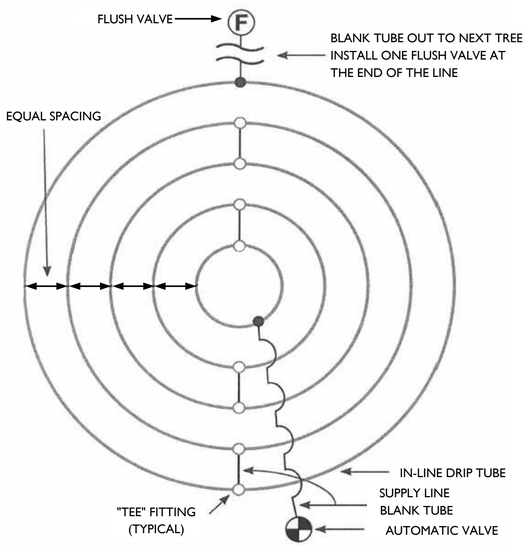
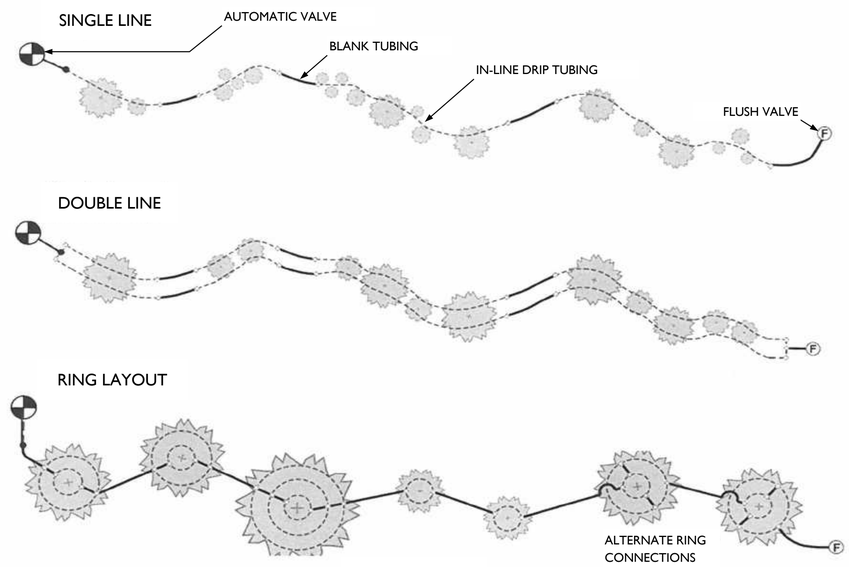
SAMPLE DRIP IRRIGATION DETAILS



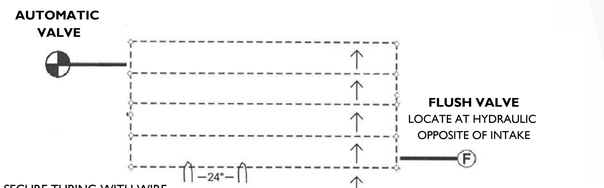
PLAN VIEW

IN-LINE DRIP RING LAYOUT



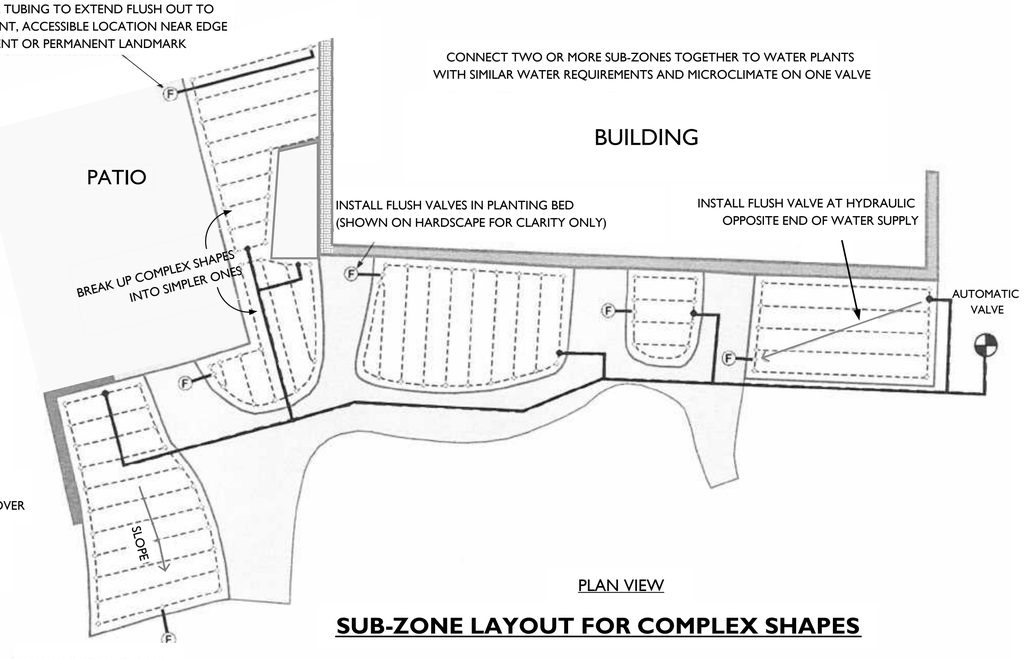
PLAN VIEW

IN-LINE DRIP SNAKE LAYOUTS



PLAN VIEW

IN-LINE DRIP TUBING ZONE LAYOUT

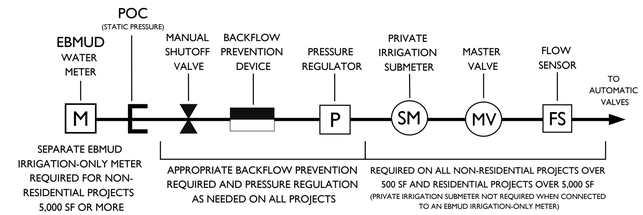


PLAN VIEW

SUB-ZONE LAYOUT FOR COMPLEX SHAPES

SAMPLE IRRIGATION LEGEND
(MAKE AND MODEL OF EACH COMPONENT REQUIRED)

SYMBOL	COMPONENT MAKE, MODEL, TYPE, AND DESCRIPTION
M	EBMUD INSTALLED METER
C	WEATHER-BASED, AUTOMATIC IRRIGATION CONTROLLER
S	RAIN (*OR SOIL*) SENSOR
POC (STATIC PRESSURE)	POINT OF CONNECTION AND STATIC PRESSURE
	MANUAL BALL (*OR GATE*) VALVE
	REDUCED PRESSURE BACKFLOW PREVENTION DEVICE (*ANTI-SIPHON VALVES MAY BE SUBSTITUTED IF INSTALLED PROPERLY; DOUBLE CHECK VALVES ARE NOT ALLOWED*)
P	PRESSURE REGULATOR (*IF CONDITIONS REQUIRE*)
	AUTOMATIC VALVE
6 / 1" / 1.2 / 185	VALVE/ZONE NUMBER FLOW RATE IN GALLONS PER MINUTE ZONE AREA IN SQUARE FEET VALVE SIZE
	MAIN LINE DIAMETER AND TYPE
	LATERAL LINE DIAMETER AND TYPE
	SLEEVE DIAMETER AND TYPE
	SURFACE 1/2" IN-LINE DRIP TUBING 0.6 GPH, 12" EMITTER SPACING, 12" ROW SPACING (*MINIMUM SPACING RECOMMENDED FOR WELL DRAINED SOIL, RAISED BEDS AND STORMWATER TREATMENT FACILITIES*)
	SUB-SURFACE 1/2" IN-LINE DRIP TUBING 0.6 GPH, 12" EMITTER SPACING, 12" ROW SPACING (*MINIMUM SPACING RECOMMENDED FOR WELL DRAINED SOIL, RAISED BEDS AND STORMWATER TREATMENT FACILITIES*)
	SURFACE 1/2" IN-LINE DRIP TUBING 0.6 GPH, 18" EMITTER SPACING, 18" ROW SPACING (*MINIMUM SPACING RECOMMENDED FOR WELL DRAINED SOIL, RAISED BEDS AND STORMWATER TREATMENT FACILITIES*)
F	FLUSH VALVE AND POP-UP DRIP ZONE INDICATOR
A	AIR VACUUM RELIEVE VALVE (*IF CONDITIONS REQUIRE*)
WFV	WATER FEATURE VALVE TYPE (*I.E. FLOAT VALVE*) AND FLOW RATE
	HOSE BIB



TYPICAL IRRIGATION POINT OF CONNECTION

DESIGNER CONTACT INFORMATION

PROJECT TITLE AND SITE ADDRESS

IRRIGATION LEGEND, NOTES AND DETAILS

DATE:
05/21/2018

REVISIONS:

L

2.1

SAMPLE WATER BUDGET WORKSHEET

(REQUIRED FOR RESIDENTIAL LANDSCAPES OVER 2,500 SQUARE FEET AND NON RESIDENTIAL LANDSCAPES OVER 1,000 SQUARE FEET)

EBMUD - Water Efficient Landscape Worksheet

The purpose of this worksheet is to calculate a project's Estimated Total Water Use and Maximum Applied Water Allowance to determine its compliance with the Model Water Efficient Landscape Ordinance (MWELO). This worksheet is to be filled out by the project applicant and is a required element of the MWELO Landscape Documentation Package.

Property Address:	175 Gil Blas Rd., Danville, 94526
Reference Site (See MWELO Appendix A):	Walnut Creek
Annual ETo (Reference Evapotranspiration Rate):	46.2 Inches
ETAF (ET Adjustment Factor) for Landscape Areas:	55.0 %
ETAF for Special Landscape Areas:	100%

NOTES

1) ETo is the reference evapotranspiration rate and represents the water needs of grass at a given location. It is an estimate of the inches of water lost due to evapotranspiration from a field of cool-season grass that is well watered. ETo values can be derived from MWELO Appendix A for locations across the State of California.

2) Use an evapotranspiration adjustment factor (ETAF) of 45% for new non-residential landscapes, 55% for new residential landscapes and 65% for schools. ETAF is a percentage of ETo and establishes the amount of water allowed per year for irrigation.

3) Use an ETAF of 100% for any special landscape areas which are those dedicated solely to edible plants, programmed recreational areas (e.g. public pools and sports fields), areas irrigated with non-potable water (e.g. recycled, grey and rain water) and stormwater treatment facilities that are required by permit (e.g. bio-retention basins, bio-swales, and flow-through planters).

ESTIMATED TOTAL WATER USE (ETWU) = (ETo) x (APF) x (Area) x (0.62) where 0.62 is the coefficient that converts inches to gallons per square foot

ZONE/ VALVE #	PLANTING DESCRIPTION E.g. Medium Trees, Groundcover, Water Feature, etc.	PLANT FACTOR (PF) Water requirements as a % of ETo	IRRIGATION EFFICIENCY (IE) Percent of applied water that reaches its target (e.g. root zone or water feature) by irrigation method	ADJUSTED PLANT FACTOR (APF) (PF/IE) = APF Watering requirements adjusted for irrigation efficiency as a % of ETo	HYDROZONE AREA (AREA) Square Feet	CONVERSION FACTOR The coefficient that converts inches to gallons per square foot	ETWU PER HYDROZONE (ETo)(APF)(Area)(0.62) = Annual gallons required to irrigate this landscape		MAXIMUM APPLIED WATER ALLOWANCE (MAWA) MAWA represents the annual water budget for this landscape. It is the maximum amount of water allowed per year for irrigation
Landscape Areas (LA)									LA
1	Shrubs	30%	90%	33%	450	0.62	4241		(ETo)(ETAF)(Total Area)(0.62) = Annual gallons allowed
4	Forbs	30%	90%	33%	675	0.62	6361		
5	Trees	50%	90%	56%	90	0.62	1445		
6	Shrubs	20%	90%	22%	185	0.62	1170		
7	Shrubs	30%	90%	33%	125	0.62	1178		
8	Shrubs	30%	90%	33%	160	0.62	1508		
9	Grasses and Strap-leafed Plants	60%	90%	67%	500	0.62	9610		
10	Trees	60%	90%	67%	100	0.62	1922		
11	Shrubs	30%	90%	33%	120	0.62	1131		
12	Trees	50%	90%	56%	90	0.62	1445		
13	Shrubs	30%	90%	33%	245	0.62	2309		
14	Shrubs	20%	90%	22%	350	0.62	2213		
15	Water Feature	100%	100%	100%	35	0.62	1003		
				Totals:	3125	0.62	35536	MAWA for LA:	49213
Special Landscape Areas (SLA)									SLA
2	Trees			100%	560	0.62	16041		(ETo)(ETAF)(Total Area)(0.62) = Annual gallons allowed
3	Forbs			100%	125	0.62	3581		
				Totals:	685	0.62	19622	MAWA for SLA:	19621
Controller Controller A						ETWU Grand Total:	55158	MAWA Grand Total:	68834

PLANT FACTOR RANGES:

0-10% = Very low; 10-30% = Low; 40-60% = Moderate; 70-100% = High. Water Requirements cited in this ordinance are derived from the publication â€œWater Use Classification of Landscpe Speciesâ€ (ucanr.edu/sites/WUCOLS/).

IRRIGATION METHODS AND EFFICIENCIES:

Spray = 70%; Rotating nozzle = 75%; Bubblers = 80%;
Point-source drip = 85%; In-line drip = 90%; Water feature = 100%

Pass: Yes

ETWU shall not exceed MAWA

SAMPLE BASE IRRIGATION SCHEDULE

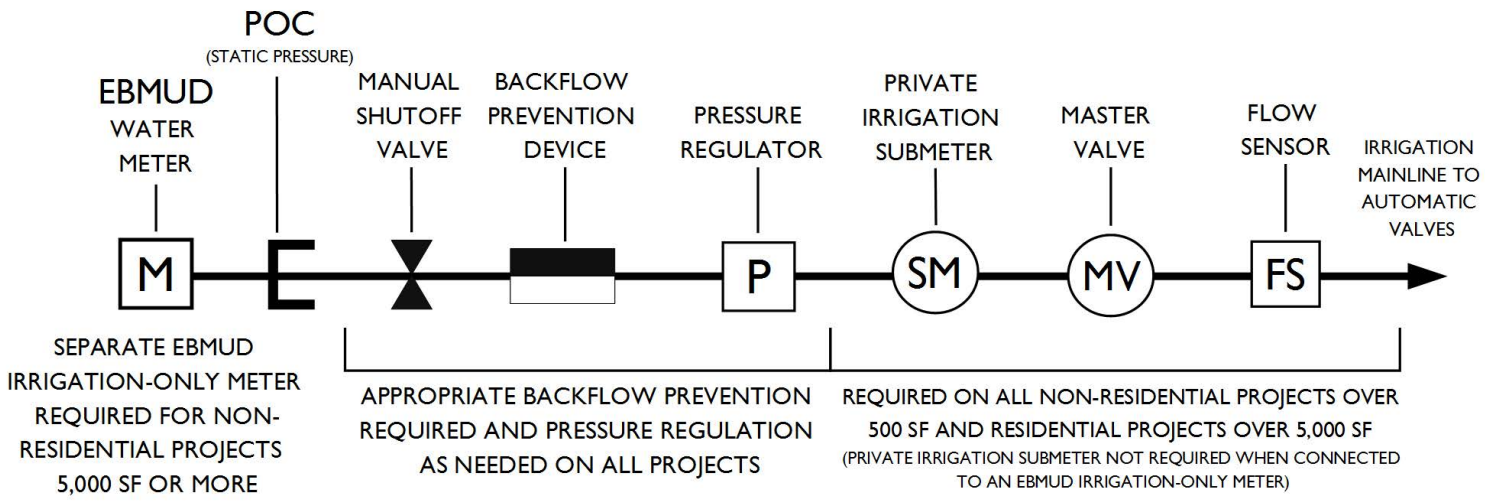
Monthly Irrigation Schedule for the Estimated Water Use Controller Controller A		Monthly ETO Values:	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total Annual
			0.8	1.5	2.9	4.4	5.6	6.7	7.4	6.4	4.7	3.3	1.5	1.0	46.2
ZONE/ VALVE #	FLOW RATE Sum of all emitters in a zone in gallons per minute (GPM)	AVERAGE PRECIPITATION RATE (IN/HR) (FR x 60 Min per Hr)/(Area in SF/1.6 In per SF)	Monthly Run Time in Minutes												
Landscape Areas															
1	2.0	0.43	37	69	133	202	257	308	340	294	216	152	69	46	2121
4	6.7	0.961	16	31	60	90	115	138	152	131	97	68	31	21	949
5	0.9	0.968	28	52	101	153	195	233	257	222	163	115	52	35	1605
6	0.8	0.418	25	48	92	139	177	212	234	203	149	105	48	32	1464
7	1.2	0.929	17	32	62	94	119	142	157	136	100	70	32	21	982
8	1.6	0.968	16	31	59	90	114	137	151	130	96	67	31	20	942
9	5.0	0.968	33	62	121	183	233	279	308	266	195	137	62	42	1921
10	1.0	0.968	33	62	121	183	233	279	308	266	195	137	62	42	1921
11	1.2	0.968	16	31	59	90	114	137	151	130	96	67	31	20	942
12	0.9	0.968	28	52	101	153	195	233	257	222	163	115	52	35	1605
13	2.4	0.948	17	31	60	92	117	140	154	133	98	69	31	21	962
14	1.5	0.415	26	48	93	140	179	214	236	204	150	105	48	32	1475
15	5.0	13.825	3	7	13	19	24	29	32	28	20	14	7	4	201
Special Landscape Areas															
2	2.5	0.432	111	208	403	611	778	931	1028	889	653	458	208	139	6417
3	3.0	2.323	21	39	75	114	145	173	191	165	121	85	39	26	1193
Monthly Budget for the Maximum Applied Water Allowance															
Landscape Areas															
		Inches applied per month	0.4	0.8	1.6	2.4	3.1	3.7	4.1	3.5	2.6	1.8	0.8	0.6	25.4
		Gallons per month	852	1598	3089	4687	5965	7137	7883	6817	5007	3515	1598	1065	49213
		Average gallons per day	27.5	57.1	99.6	156.2	192.4	237.9	254.3	219.9	166.9	113.4	53.3	34.4	
Special Landscape Areas															
		Inches applied per month	0.8	1.5	2.9	4.4	5.6	6.7	7.4	6.4	4.7	3.3	1.5	1.0	46.2
		Gallons per month	340	637	1232	1869	2378	2845	3143	2718	1996	1402	637	425	19622
		Average gallons per day	11.0	22.8	39.7	62.3	76.7	94.8	101.4	87.7	66.5	45.2	21.2	13.7	
All Landscape Areas															
		Total Gallons per month	1192	2235	4321	6556	8343	9982	11026	9535	7003	4917	2235	1490	68835

Water Efficiency Review

Outdoor Water Use

Typical Irrigation Point of Connection

The diagram below illustrates the irrigation point of connection (POC) and typical sequencing of associated components required to meet EBMUD Section 31 water efficiency regulations and the Model Water Efficient Landscape Ordinance (MWELO). The POC is the point where the irrigation sytem connects to the water supply. For example, in a single family residential setting it is commonly located outside where a hose bib connects but it may also be located anywhere along the water line between the EBMUD water meter and the structure it is supplying.



TYPICAL IRRIGATION POINT OF CONNECTION

Water Efficiency Review

Outdoor Water Use

Water Efficient Landscape Worksheet

The Water Efficient Landscape Worksheet is a required element of the Model Water Efficient Landscape Ordinance (MWELO) landscape documentation package. It must be filled out by the project applicant for landscape projects 2,500 square feet or larger in area. Its purposed is to establish a water budget by calculating a project's Estimated Total Water Use (ETWU) and its Maximum Applied Water Allowance (MAWA).

The ETWU is an estimate of the amount a water a landscape will use in a year based on the landscape design. The MAWA is the maximum amount of water allowed for the landscape in a year and represents the regulatory threshold under the ordinance. The ETWU may not exceed the MAWA.

The attached EBMUD Water Efficient Landscape Worksheet may be used to satisfy this requirement.

EBMUD Water Efficient Landscape Worksheet

The purpose of this worksheet is to calculate a project's Estimated Total Water Use and Maximum Applied Water Allowance to determine its compliance with the Model Water Efficient Landscape Ordinance (MWELO). This worksheet is to be filled out by the project applicant and is a required element of the MWELO Landscape Documentation Package.

Property address: _____

Reference Site (See MWELO Appendix A): _____

Annual ETo (Inches): _____

ET Adjustment Factor (ETAF) for Regular Landscape Areas: _____

ETAF for Special Landscape Areas: 100%

Notes: 1) ETo is the reference evapotranspiration rate and represents the water needs of grass at a given location. It is an estimate of the inches of water lost due to evapotranspiration from a field of cool-season grass that is well watered. ETo values can be derived from MWELO Appendix A for locations throughout the State of California.

2) Use an evapotranspiration adjustment factor (ETAF) of 45% for new non-residential landscapes, 55% for new residential landscapes and 65% for schools. ETAF is a percentage of ETo and establishes the limit on the amount of water allowed per year for irrigation.

3) Use an ETAF of 100% for any special landscape areas which are those dedicated solely to edible plants, programmed recreational areas (e.g. public pools and sports fields), areas irrigated with non-potable water (e.g. recycled, grey and rain water) and stormwater treatment facilities that are required by permit.

Estimated Total Water Use (ETWU) = (ETo)(APF)(Area)(0.62) where 0.62 is the coefficient that converts inches to gallons per square foot

Valve No.	Planting Description E.g. Medium Trees, Groundcover, Water Feature, etc.	Plant Factor [a] (PF) Watering requirements as a percent of ETo	Irrigation Efficiency [b] (IE) Percent of applied water that reaches its target (e.g. root zone or water feature) by irrigation method	Adjusted Plant Factor (APF) (PF/IE) = APF Watering requirements adjusted for irrigation efficiency	Hydrozone Area (Area) Area in square Feet	Conversion Factor (0.62) The coefficient that converts inches to gallons per square foot	ETWU per Hydrozone (ETo)(APF)(Area)(0.62) = Annual gallons required to irrigate this landscape
Landscape Areas (LA)							
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
						0.62	
				Totals:		**0.62**	
Special Landscape Areas (SLA)							
				100%		0.62	
				100%		0.62	
				100%		0.62	
				Totals:		**0.62**	
						ETWU Grand Total:	

	Maximum Applied Water Allowance (MAWA) MAWA represents the annual water budget for this landscape. It is the maximum amount of water allowed per year for irrigation.
	LA
	(ETo)(ETAF)(Total Area)(0.62) = Annual gallons allowed
MAWA for LA:	
	SLA
	(ETo)(ETAF)(Total Area)(0.62) = Annual gallons allowed
MAWA for SLA:	
MAWA Grand Total:	

[a] Plant Factor Ranges

0-10% = Very low; 10-30% = Low; 40-60% = Moderate; 70-100% = High

Water Requirements cited in this ordinance are derived from the publication "Water Use Classification of Landscape Species" (ucanr.edu/sites/WUCOLS/)

[b] Irrigatin Methods and Efficiencies

Spray = 70%; Rotating nozzle = 75%; Bubblers = 80%;

Point-source drip = 85%; In-line drip = 90%; Water feature = 100%

Pass:	

ETWU shall not exceed MAWA