109.70 1/1/2016 / AGA [16.11] / $1,090.08 1/1/2015 / AGA [21.06] / $1,073.97 1/1/2014 / AGA [17.60] / $1,052.91 1/1/2013 / AGA [17.31] / $1,035.31 1/1/2012 / AGA [16.03] / $1,018.00 1/1/2011 / AGA [6.97] / $1,001.97 **1/1/2010 /** -- / **$995.00** 7/1/2009 / VAC [-54.96] / $995.00	 Garbage	VR No. 69717 # Bedrooms: 1 # Occ reported: 1 # Occ names: 1
1157 HEARST AVE	RENTED - Rented or Available (continuous from 4/1/2003)	12/11/2005	1/1/2009 / AGA [27.60] / $1,049.96 1/1/2008 / AGA [22.01] / $1,022.36 1/1/2007 / AGA [25.35] / $1,000.35 **1/1/2006 /** -- / **$975.00** 12/11/2005 / VAC [25.00] / $975.00	(data temporarily not available as of Sep 2015)	VR No. 47542 # Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.
1157 HEARST AVE	RENTED - Rented or Available (continuous from 4/1/2003)	1/2/2005	1/2/2005 / VAC [41.90] / $950.00	(data temporarily not available as of Sep 2015)	VR No. 42862 # Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.
1157 HEARST AVE	RENTED - Rented or Available	4/1/2003	1/1/2005 / AGA [8.10] / $908.10 **1/1/2004 /** -- / **$900.00** 4/1/2003 / VAC [-30.00] / $900.00	(data temporarily not available as of Sep 2015)	VR No. 35781 # Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.
1157 HEARST AVE	NAR - Not Available for Rent	9/1/2002	1/1/2003 / -- / $930.00 9/1/2002 / -- / $930.00	(data temporarily not available as of Sep 2015)	# Bedrooms: 1
1157 HEARST AVE	RENTED - Rented or Available	1/15/2000	1/1/2002 / AGA [30.00] / $930.00 **1/1/2001 /** -- / **$900.00** 1/15/2000 / VAC [411.70] / $900.00	(data temporarily not available as of Sep 2015)	VR No. 16469 # Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.

1157 HEARST AVE	RENTED - Rented or Available	12/14/1993	1/1/2000 /	AGA [6.00]	/ $488.30	(data temporarily not available as of Sep 2015)	# Bedrooms: 1
			1/1/1999 /	AGA [4.30]	/ $482.30		
			1/1/1998 /	AGA [3.79]	/ $478.00		
			(p)(/t) 12/1/1997 /	CAP [-3.00]	/ $474.21		
			1/1/1997 /	AGA [5.39]	/ $477.21		
			1/1/1996 /	AGA [4.64]	/ $471.82		
			1/1/1995 /	AGA [6.86]	/ $467.18		
			1/1/1994 /	AG1 [18.00]	/ $460.32		
			12/14/1993 /	--	/ $442.32		
			(p) = Landlord Petition L-449.				
1157 HEARST AVE		5/31/1980	1/1/1993 /	AG1 [20.00]	/ $442.32	(data temporarily not available as of Sep 2015)	# Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.
			(/t) 5/1/1992 /	P74 [33.25]	/ $422.32		
			1/1/1992 /	AG1 [26.00]	/ $389.07		
			(t) 11/1/1991 /	Misc (2) [50.00]	/ $363.07		
			1/1/1991 /	AG1 [17.00]	/ $313.07		
			1/1/1990 /	AG1 [16.00]	/ $296.07		
			1/1/1989 /	AG1 [8.07]	/ $280.07		
			1/1/1988 /	AG1 [25.00]	/ $272.00		
			(p)(t) 12/1/1987 /	Misc (2) [2.74]	/ $247.00		
			1/1/1987 /	ZA1 [8.26]	/ $244.26		
			1/1/1986 /	ZA1 [9.00]	/ $236.00		
			1/1/1985 /	ZA1 [5.00]	/ $227.00		
			1/1/1984 /	--	/ $222.00		
			1/1/1983 /	ZA1 [11.00]	/ $222.00		
			1/1/1982 /	ZA1 [17.00]	/ $211.00		
			1/1/1981 /	ZA1 [9.00]	/ $194.00		
			5/31/1980 /	ZB1 [185.00]	/ $185.00		
			(p) = Landlord Petition L-449.				
			Base Rent = $185.00 established 5/31/1980.				

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1159 Hearst Ave

1159 HEARST AVE (2 units found) is a secondary address at main property = 1157 HEARST AVE (6 units, all addresses combined).

Unit History @ 1159 HEARST AVE #A (Compliant)

1157 HEARST AVE [MAIN/acct recv /own hist] >> Unit Directory [6 (6/0)] >> 1159 HEARST AVE #A [history] : (unit status...) (tenants...)

Unit Address	Unit Status Change	Effective Date	Rent Ceiling	Housing Services	Tenancy
1159 HEARST AVE #A	RENTED - Rented or Available	5/31/1980	Rent Ceiling Drilldown shows all adjustment line item details dating back to 5/31/1980. Current rent ceiling @1159 HEARST AVE #A = **$1,231.24**.	Parking	# Bedrooms: 1 # Occ reported: 0 # Occ names: 1

	1/1/2017 /	AGA [21.77]	/ $1,231.24
	1/1/2016 /	AGA [17.87]	/ $1,209.47
	1/1/2015 /	AGA [23.36]	/ $1,191.60
	1/1/2014 /	AGA [19.53]	/ $1,168.24
	1/1/2013 /	AGA [19.20]	/ $1,148.71
	1/1/2012 /	AGA [17.79]	/ $1,129.51
	1/1/2011 /	AGA [7.73]	/ $1,111.72
	1/1/2010 /	AGA [1.10]	/ $1,103.99
	1/1/2009 /	AGA [29.00]	/ $1,102.89
	1/1/2008 /	AGA [23.12]	/ $1,073.89
	(p) 12/1/2007 /	CAPP [22.00]	/ $1,050.77
	1/1/2007 /	AGA [26.07]	/ $1,028.77
	1/1/2006 /	AGA [6.97]	/ $1,002.70
	1/1/2005 /	AGA [8.88]	/ $995.73
	(p) 11/1/2004 /	CAPP [66.26]	/ $986.85
	1/1/2004 /	AGA [16.55]	/ $920.59
	1/1/2003 /	--	**/ $904.04**
	1/1/2002 /	AGA [30.00]	/ $904.04
	1/1/2001 /	AGA [10.00]	/ $874.04
	1/1/2000 /	AGA [6.00]	/ $864.04
	1/1/1999 /	AGA [8.00]	/ $858.04
	1/1/1998 /	AGA [6.75]	/ $850.04
	(p)(/t) 12/1/1997 /	**CAP [-7.00]**	**/ $843.29**
	1/1/1997 /	AGA [9.59]	/ $850.29
	1/1/1996 /	AGA [8.25]	/ $840.70
	1/1/1995 /	AGA [12.20]	/ $832.45
	(/t) 1/1/1994 /	Misc (2) [67.57]	/ $820.25
	(t)(/t) 1/1/1993 /	Misc (3) [83.61]	/ $752.68
	1/1/1992 /	AG1 [26.00]	/ $669.07
	(t) 11/1/1991 /	Misc (2) [57.82]	/ $643.07
	1/1/1991 /	AG1 [22.24]	/ $585.25
	(p)(t)(/t) 8/1/1990 /	**Misc (2) [-1.50]**	**/ $563.01**
	1/1/1990 /	AG1 [16.00]	/ $564.51
	(p)(t) 12/1/1989 /	Misc (2) [8.78]	/ $548.51
	1/1/1989 /	ZA1 [15.72]	/ $539.73
	1/1/1988 /	ZA1 [25.00]	/ $524.01
	1/1/1987 /	ZA1 [17.00]	/ $499.01
	(p) 12/31/1986 /	ZA2 [0.01]	/ $482.01
	1/1/1986 /	ZA1 [16.00]	/ $482.00
	1/1/1985 /	ZA1 [9.00]	/ $466.00
	1/1/1984 /	--	**/ $457.00**
	1/1/1983 /	ZA1 [22.00]	/ $457.00
	1/1/1982 /	ZA1 [36.00]	/ $435.00

			1/1/1981 / ZA1 [19.00] / $399.00 5/31/1980 / ZB1 [380.00] / $380.00 (p) = One or more of: Landlord Petition L-3912, Landlord Petition L-3840, Landlord Petition L-449. *Base Rent = $380.00 established 5/31/1980.*		

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1159 hearst ave

1159 HEARST AVE (2 units found) is a secondary address at main property = 1157 HEARST AVE (6 units, all addresses combined).

Unit History @ 1159 HEARST AVE #B (Compliant)

1157 HEARST AVE [MAIN/acct recv /own hist] >> Unit Directory [6 (6/0)] >> 1159 HEARST AVE #B [history] : (unit status...) (tenants...)

Unit Address	Unit Status Change	Effective Date	Rent Ceiling	Housing Services	Tenancy
1159 HEARST AVE #B	RENTED - Rented or Available	6/14/1997	Rent Ceiling Drilldown shows all adjustment line item details dating back to 5/31/1980. Current rent ceiling @1159 HEARST AVE #B = **$1,111.09**. 1/1/2017 / AGA [19.65] / $1,111.09 1/1/2016 / AGA [16.13] / $1,091.44 1/1/2015 / AGA [21.08] / $1,075.31 1/1/2014 / AGA [17.62] / $1,054.23 1/1/2013 / AGA [17.33] / $1,036.61 1/1/2012 / AGA [16.05] / $1,019.28 1/1/2011 / AGA [6.97] / $1,003.23 1/1/2010 / AGA [1.00] / $996.26 1/1/2009 / AGA [26.17] / $995.26 1/1/2008 / AGA [20.86] / $969.09 1/1/2007 / AGA [24.03] / $948.23 1/1/2006 / AGA [6.42] / $924.20 1/1/2005 / AGA [8.19] / $917.78 (p) 11/1/2004 / CAPP [16.95] / $909.59 1/1/2004 / AGA [16.15] / $892.64 **1/1/2003 / -- / $876.49** **(p)(/t) 12/1/2002 / CAP [-11.00] / $876.49** 1/1/2002 / AGA [29.64] / $887.49 (p) 2/1/2001 / SRV [396.00] / $857.85 1/1/2001 / AGA [10.00] / $461.85 1/1/2000 / AGA [6.00] / $451.85 1/1/1999 / AGA [3.97] / $445.85 1/1/1998 / AGA [3.42] / $441.88 (p)(t)(/t) 12/1/1997 / Misc (2) [-7.00] / $438.46 6/14/1997 / -- / $445.46 (p) = One or more of: Landlord Petition L-3840, Landlord Petition L-449, Landlord Petition L-3626.	Garbage Parking Water	# Bedrooms: 3
1159 HEARST AVE #B	(~) MISC - Exempt-Misc	12/14/1993	(p)(t)(/t) 2/1/1997 / Misc (2) [-3.00] / $445.46 1/1/1997 / AGA [4.86] / $448.46 (p)(t)(/t) 1/1/1996 / AGA (+2) [-1.82] / $443.60 1/1/1995 / AGA [6.18] / $445.42 1/1/1994 / AG1 [18.00] / $439.24 12/14/1993 / -- / $421.24 (p) = Landlord Petition L-449.	(data temporarily not available as of Sep 2015)	# Bedrooms: 3
1159 HEARST AVE #B	(~) MISC - Exempt-Misc	5/15/1989	1/1/1993 / AG1 [20.00] / $421.24 (/t) 5/1/1992 / P74 [45.85] / $401.24 1/1/1992 / AG1 [26.00] / $355.39	(data temporarily not available as of Sep 2015)	# Bedrooms: 3

			(t) 11/1/1991 / Misc (2) [50.00] / $329.39 1/1/1991 / AG1 [17.00] / $279.39 (p)(t)(/t) 8/1/1990 / Misc (2) [-1.50] / $262.39 1/1/1990 / AG1 [16.00] / $263.89 12/1/1989 / ZA2 [6.39] / $247.89 5/15/1989 / -- / $241.50 (p) = Landlord Petition L-449.		
1159 HEARST AVE #B		5/31/1980	1/1/1989 / -- / $241.50 1/1/1988 / -- / $241.50 (p)(t) 12/1/1987 / CAP [28.50] / $241.50 1/1/1987 / -- / $213.00 1/1/1986 / -- / $213.00 1/1/1985 / -- / $213.00 1/1/1984 / -- / $213.00 1/1/1983 / -- / $213.00 1/1/1982 / -- / $213.00 1/1/1981 / -- / $213.00 5/31/1980 / ZB1 [213.00] / $213.00 (p) = Landlord Petition L-449. *Base Rent = $213.00 established 5/31/1980.*	(data temporarily not available as of Sep 2015)	# Bedrooms: 3 # Occ reported: 0 # Occ names: 1

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1161 hearst ave

1161 HEARST AVE (1 unit found) is a secondary address at main property = 1157 HEARST AVE (6 units, all addresses combined).

Unit History @ 1161 HEARST AVE (Compliant)

1157 HEARST AVE [MAIN/acct recv /own hist] >> Unit Directory [6 (6/0)] >> 1161 HEARST AVE [history] : (unit status...) (tenants...)

Unit Address	Unit Status Change	Effective Date	Rent Ceiling	Housing Services	Tenancy
1161 HEARST AVE	RENTED - Rented or Available	7/1/2009	Rent Ceiling Drilldown shows all adjustment line item details dating back to 5/31/1980. Current rent ceiling @1161 HEARST AVE = **$1,171.03**. 1/1/2017 / AGA [20.71] / $1,171.03 1/1/2016 / AGA [17.00] / $1,150.32 1/1/2015 / AGA [22.22] / $1,133.32 1/1/2014 / AGA [18.57] / $1,111.10 1/1/2013 / AGA [18.26] / $1,092.53 1/1/2012 / AGA [16.92] / $1,074.27 1/1/2011 / AGA [7.35] / $1,057.35 **1/1/2010 / -- / $1,050.00** 7/1/2009 / VAC [26.65] / $1,050.00	Garbage	VR No. 69718 # Bedrooms: 1 # Occ reported: 2 # Occ names: 1
1161 HEARST AVE	RENTED - Rented or Available (continuous from 11/15/2003)	2/1/2006	1/1/2009 / AGA [26.90] / $1,023.35 1/1/2008 / AGA [21.45] / $996.45 **1/1/2007 / -- / $975.00** 2/1/2006 / VAC [18.35] / $975.00	(data temporarily not available as of Sep 2015)	VR No. 47543 # Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.
1161 HEARST AVE	RENTED - Rented or Available (continuous from 11/15/2003)	11/1/2004	1/1/2006 / AGA [6.65] / $956.65 **1/1/2005 / -- / $950.00** 11/1/2004 / VAC [50.00] / $950.00	(data temporarily not available as of Sep 2015)	VR No. 41268 # Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.
1161 HEARST AVE	RENTED - Rented or Available	11/15/2003	**1/1/2004 / -- / $900.00** 11/15/2003 / VAC [0.00] / $900.00	(data temporarily not available as of Sep 2015)	VR No. 36677 # Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.
1161 HEARST AVE	RENTED - Rented or Available	8/17/2003	8/17/2003 / VAC [207.44] / $900.00	(data temporarily not available as of Sep 2015)	VR No. 35813 # Bedrooms: 1 # Occ reported: 0 # Occ names: 2 End reason: VOLVAC - Voluntary Vacancy.
		8/7/2002	1/1/2003 / -- / $692.56	(data temporarily not available as of Sep 2015)	# Bedrooms: 1

1161 HEARST AVE	NAR - Not Available for Rent		8/7/2002 /	--	/ $692.56		
1161 HEARST AVE	RENTED - Rented or Available	8/6/2002	8/6/2002 /	--	/ $692.56	(data temporarily not available as of Sep 2015)	# Bedrooms: 1
1161 HEARST AVE	NAR - Not Available for Rent	12/15/2001	1/1/2002 /	AGA [23.42]	/ $692.56	(data temporarily not available as of Sep 2015)	# Bedrooms: 1
			12/15/2001 /	--	/ **$669.14**		
1161 HEARST AVE	RENTED - Rented or Available	12/14/1993	1/1/2001 /	AGA [10.00]	/ $669.14	(data temporarily not available as of Sep 2015)	# Bedrooms: 1
			1/1/2000 /	AGA [6.00]	/ $659.14		
			1/1/1999 /	AGA [5.82]	/ $653.14		
			1/1/1998 /	AGA [5.14]	/ $647.32		
			1/1/1997 /	AGA [7.30]	/ $642.18		
			1/1/1996 /	AGA [6.29]	/ $634.88		
			1/1/1995 /	AGA [9.29]	/ $628.59		
			1/1/1994 /	AG1 [18.00]	/ $619.30		
			12/14/1993 /	--	/ **$601.30**		
1161 HEARST AVE		5/31/1980	(p)(/t) 9/1/1993 /	CAP [-6.00]	/ $601.30	(data temporarily not available as of Sep 2015)	# Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.
			1/1/1993 /	AG1 [20.00]	/ $607.30		
			(/t) 5/1/1992 /	P74 [59.02]	/ $587.30		
			1/1/1992 /	AG1 [26.00]	/ $528.28		
			(t) 11/1/1991 /	Misc (2) [64.73]	/ $502.28		
			1/1/1991 /	AG1 [17.00]	/ $437.55		
			1/1/1990 /	AG1 [16.00]	/ $420.55		
			1/1/1989 /	AG1 [11.61]	/ $404.55		
			1/1/1988 /	AG1 [25.00]	/ $392.94		
			(p)(t) 12/1/1987 /	CAP [6.00]	/ $367.94		
			1/1/1987 /	ZA1 [12.24]	/ $361.94		
			1/1/1986 /	ZA1 [12.61]	/ $349.70		
			1/1/1985 /	ZA1 [6.61]	/ $337.09		
			1/1/1984 /	--	/ **$330.48**		
			1/1/1983 /	ZA1 [15.74]	/ $330.48		
			1/1/1982 /	ZA1 [25.99]	/ $314.74		
			1/1/1981 /	ZA1 [13.75]	/ $288.75		
			5/31/1980 /	**ZB1 [275.00]**	/ **$275.00**		
			(p) = Landlord Petition L-449.				
			Base Rent = $275.00 established 5/31/1980.				

2125 Milvia Street, Berkeley, CA 94704

Property Finder / SEARCH

○ MAIN
○ Unit Directory ◉ Unit History
○ Acct Recv Drilldown ○ Rent Ceiling Drilldc
○ Owner History ○ TBD

1163 hearst ave

1163 HEARST AVE (1 unit found) is a secondary address at main property = 1157 HEARST AVE (6 units, all addresses combined).

Unit History @ 1163 HEARST AVE (Compliant)

1157 HEARST AVE [MAIN/acct recv /own hist] >> Unit Directory [6 (6/0)] >> 1163 HEARST AVE [history] : (unit status...) (tenants...)

Unit Address	Unit Status Change	Effective Date	Rent Ceiling	Housing Services	Tenancy
1163 HEARST AVE	RENTED - Rented or Available	12/12/2011	Rent Ceiling Drilldown shows all adjustment line item details dating back to 5/31/1980. Current rent ceiling @1163 HEARST AVE = **$1,199.08**. 1/1/2017 / AGA [21.20] / $1,199.08 1/1/2016 / AGA [17.41] / $1,177.88 1/1/2015 / AGA [22.75] / $1,160.47 1/1/2014 / AGA [19.02] / $1,137.72 1/1/2013 / AGA [18.70] / $1,118.70 **1/1/2012 / -- / $1,100.00** 12/12/2011 / VAC [105.00] / $1,100.00	Garbage	VR No. 86442 # Bedrooms: 1 # Occ reported: 1 # Occ names: 1
1163 HEARST AVE	RENTED - Rented or Available	1/1/2010	**1/1/2011 / -- / $995.00** 1/1/2010 / AGA (+1) [-49.57] / $995.00	(data temporarily not available as of Sep 2015)	VR No. 69715 # Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.
1163 HEARST AVE	RENTED - Rented or Available	6/4/2005	1/1/2009 / AGA [27.46] / $1,044.57 1/1/2008 / AGA [21.89] / $1,017.11 1/1/2007 / AGA [25.22] / $995.22 **1/1/2006 / -- / $970.00** 6/4/2005 / VAC [36.67] / $970.00	(data temporarily not available as of Sep 2015)	VR No. 45501 # Bedrooms: 1 # Occ reported: 0 # Occ names: 2 End reason: VOLVAC - Voluntary Vacancy.
1163 HEARST AVE	RENTED - Rented or Available (continuous from 7/1/2000)	12/7/2003	1/1/2005 / AGA [8.33] / $933.33 **1/1/2004 / -- / $925.00** 12/7/2003 / VAC [-5.00] / $925.00	(data temporarily not available as of Sep 2015)	VR No. 37090 # Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.
1163 HEARST AVE	RENTED - Rented or Available	7/1/2000	**1/1/2003 / -- / $930.00** 1/1/2002 / AGA [30.00] / $930.00 **1/1/2001 / -- / $900.00** 7/1/2000 / VAC [240.86] / $900.00	(data temporarily not available as of Sep 2015)	VR No. 20589 # Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.
1163 HEARST AVE	RENTED - Rented or Available	12/14/1993	1/1/2000 / AGA [6.00] / $659.14 1/1/1999 / AGA [5.82] / $653.14 1/1/1998 / AGA [5.14] / $647.32	(data temporarily not available as of Sep 2015)	# Bedrooms: 1

			1/1/1997 /	AGA [7.30]	/ $642.18		
			1/1/1996 /	AGA [6.29]	/ $634.88		
			1/1/1995 /	AGA [9.29]	/ $628.59		
			1/1/1994 /	AG1 [18.00]	/ $619.30		
			12/14/1993 /	--	**/ $601.30**		
1163 HEARST AVE		5/31/1980	(p)(/t) 9/1/1993 /	CAP [-6.00]	/ $601.30	(data temporarily not available as of Sep 2015)	# Bedrooms: 1 # Occ reported: 0 # Occ names: 1 End reason: VOLVAC - Voluntary Vacancy.
			(/t) 1/1/1993 /	Misc (2) [35.86]	/ $607.30		
			(t)(/t) 5/1/1992 /	Misc (2) [43.16]	/ $571.44		
			1/1/1992 /	AG1 [26.00]	/ $528.28		
			(t) 11/1/1991 /	Misc (2) [64.73]	/ $502.28		
			1/1/1991 /	AG1 [17.00]	/ $437.55		
			1/1/1990 /	AG1 [16.00]	/ $420.55		
			1/1/1989 /	AG1 [11.61]	/ $404.55		
			1/1/1988 /	AG1 [25.00]	/ $392.94		
			(p)(t) 12/1/1987 /	CAP [6.00]	/ $367.94		
			1/1/1987 /	ZA1 [12.24]	/ $361.94		
			1/1/1986 /	ZA1 [12.61]	/ $349.70		
			1/1/1985 /	ZA1 [6.61]	/ $337.09		
			1/1/1984 /	--	**/ $330.48**		
			1/1/1983 /	ZA1 [15.74]	/ $330.48		
			1/1/1982 /	ZA1 [25.99]	/ $314.74		
			1/1/1981 /	ZA1 [13.75]	/ $288.75		
			5/31/1980 /	ZB1 [275.00]	**/ $275.00**		
			(p) = Landlord Petition L-449.				
			Base Rent = $275.00 established 5/31/1980.				

PLANNING & DEVELOPMENT
Land Use Planning, 2120 Milvia Street, Berkeley, CA 94704
Tel: 510.981.7410 TDD: 510.981.9603 Fax: 510.981.7420 Email: Planning@ci.berkeley.ca.us

TABULATION FORM

Project Address: 1155-73 Hearst Ave Date: January 5,

Applicant's Name: Rhoades Planning Group

Zoning District R-2A

Please print in ink the following numerical information for Use Permit, Variance, and other Zoning Ordinance related permit applications:

		Existing (Base Project)	*Proposed*	*Permitted/ Required*
Units; Parking Spaces				
Number of Dwelling Units	(#)	7	18	N/A
Number of Parking Spaces	(#)	7	18	18
Yards and Height				
Front Yard Setback	(ft.)	7'-10"	7'-10"	15'
Side Yard Setbacks: (facing property)	Left: (ft.)	3.8'	3.8'	4' @ 1,2 stories, 6'@ 3rd
	Right: (ft.)	4-6'	4-6'	4' @ 1,2 stories, 6'@ 3rd
Rear Yard Setback	(ft.)	28'	28'	15'
Building Height*	(# Stories)	2	3	3 w/ AUP
Average*	(ft.)	23'	35'	28' avg, 35' w/ AUP
Maximum*	(ft.)	23'	35'	35' w/ AUP
Areas				
Lot Area	(SqFt.)	21,673	21,673	N/A
Gross Floor Area* Total Area Covered by All Floors	(SqFt.)	7,188 SF (previously 7,226. Resolved discrepancy at Begonia	20,010 SF (previously 20,490. Begonia stair reconfig changed total	N/A
Building Footprint* Total of All Structures	(SqFt.)	4,928 SF (previously	8,670	N/A
Lot Coverage* (Footprint/Lot Area)	(%)	22.7% (previously	40%	3 stories: 35% 2 stories: 40%
Useable Open Space*	(SqFt.)	8,159 SF (previously not shown)	6,128 SF (previously 6,458)	5,400
Floor Area Ratio* Non-Residential Projects only (except ES-R)		N/A	N/A	N/A

*See Definitions – Zoning Ordinance Title 23F.

Revised: 09/02
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TABULATION FORM

Project Address: AZALEA - 1555 - 57 HEARST Date: January 5, 2017

Applicant's Name: Rhoades Planning

Zoning District R-2

Please print in ink the following numerical information for Use Permit, Variance, and other Zoning Ordinance related permit applications:

		Existing	Proposed	Permitted/ Required
Units; Parking Spaces				
Number of Dwelling Units	(#)	2	4	N/
Number of Parking Spaces	(#)	2	4	1/UNIT =
Yards and Height				
Front Yard Setback	(ft.)	10'-6"	10'-6" (EXTEND EXISTING)	15'
Side Yard Setbacks: (facing property)	Left: (ft.)	3'-10	3'-10", 4'-0" @ LVL	4'-0" TO
	Right: (ft.)	42'-7	2.3 79'-2	4'-0" TO
Rear Yard Setback	(ft.)	141'-8"	141'-8"	15'-0
Building Height*	(# Stories)	1	3	3 W/
Average*	(ft.)	12'-11"	33'-3"	N/
Maximum*	(ft.)	12'-11'	33'-8	35' W/
Areas				
Lot Area	(SqFt.)	13,469	21,673 PROPOSAL ASSUMES LOT	N/
Gross Floor Area* Total Area Covered by All Floors	(SqFt.)	992 SF	3,508SF	N/
Building Footprint* Total of All Structures	(SqFt.)	992 AZALEA	1154 AZALEA	N/
Lot Coverage* (Footprint/Lot Area)	(%)	7.6% AZALEA	5.3% AZALEA	40
Useable Open Space*	(SqFt.)	2,560 SF	6,128 SF	300 SF/UNIT = 5400
Floor Area Ratio* Non-Residential Projects only (except ES-R)		N/	N/	N/

*See Definitions – Zoning Ordinance Title 23F.

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TABULATION FORM

Project Address: BEGONIA - 1161-63 Hearst Date: January 5, 2017

Applicant's Name: Rhoades Planning

Zoning District R-2

Please print in ink the following numerical information for Use Permit, Variance, and other Zoning Ordinance related permit applications:

		Existing	Proposed	Permitted/ Required
Units; Parking Spaces				
Number of Dwelling Units	(#)	2	4	N/
Number of Parking Spaces	(#)	2	4	1/UNIT =
Yards and Height				
Front Yard Setback	(ft.)	8'-0	8'-0"	15'-0
Side Yard Setbacks: (facing property)	Left: (ft.)	42'-7	42'-7	N/
	Right: (ft.)	3'-11	43'-11	4'-0" TO
Rear Yard Setback	(ft.)	142'-5	141'-8"	15'-0
Building Height*	(# Stories)	1	3	3 W/
Average*	(ft.)	12'-11	33'-11	N/
Maximum*	(ft.)	12'-11	34'-8	35' W/
Areas				
Lot Area	(SqFt.)	13,469	21,67 PROPOSAL ASSUMES LOT	N/
Gross Floor Area* Total Area Covered by All Floors	(SqFt.)	1018 SF	3,508 SF	N/
Building Footprint* Total of All Structures	(SqFt.)	1018 SF	1,324 SF	N/
Lot Coverage* (Footprint/Lot Area)	(%)	7.6%	6.1% BEGONIA	40
Useable Open Space*	(SqFt.)	2,560 SF	6,128 SF	300 SF/UNIT = 5,400
Floor Area Ratio* Non-Residential Projects only (except ES-R)		N/	N/	N/

*See Definitions – Zoning Ordinance Title 23F.

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TABULATION FORM

Project Address: CAMELLIA - 1173 HEARST Date: January 5, 2016

Applicant's Name: Rhoades Planning

Zoning District R-2

Please print in ink the following numerical information for Use Permit, Variance, and other Zoning Ordinance related permit applications:

		Existing	Proposed	Permitted/ Required
Units; Parking Spaces				
Number of Dwelling Units	(#)	1	1	N/A
Number of Parking Spaces	(#)	2	2	1/
Yards and Height				
Front Yard Setback	(ft.)	11'-0" TO HOUSE.	11'-0" TO HOUSE.	15'-0
Side Yard Setbacks: (facing property)	Left: (ft.)	7'-10	75-3	4'-0" TO
	Right: (ft.)	4'-6	4'-6	4'-0" TO
Rear Yard Setback	(ft.)	143'-7	143'-7	15'-0
Building Height*	(# Stories)	2	2	3 W/
Average*	(ft.)	21'-0	21'-0"	N/
Maximum*	(ft.)	23'-6	23'-6	35' W/
Areas				
Lot Area	(SqFt.)	8,20	21,67 PROPOSAL ASSUMES LOT	N/
Gross Floor Area* Total Area Covered by All Floors	(SqFt.)	2,34	2,34	N/
Building Footprint* Total of All Structures	(SqFt.)	1,50	1,50	N/
Lot Coverage* (Footprint/Lot Area)	(%)	18.3	6.9	40
Useable Open Space*	(SqFt.)	5,599 SF	6,128 SF	300 SF/UNIT = 5,400
Floor Area Ratio* Non-Residential Projects only (except ES-R)		N/	N/	N/

*See Definitions – Zoning Ordinance Title 23F.

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Land Use Planning, 2120 Milvia Street, Berkeley, CA 94704
Tel: 510.981.7410 TDD: 510.981.7474 Fax: 510.981.7420 Email: Planning@ci.berkeley.ca.us

TABULATION FORM

Project Address: DAFFODI Date: January 5, 2016

Applicant's Name: Rhoades Planning

Zoning District R-2

Please print in ink the following numerical information for Use Permit, Variance, and other Zoning Ordinance related permit applications:

		Existing	Proposed	Permitted/ Required
Units; Parking Spaces				
Number of Dwelling Units	(#)	N/	2	N/
Number of Parking Spaces	(#)	N/	2	1/UNIT =
Yards and Height				
Front Yard Setback	(ft.)	N/	75'-3"	15'-0
Side Yard Setbacks: (facing property)	Left: (ft.)	N/	71'-7	4'-0" TO
	Right: (ft.)	N/	4'-0	4'-0" TO
Rear Yard Setback	(ft.)	N/	94'-1	15'-0
Building Height*	(# Stories)	N/	2	3 W/
Average*	(ft.)	N/	25'-4	N/
Maximum*	(ft.)	N/	25'-4	35' W/
Areas				
Lot Area	(SqFt.)	N/	21,67 PROPOSAL ASSUMES LOT	N/
Gross Floor Area* Total Area Covered by All Floors	(SqFt.)	N/	1,82	N/
Building Footprint* Total of All Structures	(SqFt.)	N/	935	N/
Lot Coverage* (Footprint/Lot Area)	(%)	N/	4.3	40
Useable Open Space*	(SqFt.)	5,599 SF	6,128 SF	300 SF/UNIT = 5,400
Floor Area Ratio* Non-Residential Projects only (except ES-R)		N/	N/	N/

*See Definitions – Zoning Ordinance Title 23F.

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TABULATION FORM

Project Address: EDELWEISS HEARST Date: JANUARY 5, 2016

Applicant's Name: Rhoades Planning

Zoning District R-2

Please print in ink the following numerical information for Use Permit, Variance, and other Zoning Ordinance related permit applications:

		Existing	*Proposed*	*Permitted/ Required*
Units; Parking Spaces				
Number of Dwelling Units	(#)	N/	2	N/
Number of Parking Spaces	(#)	N/	2	1/UNIT =
Yards and Height				
Front Yard Setback	(ft.)	N/	136'-3	15'-0
Side Yard Setbacks: (facing property)	Left: (ft.)	N/	71'-7	4'-0" TO
	Right: (ft.)	N/	4'-0	4'-0" TO
Rear Yard Setback	(ft.)	N/	33'-2	N/
Building Height*	(# Stories)	N/	2	3 W/
Average*	(ft.)	N/	25'-6	N/
Maximum*	(ft.)	N/	25'-6	35' W/
Areas				
Lot Area	(SqFt.)	N/	21,67 PROPOSAL ASSUMES LOT	N/
Gross Floor Area* Total Area Covered by All Floors	(SqFt.)	N/	1,82	N/
Building Footprint* Total of All Structures	(SqFt.)	N/	935	N/
Lot Coverage* (Footprint/Lot Area)	(%)	N/	4.3	40
Useable Open Space*	(SqFt.)	5,599 SF	6,128 SF	300 SF/UNIT = 5,400
Floor Area Ratio* Non-Residential Projects only (except ES-R)		N/	N/	N/

*See Definitions – Zoning Ordinance Title 23F.

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TABULATION FORM

Project Address: FREESIA - 1179 HEARST Date: JANUARY 9, 2016

Applicant's Name: Rhoades Planning

Zoning District R-2

Please print in ink the following numerical information for Use Permit, Variance, and other Zoning Ordinance related permit applications:

		Existing	*Proposed*	*Permitted/ Required*
Units; Parking Spaces				
Number of Dwelling Units	(#)	2	3	N/
Number of Parking Spaces	(#)	2	3	1/UNIT =
Yards and Height				
Front Yard Setback	(ft.)	136'-11	136-11	N/
Side Yard Setbacks: (facing property)	Left: (ft.)	16'-11	5'-8"	N/
	Right: (ft.)	10'-6	49'-9	N/
Rear Yard Setback	(ft.)	27'-10	27'-10	N/
Building Height*	(# Stories)	2	3	3 W/
Average*	(ft.)	19'-1	32'-8	N/
Maximum*	(ft.)	19'-9	32'-8	35' W/
Areas				
Lot Area	(SqFt.)	13,46	21,67 PROPOSAL ASSUMES LOT	N/
Gross Floor Area* Total Area Covered by All Floors	(SqFt.)	2,83	4,81	N/
Building Footprint* Total of All Structures	(SqFt.)	1,41	1,64	N/
Lot Coverage* (Footprint/Lot Area)	(%)	10.5	7.6	40
Useable Open Space*	(SqFt.)	2,560 SF	6,128 SF	300 SF/UNIT = 5400
Floor Area Ratio* Non-Residential Projects only (except ES-R)		N/	N/	N/

*See Definitions – Zoning Ordinance Title 23F.

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Land Use Planning, 2120 Milvia Street, Berkeley, CA 94704
Tel: 510.981.7410 TDD: 510.981.7474 Fax: 510.981.7420 Email: Planning@ci.berkeley.ca.us

TABULATION FORM

Project Address: Geranium - Hearst Date: January 5, 2016

Applicant's Name: Rhoades Planning

Zoning District R-2

Please print in ink the following numerical information for Use Permit, Variance, and other Zoning Ordinance related permit applications:

		Existing	Proposed	Permitted/ Required
Units; Parking Spaces				
Number of Dwelling Units	(#)	N/	2	N/
Number of Parking Spaces	(#)	N/	2	1/UNIT =
Yards and Height				
Front Yard Setback	(ft.)	N/	81'-8	15'-0
Side Yard Setbacks: (facing property)	Left: (ft.)	N/	39'-3"	4'-0" to
	Right: (ft.)	N/	44'-0	4'-0" to
Rear Yard Setback	(ft.)	N/	72'-2"	15'-0
Building Height*	(# Stories)	N/	3	3 W/
Average*	(ft.)	N/	32'-1"	N/
Maximum*	(ft.)	N/	32'-10	35' W/
Areas				
Lot Area	(SqFt.)	N/	21,67 PROPOSAL ASSUMES LOT	N/
Gross Floor Area* Total Area Covered by All Floors	(SqFt.)	N/	2,42	N/
Building Footprint* Total of All Structures	(SqFt.)	N/	1,17	N/
Lot Coverage* (Footprint/Lot Area)	(%)	N/	5.4	N/
Useable Open Space*	(SqFt.)	2,560 SF	6,128 SF	300 SF/UNIT = 5400
Floor Area Ratio* Non-Residential Projects only (except ES-R)		N/	N/	N/

*See Definitions – Zoning Ordinance Title 23F.

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Planning and Development Department
Land Use Planning Division

March 2, 2017

Sent via email:
mark@rhoadesplanninggroup.com

Mark Rhoades
46 Shattuck Square, Suite 11
Berkeley, CA 94704

Re: Use Permit #ZP2016-0028 – 1155-1173 Hearst Avenue

Mark,

Thank you for the items you submitted for the above referenced project on January 31st and February 9th. Please see below for the corrections (still) required for project completeness and additional information that is required.

–

Items Required for Project Completeness:

- Floor Plans – *Label the existing and proposed ground floor of Camelia* on pages A.1.2 A4.4; and Azalia and Begonia Level 1 on page A4.2. To expedite this submittal (and project completeness), feel free to resubmit just these pages and not the whole plan set.

Additional Items Required for Submittal or Revision:

- Tenant Information – Provide detailed information on how you plan to handle existing tenants during project construction.
- Peer Review of Stormwater and Flood Assessment – I have not yet received the peer review. I will let you know if any further information is required.

As always, do not hesitate to contact me if you have any questions or if you would like to set up a meeting. I can be reached at (510) 981-7426 or lmendez@ci.berkeley.ca.us.

Sincerely,

Leslie Mendez
Senior Planner

Memorandum

To: Leslie Mendez, City of Berkeley Planning & Development Department
From: Mark Rhoades, Rhoades Planning Group
Date: March 6, 2017
Re: 1155-1173 Hearst Avenue/ZP2016-0028 Response to March 2, 2017 Incomplete Letter

Dear Ms. Mendez,

This letter and the attached materials are provided as a response to your incomplete letter, dated March 2, 2017 for the property located at 1155-1173 Hearst Avenue.

Completeness Items:

Note: The plan set submitted on January 31, 2017 is organized to show the existing floor plans first, followed by the proposed floor plans. The existing and proposed floor plan for each building are not on the same sheet, so the plan set reads existing floor plans first followed by the proposed floor plans.

- Please see attached Page A1.2 showing the existing conditions of the Camelia building. Please see Page A4.4 showing the proposed floor plans for the Camelia building. Page A1.2 only shows the existing Camelia floor plan and Page A4.4 only shows the proposed Camelia floor plans.

- Please see attached Page A4.2 showing the proposed floor plans for the Azalea and Begonia Buildings. The existing floor plans for the Azalea and Begonia buildings can be found on Page A1.1 of the plan set submitted on January 31, 2017.

Additional Items:

- Tenant Information: Tenants will be temporarily relocated during construction per City of Berkeley and Berkeley Rent Stabilization Board requirements.

Materials submitted with this letter:

1. Pages A1.2, A4.4 and A4.2

PROJECT:

HEARST GARDENS
BERKELEY, CA 94702

DESCRIPTION:

DEVELOPMENT OF TWO EXISTING LOTS AT HEARST STREET BETWEEN SAN PABLO & CURTIS STREET. THE EXISTING LOTS ARE OVER 21,000 SF, AND CURRENTLY HAVE 7 RESIDENCES ON SITE. 6 OF THESE ARE TO BE MAINTAINED AND RENOVATED WHILE THE SOUTH EAST EXISTING BUILDING WILL BE DEMOLISHED AND REBUILT. THERE WILL BE 11 ADDITIONAL HOMES TO THE SITE, 5 OF WHICH ARE DENSITY BONUS. UNITS ARE ARRANGED AROUND A CENTRAL PASEO THAT PROVIDES ACCESS TO ALL UNITS AND AMPLE OPEN SPACE.

SITE ADDRESS:

1155, 1157, 1159, 1161, 1163 & 1173 HEARST AVE.
BERKELEY, CA 94704

ASSESSOR'S PARCEL #:

LOT 1173: 057 208601300
LOT 1157: 057 208601400

APPLICANT:

RHOADES PLANNING GROUP
1611 TELEGRAPH AVE. SUITE 200
OAKLAND, CA 94612
[510] 545-4341

ARCHITECT:

DEVI DUTTA-CHOUDHURY, AIA
DEVI DUTTA ARCHITECTURE INC.
1958A UNIVERSITY AVENUE
BERKELEY, CA 94704
[510] 705-1937
hello@devidutta.com

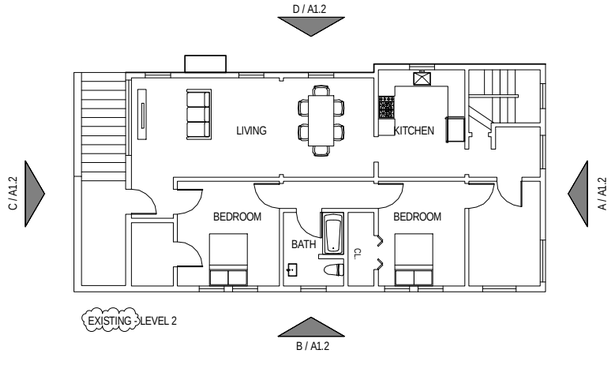
OWNER:

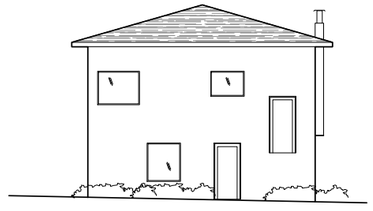
HEARST AVE COTTAGES, LLC
1958A UNIVERSITY AVENUE
BERKELEY, CA 94704

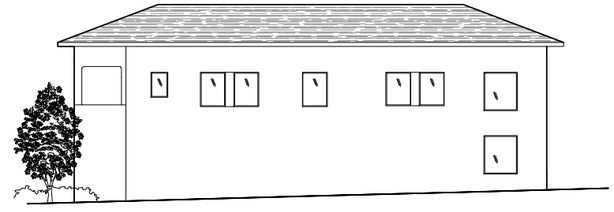
SHEET INDEX

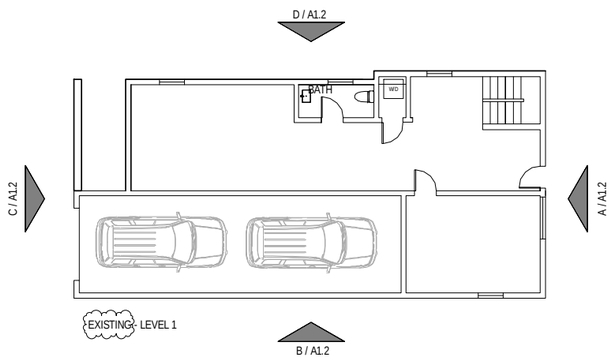
SHEET INDEX (CONTINUED)

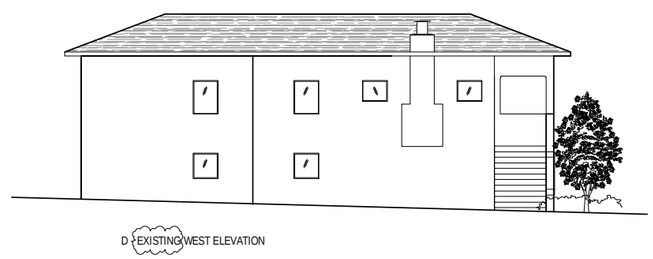
SHEET INDEX (CONTINUED)











1 **EXISTING PLANS & ELEVATIONS - CAMELLIA / 1173 HEARST**

1/16" = 1'-0"

DRC - PRELIMINARY

01.05.2017

HEARST GARDENS

DEVI DUTTA ARCHITECTURE INC.

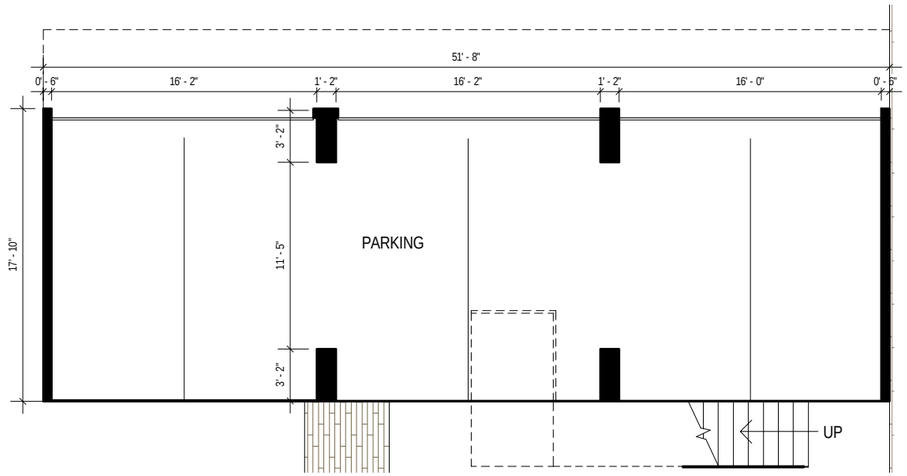
0 4' 8' 16' 32'

EXISTING PLANS & ELEVATIONS CAMELLIA

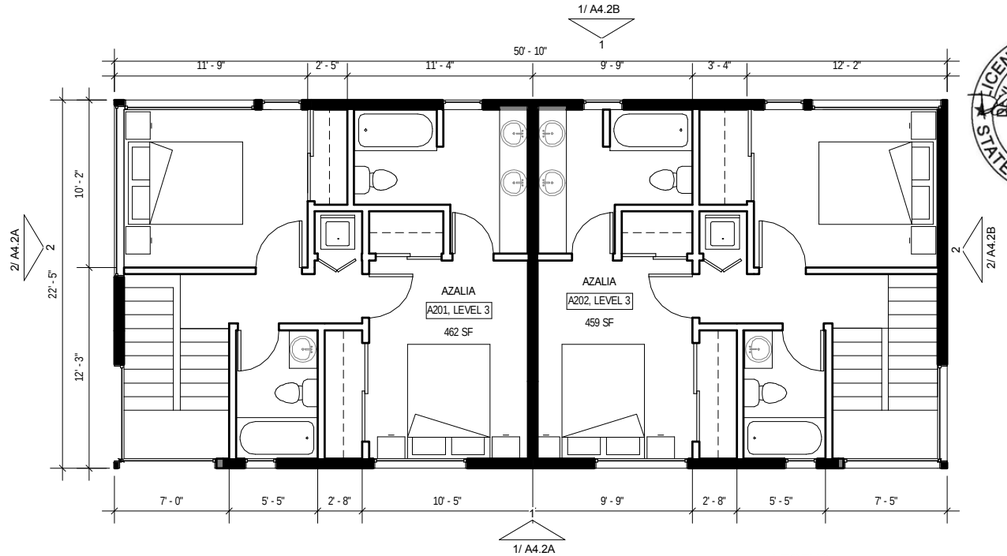
SCALE: 1/16" = 1'-0"

N

A1.2



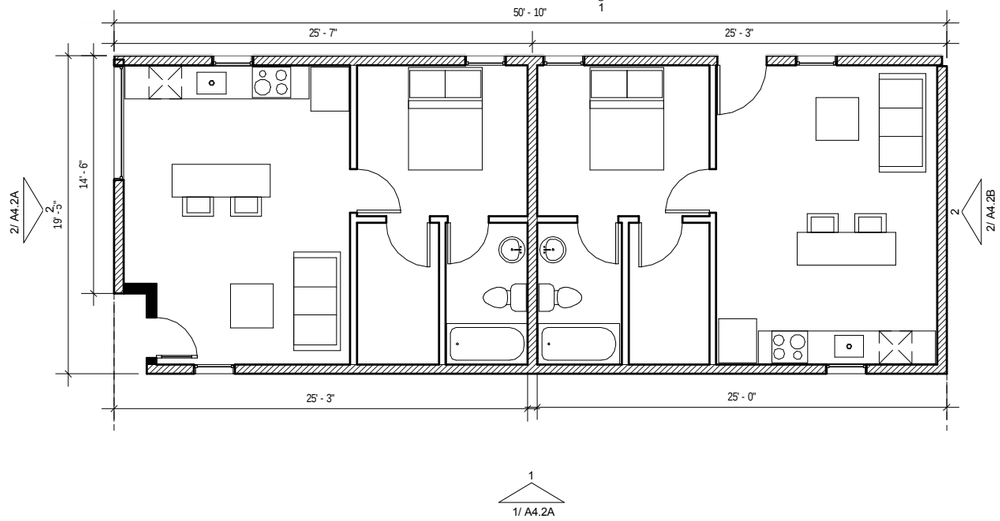
PROPOSED GERANIUM
LEVEL 1



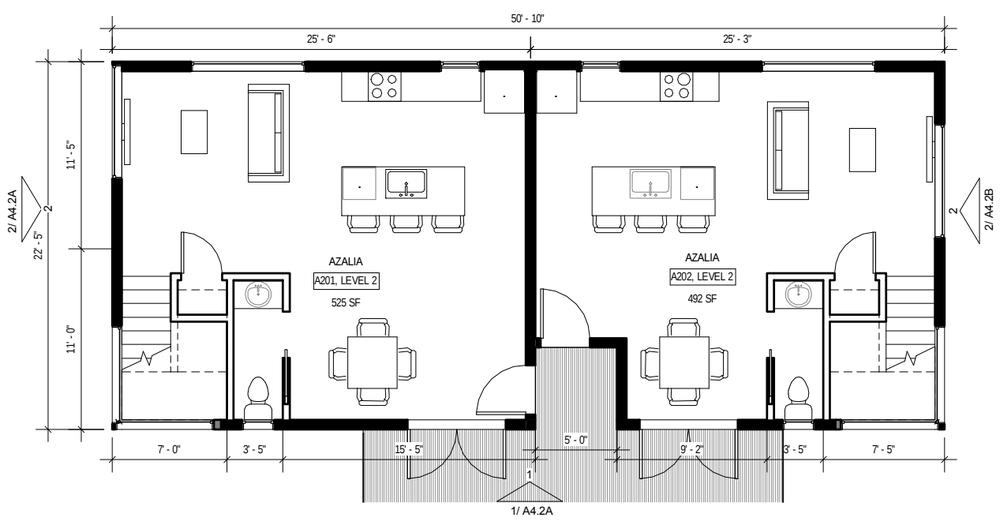
PROPOSED AZALIA, BEGONIA, GERANIUM
TOWNHOMES
LEVEL 3

LICENSED ARCHITECT
DEVI DUTTA-CHOUDHURY
No. C32382
Ren. 7/31/2015
STATE OF CALIFORNIA

LEGEND
- NEW EXTERIOR WALL
- (E) WALL
- NEW INTERIOR WALL
- OPEN SPACE



PROPOSED AZALIA & BEGONIA
LEVEL 1



PROPOSED AZALIA, BEGONIA, GERANIUM
LEVEL 2

DRC - PRELIMINARY
01.05.2017

HEARST GARDENS
DEVI DUTTA ARCHITECTURE INC.

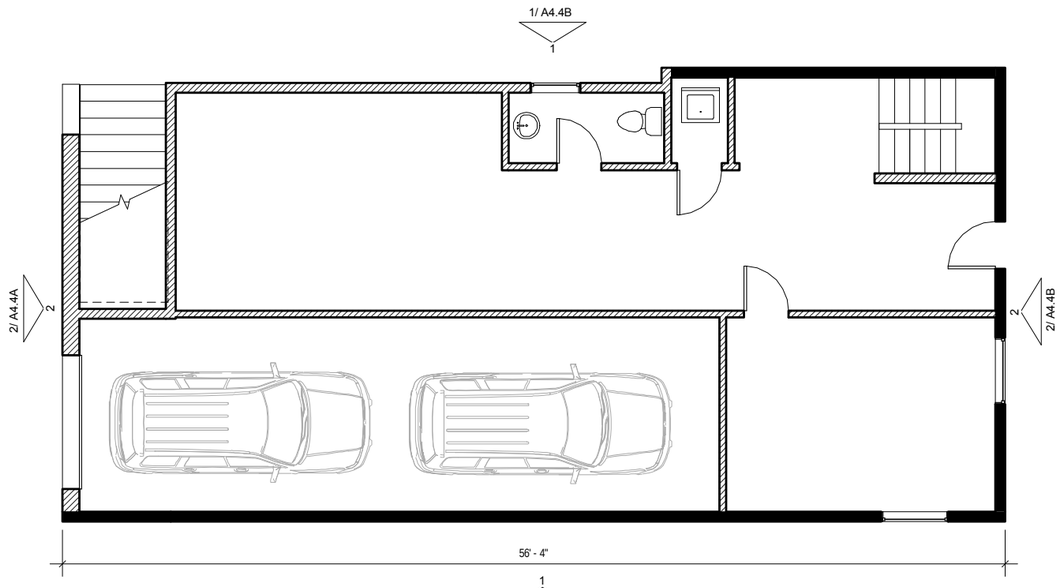
0 2' 4' 8' 16'

PROPOSED TOWNHOMES @ HEARST - AZALEA
SCALE: As indicated

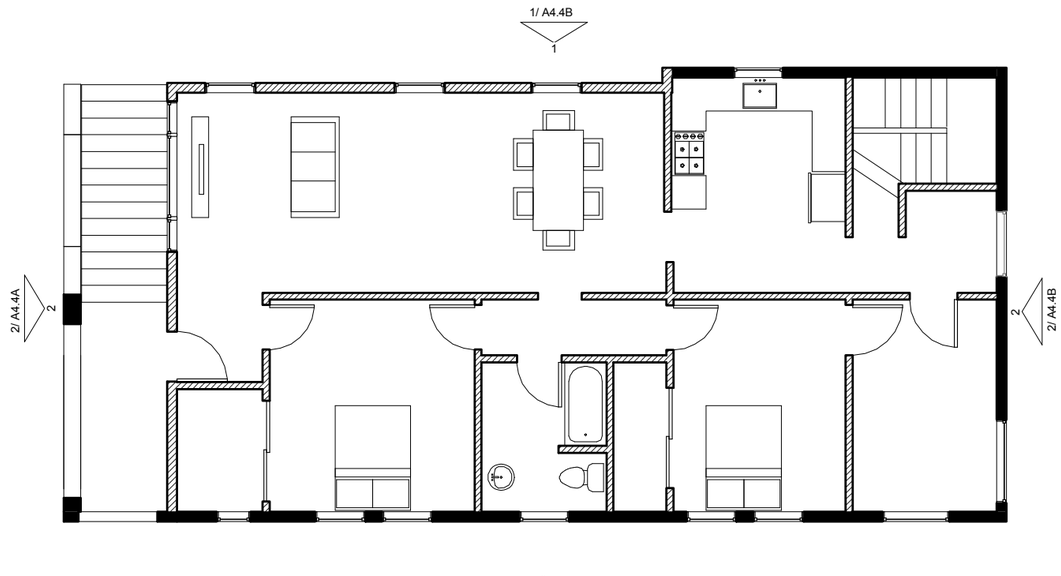
A4.2

LEGEND
NEW EXTERIOR WALL
(E) WALL
NEW INTERIOR WALL
OPEN SPACE

LICENSED ARCHITECT
DEVI DUTTA-CHOUDHURY
No. C32382
Ren. 7/31/2015
STATE OF CALIFORNIA



PROPOSED CAMELLIA BASEMENT PLAN



PROPOSED CAMELLIA LEVEL 2

DRC - PRELIMINARY
01.05.2017

HEARST GARDENS
DEVI DUTTA ARCHITECTURE INC.

0 2' 4' 8' 16'

CAMELLIA BASEMENT & LEVEL 2 - PROPOSED
SCALE: As indicated

A4.4

March 16, 2017

Ms. Leslie Mendez
Land Use Planning Division
City of Berkeley
1947 Center Street, 3rd Floor
Berkeley, California 94704

RE: Peer Review of the Stormwater and Flooding Assessment for the Hearst Avenue Project, City of Berkeley

Dear Ms. Mendez:

Thank you again for contacting Balance Hydrologics regarding peer review of the drainage analyses completed for the proposed Hearst Avenue Project ("Project"). Specifically, you have requested a review of the document titled "Stormwater and Flooding Assessment and Mitigation Design for the Hearst Avenue Project, 1161 – 1173 Hearst Avenue, Berkeley, CA" prepared by Clearwater Hydrology and dated January 7, 2016. I have completed my review of the Project document (herein, "report"), and this letter summarizes my observations and comments related to the information presented therein.

Overall, the document presents a good discussion and supporting analyses related to the stormwater management issues pertinent to the site in question. Perhaps most notably, it acknowledges the impaired drainage conditions at the site and neighboring properties, such as flooding at the back of adjacent lots off Curtis Street. The drainage design explicitly pursues solutions that would avoid worsening those conditions, with the potential to improve them as well.

Peer Review Comments

The following comments relate to clarifications or additional information that should be provided to assure that the proposed project has fully addressed the pertinent issues and requirements for stormwater management.

1. *Soil Characteristics and Depth to Groundwater*. The report acknowledges (Section 2.3) that information on soil properties and depth to groundwater had not been collected. However, both parameters will be important in the ultimate design of the site facilities. Absent specific information the report should be clear on use of the published soil survey data for the site, which identifies the soils as essentially completely Urban Land – Tierra Complex falling in Hydrologic Soil Group D (highest runoff potential). If information on seasonal high

groundwater data is not available, then the drainage design should proceed under the assumption that high groundwater conditions will prevail.

2. *Design Guidance*. The report relies almost exclusively on generalized urban drainage design parameters provided in the U.S. Geological Survey Open-File Report authored by Rantz in 1971. Though I acknowledge the past value of this document in providing a standardized design framework for urban drainage systems in the Bay Area, the project report does not clearly establish reasoning for not using more up-to-date and specific design guidance at this site. Absent specific information from the City of Berkeley, the Hydrology and Hydraulics Manual prepared by the Alameda County Flood Control and Water Conservation District ("ACFC") provides a more detailed and current calculational framework, particularly for the rational method runoff calculations that are presented. The following items are of particular note:

    a. Runoff Coefficients. Back-checks of the runoff coefficients from Rantz versus those used by ACFC show that the latter will generally be higher and therefore indicate a higher peak flow potential than currently presented in the report.

    b. Impervious Cover. Directly associated with the above, the calculations in the Technical Appendix appear to use land use classifications from Rantz such as "medium density residential" that are called out as 25% impervious cover. This would appear to significantly underestimate the actual impervious cover in the respective sub-watersheds, particularly those such as Sub-Watershed B which are largely street surfaces. In such cases, a composite runoff coefficient approach should be considered.

    c. Time of Concentration. The project site itself comprises a part of the identified Sub-Watershed A. The calculations in the Appendix (pdf page 29) give a time of concentration of 20 minutes for that Sub-Watershed for the 10-year design condition. However, calculations later in the Appendix for the project site itself yield an existing condition time of concentration of 27 minutes (pdf page 72). The calculations need to be reviewed, as it is difficult to reconcile how a smaller sub-area can have a higher time of concentration in this case.

    d. Rainfall Intensity. Back-checks of the rainfall intensity for a given time of concentration show that values from the ACFC manual are consistently higher (by 30% or more) than those used from Rantz, calling into question whether the analyses are sufficiently conservative.

3. *HEC-RAS Modeling and Overflow from Curtis*. HEC-RAS modeling was apparently completed, in part, to provide insight into the amount of gutter flow that might overtop driveways along Curtis Street and therefore ultimately result in run-on to the project site. The completed model would appear to have sufficient information to use the predicted flow depths to calculate peak overflow rates, which could be quite large. However, the report states that a conservative assumption is that only the Sub-Watershed B runoff flows through the yards along Curtis to reach the east side of the project, and it is that relatively low flow rate which is used to inform the drainage channel sizing. The report should be revised to clarify why potentially even larger backflows from upper Hearst Avenue are not to be expected or to include provision for larger on-site conveyance capacity.

4. *Project Drainage*. Section 3 of the report and the Appendix present options for draining the depressed site topography out to Hearst Avenue and identify a grated rectangular channel and a gravel swale at the primary stormwater conveyance facilities. It is understood that the site topography imposes significant constraints on the use of piped drainage. However, the calculations presented in the Appendix use a Manning's roughness coefficient of 0.011, a very low value for a gravel lined conveyance. The low roughness values will need to be justified or these calculations (and the conveyance channel dimensions) will need to be updated to use more conservative roughness values.

5. *Changes in Peak Flow*. As noted previously, the report is commendable for considering the impaired drainage conditions existing along the eastern boundary (flooding depths of up to 12 inches in adjoining yards). However, the report concludes that there will be no increase in peak discharge from the site for the 100-year event and only a small (0.02 cfs) increase for the 10-year event. This conclusion should be reviewed in light of the following:

    a. Loss of De Facto Detention Storage. The report states that site grading and drainage enhancements are such that flooding depths on adjacent properties may be lowered by as much as 6 inches (pdf page 10). The flooding of the neighboring properties, though an acknowledged problem, almost certainly represents de facto detention storage that modulates peak flow rates out to Hearst Avenue, as does the cited impaired side lot drainage from the project property itself. The report should be revised to directly address how reduced flooding depths and more efficient on-site conveyance can be accomplished without increasing peak flow rates to Hearst Avenue and/or how any increases are acceptable in the downstream drainage system.

    b. Post-project Impervious Cover. Central to the report's conclusion related to minimal increase in peak flow is a small (1.8%) increase in impervious cover compared to pre-project conditions. However, this value is achieved by completely discounting the contribution from driveways, parking areas, and walkways, which are proposed to be constructed of pervious paving or brick pavers. Such pervious surface treatments are definite improvements from traditional asphalt and concrete surfaces. However, given the low soil permeability and potential high ground levels, the report should be revised to substantiate the conclusion that those surfaces can indeed be discounted entirely in the rational method calculations of peak flow.

6. *C.3 Compliance*. The report appropriately cites the Alameda County C.3 Guidance as a source of design information for stormwater quality management at the site. The proposed bioretention planters are an excellent approach to meeting the pertinent requirements for roof runoff. However, it should be noted that, per the C.3 Guidance, pervious pavement surfaces overlying low permeability soils can only be considered self-treating if underlain by a course of sub-grade material sufficient to store the required treatment volume. The report should be revised to acknowledge this constraint and confirm that such an under-course could be actively drained out to Hearst Avenue.

Closing

Thank you again for the opportunity to provide peer review comments related to stormwater management for the Hearst Avenue Project. Though the site presents several challenges, it appears that the major issues are being addressed, subject to the recommended additional information needs I have noted.

Do not hesitate to contact us if you have questions related to the scope of my review or the conclusions presented herein.

Sincerely,

BALANCE HYDROLOGICS, Inc.

Edward D. Ballman, P.E. 64095
Principal Engineer

Planning and Development Department
Land Use Planning Division

April 3, 2017

Mark Rhoades
46 Shattuck Square, Suite 11
Berkeley, CA 94704

Re: Use Permit #ZP2016-0028 – 1155-1173 Hearst Avenue

Mark,

Thank you for the items you submitted for the above referenced project on March 6th. I've finally discovered the disconnect between what I have been trying to request and what you are submitting. Email me the revised plan sheets and I'll review within 48 business hours (minus any RDO I have) to deem to project complete.

Items Required for Project Completeness:

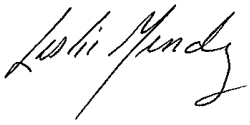
- Floor Plans – *Label **ALL** existing and proposed ground floor **rooms** of Camelia* on pages A.1.2 A4.4; and Azalia and Begonia Level 1 on page A4.2. To expedite this submittal (and project completeness), feel free to resubmit just these pages and not the whole plan set.

Additional Items Required for Submittal or Revision:

- Tenant Information – The information you provided is not detailed. Are the tenants of an income level to qualify for the replacement units? If not, as mentioned early on, staff will not be able to support any additional units on rent controlled buildings that would require a new occupancy permit and, therefore, the elimination of the rent controlled unit. This would apply to any structure currently containing one or two units which is proposed for three or more. This applies to Azalia, Begonia, and Freesia. It may be worthwhile to meet to discuss in person, however, it will be imperative to be able to fully describe tenant protections in writing.
- Application Fee – As you are aware, this is a cost recover project. To date, you have paid for a total of 36 hours of staff time (base fee = 24 hours, plus 6 additional use permits at 2 hours each = 24 hours). Through the writing of this letter, staff has spent a total of 40 hours. To keep the project in the 'black' I am including an invoice for an additional 16 hours. Please remit payment with the resubmittal to ensure continued project processing.

As always, do not hesitate to contact me if you have any questions or if you would like to set up a meeting. I can be reached at (510) 981-7426 or lmendez@ci.berkeley.ca.us.

Sincerely,



Leslie Mendez
Senior Planner

Mendez, Leslie

From: Hussein Saffouri <Hussein@ramseylawgroup.com>
Sent: Monday, April 10, 2017 4:54 PM
To: Mendez, Leslie
Subject: 1155-1173 Hearst Ave. - Zoning Permit ZP2016-0028
Attachments: Draft Review of Clearwater Hydrology 1161-1173 Hearst Ave. Drainage Rpt.pdf; Draft 1824 Curtis Street Site Hydrologic Assessment Tech Memo_rev.pdf

Hi Leslie. As you may recall I represent a resident who owns and lives in the home at 1824 Curtis Street, which is adjacent to the project planned by the Rhoades Planning Group for 1155-1173 Hearst Avenue. The most recent documentation in the City's zoning file indicates that the City has required the developer to obtain a peer review of its proposed hydrology and drainage plan. I am attaching two reports prepared by our consulting hydrologist which address the hydrology of the site, and comment on the developer's plan.

I am sending them to you to make sure that the zoning and planning department(s) and the third party reviewer consider these in connection with the peer review.

Also, it would be greatly appreciated if you could provide me the contact information for the third party reviewer so that our consulting hydrologist can set up a meeting with them before they complete their findings.

Please do not hesitate to call me if you have any questions.

Regards, Hussein.

HUSSEIN SAFFOURI
Attorney
hussein@ramseylawgroup.com
(925) 284-2002 Direct
(510) 708-1122 Cell
(925) 402-8053 Fax

Ramsey Law Group, a professional corporation
3736 Mt. Diablo Blvd., Suite 300
Lafayette, CA 94549

terraphase engineering

DRAFT TECHNICAL MEMORANDUM

To:
Rain Sussman, Guy Sussman
1824 Curtis Street
Berkeley, CA 94702

Lucas W. Paz, Ph.D., CPESC, QSD
Terraphase Engineering, Inc.

cc:
Hussein Saffouri
Ramsey Law Group

Date:
October 07, 2015

Project Number:
0132.001.001

From:

Subject: Existing Conditions Site Drainage Evaluation and Assessment of Potential Hydrologic Impacts from Proposed Adjacent Development Project, 1824 Curtis Street, Berkeley, California

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Introduction

It is our understanding that the property located at 1824 Curtis Street ("the site") is subject to ongoing drainage/flooding issues and is located in an area where a historically mapped segment of a primary north fork tributary to Strawberry Creek previously existed as shown on both historic and current maps. Terraphase also understands that a sizeable multi-unit residential project is proposed to be built directly adjacent along the western edge of the site on two combined lots that also overlie the historic north fork Strawberry Creek tributary segment. The proposed development project would potentially result in increased rates of runoff associated with the additional impervious surfaces that would be developed and could also result in additional drainage impediments that could exacerbate existing flooding hazards at the site. Potential drainage impacts associated with the proposed project merit cautious consideration by the City of Berkeley. Terraphase would like the City of Berkeley to be aware and consider the following information as it pertains to ongoing site drainage concerns and with respect to proposed development project applications in the immediate vicinity of the site that could further exacerbate existing drainage problems. It is expected that prior to future project approval by the City, a carefully designed stormwater control plan should be developed for the project to avoid and mitigate potential drainage impacts.

Drainage Assessment of Existing Conditions

According to the drainage observations of Anderberg Construction Consulting (2013), the site is located on a downhill lot which is lower in elevation than both the front of the property and the fronts of the surrounding properties. Anderberg Consulting (2013) observed that the 3 adjacent properties to the north of the site all slope towards the site originating from both the north and the east so that all stormwater from the north and east would flow towards the back yard of the site. Additionally, the roofs of adjacent residences discharge to downspouts that contribute to the overall accumulation of water flowing onto the site, which sits at the lowest elevation of the surrounding properties. The rear

(western-most) perimeter of the back yard of the site is slightly built up in elevation so that surface water does not pass through the yard. Surface water flow into the back yard, therefore, results in a large amount of ponding which has, in the past, gradually risen up to enter the rear portion of the site. Furthermore, the adjacent neighbor has reported that their garage has periodically experienced roughly 1" of standing water in their garage. Since the site's rear yard is roughly 8" lower in elevation than the adjacent neighbor's garage floor, Ms. Sussman's statement and photo documentation that the site has experienced significant flooding in the garden room at the rear of her residence, as well as the crawl space soil area, is further substantiated (Anderberg Construction Consulting, 2013).

A french drain and sump pump system has been installed at the site as recommended by Anderberg Consulting. The site improvements have included a larger sump pump system (than previously existed) as well as a catch basin in front of the garage (approximately 24" x 24").

The backyard of the site currently acts as a rain garden which has experienced severe flooding on multiple occasions in 2012. The directly adjacent property to the west of the site currently serves as an open space vegetated corridor that allows for infiltration of stormwater. Therefore, if the adjacent space was developed, the amount of impervious surface would likely increase and lend to a greater amount of flooding due to the topography of the site and the surrounding area (Anderberg Construction Consulting, 2013).

Hydrologic Site Assessment and Documentation of Existing Conditions

Terraphase has conducted a hydrologic evaluation of the property and surrounding drainage area including the surrounding municipal storm drain system to assess existing Site drainage problems, characterizing the location, severity, and frequency of known deficiencies. A historical conditions evaluation of the Site has been conducted and is discussed in the following section. This evaluation documents the occurrence and implications of the buried/historic creek segment based on available mapping data and physical Site features. Terraphase has evaluated the subject property and surrounding drainage area conditions that influence both the generation of stormwater flows and the consideration of potential options available for future improvements.

Terraphase has documented the Site drainage issues affecting the property by providing the following:

- Written descriptions and photo documentation of the issues and any related, known or suspected adverse manifestations to portray current site conditions.
- Detailed accounts of on-site issue(s)/manifestations but also any that relate to adjacent, upslope or downslope properties
- Confirmation of previous site observation reports, as-built or construction sketches/designs, construction reports, and previous design documents (related to drainage)
- A summary of current and historical drainage mapping in the following section, as well as in the attachments.
- A preliminary estimate of the local site drainage area based on topography data.
- Average overland flow slope which is estimated at 2-5%.
- Research was conducted to determine groundwater levels, further discussed in this section.

- Research was conducted to determine on-site and surrounding soil characteristics, further discussed in this section.

Based upon a review of the City of Berkeley Watershed Management Plan (2011), the area surrounding the site is not served by storm drains, only surface drainage. Based on available topographic data (Attachment 1) the site receives runoff from the surrounding area which is preliminarily estimated as approximately 2 acres. According to information obtained from Sutton (2002), it appears that the north branch of Strawberry Creek, which underlies the site, was likely filled in between the 1930's and 1950's when the surrounding area was further developed. According to Carole Schemmerling with the Urban Creeks Council (pers. comm. 2002), the north branch of Strawberry Creek was filled in with soil and debris prior to the area being developed. It is classified as "filled wetlands" and as "seismically unstable and subject to liquefaction". Since the fill material was not laid properly, water comes up to the surface during storm conditions so that the subsurface becomes saturated. The Site is surrounded by impervious surfaces and while the local drainage area is approximately 2 acres, there is a potential for other surrounding impervious areas to contribute runoff to the Site during more significant rain events. Since large scale municipal storm drain features are limited in the area, municipal storm drains do not help minimize surface flow during heavy rain events. Consequently, the surface and subsurface runoff contributes to flooding in the back yard and the rear portion of the residence since the back yard of the site is a low spot.

Based on the EPA National Stormwater Calculator Report for 1824 Curtis Street which utilizes EPA Stormwater Management Model [SWMM] modeling engine (Attachment 2), the annual rainfall for the past 20 years averaged 22.92 inches per year. The amount of impervious surface at the Site was calculated at 82%. The baseline scenario for the site considers that no stormwater practices are in place and the current scenario is based upon the actual site conditions in which a rain garden is present in the backyard of the site. The baseline scenario would contribute 16.23 inches of average annual runoff while the current scenario only contributes 14.88 inches of average annual runoff. The current scenario with a rain garden also reduces the days per year with runoff, 37.37 days as compared to the baseline of 40.67 days. The current scenario also increases the percentage of wet days retained with 18.11 days for the baseline scenario and 24.75 wet days retained with the current scenario. The raingarden increases the amount of rainfall that can occur without runoff as well as the maximum rainfall retained with a baseline of 0.18 inches and 0.79 inches, respectively, and the current scenario at 0.22 inches and 0.85 inches, respectively. The rainfall retention frequency in attachment 2 provides a good visual reference of the differences in retention of rainfall between the baseline and the current scenario. From the SWMM model one can ascertain that the on-site rain garden provides for reduction in the annual runoff from the site and increases the amount of runoff retained, up to 90% of the rain water for small rain events.

According to the National Resource Conservation Service web Soil Survey (Attachment 3), the site is classified as Urban Land Tierra complex with 2 to 5% slopes. The land at the Site is classified as moderately well drained with a high runoff class and a low to moderately low capacity for the most limiting layer to transmit water. Groundwater data pertaining to the wells in the general vicinity is not publicly available, however, the web soil survey indicates that the depth to water table is more than 80 inches with a moderate water storage profile (about 7.1 inches). The underlying soil at the site is classified as Hydrologic Soil Group D with a hydraulic conductivity of 0.1 inch/hour. The typical soil profile consists of loam for 0-12 inches (H1), clay for 12-32 inches (H2), and sandy clay loam for 32 to 60 inches (H3).

According to the National Flood Insurance Program Flood Insurance Rate Map (FIRM) for Alameda County (Attachment 4) the property resides in the unshaded Zone X which is defined as an area of minimal flood hazard, usually depicted as above the 500 year flood level. Therefore, the elevation, surface drainage from nearby properties, the site's position over the historic tributary of Strawberry Creek and subsurface flow of stormwater at the site contribute to flood conditions that otherwise would not be present.

Historic Creek Alignment/Regulatory Information

Based on a site visit and review of available correspondence/maps, the history and physical setting of the subject property can be summarized as follows. Historical maps and the map entitled, "The Creek & Watershed Map of Oakland & Berkeley (J. Sowers, 1995) indicate that a tributary channel to Strawberry Creek once existed across the property. The "Berkeley Creeks" map (Attachment 5) from the Alameda County Department of Public Works, and the UC Berkeley Strawberry Creek Map (Attachment 6) and a City of Berkeley Strawberry Creek Map from 1990 (Attachment 7) also indicate that the site was built almost directly on top of one of the Strawberry Creek Tributaries. This indicates that subsurface stormflow, as well as surface water, would flow towards the site during times of substantial rainfall (Anderberg Construction Consulting, 2013). Based on these maps, the alignment of this creek extends downstream across the 1155-1163 Hearst property and in an upstream direction somewhere towards the homes between 1826 and 1814 Curtis Street. It appears that the creek channel has been filled and there are no records that it is contained in a culvert or storm drain.

Terraphase believes that during wet periods there is a shallow groundwater table beneath the site vicinity. During the rainy season, rainfall that does not run off impervious surfaces infiltrates into the ground and recharges the shallow water table. As a result, there is a seasonal rise in the water table during the winter months that intersects the ground surface, which is expressed as ponding in the low-lying portions of the property. As winter rains subside and groundwater recharge ceases, the local groundwater table recedes during the spring-summer dry period.

The buried creek channel is very likely to be a contributing factor to the local shallow groundwater conditions. Regionally, groundwater flow is to the west with the water table surface likely mimicking the ground surface. If the buried creek channel is filled with material that has a higher permeability and porosity than the surrounding subsurface sediments it will preferentially hold and transmit groundwater beneath and across the Site. Based on the available maps, the buried creek channel may be receiving surface and groundwater recharge from upstream areas to the east including West Street, between Delaware and Bay Streets. In summary, the buried creek channel may be preferentially directing groundwater and subsurface flow towards and beneath the subject property, which then continues westward beneath the 1155-1163 Hearst Avenue site and westward to the confluence with the main-stem of Strawberry Creek near San Pablo and University Avenues.

According to Chapter 17.08 of the Berkeley Municipal Code, the purpose of this chapter is to regulate (1) building over or near culverted creeks; (2) building near open creeks; (3) the rehabilitation and restoration of natural waterways; and (4) the management of watersheds. Multiple sources (Attachments 5, 6 &7) have identified the property as the location of a tributary to Strawberry Creek, in which Ms. Sussman's residence was erected on top of (Berkeley Municipal Code, 2006).

Natural Streams and their associated riparian habitat have great ecological value, and should be protected and restored because they provide environmental amenities to the community and riparian owners. “Creek” means a watercourse (1) that carries water from either a permanent or natural source, either intermittently or continuously, in a defined channel, continuous swale or depression, or in a culvert that was placed in the general historic location thereof; and (2) the water either merges with a larger watercourse or body of water, or is diverted into an engineered structure that does not follow the general historic course of a creek. A “permanent or natural source” includes a spring, artesian well, lake, estuary, or a rainfall drainage area that covers at least one-third acre (Berkeley Municipal Code, 2006). Currently, according to the city of Berkeley, the site is not subject to the provisions of BMC 17.08, however, with the given information, Terraphase would like the city to consider the site as subject to those provisions.

According to the City of Berkeley (2015) Draft General Plan, policy EM-24 is to protect and improve water quality by improving the citywide sewer system. Of the six actions listed within that policy, Action E and F apply to this project. Action E. is to ensure that new development pays its fair share of improvements to the storm drainage system necessary to accommodate increased flows from the development. Action F. Coordinate storm sewer improvements with creek restoration projects. Policy EM-27 – EM-29 state that whenever feasible, creeks should be exposed by removing culverts, underground pipes, and obstructions to fish and animal migrations and impervious surfaces should be reduced. In place of impervious surfaces, swales, cisterns and other devices that increase infiltration of water and replenishment of underground water supplies that nourish creeks should be constructed. Adjoining jurisdictions should jointly undertake watershed and creek restoration projects to reduce existing flood hazards in Berkeley. According to Policy S-29 Development review should be used to ensure that new development does not contribute to an increase in flood potential (City of Berkeley, 2015).

If development could substantially alter an existing drainage area, or contribute to runoff water which would exceed the capacity of existing or planned stormwater drainage systems or create an increase in calculated peak flood discharges. Section 2b of the City of Berkeley Draft General Plan (2015) discusses hydrology and water quality impacts and mitigation measures. According to the Berkeley General Plan, new housing construction would likely result in a net increase in impervious surfaces, which would increase runoff volumes and velocities. When stormwater runoff volumes and velocities are increased, existing storm drainage components that are at or near capacity may be inadequate to convey the additional runoff during peak events, causing localized ponding and flooding. However, existing City programs for project design and approval require drainage plans (including hydraulic calculations quantifying potential increases in runoff volumes associated with particular projects) prior to approval.

The San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (MRP) [Order R2-2009-0074; NPDES Permit No. CAS612008], applicable to the City of Berkeley, requires that certain new development or redevelopment projects design and implement permanent post-construction stormwater control measures to address water quality and quantity of runoff discharges from proposed projects. The goal of the MRP Provision C.3 is for the Cities to use their planning authorities to include appropriate source control, site design, and stormwater treatment measures in new development and redevelopment projects to address both soluble and insoluble stormwater runoff pollutant discharges and prevent increases in runoff flows from new development and redevelopment projects. This goal is to be accomplished primarily through the implementation of low impact development (LID) techniques.

For all new development and redevelopment projects that are subject to City planning, building, development, or other comparable reviews, but not regulated by MRP Provision C.3, the MRP still strongly encourages the inclusion of adequate site design measures that may include minimizing land disturbance and impervious surfaces (especially parking lots); clustering of structures and pavement; directing roof runoff to vegetated areas; use of micro-detention, including distributed landscape-based detention; preservation of open space; protection and/or restoration of riparian areas and wetlands as project amenities.

Summary

Given the evidence of the past alignment of the North fork of Strawberry Creek, Terraphase recommends that the City of Berkeley consider the historic creek alignment in accordance with Chapter 17.08 of the Berkeley Municipal Code (2006), the City of Berkeley (2015) Draft General Plan and The San Francisco Bay Region Municipal Regional Stormwater NPDES Permit (MRP) [Order R2-2009-0074; NPDES Permit No. CAS612008].

The proposed adjacent development at 1155-1163 Hearst Avenue would exacerbate existing surface runoff due to the proposed increase in hardscape. Also, any construction including subsurface foundation and/or structures would impact the existing groundwater conditions in a fashion that would alter the existing groundwater flow direction (from east to west) and/or cause local groundwater levels to rise, leading to increased flooding. The proposed construction could create adverse conditions or "dams" that block the buried creek channel, altering the preferential flow of groundwater through it.

This memo provides preliminary results of the Site hydrologic assessment. Additional evaluation may be conducted after discussions with the City of Berkeley and after the development application for the adjacent property has been fully reviewed. Flooding and drainage issues continue to be an ongoing concern at the property and moving forward it is critical that these issues not be exacerbated.

List of Attachments

1 Site Topography

2 SWMM Stormwater Evaluation Results

3 Map Unit Description

4 City of Berkeley FEMA Map

5 Alameda County Berkeley Creeks Map

6 UC Berkeley Creeks Map

7 City of Berkeley Creeks Map

References

Anderberg Construction Consulting, Inc. (2013). Drainage Observations for 1824 Curtis Street, Berkeley, CA. February 7.

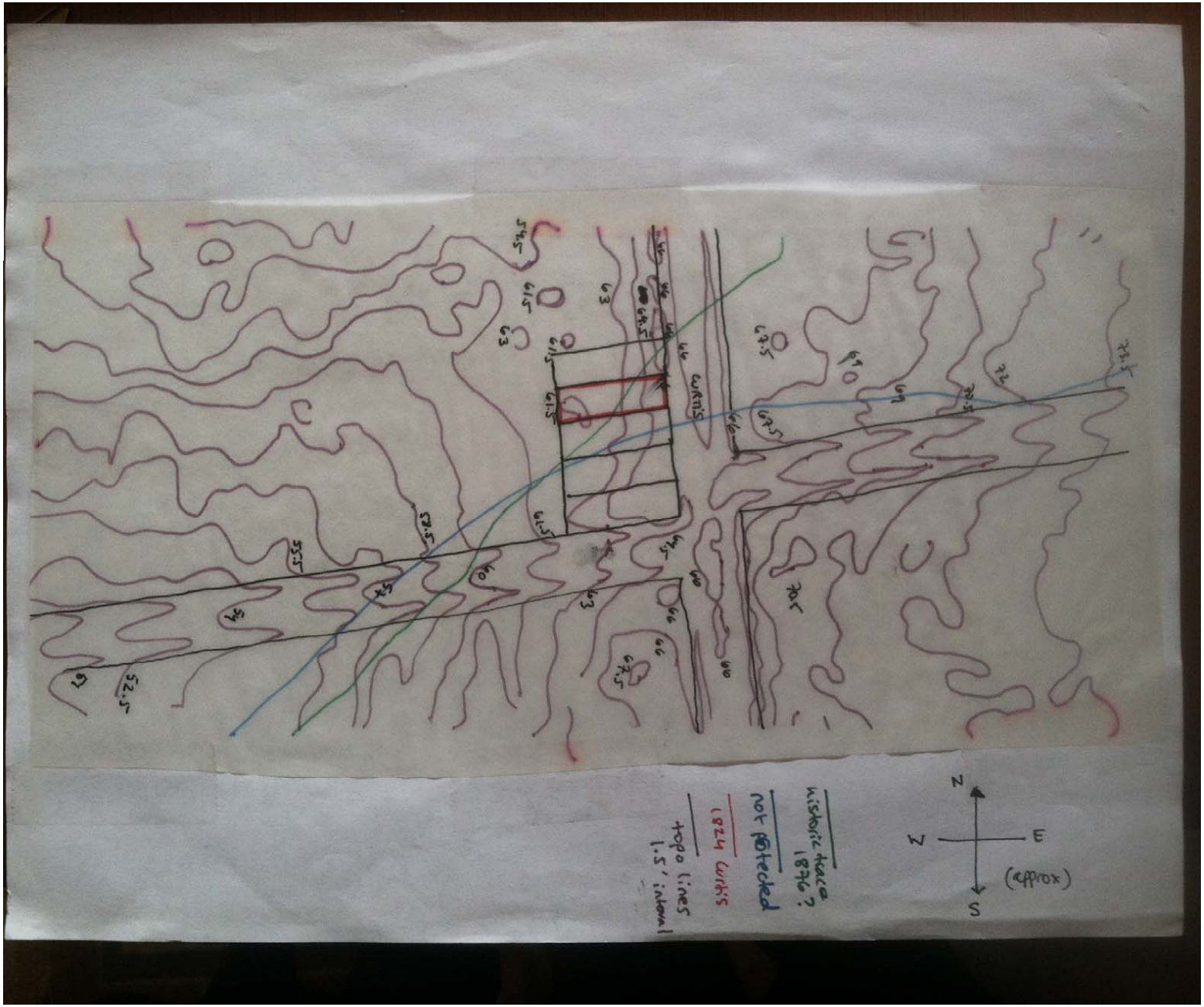
Berkeley Municipal Code. 2006. Chapter 17.08. Preservation and Restoration of Natural Watercourses.

City of Berkeley: Department of Public Works Engineering. 2011. Watershed Management Plan Version 1.0. October.

City of Berkeley: Department of Planning and Development. 2015. Berkeley Draft General Plan: J. Hydrology and water Quality. August 3.

National Flood Insurance Program. 2009. Flood Insurance Rate Map for Alameda County, California. Panel 0058G. Map Number 06001C0056G. August 3.

ATTACHMENT 1
SITE TOPOGRAPHY


historic trace 1876?
not detected
1876 Curtis
topo lines 1.5' interval
N
E
S
W
(approx)

ATTACHMENT 2
SWMM STORMWATER EVALUATION RESULTS

National Stormwater Calculator Report

Site Description

Sussman Property, 1824 Curtis St.

Parameter	Current Scenario	Baseline Scenario
Site Area (acres)	2	2
Hydrologic Soil Group	D	D
Hydraulic Conductivity (in/hr)	0.1	0.1
Surface Slope (%)	5	5
Precip. Data Source	OAKLAND MUSEUM	OAKLAND MUSEUM
Evap. Data Source	OAKLAND MUSEUM	OAKLAND MUSEUM
Climate Change Scenario	None	None
% Forest	10	10
% Meadow	4	4
% Lawn	4	4
% Desert	0	0
% Impervious	82	82
Years Analyzed	20	20
Ignore Consecutive Wet Days	False	False
Wet Day Threshold (inches)	0.05	0.05

LID Control	Current Scenario	Baseline Scenario
Disconnection	0	0
Rain Harvesting	0	0
Rain Gardens	40 / 2	0
Green Roofs	0	0
Street Planters	0	0
Infiltration Basins	0	0
Porous Pavement	0	0

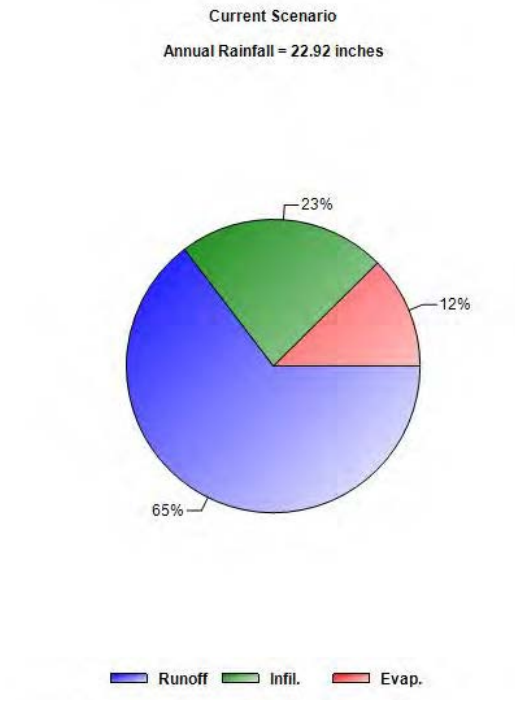
% of impervious area treated / % of treated area used for LID

National Stormwater Calculator Report

Summary Results

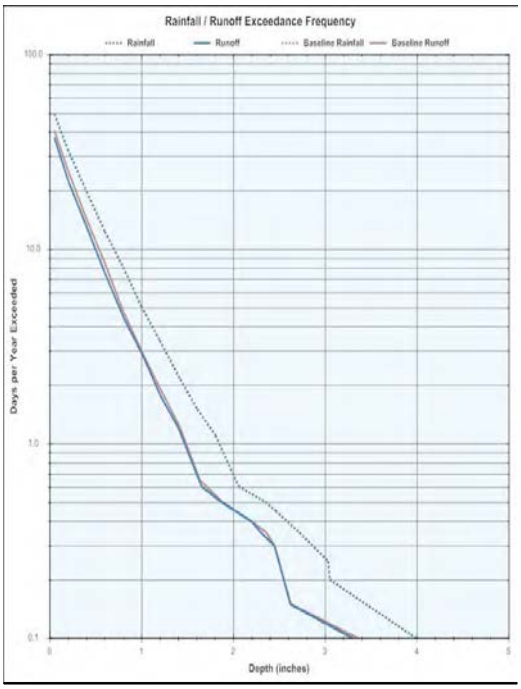
Sussman Property, 1824 Curtis St.

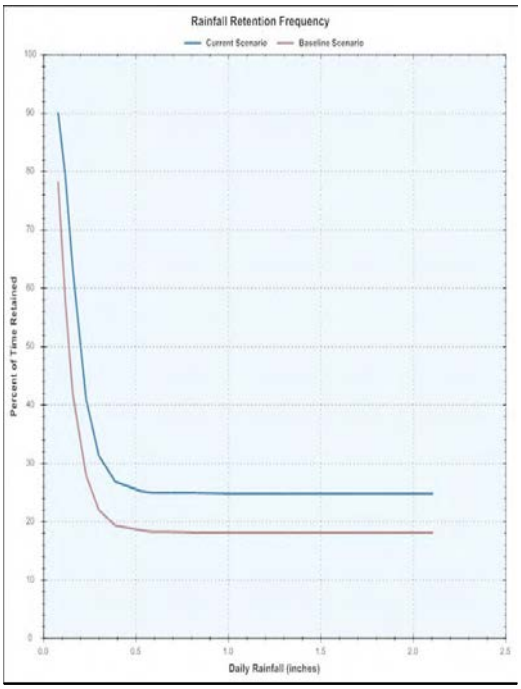
Statistic	Current Scenario	Baseline Scenario
Average Annual Rainfall (inches)	22.92	22.92
Average Annual Runoff (inches)	14.88	16.23
Days per Year With Rainfall	49.67	49.67
Days per Year with Runoff	37.37	40.67
Percent of Wet Days Retained	24.75	18.11
Smallest Rainfall w/ Runoff (inches)	0.06	0.06
Largest Rainfall w/o Runoff (inches)	0.22	0.18
Max. Rainfall Retained (inches)	0.85	0.79



National Stormwater Calculator Report

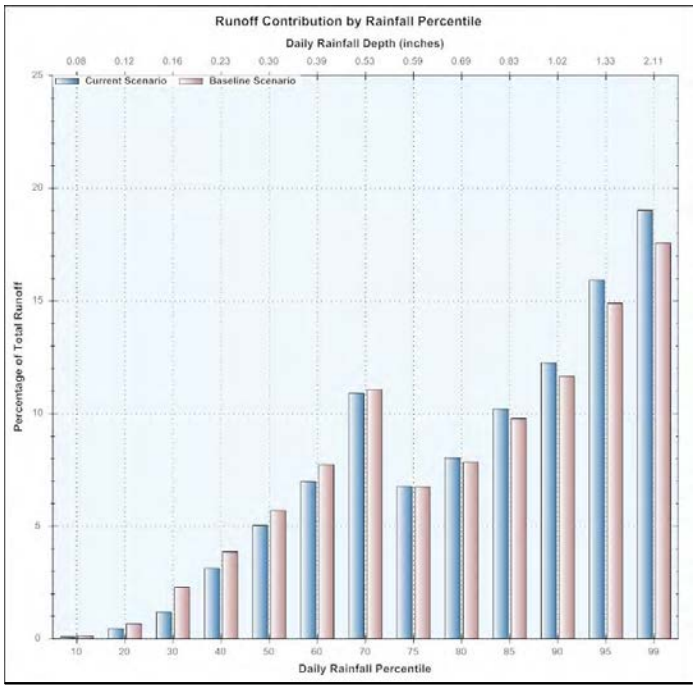
Sussman Property, 1824 Curtis St.

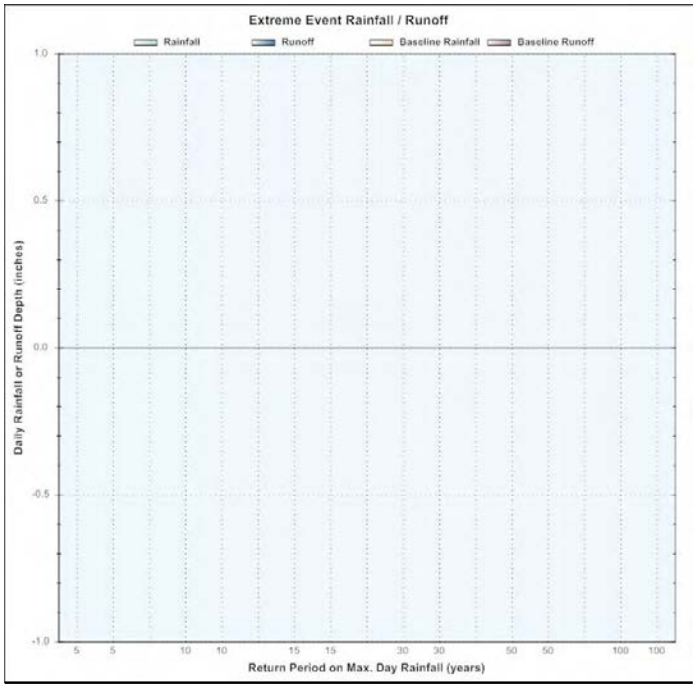




National Stormwater Calculator Report

Sussman Property, 1824 Curtis St.





ATTACHMENT 3
MAP UNIT DESCRIPTION

Alameda County, California, Western Part

150—Urban land-Tierra complex, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: hb7c
Elevation: 100 to 1,100 feet
Mean annual precipitation: 14 to 25 inches
Mean annual air temperature: 57 to 59 degrees F
Frost-free period: 300 to 320 days
Farmland classification: Not prime farmland

Map Unit Composition

Tierra and similar soils: 50 percent
Urban land: 40 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tierra

Setting

Landform: Fan terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 12 inches: loam
H2 - 12 to 32 inches: clay
H3 - 32 to 60 inches: sandy clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D

Description of Urban Land

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8

Minor Components

Azule

Percent of map unit: 5 percent

Danville

Percent of map unit: 5 percent

Data Source Information

Soil Survey Area: Alameda County, California, Western Part
Survey Area Data: Version 10, Sep 25, 2014

ATTACHMENT 4
CITY OF BERKELEY FEMA MAP

MAP SCALE 1" = 500'

250 0 500 1000 FEET

METER

NFIP

PANEL 0056G

FIRM

FLOOD INSURANCE RATE MAP

ALAMEDA COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 56 OF 725

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BERKELEY, CITY OF	060004	0056	G
EMERYVILLE, CITY OF	060005	0056	G
OAKLAND, CITY OF	065048	0056	G

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
06001C0056G

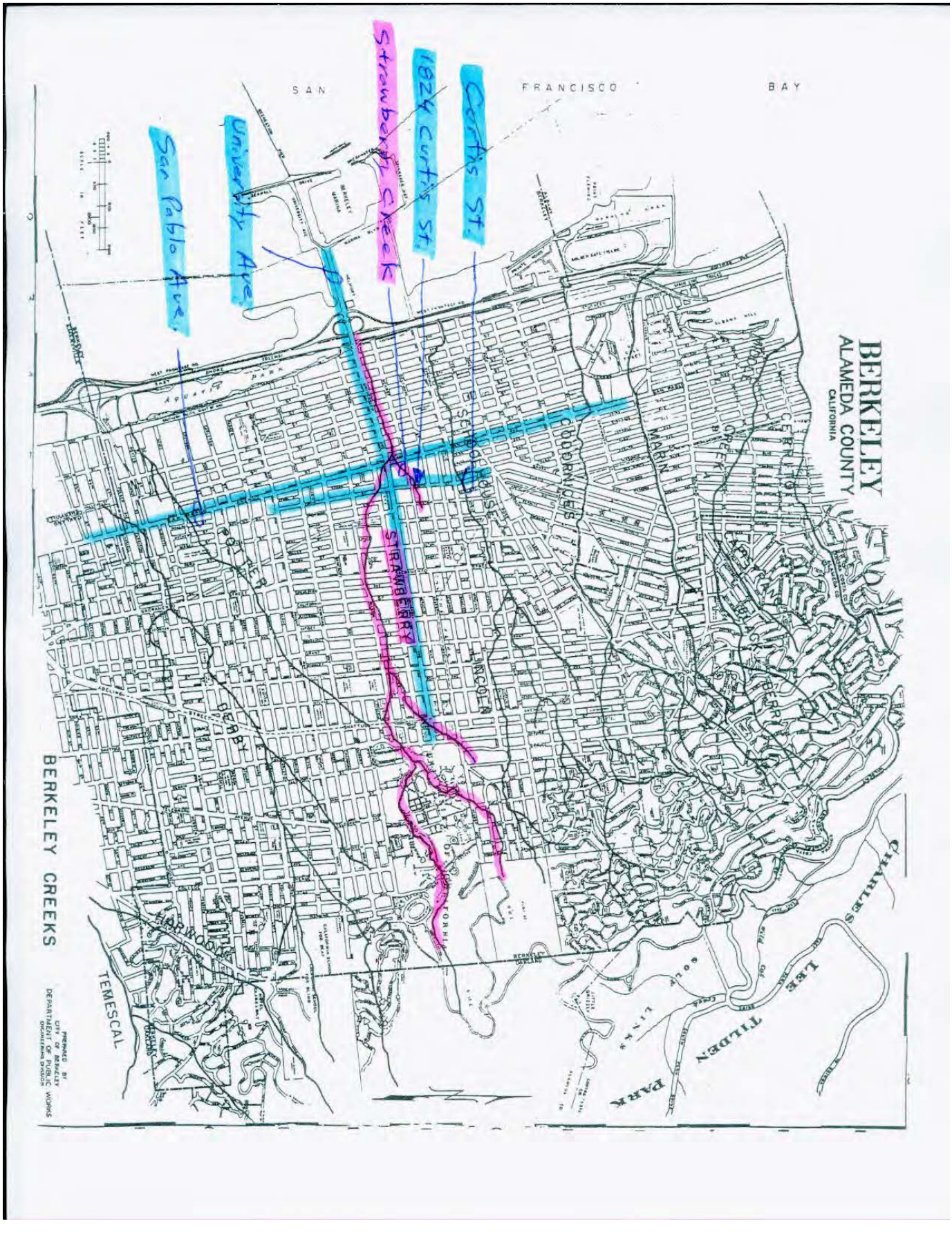
EFFECTIVE DATE
AUGUST 3, 2009

Federal Emergency Management Agency

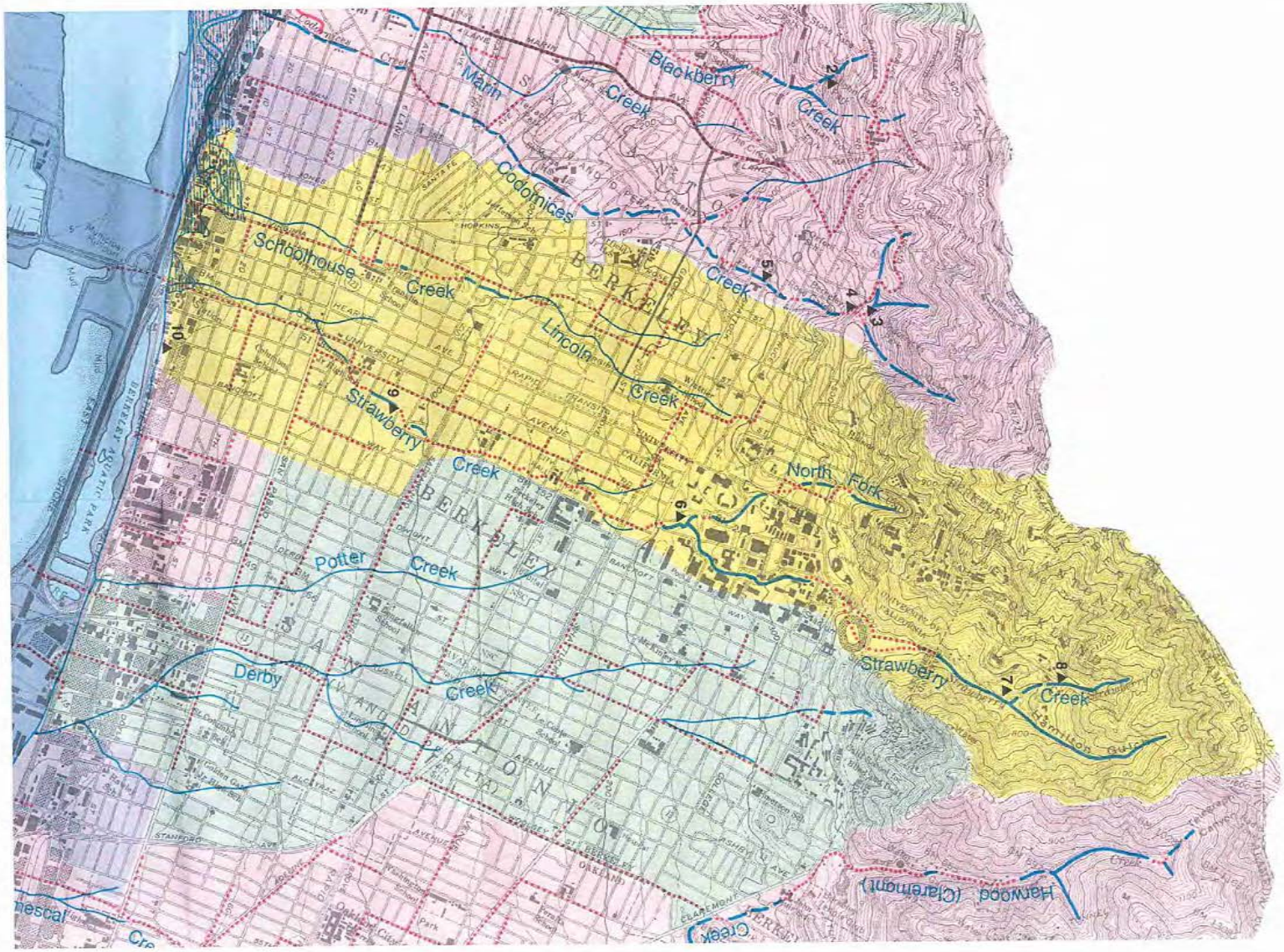
NATIONAL FLOOD INSURANCE PROGRAM

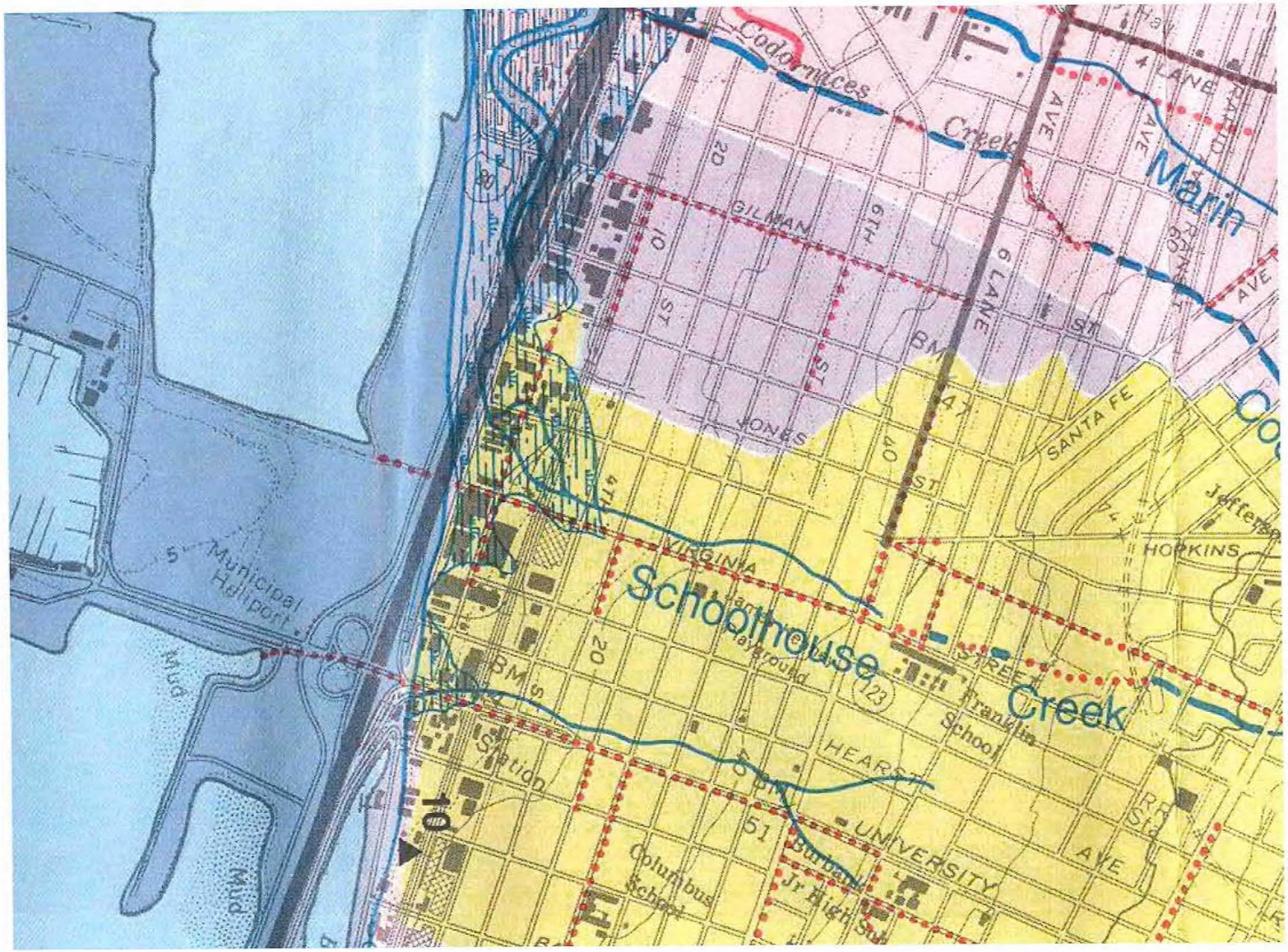
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

ATTACHMENT 5
ALAMEDA COUNTY BERKELEY CREEKS MAP


San Pablo Ave.
University Ave.
Strawberry Creek
1824 Curtis St.
Curtis St.
SAN FRANCISCO BAY
BERKELEY
ALAMEDA COUNTY
CALIFORNIA
BERKELEY CREEKS
STRAWBERRY
TEMESCAL
CHARLES
LEE
TILDEN
PARK

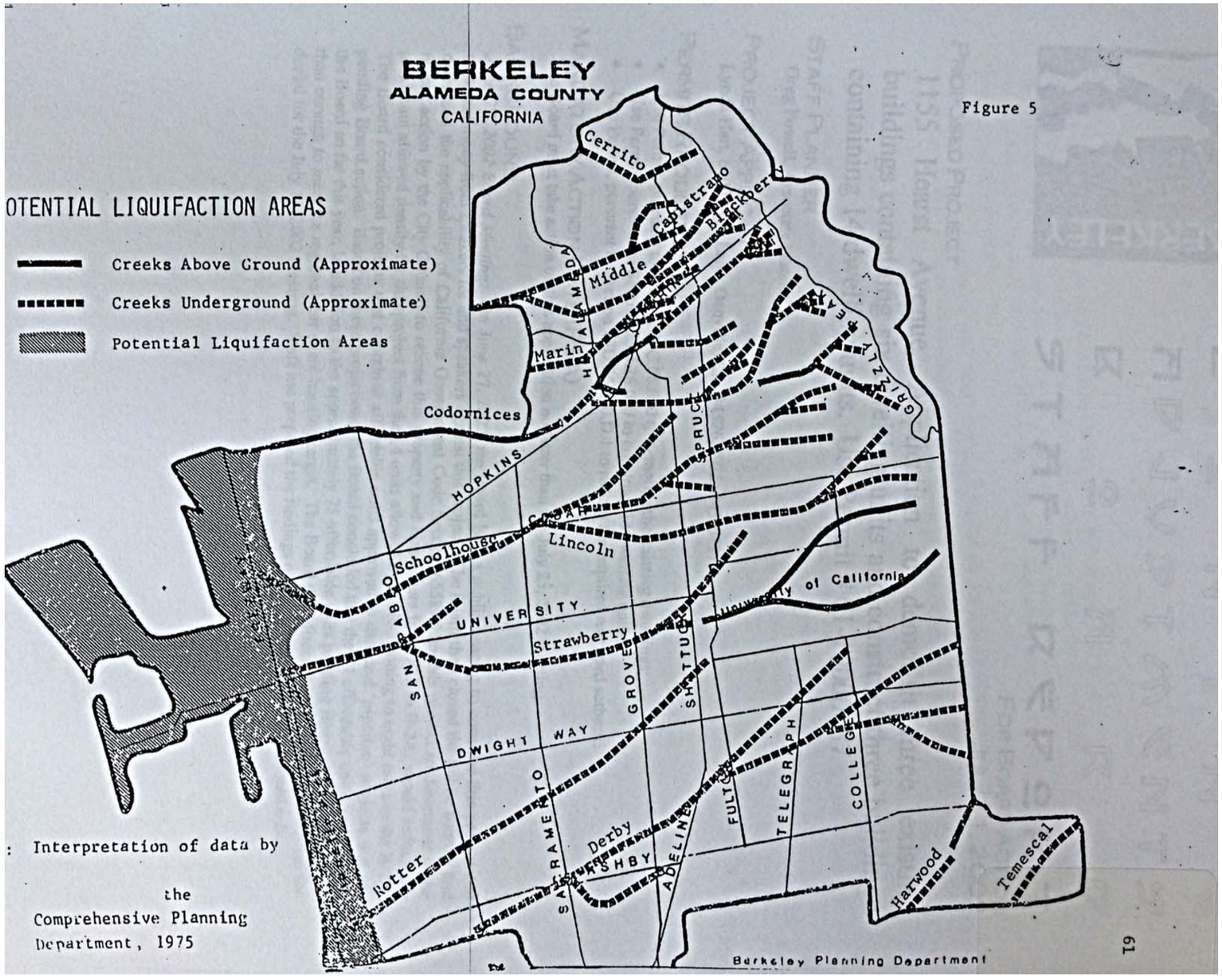
ATTACHMENT 6
UC BERKELEY CREEKS MAP





ATTACHMENT 7
CITY OF BERKELEY CREEKS MAP

Figure 5


BERKELEY
ALAMEDA COUNTY
CALIFORNIA
OTENTIAL LIQUIFACTION AREAS
Creeks Above Ground (Approximate)
Creeks Underground (Approximate)
Potential Liquifaction Areas
: Interpretation of data by
the
Comprehensive Planning
Department, 1975
Cerrito
Capistrano
Blackberry
Middle
Marin
Codornices
HOPKINS
Schoolhouse
Lincoln
University of California
UNIVERSITY
Strawberry
DWIGHT WAY
Derby
Rotter
Harwood
Temescal
SAN PABLO
GROVE
SHATTUCK
SPRUCE
ALAMEDA
EUCLID
SACRAMENTO
ADELINE
FULTON
TELEGRAPH
COLLEGE
ASHBY
Berkeley Planning Department
61


CURTIS
CHESTNUT
WEST
FRANKLIN
Addison St

DRAFT TECHNICAL MEMORANDUM

To:
Rain Sussman, Guy Sussman
1824 Curtis Street
Berkeley, CA 94702

cc:
William Vandivere, M.S., P.E.
City of Berkeley Planning Department
Hearst Ave. Cottages, LLC

Lucas W. Paz, Ph.D., CPESC, QSD
Terraphase Engineering, Inc.

Date:
February 19, 2016

Project Number:
0132.001.001

Subject: Preliminary review and comments on the Stormwater and Flooding Assessment and Mitigation Design for the Hearst Avenue Project 1161-1173 Hearst Avenue, Berkeley, California. Prepared by: Clearwater Hydrology, Berkeley, California.

Introduction

Terraphase Engineering Inc. (Terraphase) has prepared this technical memorandum based on our review of the Stormwater and Flooding Assessment and Mitigation Design for the Hearst Avenue Project 1161-1173 Hearst Avenue, Berkeley, California. Terraphase appreciates the thorough assessment and preliminary design prepared Clearwater Hydrology. The document is well-researched, clearly written, and we are in general agreement with many of the report findings. However, in the following sections, Terraphase has provided selected excerpts of the document for which we have questions, concerns or suggestions and where we feel additional information or analysis is needed.

Review Comments/ Findings

Executive Summary (pg. 1)

- "The hydrologic/hydraulic assessments confirmed anecdotal evidence gleaned from the developer and one local resident (along Curtis Street) that stormwater runoff backs-up along Curtis, north of the Hearst Ave. intersection, and discharges over residential driveways into a topographic depression west of Curtis St."
    - Terraphase strongly agrees that stormwater flooding is an ongoing problem that impacts the development site as well as adjacent parcels located within the referenced topographic depression; however, we are concerned that the proposed development may exacerbate existing flooding conditions and that the proposed drainage improvements do not provide the necessary assurances to fully mitigate the impacts of the project.

- "At its mild slope of 0.8%, its capacity would be 4 cfs, which is roughly equivalent to the combined 25-yr. peak discharge from the lands normally draining to the depression (Sub-Watershed A in Figure 2) and the entire diverted peak discharge for the westside Curtis St. sub-watershed (Sub-Watershed B in Figure 2)."
    - It would be helpful to provide the referenced estimated peak discharge rates here and cross-reference the full listing of peak discharge rates that can be found in Table 1 (although the first line item for Sub-Watershed A is blank).

- "Since some discharge from the depression will also occur through driveways and side yards west of 1155 Hearst, the capacity of the system would likely be greater than that of a 25-yr. storm. The proposed design would also reduce the severity of flooding on the neighboring properties to the east along Curtis Street."
    - The language in the first sentence is partly unclear. It should be clarified whether the report is stating that the discharge from the depression is coming into the driveways and side yards, or if it is leaving the driveways and side yards, and if it is leaving the driveways and side yards, where is it being discharged?
    - Considering that the known area is currently subject to flooding concerns, it would be prudent to conservatively design drainage elements and associated BMPs to support the capacity of a 100-yr. storm. Also, based on changing climatic projections, extreme precipitation events are becoming more common, therefore past precipitation data (prior to 1971) may not account for extreme rain events based on an updated full period of record. Given the outdated source data, additional conservative adjustments to the hydrology calculations should be applied to provide an additional factor of safety.

1.0 Introduction (pg. 2)

- "As noted on the architectural plans, the project impervious surface area of 10,892 sq. ft. (sf) would increase the existing impervious surface area at the site (10,495 sf) by 1.8 percent. Also, all of the proposed project hardscape features (driveway, parking lot and walkway areas) would consist of either pervious paving or pervious brick pavers. Therefore, the project impervious surface total excludes those areas of the site."
    - The project impervious surface areas listed in form C.3.i Stormwater Requirements checklist included in the 1155-1173 Hearst Avenue Project Application to the City of Berkeley are inconsistent with the impervious surface areas listed in this drainage report.

2.0 Existing Conditions – Hydrologic Setting (pg. 2)

- Cross sections on page 3
    - Please label either end of the cross sections east/west and north/south. Also, please clarify/revise the headings and titles of the cross sections. It appears that the Hearst Ave and Curtis Street labels should be switched.

2.1 Hearst Avenue Watershed (pg. 3)

- "Following our walking inspection, which was conducted during an early December rainstorm, and our supplemental topographic survey of Curtis Street between Delaware St. and Hearst, we delineated sub-watersheds tributary to the north side of Hearst Ave. These northside Hearst Ave. sub-watersheds are shown in Figure 2."
    - The overall assessment of the drainage conditions and drainage areas is appropriate. However, we question the assumptions for the contributing watershed areas that generate flows along the Curtis Street gutter. It seems that a larger area may contribute to watersheds A and B than was considered in this assessment. We believe this should be further explored and clarified.

2.2 Project Site Drainage (pg. 4)

- "As shown in the east-west (Curtis) cross-section above, there is an abrupt 1.0- 2.0 drop in Elevation…"
    - Please clarify that Curtis Street runs from North to South
    - Please label the units (1.0-2.0) in feet.

- "Thus, for the existing site conditions, ponding of up to 1.0 foot may occur during intense storms when Curtis Street stormwater breaches the west side driveways."
    - Due to a combination of existing conditions, there is a concern that the limited proposed drainage features may not significantly alleviate the current ponding experienced.

2.3 Site Soils and Local Groundwater Levels (pg. 4)

- "A geotechnical assessment has not yet been performed for the property, so the exact nature of the soils underlying the Project site has not been determined. However, the surface soils likely consist of loamy fill imported for residential building pad construction. Given the site's position within the topographic depression and the relic Strawberry Creek tributary alignment under the site, it is likely that the seasonal groundwater table underlying the site affects local infiltration rates, at least in wet years."
    - Terraphase recommends that a geotechnical investigation be performed for the following reasons:
    - This evaluation does not address subsurface drainage conditions, it only considers surface drainage conditions. Additional investigation into the subsurface conditions needs to be considered so that existing groundwater release preferential flow pathways are not impacted.
    - Given the relic Strawberry Creek tributary alignment that underlies the site, and the currently undeveloped vegetated space (which may be considered a jurisdictional wetland) it may not be appropriate to assume the nature of the soils underlying the project site. Based on historical maps, a segment of a primary tributary to Strawberry Creek previously extended downstream across the 1155-1163 Hearst properties. According to Carole Schemmerling with the Urban Creeks Council (2002), the north branch of Strawberry Creek was filled in with soil and debris prior to the area being

developed. It is classified as "filled wetlands" and as "seismically unstable and subject to liquefaction". Since it's apparent that the fill material was not properly engineered, and there is no record of a culvert or storm drain being installed, water comes up to the surface during storm conditions so that the subsurface becomes saturated.

- Subsurface hydrologic conditions (as described above) suggest a shallow groundwater table in the vicinity of the project site. A seasonal rise in the ground water table is experienced during the winter months due to stormwater infiltration into the ground, which recharges the shallow water table. The rising water table eventually comes in contact with the surface soils and produces ponding in the low-lying areas of the site so that the groundwater is elevated near the surface. Therefore, saturated soils along with high groundwater conditions increases runoff rates and the amount of ponding.
- Considering this information, any construction activity would likely impact existing groundwater conditions. Activities such as compaction, foundation installation, etc. would modify and impede existing subsurface flow levels, pathways and/or direction which would exacerbate subsurface conditions and worsen existing flooding conditions.

2.4 Flooding Characteristics along Northside Hearst Avenue (pg. 4)

2.4.1 Overview of HEC (pg. 4)

- "The HEC-RAS model is capable of computing flood water surface profiles for open channel, culverts, bridge crossings and other hydraulic structures. The program requires input data on design peak flows, channel reach and junction configurations, hydraulic roughness values and channel geometries."
  - The HEC-RAS model allows for the routing of flows through Channels, please clarify how the model (or other calculations) account for the surface flow from Watershed A to Watershed B.

- "Along the modeled Curtis St. reach, three mid-reach channel cross-sections were incorporated to simulate the potential driveway diversion of stormwater westward to the topographic depression in the Project area."
  - Please clarify how the model explicitly accounts for the flows and routes flows diverted from the Curtis St. reach into the topographic depression of the project area.

- "It consists of two Hearst Ave. gutter reaches and one west side Curtis St. gutter reach with a hydraulic junction at the western end of the concrete cross-swale that delivers Hearst gutter flow to the west Curtis St. gutter."
  - Please clarify how the model accounts for contributions/connections from the Curtis street back yard areas.

2.4.2 Peak Flow Rates for Model Input (pg. 5)

- "CH used the USGS version of the Rational Method (Rantz 1971) developed for SF Bay Region to compute the peak discharges for the upstream sub-watersheds (B-J in Figure 2) draining to the intersection of Hearst Ave. and Curtis Street in accordance with Figure 2."

- While the 1971 Rantz based Rational Method is a reasonable resource, Terraphase is concerned that the climatic/rainfall data and associated flow rates based on pre-1971 data are insufficient. This concern is based on the fact that the last 44+ years of rainfall data was not utilized in this model and that changing climate projections indicate extreme events are now more likely to occur. Under these circumstances we believe a more conservative factor of safety should be applied by designing for a larger 100-yr storm event capacity.

- "However, a full topographic model for the entire block was not within the scope of this assessment. So the peak discharges computed for this sub-watershed were viewed in conjunction with Curtis St. flow diversions as potential flows to evacuate from the Project area without surface flooding, at least for the 10-yr. design storm."
  - Without a full topographic model Terraphase is unsure that the amount of stormwater estimated to impact the site and the surrounding properties is accurately quantified. One recent rainfall event in December generated approximately 1.4" of rain which produced significant flooding based on recent observations and video footage.
  - Please clarify how the peak discharges from the gutters were added to watershed A?

- Table 1 is missing the peak discharge rates for Sub-Watershed A

2.4.3 HEC-RAS Flood Modeling: Results (pg. 6)

- "This suggests that even at the 2-yr. peak discharge, the flood water surface will exceed the sidewalk level along the lower (southern) segment of Curtis and divert stormwater toward the depression. The volume of diverted flow reaching the topographic depression continues to increase for higher recurrence interval storm events"
  - The executive summary states "the flooding conditions that occur along the neighboring Curtis St. properties for rainstorms exceeding roughly the 5-yr. recurrence interval." The references to peak discharge rates should remain consistent so that both say a 2-yr. storm event will produce flood conditions on Curtis Street.

- "Downstream of the Curtis St. intersection, flows are contained within the roadway gutter and portions of the driveway outlets (below the sidewalk level) even during the 100-yr. storm."
  - Recent observations and video footage filmed during a storm in December 2015 suggest that portions of Hearst Street stormwater flow does reach the sidewalk level.

3.0 Project Drainage and Flooding Mitigation (pg. 7-9)

- "raising the site grade could potentially exacerbate flooding along the west side Curtis Street properties that form the eastern portion of the topographic depression."
  - Terraphase agrees that raising the site grade would cause significant impacts to the site. However, new impervious surfaces and foundations also would exacerbate flooding conditions.

- "1) Install small diameter sub-drains that would drain the Project site and discharge evacuated stormwater to the Hearst Ave. north gutter;
  2) Install a surface channel, embedded in the driveway, or possibly the westernmost side yard, that would discharge evacuated stormwater to the Hearst gutter.
  A third possible option, installation of subgrade detention facilities (e.g. pipe array) was not investigated in depth due to its active management requirement."
  - Terraphase believes that the third option of detention facilities should still be considered as an acceptable method, as it is commonly applied on development projects.
  - A combined system could also be considered instead of one option over another as proposed.

- "As cited in Table 1 above, the combined 10-yr. peak flow for Sub-Watersheds A (topographic depression) and B (west side Curtis St.) is 2.37 cfs."
  - Please clarify how Watersheds A and B were accounted for in the flow modeling. Provide additional information for Sub-watershed B flow conditions.

- "the configuration that provided sufficient stormwater conveyance capacity and was technically feasible to construct was a 2 ft.-wide rectangular channel with a gravel or paver-style bottom and an inverted steel channel 0.4 ft. in height fit over the channel bottom. The capacity of the rectangular channel at a minimum slope of 0.8 percent would provide a maximum discharge of 4.0 cfs. This would be sufficient to evacuate in excess of the 10-yr. peak discharge entering the depression."
  - Assuming that everything is routed to the proposed channel, please clarify how the channel will collect flow from the adjacent properties.
  - The design could be expanded to include a collection trench or sub-drain behind all of the houses to direct water into the proposed rectangular channel.
  - As discussed in section 2, Terraphase is concerned that the current limited proposed drainage improvements may not significantly improve current flooding conditions for the adjacent properties along Curtis St.

4.0 Project Drainage and Flooding Mitigation (pg. 9)

- "Aside from the stormwater evacuation measures, all development projects in the City of Berkeley are required to mitigate for any increases in peak flow rates due to increases in impervious surface coverage. For the current design, the increase in impervious surface coverage would be 1.8%."
  - Terraphase does not believe that the proposed development will only increase the amount of impervious surfaces by 1.8%, as discussed in the following section.

5.0 Project Clean Water C3 Program Requirements (pg. 9-10)

- "According to the Alameda County C.3 Guidelines for stormwater treatment, all development projects that create and/or replace 10,000 square ft. or more of impervious surface must

comply with Provision C.3 of the Municipal Regional Stormwater Permit (MRP) adopted by the RWQCB in 2009 (Clean Water Program 2015)."

- Pervious paving or pervious brick layers are proposed as pervious surfaces for the project in section 1 of this drainage report. According to the City of Berkeley C.3.i Stormwater Requirements Checklist (C.3.i Checklist), "Per the MRP, pavement that meets the following definition of pervious pavement is NOT an impervious surface. Pervious pavement is defined as pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in Provision C.3.d.." Terraphase does not believe that pervious paving or pervious brick pavers would provide the same level of permeability as the existing loamy soil open space vegetated area in the north eastern portion of the development area. This existing vegetated area allows for attenuation and the temporary detention of stormwater flows so that it can slowly infiltrate and recharge the groundwater beneath the surface. All pervious areas should not be considered equivalent, the range of permeability will depend on the actual product or design and can vary greatly. The proposed pervious paving or pervious brick paver areas would have reduced infiltration capacity when compared to the existing open space vegetated area.
- It should also be noted that permeable pavers will clog and provide reduced holding capacity over time.

- "For the Project site, it is unclear whether the seasonal groundwater table is low enough to support infiltration measures such as rain gardens, or "self-retaining" (i.e. ponding) areas."
  - Due to the above mentioned uncertainty, along with the other concerns mentioned in this review, Terraphase believes that a geotechnical evaluation/report is necessary in order to properly evaluate the surface and subsurface conditions of the proposed site and the impacts of development on the surrounding properties.

Additional recommended report revisions

- Add a North Arrow and label Curtis Street for reference on all of the figures.
- Delineate the topographic depression area (a rough outline) on the figures.
- Please provide a more detailed evaluation of the proposed site current conditions vs. proposed.

Closing

We are grateful for the opportunity to offer our services on this important project. Should you have any questions or comments regarding this submittal, please contact the undersigned at (510) 645-1850 or by e-mail at Lucas.Paz@terraphase.com.

Sincerely,

For Terraphase Engineering, Inc.

Lucas W. Paz, PhD, CPESC, QSD
Senior Associate Hydrologist

Mendez, Leslie

From: Hussein Saffouri <Hussein@ramseylawgroup.com>
Sent: Thursday, May 11, 2017 1:22 PM
To: Mendez, Leslie; Iyengar, Savith; Cowan, Zach
Cc: Rain Sussman; Guy Sussman
Subject: 1155-75 Hearst Project
Attachments: Draft Review of Clearwater Hydrology 1161-1173 Hearst Ave. Drainage Rpt.pdf; Draft 1824 Curtis Street Site Hydrologic Assessment Tech Memo_rev.pdf; 12-1-00 Berkeley City Atty Opinion Letter re Creek Ordinance.pdf; 1975 Berkeley Creek Map.jpg

Leslie and Savith, thank you for taking the time to meet with me and my client this morning. I am attaching the two reports prepared by our consulting hydrologist which address the hydrology of the site, and comment on the developer's plan. Please provide copies to the peer reviewer. I look forward to receiving the peer review from you.

Also attached are the 1975 Berkeley Creek Map and a letter prepared by the Berkeley City Attorney in 2000 opining on the applicability of this map with respect to a development project.

Please do not hesitate to contact me if you have any questions.

Regards, Hussein.

HUSSEIN SAFFOURI
Attorney
hussein@ramseylawgroup.com
(925) 284-2002 Direct
(510) 708-1122 Cell
(925) 402-8053 Fax

Ramsey Law Group, a professional corporation
3736 Mt. Diablo Blvd., Suite 300
Lafayette, CA 94549

CITY OF BERKELEY

Office of the City Attorney

RECEIVED

DEC 05 2000

CURRENT PLANNING

December 1, 2000

To: WENDY COSIN, Director of Planning and Development
MARK RHOADES, Current Planning Manager
MATTHEW Le GRANT, Senior Planner

From: MANUELA ALBUQUERQUE, City Attorney
By: LAURA N. McKINNEY, Deputy City Attorney

Re: Definition of a Creek Under the Creek Ordinance – BMC § 17.08

ISSUE:

If a creek does not appear on both the Geological Survey Map and the 1975 Berkeley Creeks map, but does appear on the 1990 Berkeley Creeks map, is it "creek" protected by the Creek Ordinance pursuant to BMC § 17.08?

CONCLUSION:

Yes. If a creek appears on the 1990 Berkeley Creeks map, it is a creek that is protected under BMC § 17.08.

BACKGROUND

The owners of 137 Bret Harte Road have applied for an Administrative Use Permit (AUP) for continuation of an existing non-conforming creek setback in the same plane pursuant to BMC § 23C.04.070.B. The necessity for this AUP has been assumed to be as a result of the fact that a creek exists on the property which is subject to protection under BMC § 17.08.

However, after a dispute arose between a neighbor to this property regarding the accuracy of the application's representation of the creek on the property, the property owner asserted that the creek in question was not protected by the Creek Ordinance due to the fact that it did not appear on either the Geological Survey Map nor the 1975 Berkeley Creeks map as an above ground creek.

1947 Center Street, Berkeley, CA 94704 Tel: 510.644.6380 TDD: 510.644.6915 Fax: 510.644.8641
E-mail: attorney@ci.berkeley.ca.us

DISCUSSION:

Essentially, Berkeley's Creek Ordinance protects watercourses in Berkeley in two ways. First, it prohibits obstruction or interference with any natural watercourse in Berkeley and prohibits culverting and riprapping unless a permit is obtained. [1] Second, it requires a setback of 30 feet from the centerline of the creek for all new construction. [2]

The Ordinance defines "creek" as:

> [A] naturally occurring swale or depression, which carries water either seasonally or year-round, and which appears as an above ground creek on the Geological Survey Map and in the 1975 Berkeley creeks map prepared by the Planning Department to show the approximate undergrounding of the watercourse. The word creek will be synonymous with natural watercourse as used in the chapter. BMC § 17.08.030.A.

To determine whether the City of Berkeley intended to limit protection of creeks in Berkeley to only those identified on both the Geological Survey Map and the Berkeley 1975 map for all time, it is necessary to ascertain the legislative intent of the Creeks Ordinance.

Courts have held that to interpret statutory construction:

> [T]he court should ascertain the intent of the Legislature so as to effectuate the purpose of the law. Secondly, the provision must be given a reasonable and common sense interpretation consistent with the apparent purpose and intention of the lawmakers, practical rather than technical in nature, which upon application will result in wise policy rather than mischief or absurdity. The court should take into account matters such as context, the object in view, the evils to be remedied, the history of the times and of legislation upon the same subject, public policy, and contemporaneous construction.

DeYoung v. San Diego, 147 Cal.App.3d 11, 17 (1983).

Further, the court in *California School Employees Assn. v. Governing Bd.* 8 Cal.4th 333, 342 (1994) held:

> Ordinarily, if the statutory language is clear and unambiguous, there is no need for judicial construction. Nonetheless, a court may determine whether the literal meaning of a statute comports with its purpose. We need not follow the plain meaning of a statute

[1] However, these protections only relate to structures or conditions constructed after the effective date of the ordinance. *See* BMC §§ 17.08.040 and 17.08.060.
[2] *See* BMC § 17.08.050.

when to do so would "frustrate[] the manifest purposes of the legislation as a whole or [lead] to absurd results."

A review of the legislative history leads to the conclusion that the City's purpose in enacting the Creeks Ordinance was to protect all naturally occurring waterways in Berkeley, not just those identified on a particular map. For instance, in its November 21, 1989 report to Council recommending adoption of the Creeks Ordinance, the Parks and Recreation Commission stated that it was providing the Council with an ordinance "regarding the preservation and restoration of natural watercourses in the City of Berkeley". In addition, the report stated that the Parks and Recreation Commission was "interested in preserving the few stretches of natural creeks remaining in Berkeley"; that it had developed "an ordinance which would primarily restrict further culverting of existing open creeks"; and that the "ordinance would forbid the issuance of any permit to culvert or perform any construction in a natural watercourse without review." [3]

Nowhere in this discussion does it appear that the intent to protect creeks in Berkeley should be limited to only those that appear on a certain map or combination of maps. Instead, it appears that the City's intent was to attempt to preserve and restore *all* natural watercourses in Berkeley city limits.

The definition of "creeks" in the ordinance attempted to assist in the identification of above ground creeks, but cannot be read to limit the protection the City intended to extend to all creeks in Berkeley. To read the statute otherwise would forever freeze the protection afforded to creeks in Berkeley to those identified on a Geological Survey Map and a 1975 Berkeley map although the existence of natural waterways in Berkeley could be subject to dramatic changes as a result of natural conditions in the years following 1975. This interpretation would lead to absurd results and, therefore, the statute should not be read in this manner.

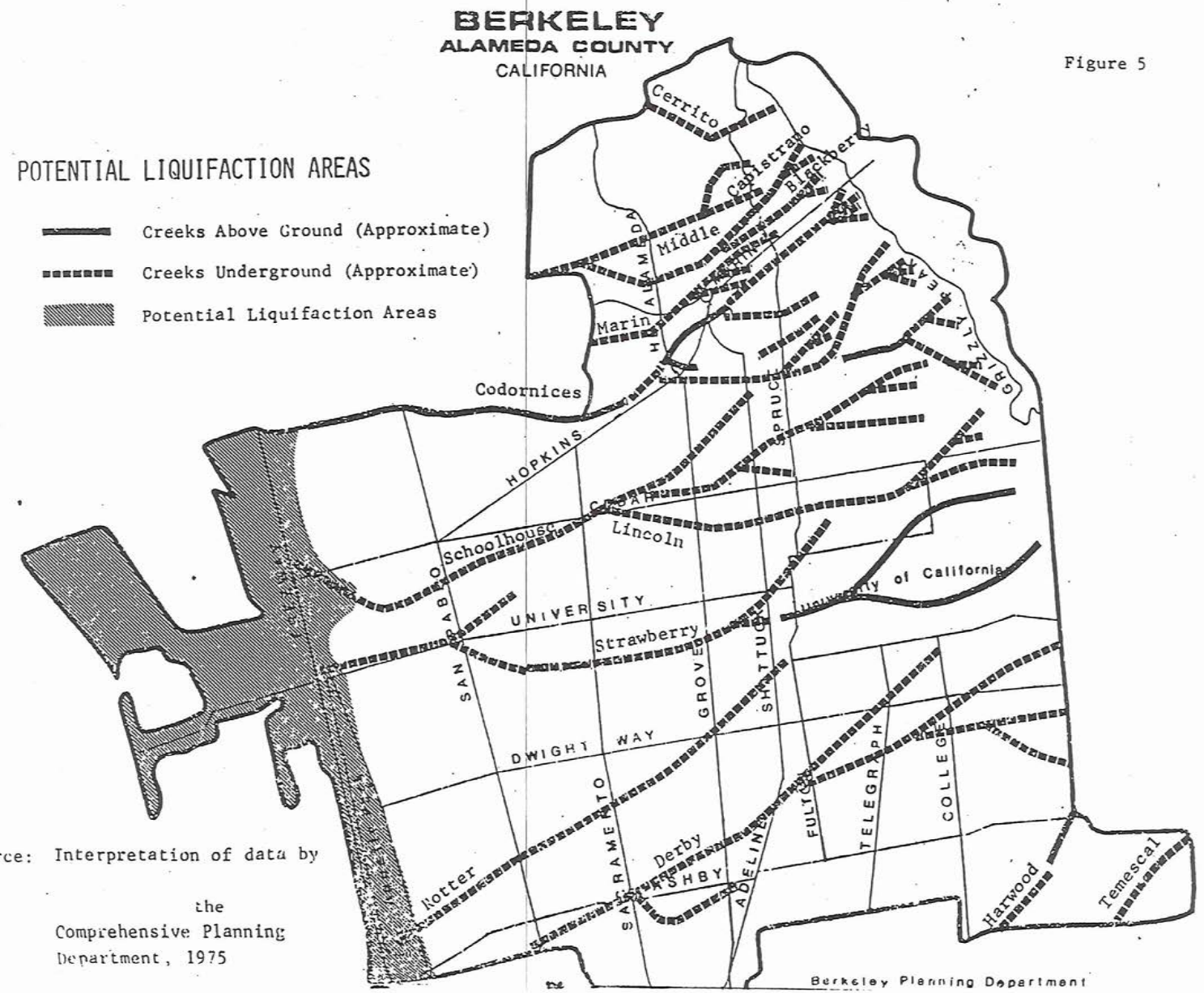
I:\ZONING\creeks.mapping.opn.doc

[3] In addition, the purpose of the ordinance states that it was intended to "establish a policy on: (1) the issuance of permits for culverting open creeks; (2) the rehabilitation and restoration of natural waterways; and (3) the management of watersheds." BMC § 17.08.010.

ZONING ADJUSTMENTS BOARD
JUNE 27, 2002
1155 HEARST AVENUE - USE PERMIT # 01-10000087

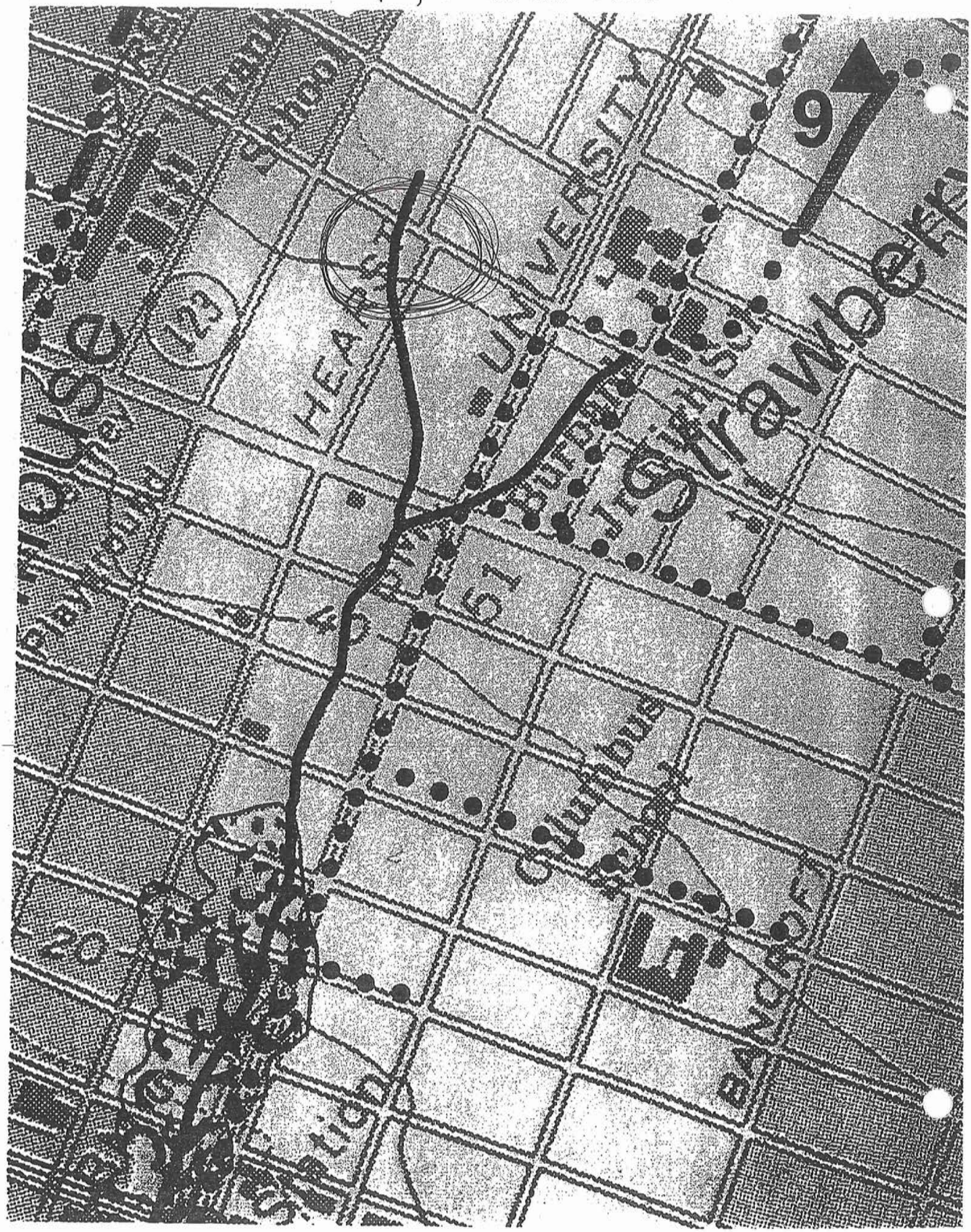
ATTACHMENT 3
1975 CREEK MAP

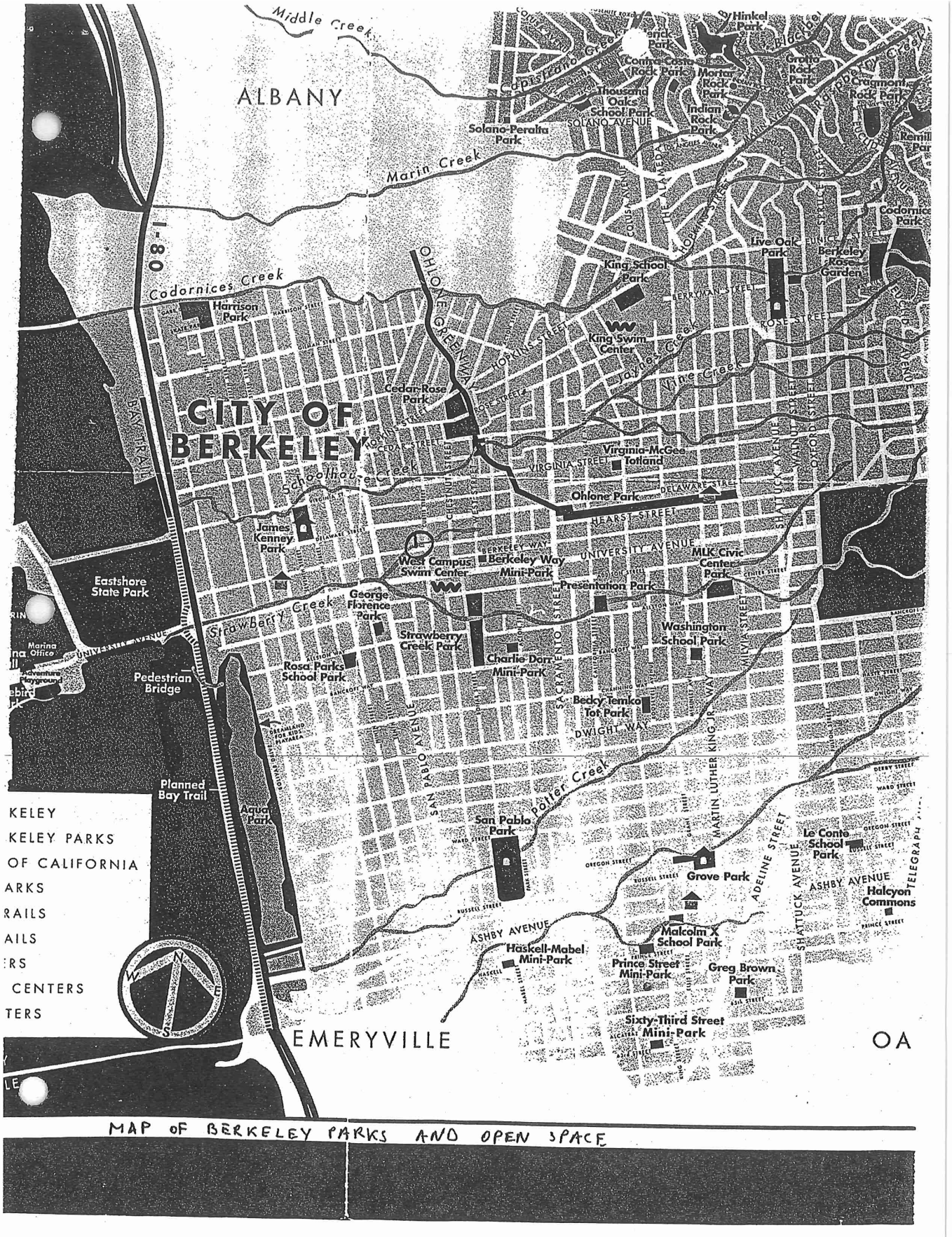
Figure 5



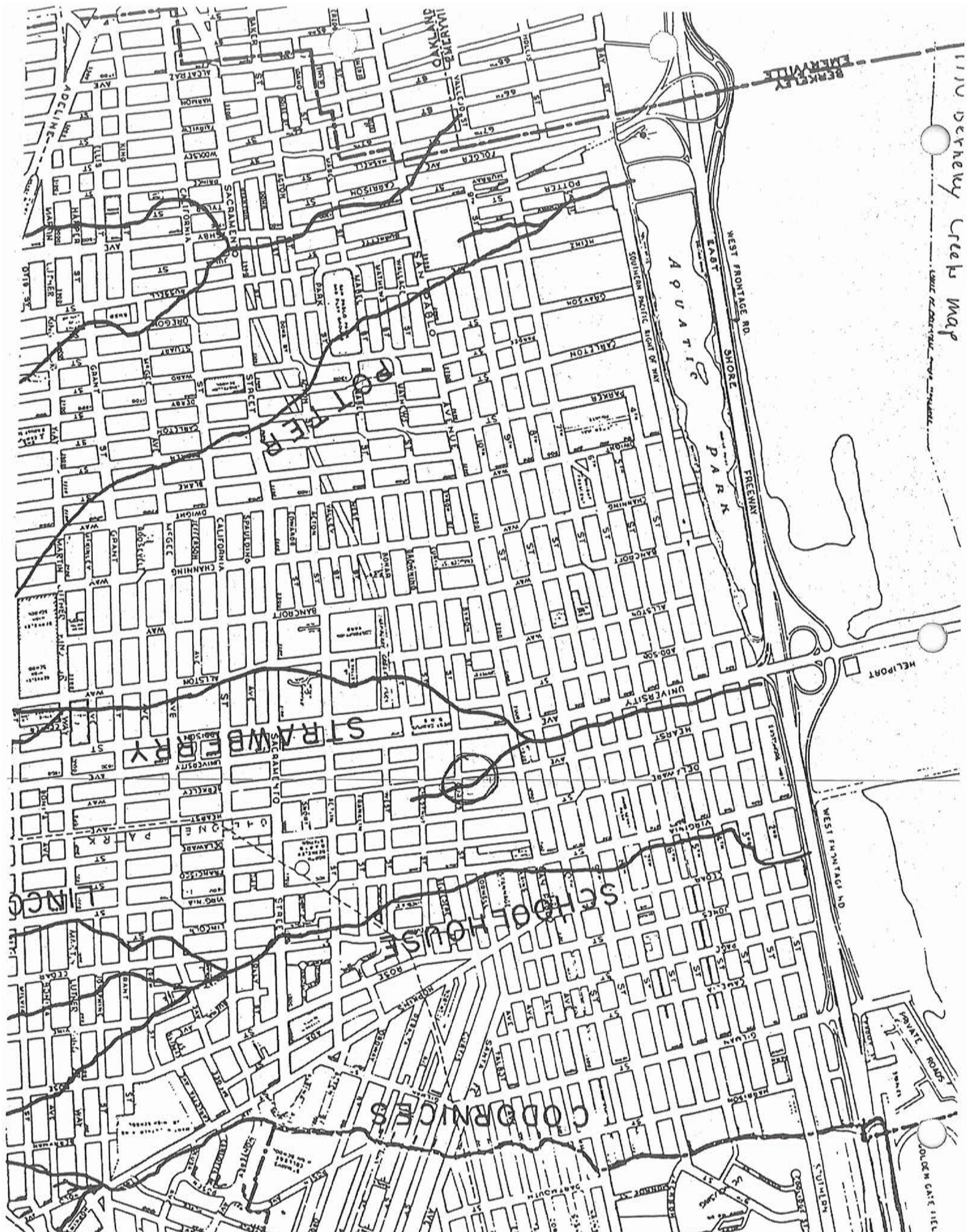
rce: Interpretation of data by the Comprehensive Planning Department, 1975

Creek and watershed map of oakland and Berkele-





MAP OF BERKELEY PARKS AND OPEN SPACE


Berkeley Creek Map
STRAWBERRY
SCHOOLHOUSE
CODORNICES
POTTER
AQUATIC PARK
WEST FRONTAGE RD.
EAST SHORE FREEWAY
SOUTHERN PACIFIC RIGHT OF WAY
SAN PABLO AVENUE
UNIVERSITY AVE
HELIPORT
BERKELEY
EMERYVILLE

BERKELEY
ALAMEDA COUNTY
CALIFORNIA

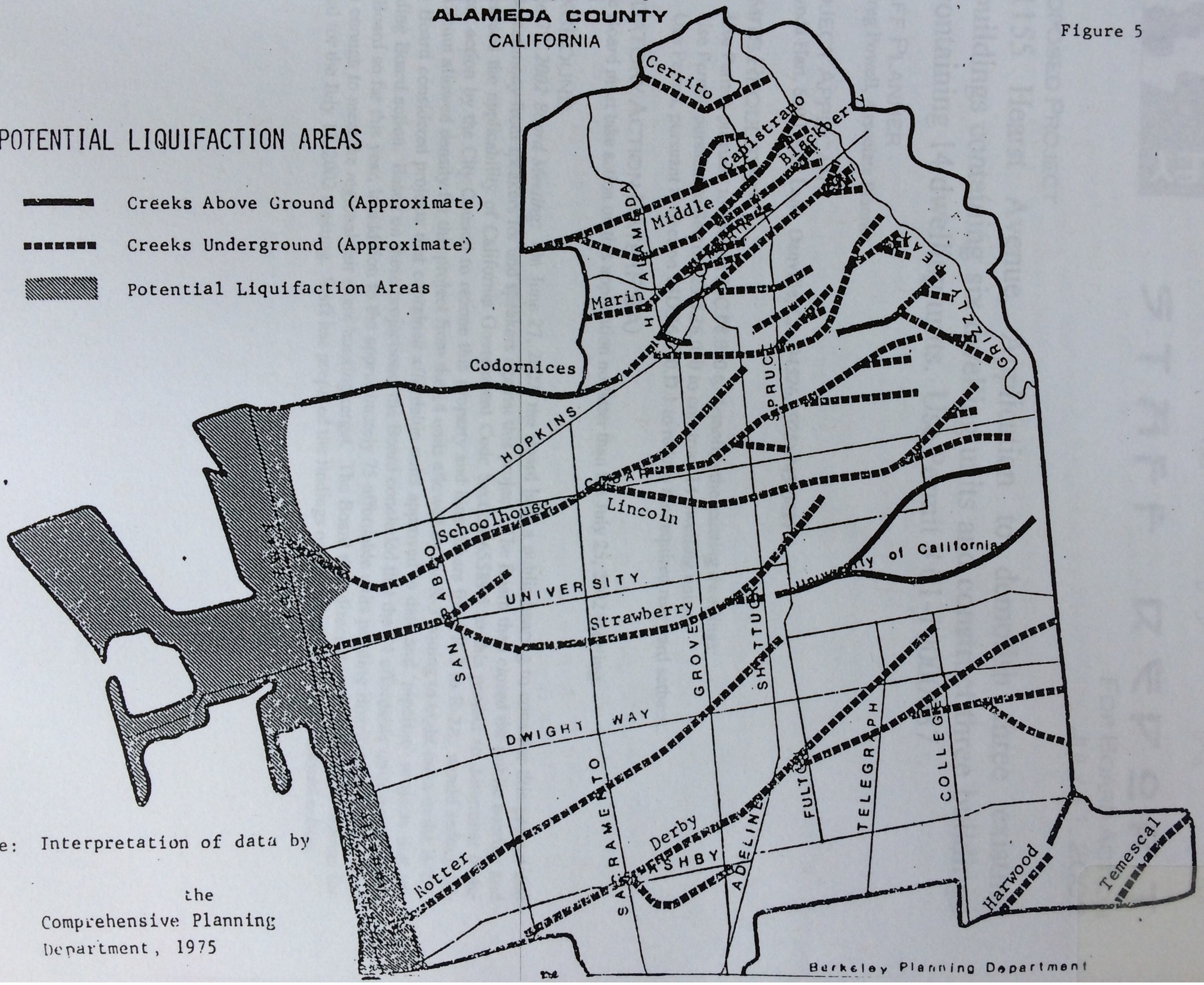
Figure 5

POTENTIAL LIQUIFACTION AREAS

Creeks Above Ground (Approximate)

Creeks Underground (Approximate)

Potential Liquifaction Areas



rce: Interpretation of data by the Comprehensive Planning Department, 1975

Berkeley Planning Department

Planning and Development Department
Land Use Planning Division

HAND DELIVERED

May 17, 2017

Mark Rhoades
46 Shattuck Square, Suite 11
Berkeley, CA 94704

Re: Use Permit #ZP2016-0028 – 1155-1173 Hearst Avenue

Mark,

Thank you for meeting with me today and submitting the remaining incomplete item. The above application is now deemed complete.

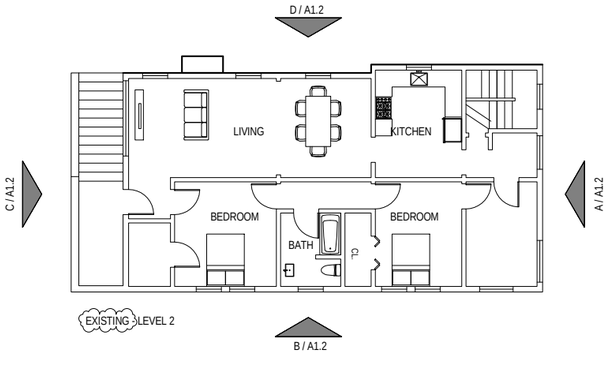
Sincerely,

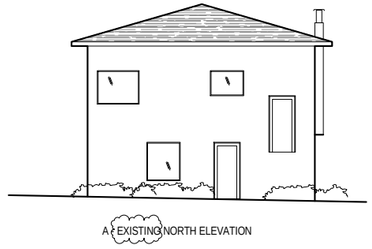
Leslie Mendez
Senior Planner

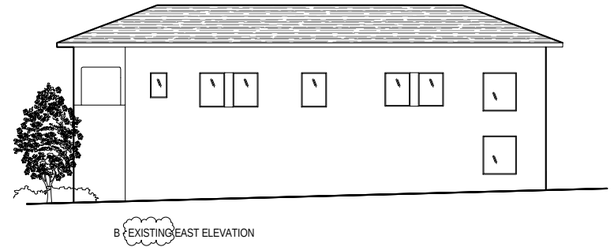
RECEIVE

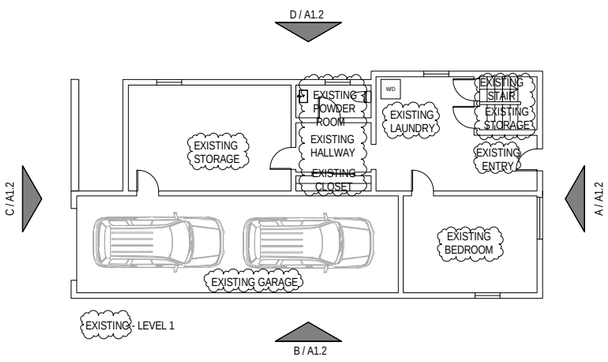
MAY 17

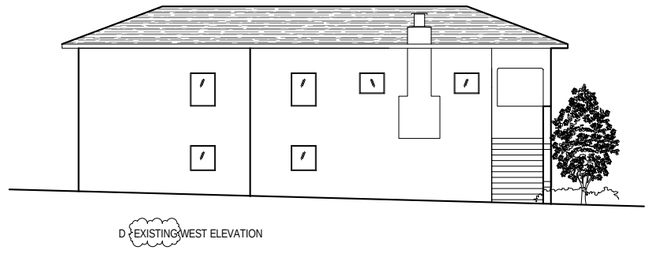
LAND USE











1 EXISTING PLANS & ELEVATIONS - CAMELIA / 1173 HEARST

1/16" = 1'-0"

DRC - PRELIMINARY

01.05.2017

HEARST GARDENS

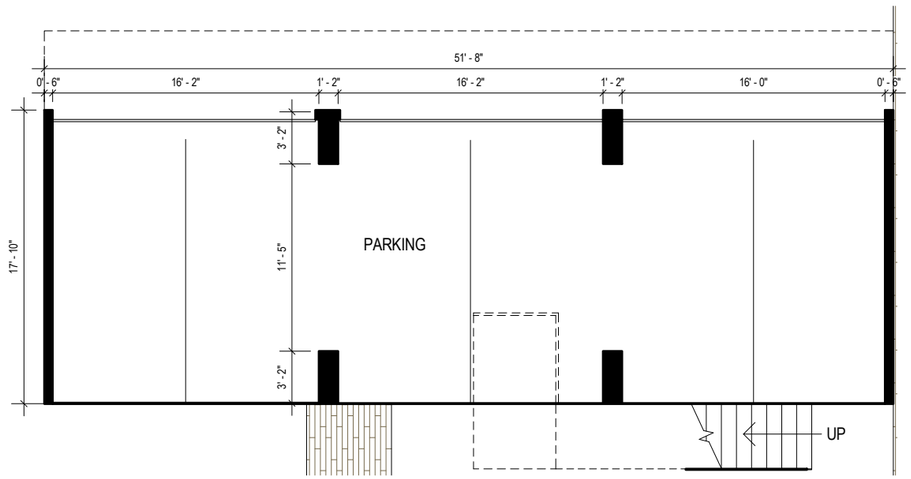
DEVI DUTTA ARCHITECTURE INC.

0 4' 8' 16' 32'

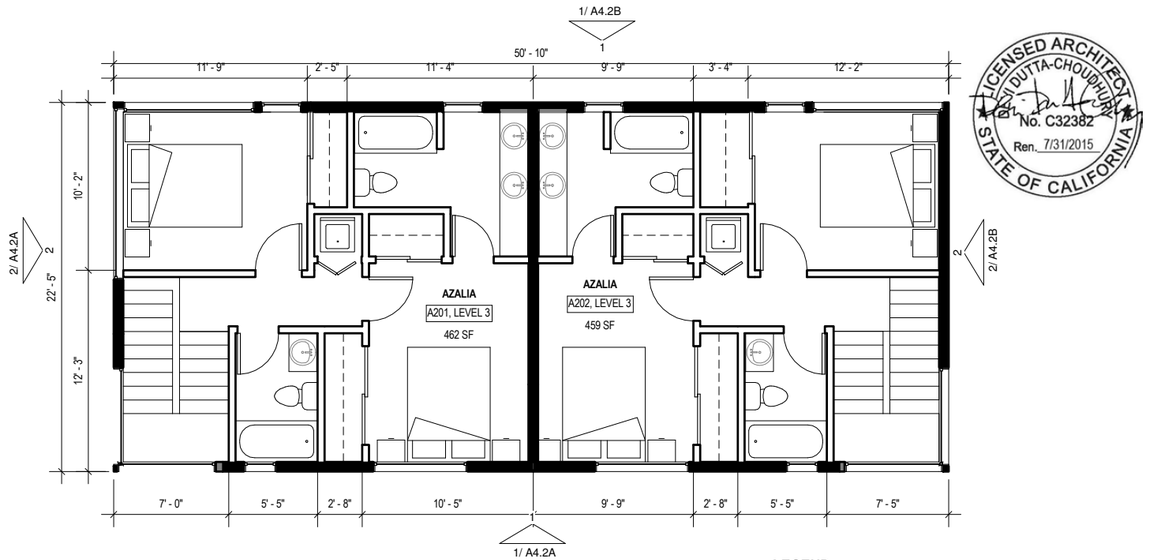
EXISTING PLANS & ELEVATIONS CAMELLIA

SCALE: 1/16" = 1'-0"

A1.2



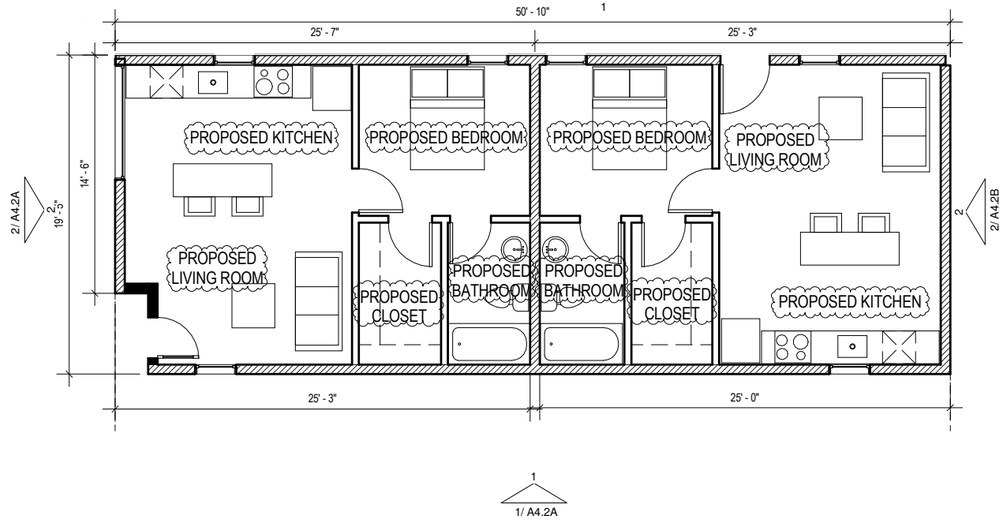
PROPOSED GERANIUM
LEVEL 1



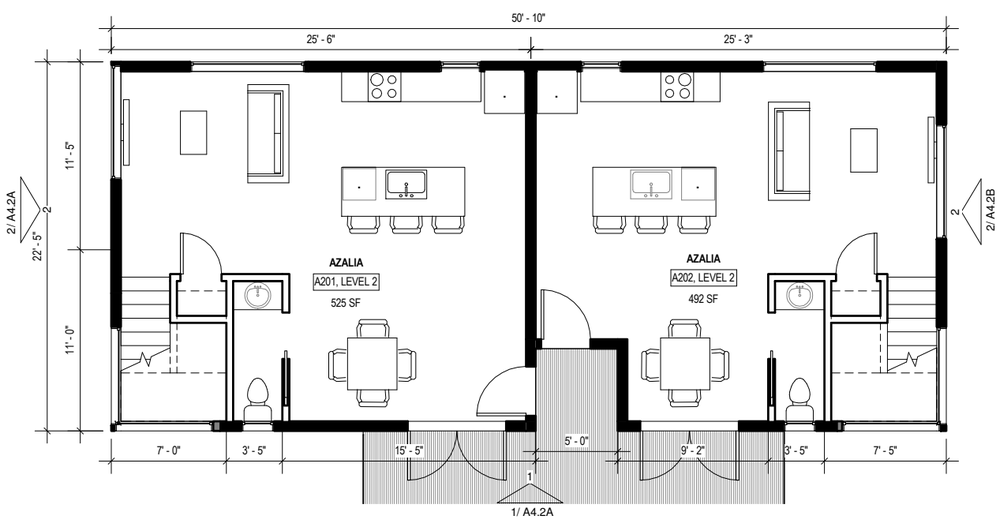
PROPOSED AZALIA, BEGONIA, GERANIUM
TOWNHOMES
LEVEL 3

LICENSED ARCHITECT
DEVI DUTTA-CHOUDHURY
No. C32382
Ren. 7/31/2015
STATE OF CALIFORNIA

LEGEND
- NEW EXTERIOR WALL
- (E) WALL
- NEW INTERIOR WALL
- OPEN SPACE



PROPOSED - AZALIA & BEGONIA
LEVEL 1



PROPOSED - AZALIA, BEGONIA, GERANIUM
LEVEL 2

DRC - PRELIMINARY

01.05.2017

HEARST GARDENS

DEVI DUTTA ARCHITECTURE INC.

0 2' 4' 8' 16'

PROPOSED TOWNHOMES @ HEARST - AZALEA

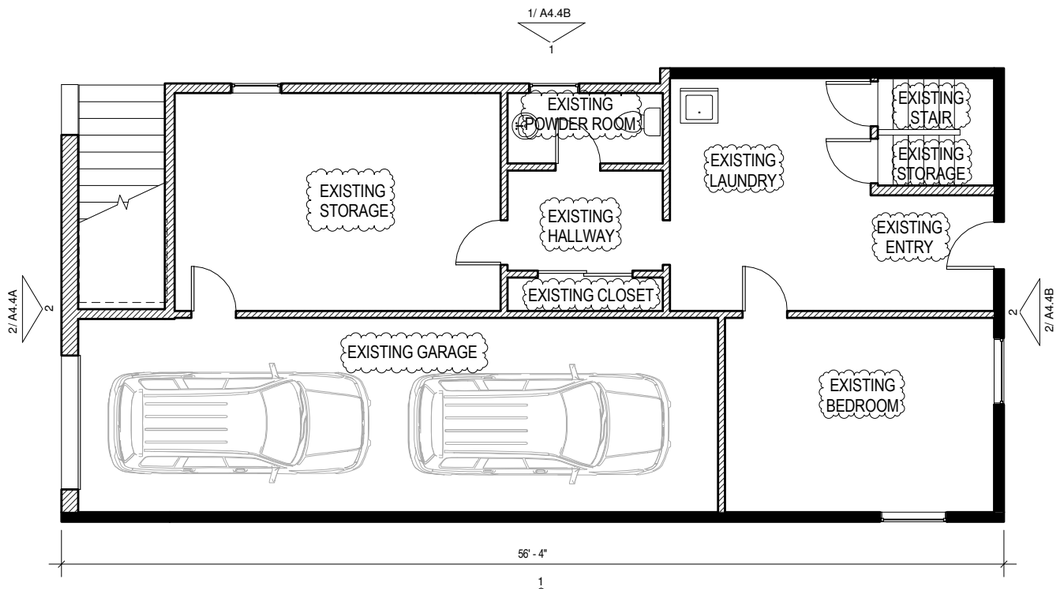
SCALE: As indicated

A4.2

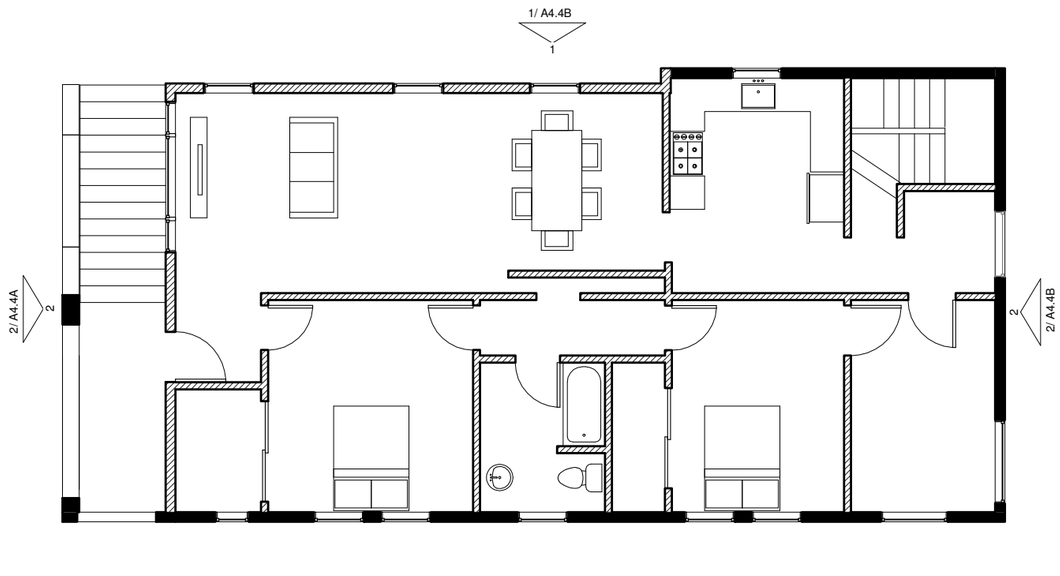
LEGEND

- NEW EXTERIOR WALL
- (E) WALL
- NEW INTERIOR WALL
- OPEN SPACE

LICENSED ARCHITECT
DEVI DUTTA-CHOUDHURY
No. C32382
Ren. 7/31/2015
STATE OF CALIFORNIA



PROPOSED - CAMELLIA BASEMENT PLAN



PROPOSED - CAMELLIA LEVEL 2

Mendez, Leslie

From: Hussein Saffouri <Hussein@ramseylawgroup.com>
Sent: Friday, July 14, 2017 3:21 PM
To: Mendez, Leslie
Subject: RE: 1155-75 Hearst Project
Attachments: Terraphase Review of Balance Hydrologics Peer Review Report_071317.pdf

Hi Leslie. I am forwarding the final report by Terraphase Engineering reviewing and commenting upon Balance Hydrologics' peer review report pertaining to the 1155-75 Hearst Project. Terraphase agrees with many of the concerns identified by Balance Hydrologics, and identifies several more.

Please put this in the project file, and also, please share it with Balance Hydrologics and with Clearwater Hydrology, which prepared the assessment and design report for the developer.

Please do not hesitate to contact me if you have any questions.

Regards, Hussein.

HUSSEIN SAFFOURI
Attorney
hussein@ramseylawgroup.com
(925) 284-2002 Direct
(510) 708-1122 Cell
(925) 402-8053 Fax

Ramsey Law Group, a professional corporation
3736 Mt. Diablo Blvd., Suite 300
Lafayette, CA 94549

TECHNICAL MEMORANDUM

To:
Rain Sussman, Guy Sussman
1824 Curtis Street
Berkeley, CA 94702

From:
Lucas W. Paz, Ph.D., CPESC, QSD
Terraphase Engineering, Inc.

Date:
July 7, 2017

Project Number:
0132.001.001

Subject: Preliminary review and comments on the Third-Party Hydrologic Evaluation prepared by Balance Hydrologics for the 1161-1173 Hearst Avenue, Berkeley, California project

---

Introduction

Terraphase Engineering Inc. (Terraphase) has prepared this technical memorandum based on our review of the March 16, 2017 Stormwater and Flooding Assessment Peer Review prepared by Balance Hydrologics, Inc. (Balance) for the Hearst Avenue Project 1161-1173 Hearst Avenue, Berkeley, California. On behalf of the City of Berkeley, Balance conducted a technical review of the "Stormwater and Flooding Assessment and Mitigation Design for the Hearst Avenue Project, 1161 – 1173 Hearst Avenue, Berkeley, CA" prepared by Clearwater Hydrology (Clearwater) for the developer and dated January 7, 2016. Terraphase generally agrees with the findings and appreciates the quality of the technical peer review conducted by Balance Hydrologics regarding the proposed 1161-1173 Hearst Avenue Project. The Peer Review is well-supported, clearly written, and we agree with each of the review findings. However, Terraphase believes further issues of concern require attention in addition to those items identified by Balance. Terraphase has summarized the findings of Balance in the first paragraph of each section below. Following each Balance summary, Terraphase has provided additional commentary as well as highlighting previous Terraphase findings that have yet to be resolved by the developer. We have added questions, concerns or suggestions to this review where we feel additional information or analysis is needed.

Review Comments/ Findings

1. Soil Characteristics and Depth to Groundwater

Section 2.3 of the Clearwater Report states that information on soil properties and depth to groundwater had not been collected. In their review of the Clearwater Report, Balance states that information on soil properties and depth to groundwater for the site will be important in the ultimate design of the site facilities. The Clearwater report should clearly state that published soil survey data for the site identifies the soils as majority Urban Land – Tierra

Complex, classified as Hydrologic Soil Group D, which has the highest runoff potential. If seasonal high groundwater data is not available, then the drainage design should assume that high groundwater conditions will prevail.

Additionally, Terraphase believes that the uncertainty of the seasonal groundwater table, along with the other concerns identified in the remainder of this review, warrant a geotechnical and groundwater evaluation for the site. Based on historical maps, a segment of a primary tributary to Strawberry Creek previously extended downstream across the 1155-1163 Hearst properties. Carole Schemmerling of the Urban Creeks Council determined in 2002 that the north branch of Strawberry Creek was filled with soil and debris prior to development. The area is also classified as "filled wetlands" and as "seismically unstable and subject to liquefaction." There is no record of properly engineered fill or a culvert or storm drain being installed. Therefore, water comes up to the surface during storm conditions so that the subsurface becomes saturated.

Terraphase believes that a geotechnical and groundwater evaluation is necessary to determine subsurface drainage conditions so that existing groundwater release preferential pathways are not impacted during the construction project. The geotechnical and groundwater evaluation would also allow for proper evaluation of the surface and subsurface conditions of the proposed site and the impacts of development on the surrounding properties.

2. **Design Guidance**

The Clearwater Report relies predominantly on generalized urban drainage design parameters from the U.S. Geological Survey Open-File Report by Rantz in 1971. While the 1971 Rantz based Rational Method is a reasonable resource, Terraphase and Balance Hydrologics are concerned that the climatic/rainfall data and associated flow rates based on pre-1971 data are insufficient. This concern is based on the fact that the last 44+ years of rainfall data was not utilized in this model and that changing climate projections indicate extreme events are now more likely to occur.

Balance suggested use of The Alameda County Flood Control and Water Conservation District (ACFC) Hydrology and Hydraulics Manual instead of the Rantz based Rational Method. The ACFC manual provides a more detailed and current calculation framework for design guidance than the USGS Survey. The ACFC Hydrology and Hydraulics Manual is missing specific information about the City of Berkeley, however, Balance and Terraphase agree that this would be a better model to use for the purposes of this survey.

a. *Runoff Coefficients:* Balance mentioned that further evaluation of the runoff coefficients from Rantz compared to those used by ACFC reveal that the runoff coefficients for the ACFC will be higher. This indicates a higher peak flow potential than currently presented in the Clearwater Report.

   Without a full topographic model, Terraphase is unsure that the amount of stormwater estimated to impact the site and surrounding properties is accurately quantified. A December 2015 rainfall event generated approximately 1.4" of rain which produced significant flooding based on observations and video footage. This video footage suggests that portions of Hearst Street stormwater flow does reach the sidewalk level, contrary to

the following statement in section 2.4.3 of the Clearwater Report: "Downstream of the Curtis St. intersection, flows are contained within the roadway gutter and portions of the driveway outlets (below the sidewalk level) even during the 100-yr. storm." The Clearwater Report also does not clarify how the peak discharges from the gutters were added to watershed A and Table 1 in the Clearwater Report is missing peak discharge rates for Sub-Watershed A.

b. *Impervious Cover*: The current calculations use land use classifications that significantly underestimate the actual impervious cover. Balance recommends a composite runoff coefficient approach.

   Terraphase agrees with the above findings provided by Balance and is also concerned about assumptions regarding the proposed mix of impervious and pervious cover and associated assumptions as described further under section 4.0 Project Drainage.

c. *Time of Concentration*: According to Balance, the time of Concentration calculations appear to be inconsistent for the project site. Calculations should be reviewed.

   Terraphase agrees with the above findings provided by Balance.

d. *Rainfall Intensity*: Rainfall intensity for a given time of concentration for the ACFC are consistently higher (at least 30%) than those used in the Rantz model.

   Furthermore, Terraphase believes that the changing climate projections, which indicate extreme events are more likely in the future, should be considered. As such, a more conservative factor of safety should be applied by designing for a larger 100-yr storm event capacity and more conservative BMPs should be designed for future drainage element on the project site.

3. HEC-RAS Modeling and overflow from Curtis Street

The Clearwater Report states that only stormwater flows through the yards along Curtis Street will reach the east side of the project and it is a relatively low flow rate. However, the completed model has information that predicts flow depths and overflow rates could be quite large, which the Clearwater report does not address. The Clearwater report also does not clarify why backflows from upper Hearst Avenue are not to be expected.

Terraphase agrees with the above findings provided by Balance and further believes that the Clearwater Report should clarify the following items: 1). How the model or other calculations account for the surface flow from watershed A to B. Clearwater should also provide additional information for Sub watershed B flow conditions. 2). How the model explicitly accounts for the flows and routes flows diverted from the Curtis St. reach into the topographic depression of the project area. 3). How the model accounts for contributions/connections from the Curtis street back yard areas.

The subsurface hydrologic conditions mentioned in the Clearwater report (and described in section 1 of this review) suggest a shallow groundwater table in the vicinity of the project site. A rising water table in the winter months due to stormwater infiltration into the ground, which

recharges the shallow water table. The rising water table eventually comes in contact with the surface soils and produces ponding in the low-lying areas of the site so that the groundwater is elevated near the surface. Therefore, saturated soils along with high groundwater conditions increases runoff rates and the amount of ponding. Compaction, foundation installation, as well as other construction activity would modify and impede subsurface flow levels, pathways and/or direction, which could exacerbate subsurface conditions and worsen existing flooding.

4. Project Drainage

Section 3 of the Clearwater Report and the Appendix present options for drainage to Hearst Avenue through a grated rectangular channel and a gravel swale. Site topography constrains the use of piped drainage. Low roughness values in the Manning's roughness coefficient need to be justified or calculations should be updated to use more conservative roughness values.

Terraphase agrees with the above findings provided by Balance and with Clearwater that raising the site grade would cause significant impacts to the site. However, new impervious surfaces and foundations also would exacerbate flooding conditions. Clearwater investigated two options for mitigating storm drainage and flooding conditions within the project site and area of influence. Terraphase does not believe that either or both options presented by Clearwater would effectively mitigate storm drainage and flooding conditions. Terraphase believes that the third option that was presented by Clearwater and subsequently dismissed, should still be considered, as well as a combined system, or treatment train. If everything is routed to the proposed channel, Clearwater will need to clarify how the channel will collect flow from the adjacent properties. The design could be expanded to include a collection trench or sub-drain behind the houses to direct water into the proposed rectangular channel.

Drainage conditions and areas assessed by Clearwater are appropriate, however, we question the contributing watershed areas that generate flows along the Curtis Street gutter. In their report Clearwater states the following "Since some discharge from the depression will also occur through driveways and side yards west of 1155 Hearst, the capacity of the system would likely be greater than that of a 25-yr. storm. The proposed design would also reduce the severity of flooding on the neighboring properties to the east along Curtis Street." Terraphase believes that the language in the first sentence is unclear. Clearwater should clarify whether they are stating that the discharge from the depression is coming into the driveways and side yards, or if it is leaving the driveways and side yards, and if it is leaving the driveways and side yards, where is it going? Additionally, there is evidence to suggest that a larger area may contribute than just watersheds A and B. Terraphase is concerned that the current limited proposed drainage improvements may not significantly improve current flooding conditions for the adjacent properties along Curtis Street, therefore further exploration and clarification is needed from Clearwater.

5. Changes in Peak Flow

The Clearwater report considers impaired drainage along the eastern boundary but concludes that there will be no increase in peak discharge from the site. The following should be considered:

a. *Loss of De Facto Detention storage*: the Clearwater Report states that site grading and drainage enhancements mean that flooding depths on adjacent properties may be lowered as much as 6 inches. This means an increased flow rate to Hearst Avenue and potentially to neighboring properties. The report needs to address how reduced flooding depths and more efficient on-site conveyance can be accomplished w/o increasing peak flow rates to Hearst Avenue and/or how any increases are acceptable in the downstream drainage system.

   Terraphase agrees with findings by Balance that greater increases in runoff are likely than the very minor increases estimated by Clearwater. The language in the Clearwater report is also unclear about discharge through driveways and side yards of Hearst and the proposed design. Due to a combination of existing conditions, there is concern that the limited proposed drainage features may not significantly alleviate the current ponding experienced. Terraphase also agrees with section 3 of the Clearwater Report that raising the site grade would cause significant impacts to the site. However, new impervious surfaces and foundations could exacerbate current flooding conditions.

b. *Post Project Impervious Cover*: The Clearwater Report states that a minimal increase in peak flow would result due to a small (1.8%) increase in impervious cover compared to pre-project conditions. This value does not include contribution from driveways, parking areas and walkways which are constructed of pervious paving or brick pavers. Pervious surface treatments are improvements from traditional but still offer low soil permeability and potential high ground levels. Therefore, those areas should not be discounted entirely for peak flow calculations.

   Terraphase agrees with the findings provided by Balance that the proposed development will increase the quantity of impervious surfaces by more than 1.8%. All pervious areas should not be considered equivalent. The existing vegetated area allows for attenuation and the temporary detention of stormwater flows so that it can slowly infiltrate and recharge the groundwater beneath the surface. However, the proposed pervious paving or pervious brick paver areas would have reduced infiltration capacity when compared to the existing open space vegetated area.

6. C.3 Compliance

The bioretention planters proposed in the Clearwater report are an excellent approach to meet the pertinent requirements for roof runoff. However, per C.3 Guidance, in this instance, Balance correctly notes that pervious pavement surfaces can only be considered self-treating if underlain by a course of sub-grade material sufficient to store the required treatment volume. The Clearwater report should be revised to acknowledge this and confirm that the under-course can be actively drained out to Hearst Avenue.

Terraphase agrees with the above findings provided by Balance and, additionally, would like to highlight the City of Berkeley C.3 program requirements. According to the City of Berkeley C.3.i Stormwater Requirements Checklist (C.3.i Checklist), "Per the MRP, pavement that meets the following definition of pervious pavement is NOT an impervious surface. Pervious pavement is defined as pavement that stores and infiltrates rainfall at a rate equal to immediately surrounding unpaved, landscaped areas, or that stores and infiltrates the rainfall runoff volume described in Provision C.3.d." Terraphase does not believe that pervious paving or pervious brick

pavers would provide the same level of permeability as the existing loamy soil open space vegetated area in the north eastern portion of the development area. This existing vegetated area allows for attenuation and the temporary detention of stormwater flows so that it can slowly infiltrate and recharge the groundwater beneath the surface. All pervious areas should not be considered equivalent, the range of permeability will depend on the actual product or design and can vary greatly. The proposed pervious paving or pervious brick paver areas would have reduced infiltration capacity when compared to the existing open space vegetated area. If permeable pavers are determined as the best available technology for use on this project, Clearwater must consider that the permeable pavers will clog and provide reduced holding capacity over time and therefore will need ongoing maintenance. Additionally, the project impervious surface area listed in the C.3.i Stormwater Requirements checklist are inconsistent with the impervious surface area listed in the Clearwater drainage report.

7. **Additional Comments for Clearwater Hydrology pertaining to the Stormwater and Flooding Assessment and Mitigation Design for the Hearst Avenue Project, 1161 – 1173 Hearst Avenue, Berkeley, CA:**

   a. The referenced estimated peak discharge rates should be provided in the Executive Summary and the data should be cross referenced in table 1 of the Clearwater Report.

   b. A North Arrow and label for Curtis Street should be added to all figures for reference.

   c. Clearwater should delineate the topographic depression area (a rough outline) on the figures.

   d. The ends of the cross sections in section 2 need to be labeled east/west and north/south. The headings and titles of cross sections need to be labeled as well: it appears that Hearst Ave and Curtis Street should be switched.

   e. In Section 2.2, Clearwater should clarify that Curtis Street runs north to south and the units should be labeled in feet.

   f. Clearwater Hydrology should provide a more detailed evaluation of the proposed site current conditions vs. proposed.

   g. The executive summary of the Clearwater Report states “the flooding conditions that occur along the neighboring Curtis St. properties for rainstorms exceeding roughly the 5-yr. recurrence interval.” The references to peak discharge rates should remain consistent so that both say a 2-yr. storm event will produce flood conditions on Curtis street.

Closing

We are grateful for the opportunity to offer our services on this important project. Should you have any questions or comments regarding this submittal, please contact the undersigned at (510) 645-1850 or by e-mail at Lucas.Paz@terraphase.com.

Sincerely,

For Terraphase Engineering, Inc.

Lucas W. Paz, PhD, CPESC, QSD
Associate Hydrologist

Mendez, Leslie

From: Mark Rhoades <mark@rhoadesplanninggroup.com>
Sent: Wednesday, July 19, 2017 10:10 PM
To: Mendez, Leslie
Cc: Mia Perkins
Subject: CEQA review of Hearst Project
Attachments: CH_FinalDesignRpt_Rhoades-HearstAve_Revised7_12_2017.pdf; ATT00001.htm

Leslie,

Our revised hydrology report is attached. Our engineer said that we are still able to maintain the essential aspect of the recommended drainage design even with the increases in the peak flows resulting from use of the County's overly conservative version of the Rational Method. We amended the report to implicitly address all of BH's peer review comments.

Our Engineer said that when we get to the

actual final design and detail for the outlet, it will work better all around to use the alternative alignment along the western property line. We've added that alignment to the plan view of both the alignments in Fig. 8.

We specified that for the driveway alternative alignment the bottom will be concrete rather than gravel or pavers- to keep the flood water surface elevations as low as possible. We've also specified that the east-side drainage ditch that will help evacuate stormwater from the Curtis Ave. backyards will be a grassed swale, rather than gravel lined. As such it should be maintained, i.e. mowed, in order to keep its conveyance capacity.

Please let me know if you have any questions.

Thank you,

Mark Rhoades

CLEARWATER
HYDROLOGY

Consultants in Hydrology
and Water Resources

Watershed Management

Stream and Wetland
Restoration

Wetland Delineation
and Permit Acquisition

Stormwater Drainage
and Flooding

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STORMWATER AND FLOODING ASSESSMENT AND MITIGATION DESIGN FOR THE HEARST AVENUE PROJECT 1161-1173 HEARST AVE. BERKELEY, CA

Prepared by:
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Shreya Hegde, M.S., Water Res. Engr.
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Prepared for:
Hearst Avenue Cottages, LLC
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July 12, 2017
(Revised)

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EXECUTIVE SUMMARY

Clearwater Hydrology (CH) conducted the initial hydrologic and hydraulic assessment in January 2016. As part of the review process the City of Berkeley had Balance Hydrologics perform a peer review of the technical aspects of the document. As a result, CH prepared a comparative assessment of the peak flow calculations using the USGS regional version of the Rational Method (Rantz 1971) and a more recent version of the same method published by the Alameda County Flood Control and Water Conservation District(2016). For the ACFCWCD computations, the roadway areas of each of the subwatersheds were segregated from the parcels and a composite C values were used, rather than the bulk "C" value related to residential density prescribed in Rantz. The Alameda County approach resulted in higher estimated peak flow rates due primarily to the higher storm rainfall intensities in the method's depth-duration-frequency tables (Attachment 7). The difference in peak flow rates for the two versions of the Rational Method was greater for smaller storm events, and less pronounced for larger events.
Clearwater Hydrology (CH) conducted hydrologic and hydraulic assessments of existing stormwater drainage and flooding conditions through the lower, northside Hearst Avenue corridor. The objective of the assessments was the development of a storm drainage system design for the proposed Hearst Avenue Project at 1155-1173 Hearst Avenue in west Berkeley. The hydrologic/hydraulic assessments confirmed anecdotal evidence gleaned from the developer and one local resident (along Curtis Street) that stormwater runoff backs-up along Curtis, north of the Hearst Ave. intersection, and discharges over residential driveways into a topographic depression west of Curtis St. This depression and its uneven bottom topography create ponding of stormwaters of up to 1.0 ft in the back yards of the west side Curtis St. properties prior to discharging west-southwest through the Project area to Hearst Avenue. Minor nuisance ponding of accumulated stormwater occurs on the Project site while it is discharged through driveways and side yard corridors to the Hearst Ave. gutter between 1153-1155 Hearst and a north-south driveway through an apartment complex at 1139 Hearst.

Based on the findings of the technical assessment, including development of a HEC-RAS hydraulic model for the lower northside Hearst Ave. corridor, piped and open channel drainage scenarios for the Project were tested for their ability to provide proper drainage without on-site flooding during the 10-yr. design rainstorm. A secondary requirement of the drainage design was the imperative to improve, even marginally, the flooding conditions that occur along the neighboring Curtis St. properties for rainstorms exceeding roughly the 2-yr. recurrence interval. The selected drainage design is depicted in plan, profile and cross-section in Figures 8-10, respectively, and includes the following components:

- A 2.5 ft. wide, 0.4 ft. deep rectangular channel with a slope of 0.8% inset within the Project main driveway, extending north to the northern edge of the new parking lot; and

- A trapezoidal grassed swale with side slopes 3:1, channel slope of 1.0% and a minimum depth of 0.3 ft. extending eastward from the parking lot to the eastern Project boundary.

To protect the rectangular channel from degradation by vehicular traffic, the channel would be covered by a metal grate with solid metal sidewalls. At its mild slope of 0.8%, its capacity would be 5.5 cfs, which is exceed the combined 25-yr. peak discharge (4.51 cfs) from the lands

normally draining to the depression (Sub-Watershed A in Figure 2) and the entire diverted peak discharge for the west side Curtis St. sub-watershed (Sub-Watershed B in Figure 2). Since some discharge from the depression will also occur through driveways and side yards west of 1155 Hearst, the capacity of the system would likely exceed the capacity of the main drain outlet channel. The proposed design would also reduce the severity of flooding on the neighboring properties to the east along Curtis Street.

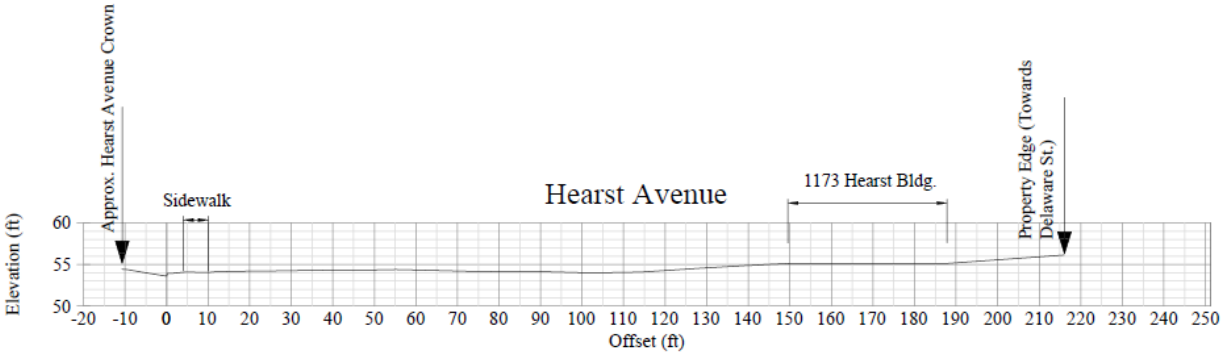
1.0 INTRODUCTION

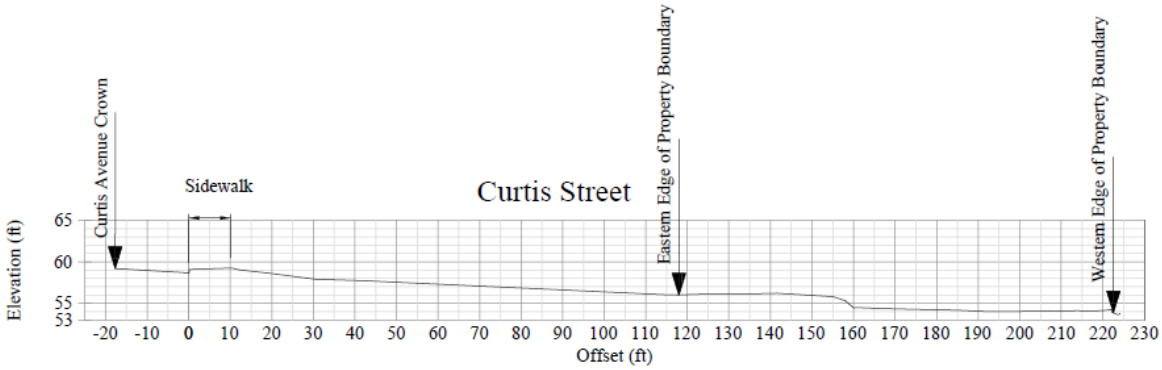
The 0.5-acre Hearst Avenue project (Project) will replace four existing residential buildings (one single family residence at 1173 Hearst and three apartment buildings at 1155, 1157, 1159, 1161, and 1163 Hearst) situated on two adjoining parcels with seven residential buildings on a combined single parcel. The new building array will also include both single family and apartment structures. Plan views of the existing and project building configurations (Devi-Dutta Architects 2015) are attached in the Technical Appendix. In both the existing and project configurations, all but one of the buildings (single family residence at 1173 Hearst) are serviced by a driveway and interior parking lot, set back from Hearst Avenue. As noted on the architectural plans, the project impervious surface area of 10,892 sq. ft. (sf) would increase the existing impervious surface area at the site (10,495 sf) by 1.8 percent. Also, all of the proposed project hardscape features (driveway, parking lot and walkway areas) would consist of either pervious paving or pervious brick pavers. Therefore, the project impervious surface total excludes those areas of the site.

Rhoades Planning Group (RPG) retained Clearwater Hydrology (CH) to assess stormwater drainage and flooding issues affecting the existing properties, and peripherally the adjoining properties along the west sides of Curtis Street, between Hearst Avenue and Delaware Street, and to develop solutions to alleviate the inefficient drainage conditions at the project site.

2.0 EXISTING CONDITIONS- HYDROLOGIC SETTNG

The project site is located in a topographic depression roughly bounded to the south by Hearst Avenue, to the north by Delaware Street, to the east by Curtis Ave. and to the west by a residential driveway that traverses a cluster of apartment buildings 100-200 ft. west of the site. As shown in Figure 1, the site lies within the Strawberry Creek Watershed and appears to occupy a portion of a former surface tributary of the historical Strawberry Creek channel. It is possible that the depression is a remnant feature of that drainage, since subsidence could not have lowered the land surface relative to the streetside topography to such an extent. Based on integrated topographic mapping prepared for the site and the west side of Curtis Ave. by Moran Engineering and CH (Curtis St. portion), CH prepared the East-West and South-North cross-sections below that help visualize the depression's extents. All surveyed elevations reference the City of Berkeley Datum, which correspond that used for the referenced street monuments.





2.1 Hearst Avenue Watershed

CH obtained all available information on the storm drain system tributary to the site drainage outlet at Hearst from the City of Berkeley Department of Public Works (DPW). We also conducted a walking survey of Hearst Avenue east of the Project site to confirm drainage directions, storm drain inlet locations and characteristics, and to assist us in delineating sub-watershed boundaries for areas tributary to the local Hearst St. drainage network.
Based on our review of the City-supplied documentation and on discussions with City staff, we determined that there are no storm drains underlying Hearst Avenue between the west side of Sacramento Avenue and San Pablo Avenue. Following our walking inspection, which was conducted during an early December rainstorm, and our supplemental topographic survey of Curtis Street between Delaware St. and Hearst, we delineated sub-watersheds tributary to the north side of Hearst Ave. These north side Hearst Ave. sub-watersheds are shown in Figure 2.

The north side of Hearst Ave. extending west from southbound Sacramento Avenue and portions of the east and west side properties along the intervening cross-streets (e.g. Short, Acton, Franklin, West, Chestnut and Curtis) drain to the intersection of Hearst and Curtis. Here gutter flow is directed across Curtis in a shallow concrete swale to the lower end of the Curtis Street gutter, then turns south at 90 degrees for a distance of approximately 40 ft. where the gutter again turns 90 degrees to the north side of Hearst.

The supplemental CH topographic survey included Curtis Street between Delaware and Hearst and some of the west side properties whose rear yards adjoin the project site. The objective of that survey was to enable hydraulic modeling of flows converging at the corner of Hearst and Curtis and west to the project site. Anecdotal evidence and an informal discussion with one of the Curtis St. residents indicated that intense rainstorms trigger roadway backwater conditions and the diversion of ponded floodwater into the Curtis St. rear yards via their steeply sloping driveways. These diverted flows join with runoff from within the boundaries of the topographic depression to create nuisance flooding of both the Curtis St. properties and portions of the Project site.

2.2 Project Site Drainage

Surface drainage on the site is generally toward the west-southwest. Local differential settlement of the parking lot appears to have created some local lowering of the grade. However, only minor ponding may occur before accumulating stormwater breaches the parking lot at its southwestern corner (elev. 53.91 ft.) and flows along the side yard to the Hearst Ave. sidewalk. This side yard discharge occurs prior to runoff overtopping the intervening high point along the driveway edge. Once flow reaches the Hearst Ave. gutter, it joins upgradient Hearst Ave. gutter flow and proceeds west to San Pablo Avenue.

As shown in the east-west (Curtis) cross-section above, there is an abrupt 1.0- 2.0 drop in elevation at the fenceline between the back yard at 1173 Hearst and the eastern edge of the adjoining Project parcel (1155-1163 Hearst) and its parking lot. Based on the limited survey data taken at the western edge of the Curtis St. properties, at the corners of two shed buildings, the lowest elevation just east of that fenceline is about 55.28 feet. Land elevations along the bulk of the back yard area at 1173 Hearst average around 56.5 ft., with the lowest breakover point at 56.3 feet. Thus, for the existing site conditions, ponding of up to 1.0 foot may occur during intense storms when Curtis Street stormwater breaches the west side driveways.

2.3 Site Soils and Local Groundwater Levels

A geotechnical assessment has not yet been performed for the property, so the exact nature of the soils underlying the Project site has not been determined. However, the surface soils likely consist of loamy fill imported for residential building pad construction. Given the site's position within the topographic depression and possibly a relic Strawberry Creek tributary alignment, it is possible that the seasonal groundwater table underlying the site could affect local infiltration rates, at least in wet years.

2.4 Flooding Characteristics along Northside Hearst Avenue

2.4.1 Overview of HEC-RAS Hydraulic Model Development

No modeling of floodflow behavior was previously done for the local north side Hearst Avenue surface drainage system. In order to determine the constraints on site stormwater design, CH developed a hydraulic model of that system using the US Army Corps of Engineers' (USACE) HEC-RAS (River Analysis System, Vers. 4.1) computer program. The HEC-RAS model is

capable of computing flood water surface profiles for open channel, culverts, bridge crossings and other hydraulic structures. The program requires input data on design peak flows, channel reach and junction configurations, hydraulic roughness values and channel geometries. A schematic representation of the Hearst Ave. hydraulic model is shown in Figure 3. It consists of two Hearst Ave. gutter reaches (Hearst Reach 1 and Reach 2) and one west side Curtis St. gutter reach (Curtis Reach 1) with a hydraulic junction at the western end of the concrete valley gutter that delivers Hearst gutter flow to the west Curtis St. gutter.

Roughness values for gutter flow were set at 0.013 (Chow 1959) and modeled flow obstructions were limited to assumed tire blockage within the gutter and road edges. Channel cross-sections delineated along the Curtis St. and Hearst Ave. gutter/roadway reaches were extracted from the integrated DTM developed in AutoCAD Civil 3D 2014, which was based on the Moran and CH topographic surveys conducted in 2015. Along the modeled Curtis St. reach, three mid-reach channel cross-sections were incorporated to simulate the potential driveway diversion of stormwater westward to the topographic depression in the Project area. The reach length between these channel cross-sections was set at 60 feet, which was the cumulative width of all driveways determined to drain downgradient to the depression. The middle cross-section (Station 1+85) was configured to incorporate a driveway sloping downward (westward) from the sidewalk to the rear yard level. The entire driveway extents were not surveyed, so the extent of fall is only suggested by the downward sloping portion of the cross-section in the right overbank. The "ineffective flow option" in HEC-RAS was used to negate any floodwater conveyance in the portions of these cross-sections that were at lower elevations than the street level until breakover points along the sidewalk (per the survey data) were reached.

2.4.2 Peak Flow Rates for Model Input

CH initially used the USGS version of the Rational Method (Rantz 1971) developed for SF Bay Region to compute the peak discharges for the project area sub-watersheds A-J that influence the efficacy of site drainage. We then conducted the same computations using the more recent version of the Rational Method published by the Alameda County Flood Control and Water Conservation District (ACFCWCD), and compared the results of the two versions.

In accordance with the HEC-RAS model configuration shown in Figure 3, upstream sub-watersheds (B-J in Figure 2) drain to the intersection of Hearst Ave. and Curtis Street. Sub-Watersheds F-J were combined into a single sub-watershed to compute the discharge at the head of Hearst Ave. Reach 1 (at the Chestnut/Hearst intersection). The peak discharges computed for Sub-Watersheds D and E were then added to obtain the combined peak discharge at the eastern edge of the Curtis/Hearst intersection. These discharges were maintained across the concrete valley gutter on Curtis St. and then augmented by the Sub-Watershed B discharges at the western end of the swale. These discharges were maintained until the lower end of the modeled Hearst Ave. Reach 2, where the discharge generated along lower Hearst Ave. (Sub-Watershed C) was added.

Similarly, peak discharges were computed for Sub-Watershed A, which comprises the rear yard areas fronting on Delaware St., the Curtis St. rear-yards, the interior of the existing Project site and some additional rear yard area to the west of the Project site. Sub-watershed A drainage

likely departs via several side yards strips along Hearst Avenue. However, a full topographic model for the entire block was not within the scope of this assessment. So the peak discharges computed for this sub-watershed were viewed in conjunction with Curtis St. flow diversions as potential flows to evacuate from the Project area without surface flooding, at least for the 10-yr. design storm. This assumption is a conservative one, since the HEC-RAS modeling showed that less than half of the west-side Curtis Ave. peak discharge and volume would be diverted to Sub-watershed A during the 10-yr. and higher magnitude storm events.

The peak flow computations for all of these sub-watersheds for the 2, 10, 25 and 100-yr. recurrence interval rainstorms are attached in the Technical Appendix, and are summarized in Table 1 below. Estimates computed using both the USGS (Rantz 1971) and the ACFCWCD (2016) versions of the Rational Method are cited in Table 1. One other set of peak discharges was generated using the USGS version, with segregated roadway sub-areas and composite runoff coefficient 'C' values in response to the City's peer review. However, the corresponding composite C values and peak flows computed using the ACFCWCD's Rational Method were substantially higher than the amended USGS values. Thus, the amended USGS values are omitted from Table 1 and the more conservative ACFCWCD values were used for both the HEC-RAS analysis and the site drainage design.

For the initial USGS Rational Method computations, land use within the project area sub-watersheds for purposes of runoff coefficient 'C' value determination was defined as the upper end of the medium density residential classification (7-10 units per acre), which matches the actual residential density of the contributing areas. The associated impervious surface area cited in Rantz (1971) is 25 percent, which is somewhat low for the tributary sub-watersheds. The C values used in deriving the peak flows for this method were in the mid-range for medium density residential use, except for Sub-watershed A which had a C value of 0.45, which is at the low end of the high density use designation (w/ 40% impervious cover).

For the ACFCWCD peak flow computations, the land use classification applied was that of Residential (3600-5000 sf lots) on Hydrologic Soil Group (HSG) 'D' soils, which refer to low permeability soils as per NRCS soil survey classifications. Table 2 of the Hydrology and Hydraulics Manual lists the base runoff coefficient value, which was then adjusted to reflect local ground slopes and a rainfall intensity factor. The composite C value results from the addition of the base C value and the adjustment factor values. Roadway right-of-way sub-areas were treated independently in the same manner and an overall composite C value was determined for each sub-watershed, i.e. for lots and segregated roadways apportioned to each one. Design rainfall intensities at the computed runoff concentration times were initially determined through use of precipitation depth-duration-frequency data in Table 4 of Rantz for the mean annual rainfall of 22 inches (ACFCWCD 2003, in Clean Water Program 2015). Rainfall intensities for the ACFCWCD method for the respective times of concentration and storm recurrence intervals were obtained from Attachment 7 of the Hydrology and Hydraulics Manual. It should be noted that the isohyetal map included in the 2016 Hydrology and Hydraulics Manual is substantially different from the isohyetal map referenced in the Alameda County's C3 stormwater guidelines in the Berkeley flatlands. The mean annual rainfall value for the project area watersheds determined using the Manual's map is more than an inch higher than That indicated by the C3 map.

Design peak discharges computed for the two versions of the Rational Method for the 2-yr, 10-yr, 25-yr and 100-yr rainstorms are summarized below in Table 1:

Table 1: Peak Discharge Rates for Modeled Hearst Ave. Storm Flows

		Peak Discharges (Rantz/Alameda County), cfs			
Sub-Watershed	**Area, ac.**	**2-yr**	**10-yr**	**25-yr**	**100-yr**
A	2.35	0.99/1.36	1.88/2.52	2.97/3.11	3.41/4.06
B	0.60	0.26/0.65	0.49/1.13	1.07/1.40	1.53/1.76
C	0.25	0.07/0.33	0.22/0.57	0.35/0.69	0.50/0.86
D	1.16	0.50/1.11	0.94/2.00	1.50/2.49	2.10/3.17
E	1.10	0.50/1.07	0.94/1.91	1.50/2.38	2.13/3.02
F-J	12.70	4.47/9.08	8.65/16.10	13.50/19.79	19.04/25.17

2.4.3 HEC-RAS Flood Modeling: Results

HEC-RAS model output for the 2-yr. to 100-yr. recurrence interval storm flows is detailed in the Technical Appendix and summarized in Figures 4- 7. The salient points drawn from the modeling were:

- Hydraulic backwater conditions occur in the vicinity of the junction of the west side Curtis St. gutter and the concrete swale that crosses Curtis St., where the two channels meet at 90 degrees, which is an ineffective junction angle resulting in locally high energy losses. In addition, the on-contour Curtis St. gutter maintains a gentler slope than the Hearst Ave. gutter segments, which outside of the intersection, roughly follow the general terrain slope.

- The severity of the backwater influence on flow depths along the Curtis St. west side gutter increases with increasing storm recurrence interval. At roughly mid-block (Station 1+85), ponded stormwater for storms greater than approximately the 5-yr. storm, breach the sidewalk elevation and divert down driveways of those residences to the topographic depression and the Project site (see Figure 7). Even at the 2-yr. peak discharge, the floodwater depth increases from 0.24 ft. at Station 1+85 to 1.54 ft. at Station 0+12 (12 ft. upstream/north of the concrete swale and the junction with the Hearst Ave. gutter flow). This suggests that even at the 2-yr. peak discharge, the flood water surface will exceed the sidewalk level along the lower (southern) segment of Curtis and divert stormwater toward the depression. The volume of diverted flow reaching the topographic depression continues to increase for higher recurrence interval storm events. Note that the HEC-RAS model extends the ends of the channel cross-sections vertically where their extent is not sufficient to contain those flows. Thus, the depths of weir-type flow over the sidewalk may be less than indicated in the model. However, the overflow simulated in the model would occur regardless of the lateral cross-section extents.

- While stormwater storage levels and volumes were not computed for the Curtis St. back yards and the rest of the topographic depression extending through the Project site, the local topography surveyed along the Project's eastern boundary indicates that portions of

the west side Curtis Street properties flood to depths of up to 1.0 foot during most intense rainstorms. Above this depth, surface drainage occurs westward onto the Project site and then toward Hearst Avenue.

- Downstream of the Curtis St. intersection, flows are contained within the roadway gutter and portions of the driveway outlets (below the sidewalk level) even during the 100-yr. storm. For the 10-yr. storm, the depth of flow in the vicinity of the main Project driveway outlet (Sta. 0+48.26) was computed at roughly 0.46 ft., which is slightly above the top of curb. This is largely due to the substantial gutter slope along this lower portion of the modeled reach, which generates critical to supercritical flow conditions and lower flow depths.

3.0 PROJECT DRAINAGE AND FLOODING MITIGATION

As outlined above, for even moderately severe rainstorms, the Project site drains via overland flow by both the westerly side yard area and eventually via the main driveway. The absence of a gravity storm drain under Hearst Ave. to accept piped flow from the Project area complicates the stormwater design for the proposed Project. In addition, raising the site grade could potentially exacerbate flooding along the west side Curtis Street properties that form the eastern portion of the topographic depression.

CH investigated two options for mitigating the undesirable storm drainage and flooding conditions within the Project site and its area of influence. Accordingly, the main objective was to devise passive measures that would drain the site efficiently during the 10-yr. design storm, while also improving the flooding conditions on the west side Curtis St. properties, or at a minimum, not worsen the existing conditions. The two options analyzed were:

1) Install small diameter sub-drains that would drain the Project site and discharge evacuated stormwater to the Hearst Ave. north gutter;

2) Install a surface channel, embedded in the driveway, or possibly the westernmost side yard, that would discharge evacuated stormwater to the Hearst gutter.

A third possible option, installation of subgrade detention facilities (e.g. pipe array) was not investigated in depth due to its active management requirement. Any such facility would require pumping to evacuate accumulated stormwater. Furthermore, due to the tendency of electrical service to be disrupted during severe storm events, a backup emergency generator would also be required. Thus, this option would represent a fall-back scenario if neither of the first two options were determined to be feasible.

As cited in Table 1 above, the combined 10-yr. peak flow for Sub-Watersheds A (topographic depression) and B (west side Curtis St.) is 3.65 cfs. This assumes that the bulk of the flow from the west-side Curtis St. sub-watershed (B) is diverted from Curtis St. to the depression during backwater flood conditions. Similarly, the combined 25-yr. peak flow for Sub-Watersheds A and B totals 4.51 cfs.

CH computed the pipe discharge capacity for a set of two 4-inch and 6-inch diameter sub-drains, given the available subgrade slopes between the eastern Project boundary and the Hearst Ave. gutter, given the 10-yr. hydraulic grade line (HGL) modeled by HEC-RAS.

Two issues were apparent for either of the pipe scenarios:

a) at best, twin 6-inch, smooth walled pipes would discharge 1.18 cfs at the available gradient of 0.8%, and,

b) there would be insufficient clearance for these pipes between the 10-yr. HGL and the sidewalk elevations along Hearst.

The 4-inch pipes could physically fit under the sidewalk, but they only delivered 0.4 cfs, so they were insufficient to mitigate the site flooding conditions.

The channel option was analyzed for various configurations, including that of a swale in gravel or brick pavers. Any swale configuration was deemed problematic due to the spatial requirements forced by transition side slopes at 2:1 or milder. If such a channel were embedded in the entrance driveway, errant tires would eventually breakdown its structure and that of the driveway pavement treads. So the configuration that provided sufficient stormwater conveyance capacity and was technically feasible to construct was a 2.5 ft.-wide rectangular channel with a concrete bottom and an inverted, U-shaped steel channel 0.4 ft. in height fit over the channel bottom. The sides of the steel channel could be solid, while the top would be integrated with a steel grate. The steel would be sufficiently thick to withstand the required vehicular loading for the Project. The rectangular channel at a minimum slope of 0.8 percent would convey the 10-yr. post-project design discharge at a flow depth of 0.31 foot. This would be sufficient to evacuate in excess of the 10-yr. to 25-yr. storm peak discharge entering the depression. As previously noted, the actual contribution of diverted Sub-watershed B discharge entering the Sub-watershed A depression would be less than assumed. Most of that Curtis Ave. west-side discharge would proceed toward the intersection at Hearst.

A plan view of the proposed rectangular channel alignment is shown in Figure 8. Also noted on that figure is a connecting grassed swale that would extend eastward from the northern edge of the new parking lot to the eastern property line. This swale would have a minimum depth of 0.3 ft., which at that point along the property line would give it an invert elevation of approximately 55.8 feet. According to the Moran project topo data, the lowest surveyed rear yard elevation at the property line was 55.28 feet. As noted previously, the lowest breakover point in the back yard of 1173 Hearst is about 56.3 feet. Thus, the proposed grass swale depicted on Figure 8 would allow some drainage of floodwater to occur 0.5 ft. lower than it does under the current conditions. This should reduce the severity of flooding along the west side Curtis St. properties, although it will not alleviate the condition entirely. Figures 9 and 10 depict the longitudinal profile and typical cross-sections for the design solution shown in Figure 8.

An alternative alignment would likely be feasible for the passive drainage system depicted in Figures 8-10. The east-west gravel swale could be extended to a point just inside the western Project site boundary. The rectangular channel could then be constructed along the western

property line, where the available clearance is about 3.5 feet. Choice of this alternative alignment would negate the need for the grated channel to traverse the driveway and parking lot. It could also improve the outlet conditions, since the north Hearst Ave. gutter elevation decreases quickly relative to the adjoining property elevations with distance downstream of the driveway.

For either the investigated option in Figure 8 or the alternative alignment, the channel outlet under the Hearst Ave. sidewalk would require some additional engineering to ensure the design is compatible with the sidewalk crossing. The sidewalk grade at the driveway crossing (elev.= 54.0 ft.) may need to be raised by 0.3-0.4 ft. to facilitate rectangular outlet channel discharge that also clear the 10-yr. HGL in the gutter (elev.=54.15 ft.). Use of the alternative side-yard alignment could eliminate the complexity of the outlet relative to clearing the 10-yr. HGL in the gutter.

4.0 PROJECT PEAK FLOW RATES

Aside from the stormwater evacuation measures, most if not all development projects in the City of Berkeley are required to mitigate for any increases in peak flow rates due to increases in impervious surface coverage. For the current design, the increase in impervious surface coverage would be 1.8%. CH used the ACFCWCD Rational Method to compute pre- and post-project peak flow rates for the Project site watershed (i.e. the site area only) generated during the 10-yr. and 100-yr. design rainstorms. While the nature of the residential development would remain unchanged (high density residential) and thus the runoff coefficient, 'C' value, would remain essentially the same, CH did compute pre- and post-project peak discharges for the two storm events. The 100-yr. peak discharges remained unchanged at 1.25 cfs, while the 10-yr. peak discharge increased from 0.81 to 0.82 cfs for the 10-yr. storm event.

Applying these peak discharges to a triangular synthetic hydrograph geometry formulated by the Soil Conservation Service (now NRCS), the volumetric storage computed to mitigate for the slight increase in peak flow rates for the 10-yr. event was 5.6 cubic feet, or 116 gallons. This amount of storage can easily be provided using a single rain cistern attached to the apartment building roof gutter. Another alternative would be to reduce the Project's impervious area to match that of the existing site condition. According to the Alameda County C3 guidelines for stormwater treatment (2015), mitigation for hydromodification at development sites is only required if the overall project area totals one acre or more. However, the CEQA assessment is currently underway and the City could decide to attach a peak flow mitigation to the project conditions. Regardless, either the cistern or a minor reduction in the project impervious surface area would satisfy any detention storage requirement.

5.0 PROJECT CLEAN WATER C3 PROGRAM REQUIREMENTS

According to the Alameda County C3 Guidelines, all development projects that create and/or replace 10,000 square ft. or more of impervious surface must comply with Provision C.3 of the Municipal Regional Stormwater Permit (MRP) adopted by the RWQCB in 2009 (Clean Water Program 2015). In conjunction with that provision, the guidelines require that development projects provide some combination of stormwater controls including:

- Site design measures
- Source control measures, and
- Low impact development (LID) treatment measures, e.g. evapotranspiration, infiltration and/or rainwater harvesting and reuse.

For the Project site, it is unclear whether the seasonal groundwater table is low enough to support infiltration measures such as rain gardens, or "self-retaining" (i.e. ponding) areas. So, biotreatment systems are likely the best fit to the site conditions. Flow-through bioretention planters (see Technical Appendix for typical planter schematic) can be located adjacent to buildings such that they capture and filter roof runoff before being discharged to the site drainageways. As a conservative estimate, the surface area of these planter facilities can be set at 4 percent of the total impervious footprint, or 436 sf. For a final design, the surface area can be reduced somewhat when the volumetric storage within each bioretention planter is considered. For the preliminary 436 sf requirement, 218 lineal ft. of 2 ft.-wide planters would be required. The requisite analysis and design of these facilities was not within the scope of work for this drainage and flooding assessment.

6.0 REFERENCES

Alameda County Flood Control and Water Conservation District 2016. *Hydrology and Hydraulics Manual 2016.*

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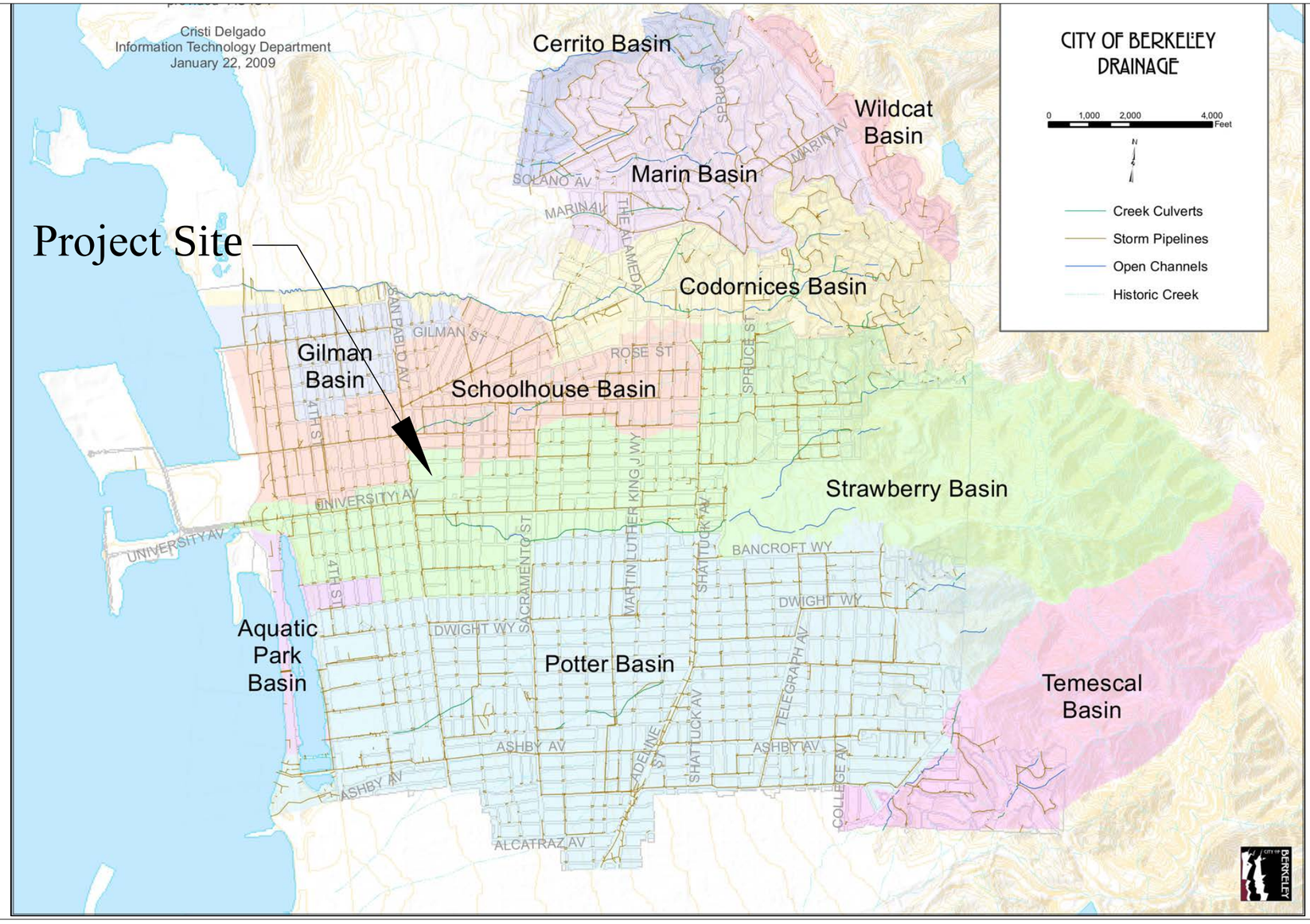
Chow, V.T. 1959. Open Channel Hydraulics. McGraw Hill, Inc.

Clean Water Program 2015. *C.3 Stormwater Technical Guidance, A handbook for developers, builders and project applicants.* Ver. 4.1.

Rantz, S.E. 1971. "Suggested Criteria for Hydrologic Design of Storm-Drainage Facilities in the San Francisco Bay Region, California, S.E. Rantz, U.S. Geological Survey Open-File Report, 1971.

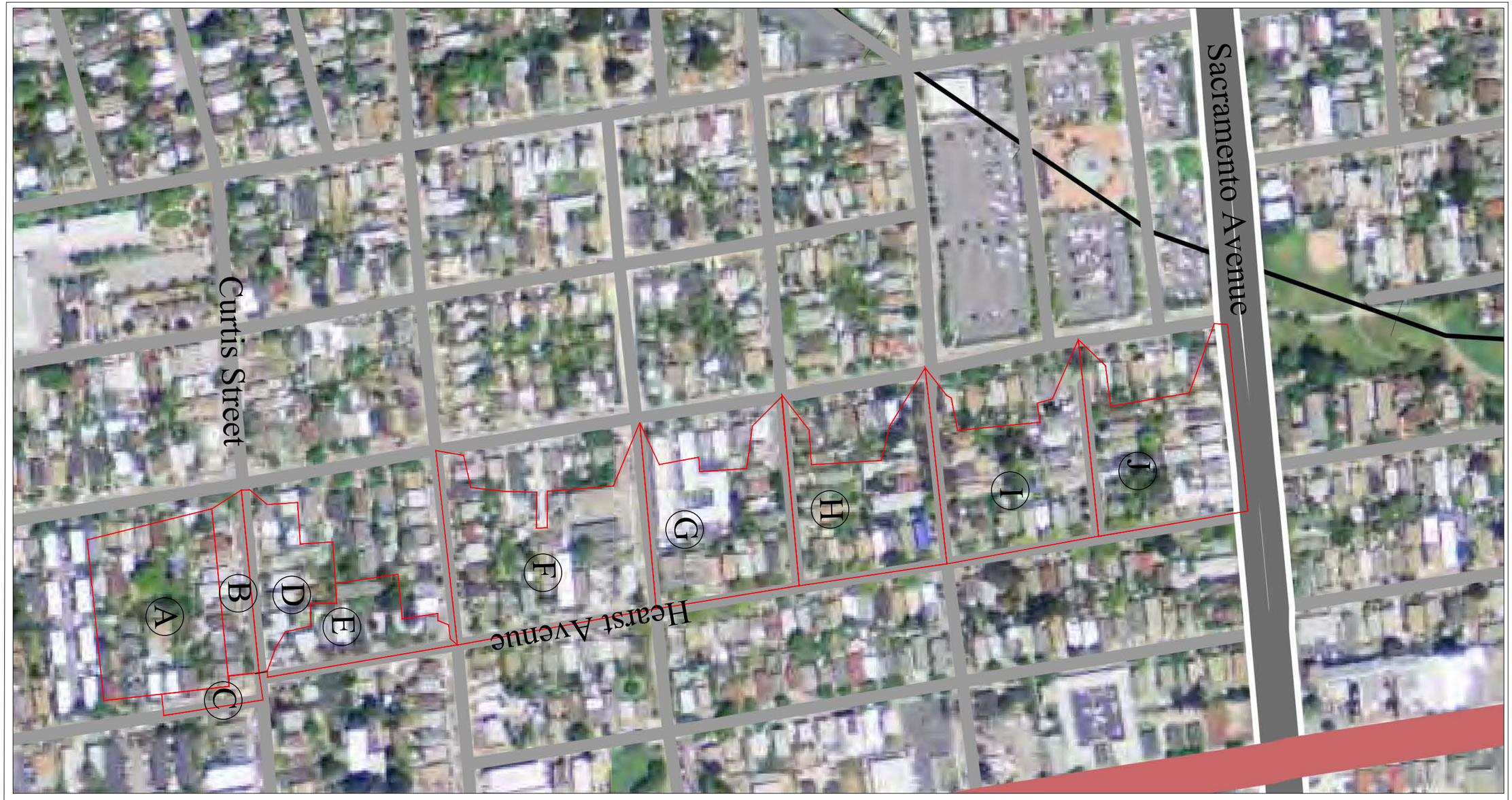
USACE 2010. "HEC-RAS River Analysis System: Hydraulic Reference Manual", Version 4.1, CPD-69, US Army Corps of Engineers Hydrologic Engineering Center, Davis, CA. Jan. 2010.



CLEARWATER HYDROLOGY

Figure 1 : Strawberry Creek Watershed

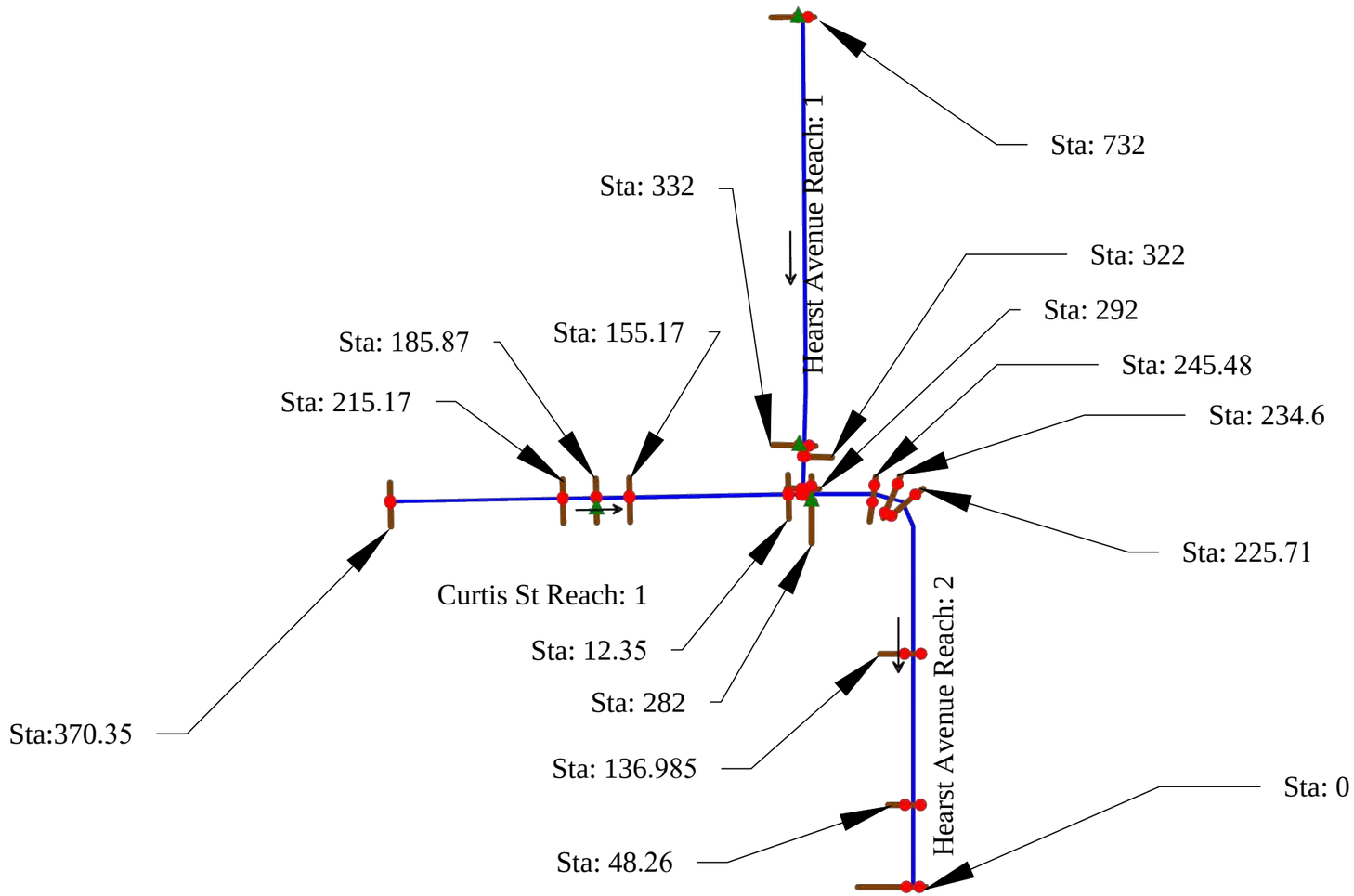
Project: 1155-1173 Hearst Avenue Project
Date: 12/30/2015



CLEARWATER HYDROLOGY

Figure 2 : Northside Hearst Avenue Sub Watersheds

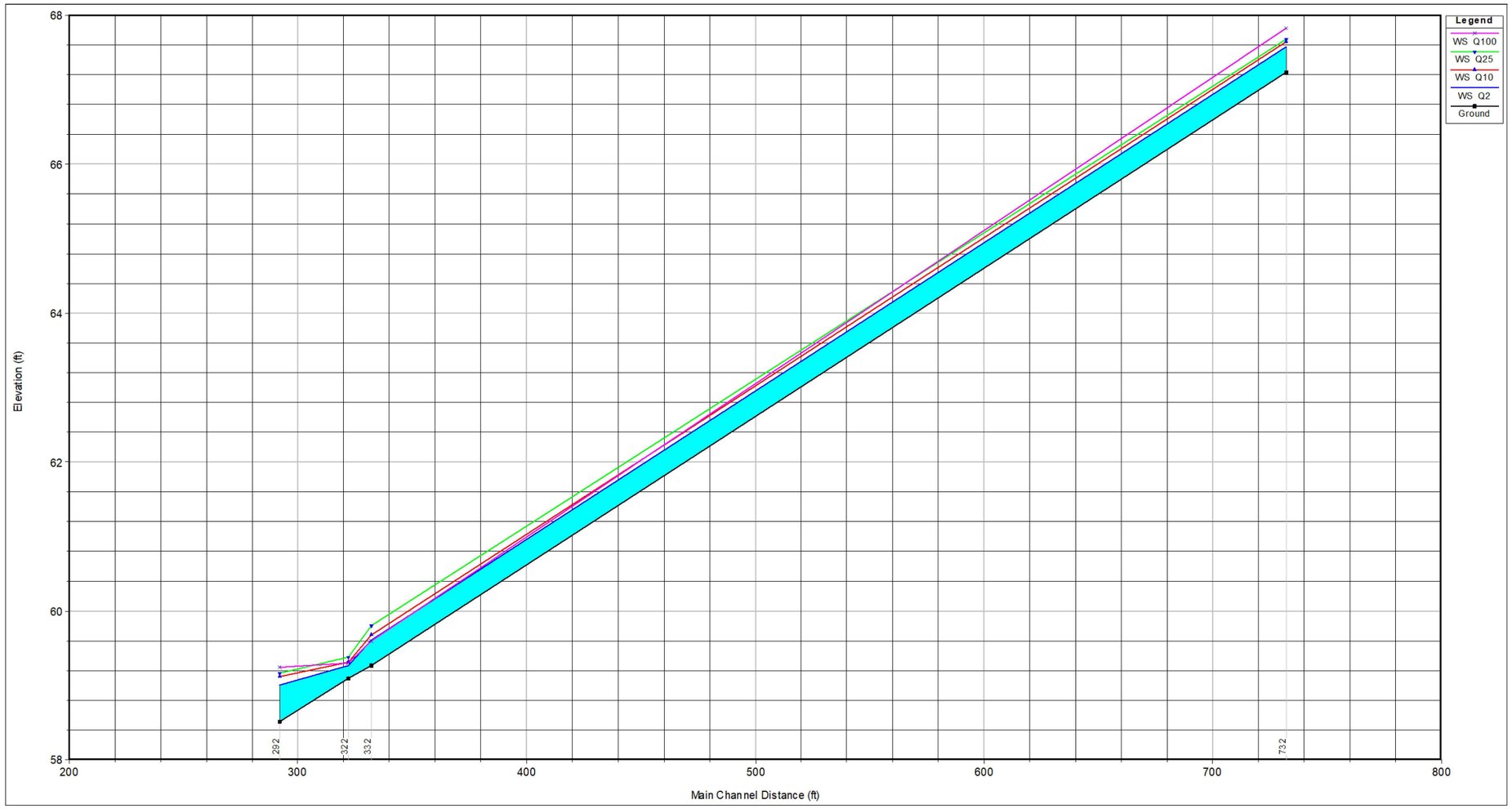
Project: 1155-1173 Hearst Avenue Project
Date: 12/30/2015



CLEARWATER HYDROLOGY

Figure 3 : HEC RAS Schematic Diagram

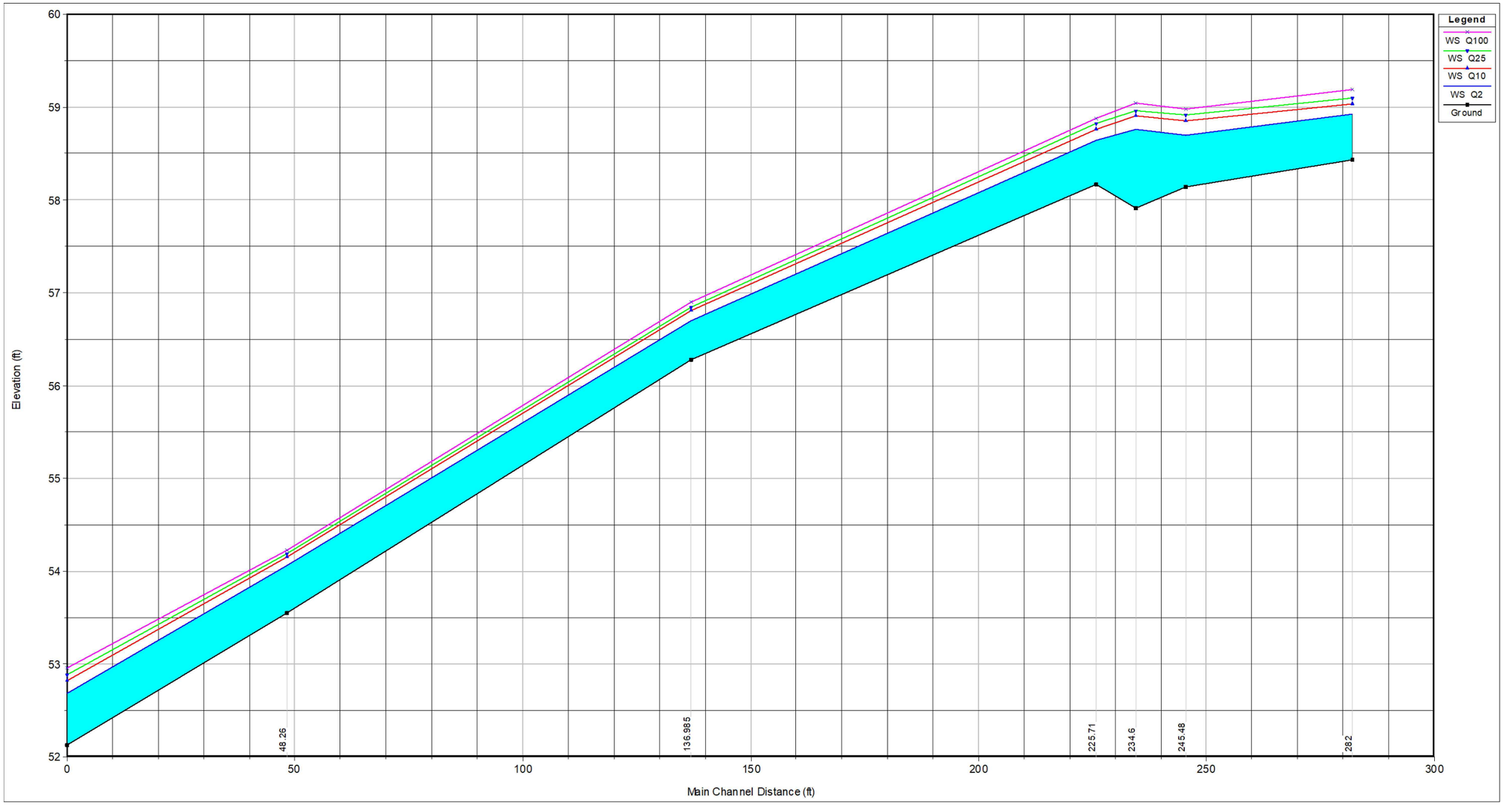
Project: 1155-1173 Hearst Avenue Project
Date: 12/30/2015



CLEARWATER HYDROLOGY

Figure 4 : HEC RAS WS Profiles (Hearst Avenue Reach 1)

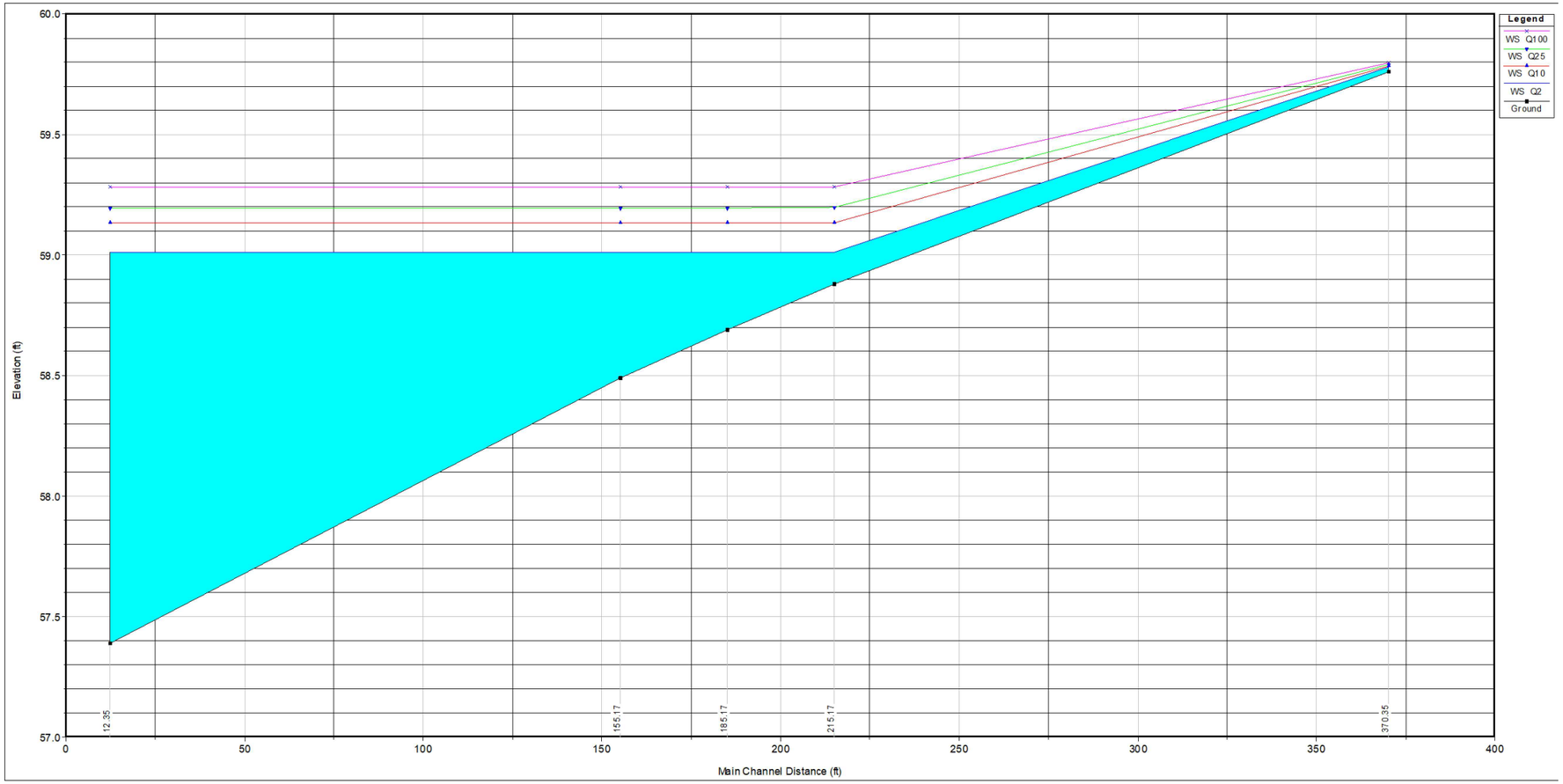
Project: 1155-1173 Hearst Avenue Project
Date: 7/11/2017



CLEARWATER HYDROLOGY

Figure 5 : HEC RAS WS Profiles (Hearst Avenue Reach 2)

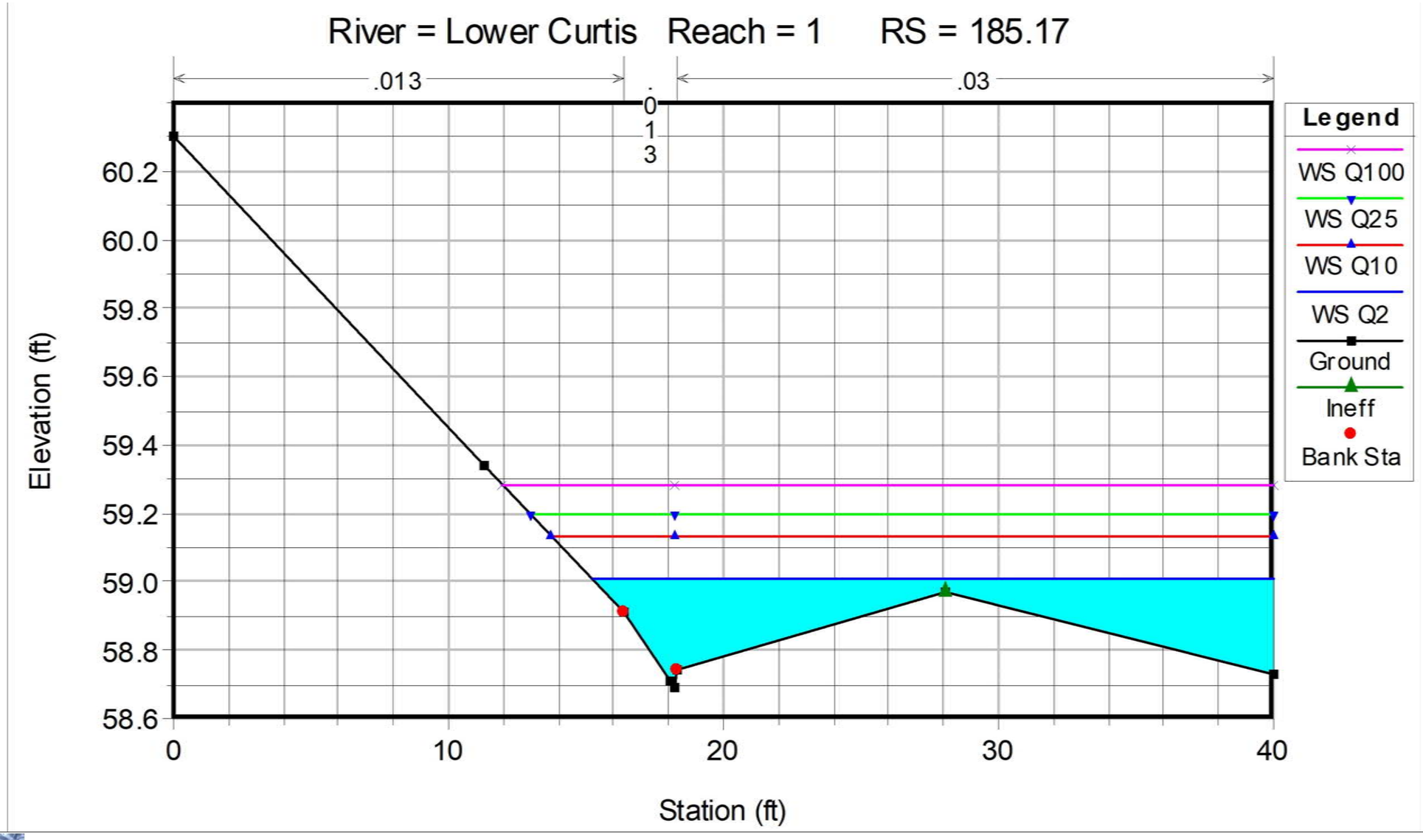
Project: 1155-1173 Hearst Avenue Project
Date: 7/11/2017



CLEARWATER HYDROLOGY

Figure 6 : HEC RAS WS Profiles (Curtis Street Reach 1)

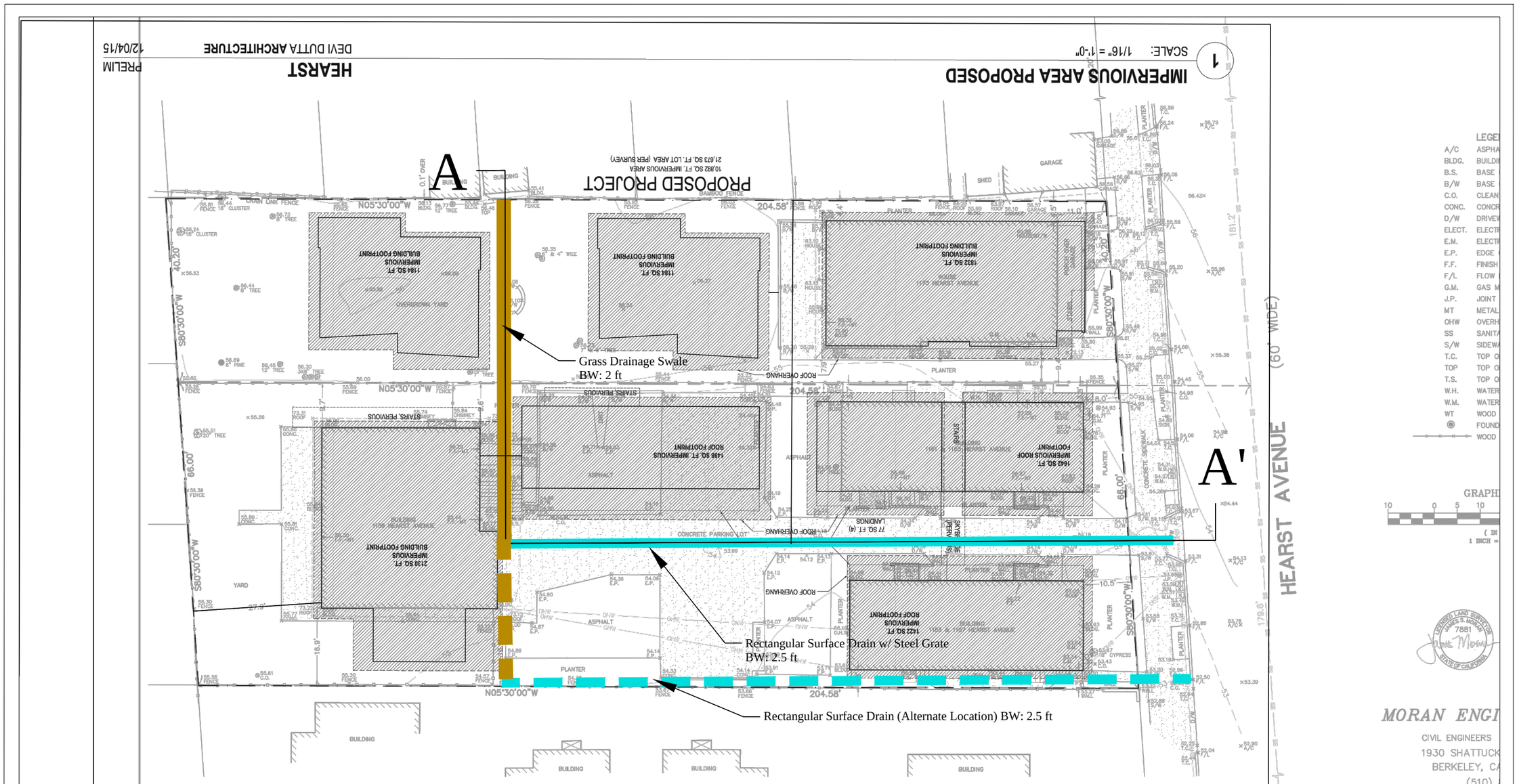
Project: 1155-1173 Hearst Avenue Project
Date: 7/11/2017



CLEARWATER HYDROLOGY

Figure 7 : HEC RAS Curtis Street Driveway XS w/ WS Elevations

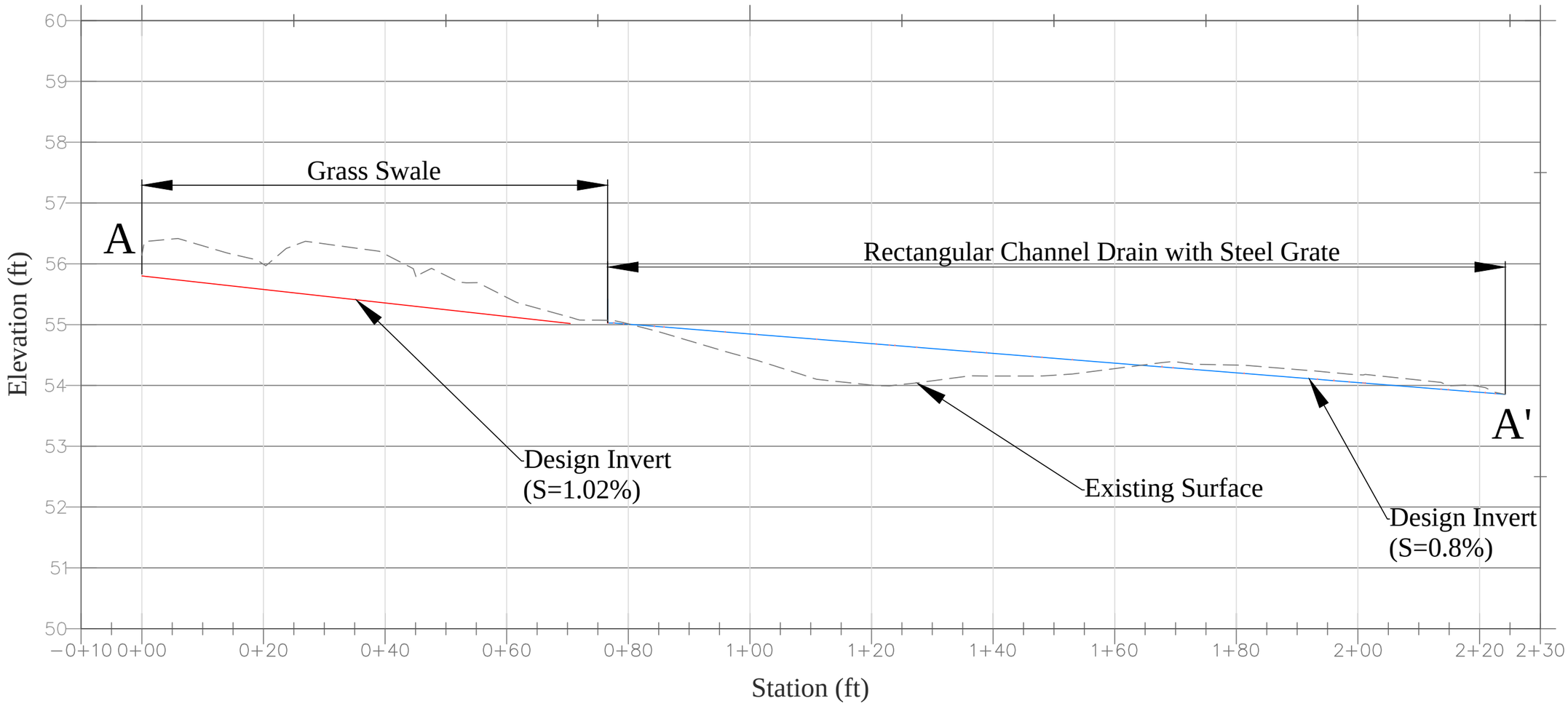
Project: 1155-1173 Hearst Avenue Project
Date: 7/11/2017



CLEARWATER HYDROLOGY

Figure 8 : Proposed Drainage Improvements

Project: 1155-1173 Hearst Avenue Project
Date: 7/11/2017



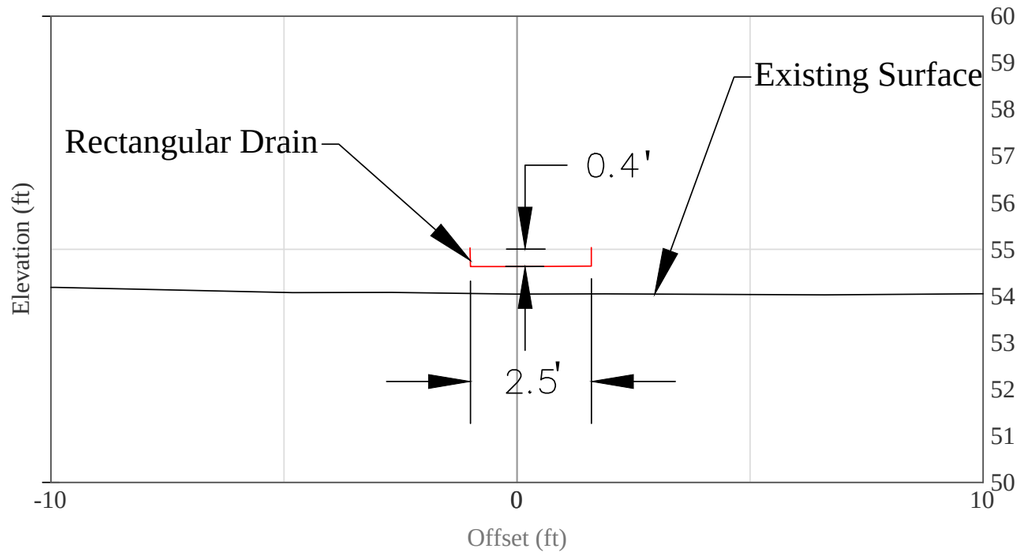
CLEARWATER HYDROLOGY

Figure 9 : Longitudinal Drainage Profile

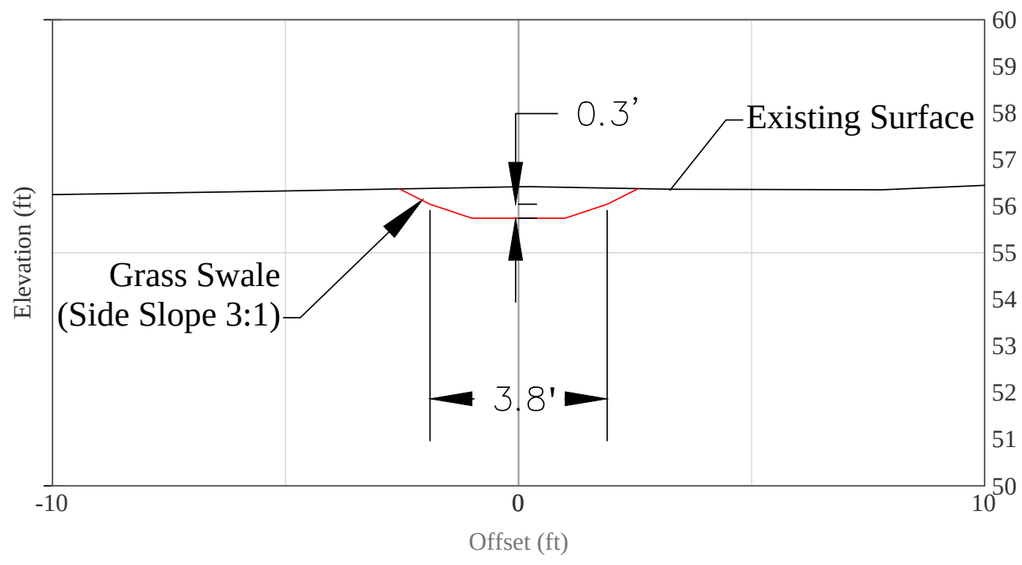
Project:1155-1173 Hearst Avenue Project
Date: 7/11/2017

Typical Drainage Channel Cross Sections

Rectangular Drain



Grass Swale



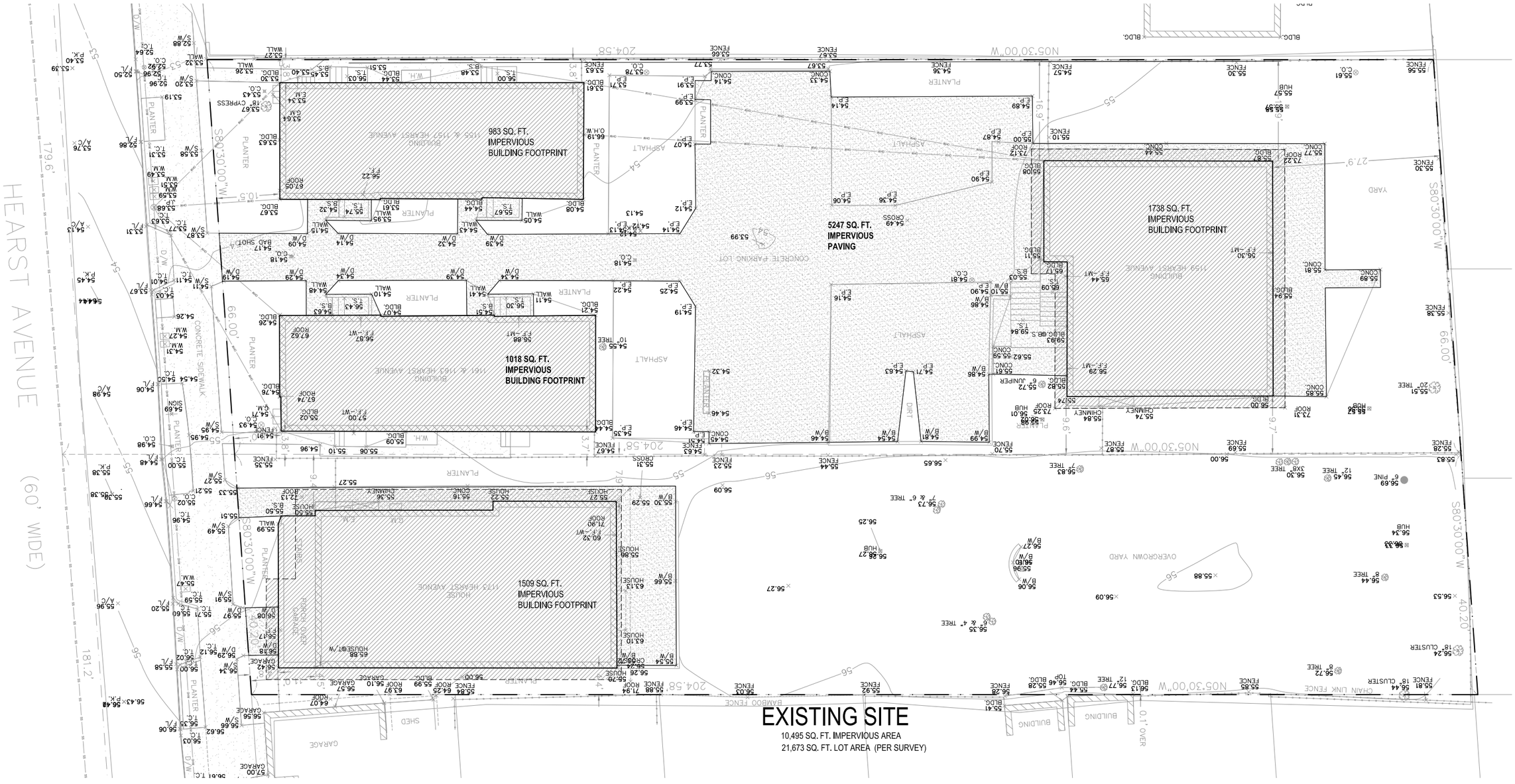
CLEARWATER HYDROLOGY

Figure 10 : Typical Cross Sections

Project:1155-1173 Hearst Avenue Project
Date: 7/11/2017

TECHNICAL APPENDIX:

- Existing and Project Plans with Topography
- Peak Discharge Computations- Hearst Ave. System:
ACFCWCD Rational Method-2016
USGS Rantz Rational Method-1971
- HEC-RAS Tabular Output Data Summaries
-Hydraflow Express- Normal Depth Computation
- Peak Flow Computations: Pre- vs. Post-Project



1

IMPERVIOUS AREA EXISTING

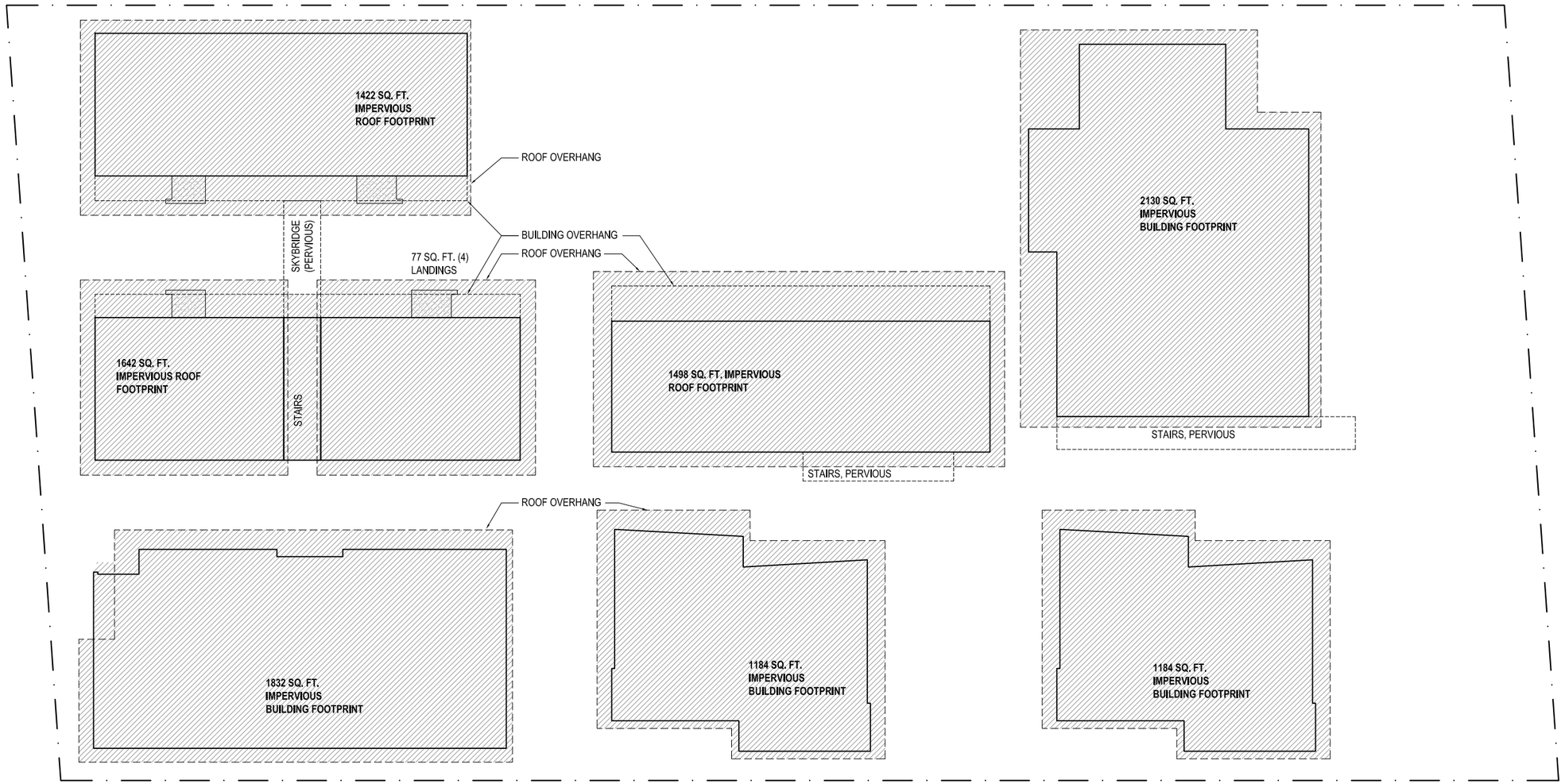
SCALE: 1/16" = 1'-0"

HEARST

DEVI DUTTA **ARCHITECTURE**

PRELIM

12/04/15



PROPOSED PROJECT

10,892 SQ. FT. IMPERVIOUS AREA
21,673 SQ. FT. LOT AREA (PER SURVEY)

1 IMPERVIOUS AREA PROPOSED

SCALE: 1/16" = 1'-0"

HEARST PRELIM
DEVI DUTTA **ARCHITECTURE** 12/04/15

HEARST AVE. PROJECT: DESIGN PEAK DISCHARGES FOR LOWER HEARST AVE. DRAINAGE SYSTEM

Alameda County Flood Control & Water Conservation District. Hydrology and Hydraulics Manual 2016

Q= CⁱA
where C= runoff coeff.;
iⁱ= rainfall intensity at duration equal to Tc;
A= drainage area, ac.

Watershed Areas

	A	B	C	D	E	F	G	H	I	J	SUM F-J
Sq Ft	102,189.7	25,984.9	10,730.1	50,480.9	47,700.4	141,259.3	101,045.8	98,928.7	106,217.6	105,749.2	553,201
Sq Miles	0.0037	0.0009	0.0004	0.0018	0.0017	0.0051	0.0036	0.0035	0.0038	0.0038	0.02
Total Acres	2.35	0.60	0.25	1.16	1.10	3.24	2.32	2.27	2.44	2.43	12.70
Roadway Sq Ft		9875	6900	9850	10375	20600	31175	28925	30450	29725	140,875
Roadway acres		0.23	0.16	0.23	0.24	0.47	0.72	0.66	0.70	0.68	3.23
%roadway		0.38	0.64	0.20	0.22	0.15	0.31	0.29	0.29	0.28	0.25

For Watershed A

Area 2.35 Acres
Slope 0.82 %
Gutter Length N/A ft

a)Computing Time of Concentration, Tc

roof to gutter time

Source/Reference

2 yr recurrence interval	5	minutes
10 yr recurrence interval	5	minutes
25 yr recurrence interval	5	minutes
100 yr recurrence interval	5	minutes

Attachment A4, Alameda County Flood Control & Water Conservation District. Hydrology and Hydraulics Manual 2016

Overland flow = 432 ft slope = 0.82 % Attachment 3

Velocity=	0.75	ft/sec
2 yr recurrence interval	9.60	minutes
10 yr recurrence interval	9.60	minutes
25 yr recurrence interval	9.60	minutes
100 yr recurrence interval	9.60	minutes

Time of concentration Tc=

2 yr recurrence interval	14.60	minutes
10 yr recurrence interval	14.60	minutes
25 yr recurrence interval	14.60	minutes
100 yr recurrence interval	14.60	minutes

b) Precipitation intensity, i

23 inches of rain-attachment 6

Tc=14.6 attachment 7

2 yr recurrence interval	1.25	in/hr
10 yr recurrence interval	2.12	in/hr
25 yr recurrence interval	2.53	in/hr
100 yr recurrence interval	3.16	in/hr

C|Runoff Coeff., C **Base Runoff**

Residential (3600-5000 SF)

2 yr recurrence interval, C	0.43
10 yr recurrence interval, C	0.43
25 yr recurrence interval, C	0.43
100 yr recurrence interval, C	0.43

Ground Slope Adjustment

2 yr recurrence interval, C	0	Equation 8
10 yr recurrence interval, C	0	Slope-Attachment 10
25 yr recurrence interval, C	0	
100 yr recurrence interval, C	0	
	0	

Rainfall Intensity Factor

2 yr recurrence interval, C	0.03	Equation 9
10 yr recurrence interval, C	0.08	
25 yr recurrence interval, C	0.09	
100 yr recurrence interval, C	0.12	

Total

2 yr recurrence interval, C		0.46
10 yr recurrence interval, C		0.51
25 yr recurrence interval, C		0.52
100 yr recurrence interval, C		0.55

Therefore,

Q2	**1.36**	**cfs**
Q10	**2.52**	**cfs**
Q25	**3.11**	**cfs**
Q100	**4.06**	**cfs**

For Watershed B

Gutter Length 394.65 feet
Slope 0.01 %
Area 0.60 Acres
Roadway Area 0.23 Acres

*Google earth elev change from 68 ft @ Curtis & Delaware to 66 ft at hearst & curtis

a)Computing Time of Concentration, Tc

roof to gutter time

Attachment A4,

2 yr recurrence interval	5	minutes
10 yr recurrence interval	5	minutes
25 yr recurrence interval	5	minutes
100 yr recurrence interval	5	minutes

Overland flow = 50 ft slope = 0.01 %

Velocity=	0.75	ft/sec
2 yr recurrence interval	1.11	minutes
10 yr recurrence interval	1.11	minutes
25 yr recurrence interval	1.11	minutes
100 yr recurrence interval	1.11	minutes

Channel Travel time V= (1.49/n)*((A/WP)^(2/3))*S^(1/2)

Area of gutter flow from CAD	0.39	Sq ft
Wetted perimeter	2.87	ft
V	3.04	ft per second
therefore Channel travel time = L/(60V)	2.17	Minutes

HEARST AVE. PROJECT: DESIGN PEAK DISCHARGES FOR LOWER HEARST AVE. DRAINAGE SYSTEM

Time of concentration Tc=

2 yr recurrence interval	8.28	minutes
10 yr recurrence interval	8.28	minutes
25 yr recurrence interval	8.28	minutes
100 yr recurrence interval	8.28	minutes

b) Precipitation intensity, i

23 inches of rain-attachment 6
attachment 7

	2 yr recurrence interval	1.70	in/hr
	10 yr recurrence interval	2.86	in/hr
	25 yr recurrence interval	3.48	in/hr
	100 yr recurrence interval	4.31	in/hr

C|Runoff Coeff., C **Base Runoff**

Roadway

2 yr recurrence interval, C	0.43	**2 yr recurrence interval, C**	0.9
10 yr recurrence interval, C	0.43	**10 yr recurrence interval, C**	0.9
25 yr recurrence interval, C	0.43	**25 yr recurrence interval, C**	0.9
100 yr recurrence interval, C	0.43	**100 yr recurrence interval, C**	0.9

Composite C

2 yr recurrence interval, C	**0.61**
10 yr recurrence interval, C	**0.61**
25 yr recurrence interval, C	**0.61**
100 yr recurrence interval, C	**0.61**

Ground Slope Adjustment

2 yr recurrence interval, C	0
10 yr recurrence interval, C	0
25 yr recurrence interval, C	0
100 yr recurrence interval, C	0

Rainfall Intensity Factor

2 yr recurrence interval, C	0.03
10 yr recurrence interval, C	0.06
25 yr recurrence interval, C	0.07
100 yr recurrence interval, C	0.08

Total

2 yr recurrence interval, C		0.64
10 yr recurrence interval, C		0.66
25 yr recurrence interval, C		0.67
100 yr recurrence interval, C		0.69

Therefore,

Q2	**0.65**	**cfs**
Q10	**1.13**	**cfs**
Q25	**1.40**	**cfs**
Q100	**1.76**	**cfs**

HEARST AVE. PROJECT: DESIGN PEAK DISCHARGES FOR LOWER HEARST AVE. DRAINAGE SYSTEM

For Watershed C

Gutter Length 253.91 feet
Slope 2.36 %
Area 0.25 Acres
Roadway Area 0.16 Acres

*Google earth elev change from 66 ft to 60 ft

a)Computing Time of Concentration, Tc

roof to gutter time

Source/Reference
Attachment A4

2 yr recurrence interval	5 minutes
10 yr recurrence interval	5 minutes
25 yr recurrence interval	5 minutes
100 yr recurrence interval	5 minutes

Overland flow = 50 ft slope = 0.01 %

Velocity=	0.75 ft/sec
2 yr recurrence interval	1.11 minutes
10 yr recurrence interval	1.11 minutes
25 yr recurrence interval	1.11 minutes
100 yr recurrence interval	1.11 minutes

Channel Travel time V= (1.49/n)*[(A/WP)^(2/3)]*S^(1/2)

Area of gutter flow from CAD		0.39 Sq ft
Wetted perimeter		2.87 ft
V	3.04 ft per second	
therefore Channel travel time = L/(60V)	1.39 Minutes	

Time of concentration Tc=

2 yr recurrence interval	7.51	minutes
10 yr recurrence interval	7.51	minutes
25 yr recurrence interval	7.51	minutes
100 yr recurrence interval	7.51	minutes

b) Precipitation intensity, i

2 yr recurrence interval	1.82	in/hr	23 inches of rain-attachment 6
10 yr recurrence interval	3.07	in/hr	attachment 7
25 yr recurrence interval	3.69	in/hr	
100 yr recurrence interval	4.58	in/hr	

Depth

C)Runoff Coeff., C **Base Runoff**

		Roadway	
2 yr recurrence interval, C	0.43	**2 yr recurrence interval, C**	0.9
10 yr recurrence interval, C	0.43	**10 yr recurrence interval, C**	0.9
25 yr recurrence interval, C	0.43	**25 yr recurrence interval, C**	0.9
100 yr recurrence interval, C	0.43	**100 yr recurrence interval, C**	0.9

Composite C

2 yr recurrence interval, C	**0.73**
10 yr recurrence interval, C	**0.73**
25 yr recurrence interval, C	**0.73**
100 yr recurrence interval, C	**0.73**

Ground Slope Adjustment

2 yr recurrence interval, C	0
10 yr recurrence interval, C	0
25 yr recurrence interval, C	0
100 yr recurrence interval, C	0

Rainfall Intensity Factor

2 yr recurrence interval, C	0.01
10 yr recurrence interval, C	0.02
25 yr recurrence interval, C	0.02
100 yr recurrence interval, C	0.03

Total

2 yr recurrence interval, C		0.74
10 yr recurrence interval, C		0.75
25 yr recurrence interval, C		0.76
100 yr recurrence interval, C		0.76

Therefore,

Q2	0.33	**cfs**
Q10	0.57	**cfs**
Q25	0.69	**cfs**
Q100	0.86	**cfs**

For Watershed D

Gutter Length 395.81 feet
Slope 0.01 %
Area 1.16 Acres
Roadway Area 0.23 Acres

*Google earth elev change from 68 ft @ Curtis & Delaware to 66 ft at hearst & curtis

a)Computing Time of Concentration, Tc

roof to gutter time

Source/Reference
Attachment A4, Alameda County Flood Control & Water Conservation District. Hydrology and Hydraulics Manual 2016

2 yr recurrence interval	5 minutes
10 yr recurrence interval	5 minutes
25 yr recurrence interval	5 minutes
100 yr recurrence interval	5 minutes

Overland flow = 50 ft slope = 0.01 %

Velocity=	0.75 ft/sec
2 yr recurrence interval	1.11 minutes
10 yr recurrence interval	1.11 minutes
25 yr recurrence interval	1.11 minutes
100 yr recurrence interval	1.11 minutes

Channel Travel time V= (1.49/n)*[(A/WP)^(2/3)]*S^(1/2)

Area of gutter flow from CAD		0.39 Sq ft
Wetted perimeter		2.87 ft
V	3.04 ft per second	
therefore Channel travel time = L/(60V)	2.17 Minutes	

Time of concentration Tc=

2 yr recurrence interval	8.28	minutes
10 yr recurrence interval	8.28	minutes
25 yr recurrence interval	8.28	minutes
100 yr recurrence interval	8.28	minutes

HEARST AVE. PROJECT: DESIGN PEAK DISCHARGES FOR LOWER HEARST AVE. DRAINAGE SYSTEM

b) Precipitation intensity, i

2 yr recurrence interval	1.70	in/hr	23 inches of rain-attachment 6
10 yr recurrence interval	2.86	in/hr	attachment 7
25 yr recurrence interval	3.48	in/hr	
100 yr recurrence interval	4.31	in/hr	

C]Runoff Coeff., C **Base Runoff**

		Roadway	
2 yr recurrence interval, C	0.43	**2 yr recurrence interval, C**	0.9
10 yr recurrence interval, C	0.43	**10 yr recurrence interval, C**	0.9
25 yr recurrence interval, C	0.43	**25 yr recurrence interval, C**	0.9
100 yr recurrence interval, C	0.43	**100 yr recurrence interval, C**	0.9

Composite C

2 yr recurrence interval, C	**0.52**
10 yr recurrence interval, C	**0.52**
25 yr recurrence interval, C	**0.52**
100 yr recurrence interval, C	**0.52**

Ground Slope Adjustment

2 yr recurrence interval, C	0
10 yr recurrence interval, C	0
25 yr recurrence interval, C	0
100 yr recurrence interval, C	0

Rainfall Intensity Factor

2 yr recurrence interval, C	0.04
10 yr recurrence interval, C	0.08
25 yr recurrence interval, C	0.10
100 yr recurrence interval, C	0.11

Total

2 yr recurrence interval, C		0.56
10 yr recurrence interval, C		0.60
25 yr recurrence interval, C		0.62
100 yr recurrence interval, C		0.63

Therefore,		
Q2	**1.11**	**cfs**
Q10	**2.00**	**cfs**
Q25	**2.49**	**cfs**
Q100	**3.17**	**cfs**

For Watershed E

Length	405.78	feet
Slope	0.02	%
Area	1.10	Acres
Roadway Area	0.24	Acres

*Google earth elev change from 74 ft @Chestnut and Hearst to 66 ft at hearst & curtis

a)Computing Time of Concentration, Tc

roof to gutter time — Source/Reference: Attachment A4, Alameda County Flood Control & Water Conservation District. Hydrology and Hydraulics Manual 2016

2 yr recurrence interval	5 minutes
10 yr recurrence interval	5 minutes
25 yr recurrence interval	5 minutes
100 yr recurrence interval	5 minutes

Overland flow = 50 ft, slope = 0.02 %

Velocity=	0.75 ft/sec
2 yr recurrence interval	1.11 minutes
10 yr recurrence interval	1.11 minutes
25 yr recurrence interval	1.11 minutes
100 yr recurrence interval	1.11 minutes

Channel Travel time: V= (1.49/n)*[(A/WP)^(2/3)]*S^(1/2)

Area of gutter flow from CAD	0.39	Sq ft
Wetted perimeter	2.87	ft
V	4.29	ft per second
therefore Channel travel time = L/(60V)	2.23	Minutes

Time of concentration Tc=

2 yr recurrence interval	8.34	minutes
10 yr recurrence interval	8.34	minutes
25 yr recurrence interval	8.34	minutes
100 yr recurrence interval	8.34	minutes

b) Precipitation intensity, i

2 yr recurrence interval	1.70	in/hr	23 inches of rain-attachment 6
10 yr recurrence interval	2.86	in/hr	attachment 7
25 yr recurrence interval	3.48	in/hr	
100 yr recurrence interval	4.31	in/hr	

C]Runoff Coeff., C **Base Runoff**

		Roadway	
2 yr recurrence interval, C	0.43	**2 yr recurrence interval, C**	0.9
10 yr recurrence interval, C	0.43	**10 yr recurrence interval, C**	0.9
25 yr recurrence interval, C	0.43	**25 yr recurrence interval, C**	0.9
100 yr recurrence interval, C	0.43	**100 yr recurrence interval, C**	0.9

Composite C

2 yr recurrence interval, C	**0.53**
10 yr recurrence interval, C	**0.53**
25 yr recurrence interval, C	**0.53**
100 yr recurrence interval, C	**0.53**

Ground Slope Adjustment

2 yr recurrence interval, C	0
10 yr recurrence interval, C	0
25 yr recurrence interval, C	0
100 yr recurrence interval, C	0

Rainfall Intensity Factor

2 yr recurrence interval, C	0.04
10 yr recurrence interval, C	0.08
25 yr recurrence interval, C	0.09
100 yr recurrence interval, C	0.11

Total

2 yr recurrence interval, C		0.57
10 yr recurrence interval, C		0.61
25 yr recurrence interval, C		0.63
100 yr recurrence interval, C		0.64

Therefore,

Q2	**1.07**	**cfs**
Q10	**1.91**	**cfs**
Q25	**2.38**	**cfs**
Q100	**3.02**	**cfs**

For Watersheds F,G,H,I & J

Total Area **12.70 Acres**
Longest path 2,120.20 feet
Slope 1.98 %
Roadway Area 3.23 Acres

a)Computing Time of Concentration

roof to gutter time

2 yr recurrence interval 5 minutes
10 yr recurrence interval 5 minutes
25 yr recurrence interval 5 minutes
100 yr recurrence interval 5 minutes

Overland flow = 50 ft slope = 0.02 %
Velocity= 0.75 ft/sec
2 yr recurrence interval 1.11 minutes
10 yr recurrence interval 1.11 minutes
25 yr recurrence interval 1.11 minutes
100 yr recurrence interval 1.11 minutes

Open channel flow (gutter flow) 2,120.20 ft slope 0.02

Channel Travel time V= (1.49/n)*((A/WP)^(2/3))*S^(1/2)
Area of gutter flow from CAD 0.3913 Sq ft
Wetted perimeter 2.8705 ft

Watershed J, Tc1 (elev change from Sac and Delaware to Short & Hearst = 116 to 98ft)
V 4.849458276 ft per second
Channel travel time = 2.424360137 Minutes

Watershed I, Tc2 (elev change = 98 to 92ft)
V 4.063458531 ft per second
Channel travel time = 1.373624617 Minutes

Watershed H, Tc3 (elev change = 92 to 86ft)
V 4.124376277 ft per second
Channel travel time = 1.313653177 Minutes

Watershed G, Tc4 (elev change = 86 to 81ft)
V 3.841120033 ft per second
Channel travel time = 1.35519153 Minutes

Watershed F, Tc4 (elev change =81 to 74ft)
V 3.838429429 ft per second
Channel travel time = 1.901260694 Minutes

Time of concentration Tc=

2 yr recurrence interval	14.48	minutes
10 yr recurrence interval	14.48	minutes
25 yr recurrence interval	14.48	minutes
100 yr recurrence interval	14.48	minutes

b) Precipitation intensity, i

2 yr recurrence interval	1.25	in/hr
10 yr recurrence interval	2.11	in/hr
25 yr recurrence interval	2.54	in/hr
100 yr recurrence interval	3.15	in/hr

23 inches of rain-attachment 6
attachment 7

C)Runoff Coeff., C **Base Runoff**

2 yr recurrence interval, C	0.43
10 yr recurrence interval, C	0.43
25 yr recurrence interval, C	0.43
100 yr recurrence interval, C	0.43

Roadway

2 yr recurrence interval, C	0.9
10 yr recurrence interval, C	0.9
25 yr recurrence interval, C	0.9
100 yr recurrence interval, C	0.9

Composite C

2 yr recurrence interval, C	**0.55**
10 yr recurrence interval, C	**0.55**
25 yr recurrence interval, C	**0.55**
100 yr recurrence interval, C	**0.55**

Ground Slope Adjustment

2 yr recurrence interval, C	0
10 yr recurrence interval, C	0
25 yr recurrence interval, C	0
100 yr recurrence interval, C	0

HEARST AVE. PROJECT: DESIGN PEAK DISCHARGES FOR LOWER HEARST AVE. DRAINAGE SYSTEM

Rainfall Intensity Factor

2 yr recurrence interval, C	0.02
10 yr recurrence interval, C	0.05
25 yr recurrence interval, C	0.06
100 yr recurrence interval, C	0.08

Total

2 yr recurrence interval, C		0.57
10 yr recurrence interval, C		0.60
25 yr recurrence interval, C		0.61
100 yr recurrence interval, C		0.63

Therefore,

Q2	**9.08**	**cfs**
Q10	**16.10**	**cfs**
Q25	**19.79**	**cfs**
Q100	**25.17**	**cfs**