

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



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Office of Sustainability and the Environment's Goal:

- Reduce Santa Monica's water consumption to a sustainable level.
- Eliminate domestic water as a source of environmental pollution

Water Conservation Ordinances

- No ponding anywhere on property
- No Watering between 10AM & 4PM
 - No hosing of hardscape
 - No runoff
 - No leaks

Enforcement Program



**The City of Santa Monica's
Green Building Ordinance
effective May 23, 2008
SMMC 8.108 Sub-Part B
Landscape and Irrigation
requirements**

HIGHLIGHTS

- Requires water-efficient irrigation systems
- Requires specific design and installation components
- Promotes climate appropriate plants
- Limits high water using plants including turf
- Eliminates irrigation runoff

The Green Building Ordinance intended to parallel existing green building standards in the United States Green Building Council's LEED rating system.

In the LEED system credit, Sustainable Sites, Stormwater Design, points are awarded for improving stormwater discharge quality and for reducing rate and quantity of stormwater flows. This is achieved by reducing impervious cover, promoting water infiltration, capturing stormwater runoff, harvesting rainwater, sloping sidewalks toward landscaping, and planting native gardens.

Under the Water Efficiency credits, reducing potable water consumption, using greywater or cistern water for landscaping, and reducing waste water effluent are other ways to garner points. For landscape water efficiency, the prescriptive measures of the GBO contribute towards the required percentage reductions specified in the LEED credits.

Finally, Innovation and Design points might be gained by the installation of subsurface flow irrigation systems, or water-conserving planting gels. While all of these actions are not necessarily required by the GBO, these actions may be taken as a result of increased compliance with the ordinance.

APPLICABILITY

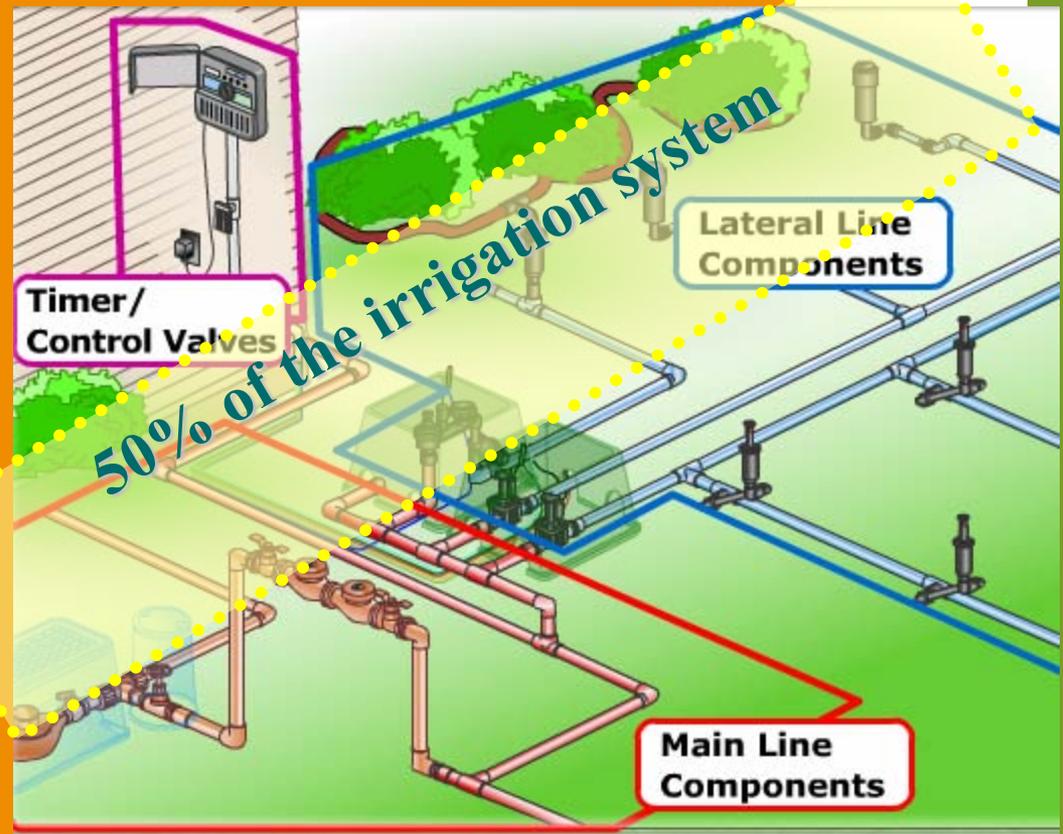
- Landscape or irrigation **IS NOT REQUIRED** for any property under this ordinance.
- **ALL NEW BUILDINGS**
- **MAJOR REMODELS**
- Does not include historic buildings, where landscape is an essential part of the aesthetic

APPLICABILITY

- **Any modification to an IRRIGATION SYSTEM must be in compliance with the GBO irrigation requirements**
- **MODIFICATIONS TO EXISTING SYSTEMS, where 50+% of the system is being altered = then the entire irrigation system must be brought into compliance with the GBO.**
- **If you are doing a retrofit, and modifying 50+% of an EXISTING SYSTEM then you must go to B & S and get an irrigation permit.**

APPLICABILITY CONTINUED

50+% modifications to existing systems would include the main line, lateral line, drip irrigation line, valves, sprayheads, and emitters. This would not include the replacement of a few broken sprayheads.



APPLICABILITY

- Anti-siphon valves are the only backflow device that can be included in an irrigation permit. For all other backflow devices you must pull a separate plumbing permit.

Permit Process

New Construction/Major Remodels

1. Submit 2 sets of plans with building plans as part of combination permit.

Irrigation system/landscaping must be inspected and perform per plan before COO issued.

2. Submit 2 sets of plans after COO and get a plumbing (irrigation) permit. Higher permit fees if pulled separately.

Permit Process

New Irrigation or 50%+ Repair ONLY

Submit 2 sets of plans and get an
irrigation permit.

Approval Process

3 to 6 weeks maximum

Inspection Process

1. Open trench inspection of pipes before covering.
2. Final compliance inspection – must run system, zero runoff permitted.

REQUIREMENTS

- **Must conform to the Guidelines for Design & Construction of Water Efficient Systems in the City of Santa Monica**
- **Turfgrass limited to 20% of total landscaped area**
- **Invasive plants not permitted from the California Invasive Plant Council list**
- **No sprinkler within 18” of hardscape, unless hardscape drains entirely to the landscape**
- **Irrigation systems can't exceed .75”/hr precipitation rate**
- **Fountains, ponds, water features must be < 25 sq ft**

**Guidelines for the
Design & Construction of
Water-Efficient Irrigation Systems
in the City of Santa Monica**

Available on-line at

www.sustainableesm.org/landscape

Guidelines for Design & Construction of Water Efficient Systems in the City of Santa Monica

- **Multi-Outlet emitters are not allowed**
 - **¼ inch “spaghetti” tubing only allowed for containers**
 - **Mulch and stakes are required for drip tubing**
 - **Compression couplings recommended for above grade installation ; Insert barbs for subsurface drip installation**
 - ***Drip (flow rates of 0.5-2.0 gph) required for plants 1 gallon or larger***
 - **All drip irrigation systems must have a backflow device, a filter and a pressure regulator within the system**
 - **Bubblers are approved for trees only; recommend RWS**
-

Weather-based Controllers (aka Smart Controllers)



**Backflow Devices must
conform to SMMC 7.12.370
Cross-Connection Prevention:**

- ~ Reduced Pressure
- ~ Pressure Vacuum Breaker
- ~ Anti-siphon Valve

Check Valves required for elevation changes of greater than 5 feet

Encourage designers to use drip irrigation and sprayheads with built-in check valves to prevent low head drainage

Parkway Landscaping Policy

TURFGRASS — listed in WUCOLS (see Region 3 for Santa

Monica).

annual bluegrass

annual ryegrass

Bermudagrass warm season colonial

bentgrass cool season creeping

bentgrass cool season

hard fescue cool season

highland bentgrass cool season

Kentucky bluegrass cool season

kikuyugrass warm season

meadow fescue cool season

perennial ryegrass

red fescue cool season

rough-stalked bluegrass cool

seashore paspalum warm season

St. Augustinegrass warm season

tall fescue cool season

zoysiagrass warm season



Invasive Species- listed in California Invasive Plant Council for the Southwest Region

What about...?

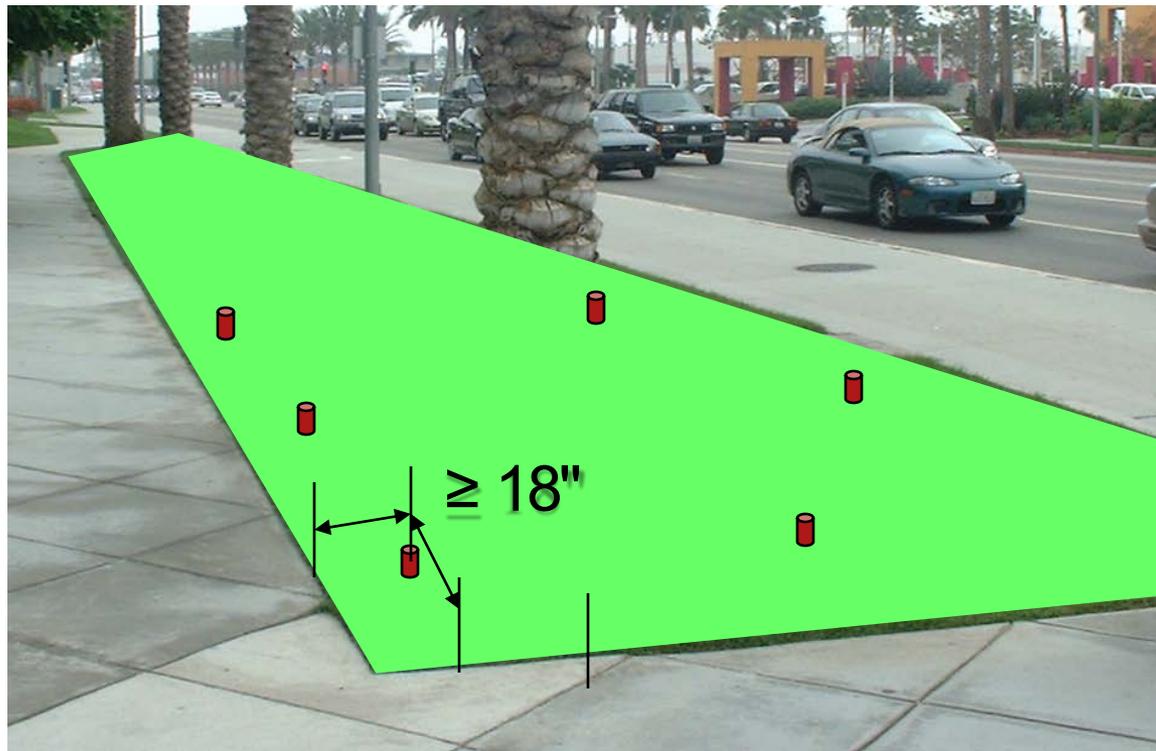
Radish?

Olives?

Licorice plant?

Purple Fountain Grass?

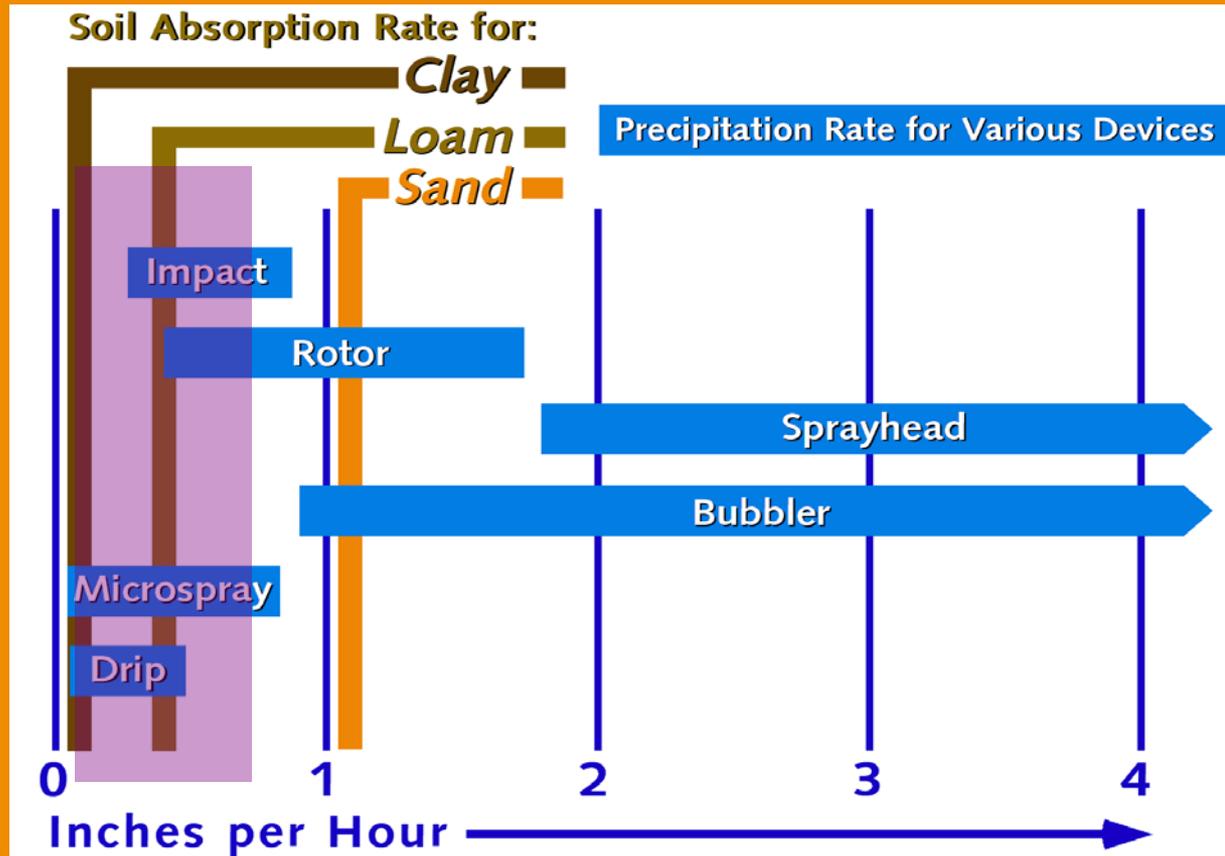
Irrigation





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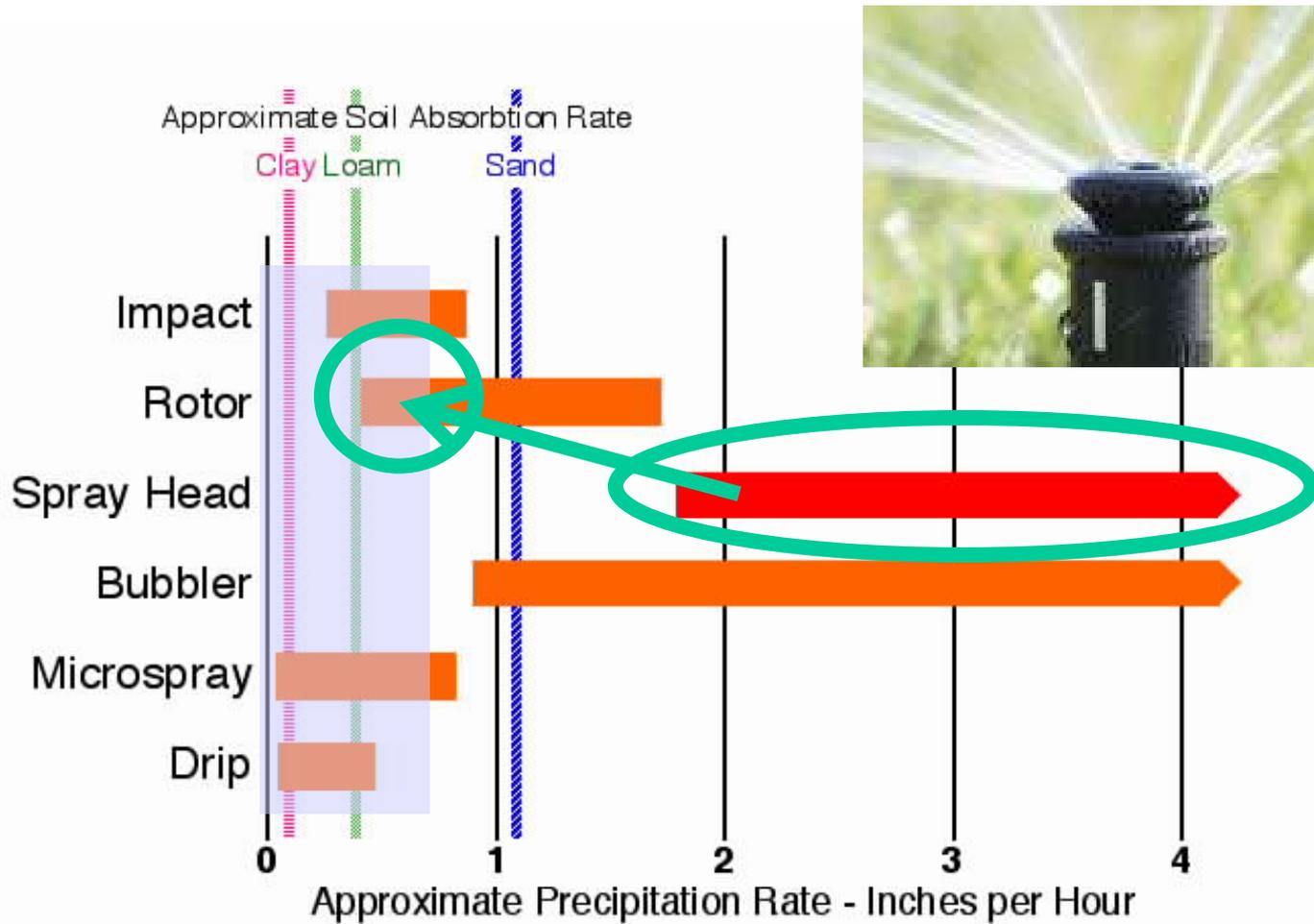
PRECIPITATION RATE – the rate water is applied by an irrigation system in inches per hour. No more than .75"/hr.



Rotary Nozzle



Landscape & Water Conservation SMMC 8.108.060 SUBPART B



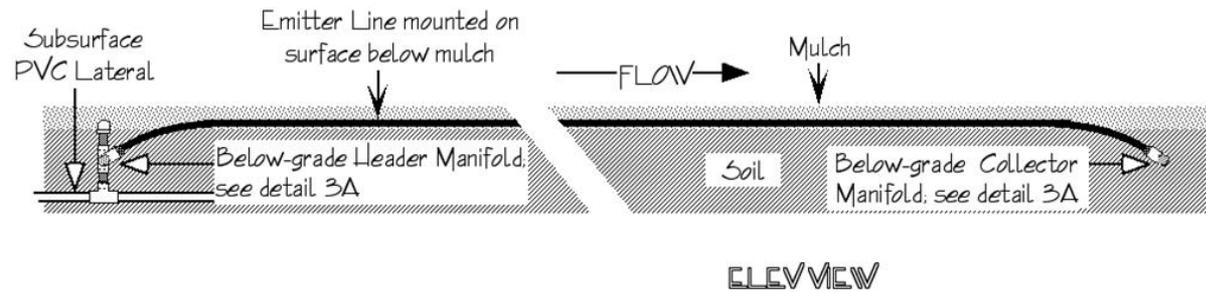
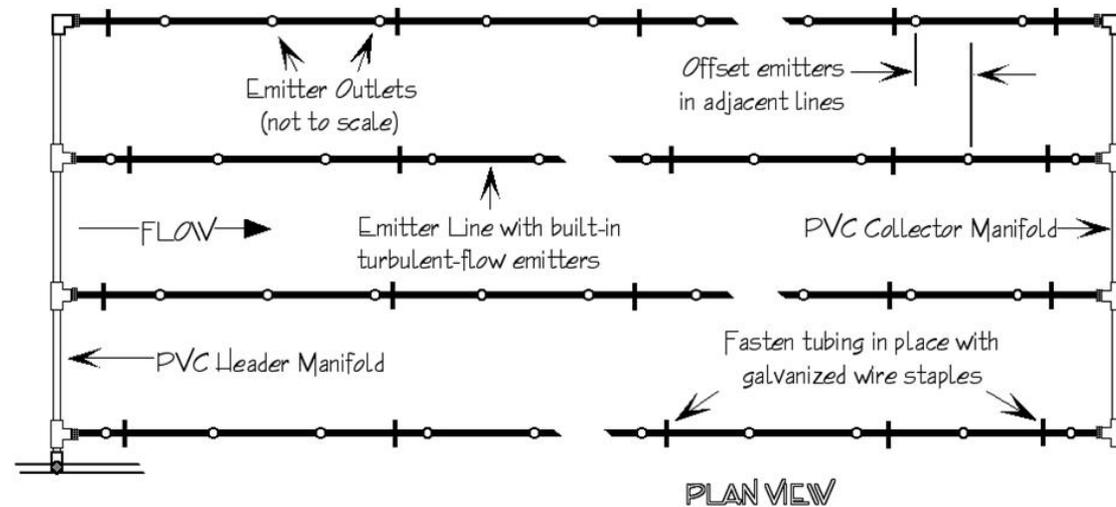
Currently only a few types of
sprayhead irrigation devices that meet
the new code:

Rotary Nozzles for sprayheads:

MP Rotators, RainBird Rotary
Nozzles, Toro Precision over 16 ft
throw, K-Rain, Orbit

Rainbird XPCN (no overlap) however
head-to-head coverage is required

Drip Grid



Precipitation Rate Caution for Grid Layout

Emitter Spacing	Row Spacing										
	12"	13"	14"	15"	16"	17"	18"	19"	20"	22"	24"
0.5 GPH											
12"	.80	.74	.69	.64	.60	.57	.53	.51	.48	.44	.40
18"	.53	.49	.46	.43	.40	.38	.36	.34	.32	.29	.27
24"	.40	.37	.34	.32	.30	.28	.26	.25	.24	.22	.20
1.0 GPH											
12"	1.60	1.48	1.38	1.28	1.20	1.14	1.06	1.02	.96	.88	.80
18"	1.07	.99	.92	.86	.80	.75	.71	.68	.64	.58	.53
24"	.80	.74	.69	.64	.60	.57	.53	.51	.48	.44	.40
2.0 GPH											
12"	3.20	2.96	2.75	2.56	2.40	2.28	2.12	2.04	1.92	1.76	1.60
18"	2.14	1.98	1.84	1.72	1.60	1.50	1.42	1.36	1.28	1.16	1.06
24"	1.60	1.48	1.38	1.28	1.20	1.14	1.06	1.02	.96	.88	.80

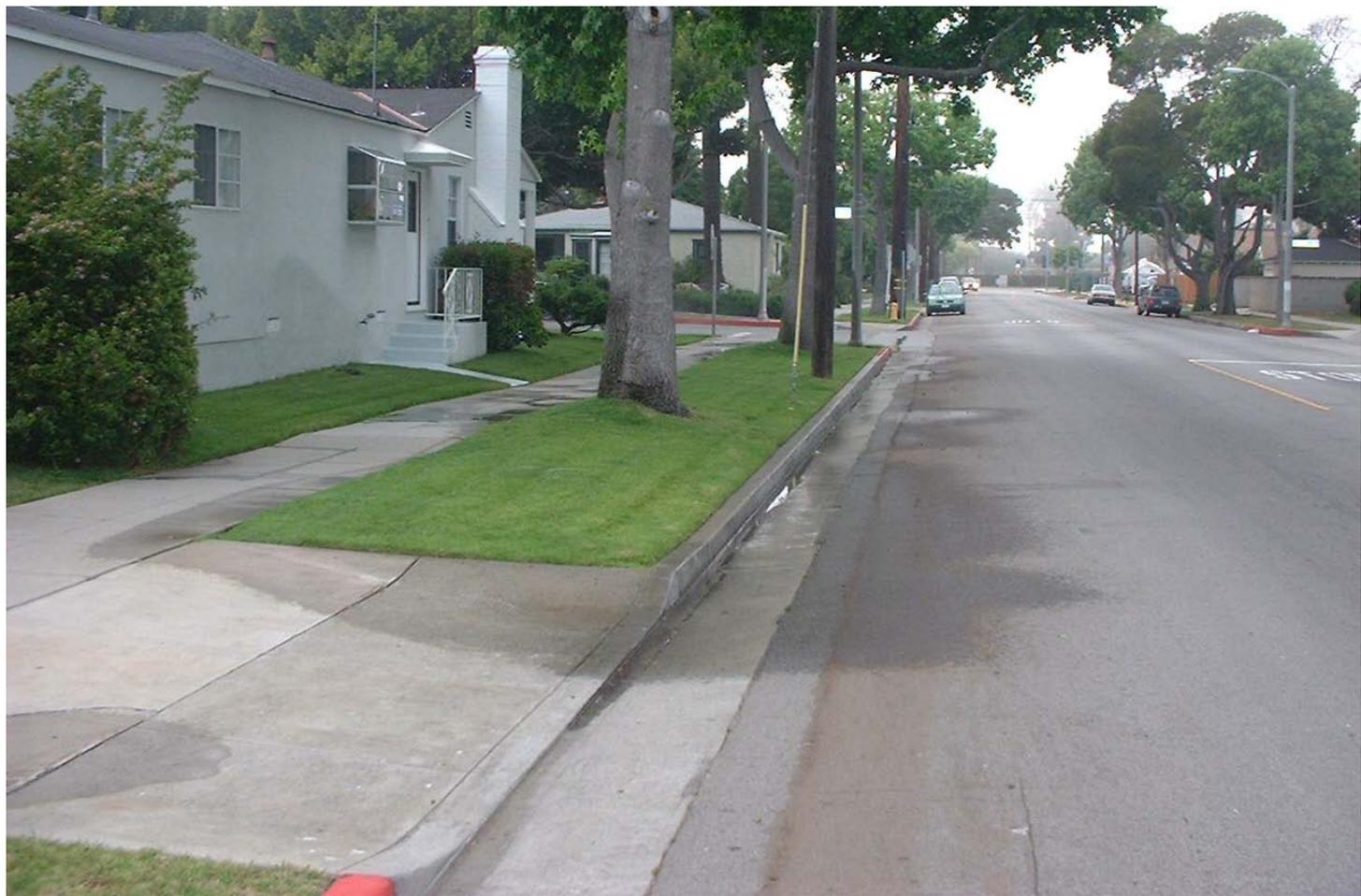
Exceeds limit of SMMC 108.08



Water-Efficient Irrigation

Are Sprinklers Really that Bad?

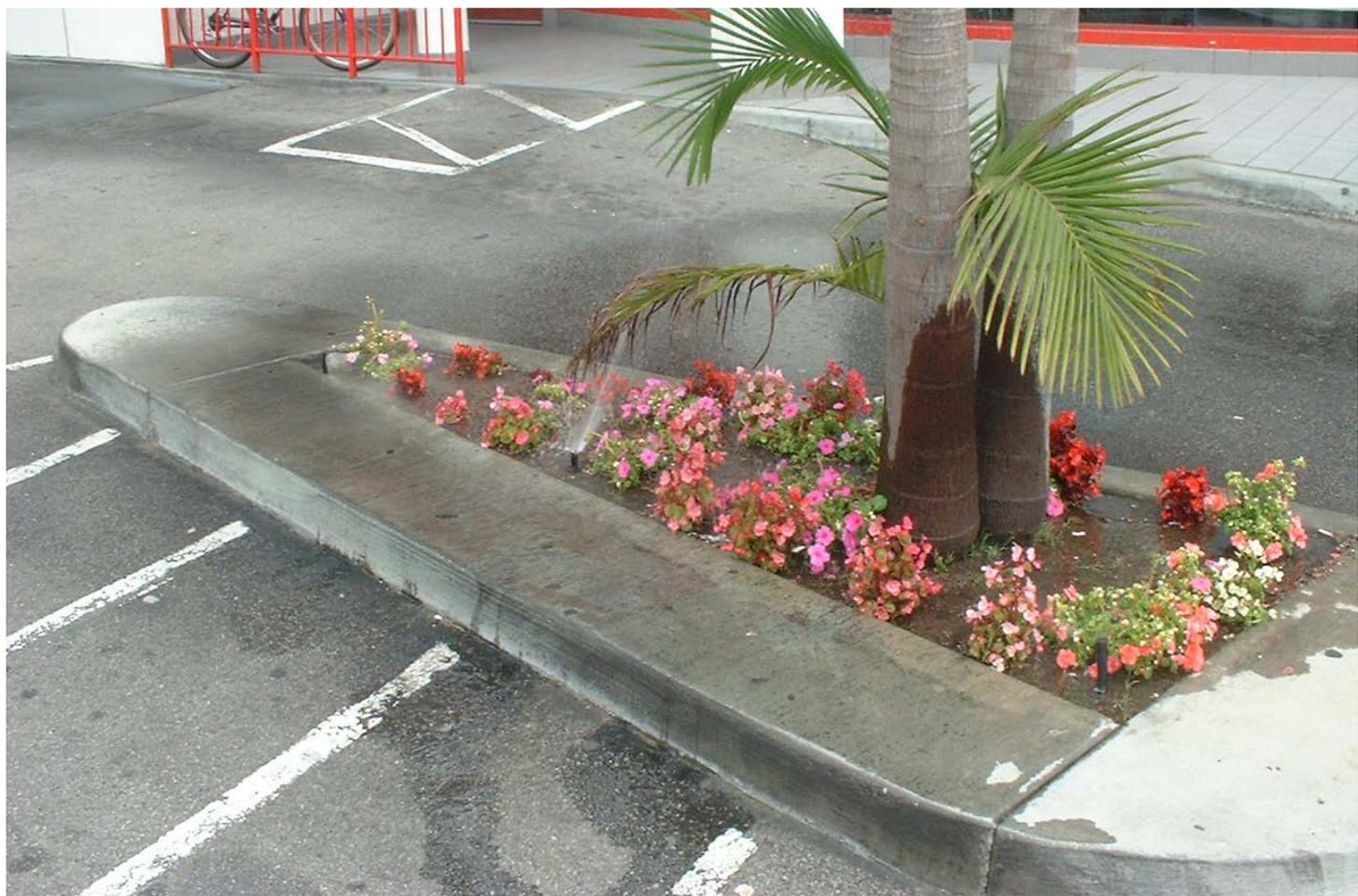




















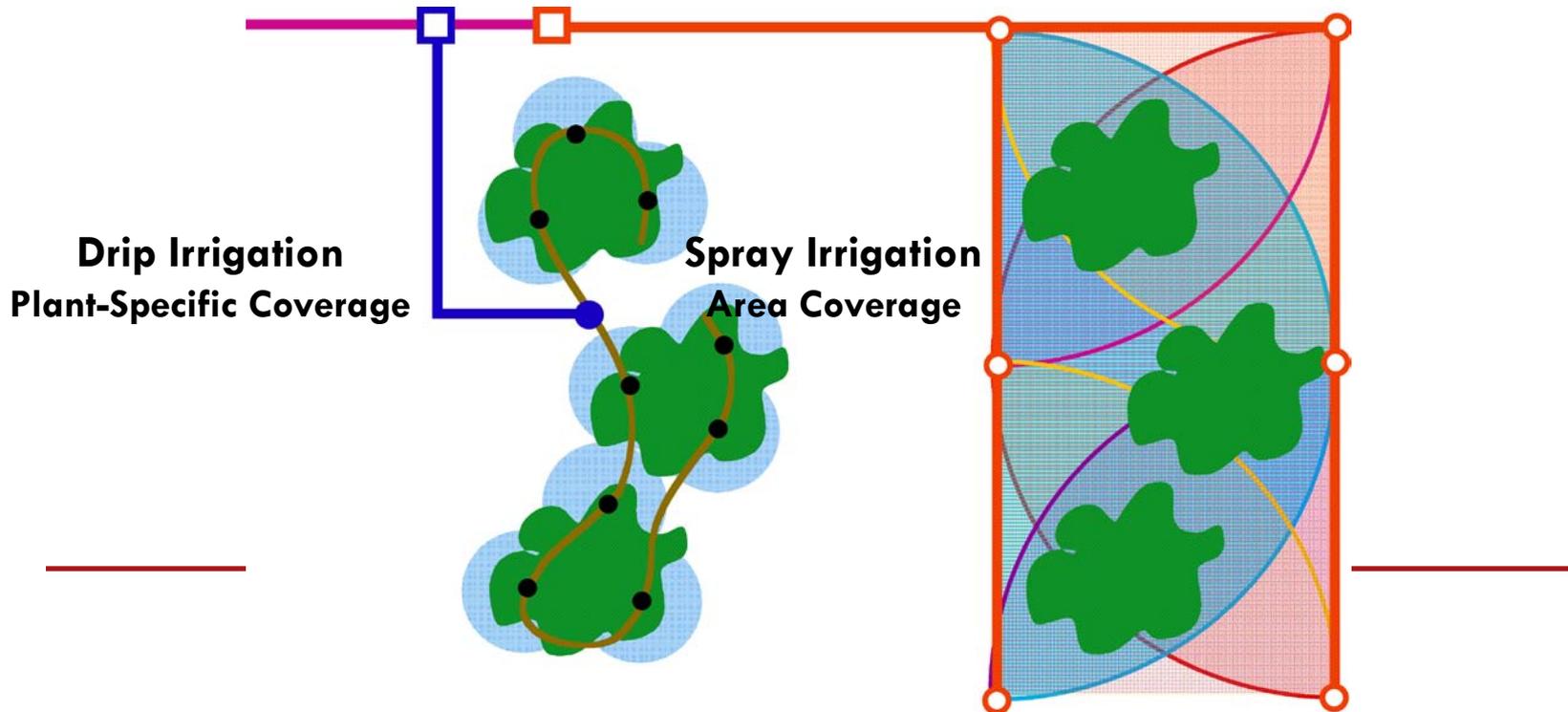






Why Drip Works:

- ~ No Overspray
- ~ No Runoff
- ~ No Blocked Spray
- ~ Fewer Weeds
- ~ Water Any time
- ~ Easier Adjustment
- ~ 85% - 95% Efficiency



Water Features

- Area less than 25 sq ft
- No overspray or runoff
- No discharge to landscaping
- Must have a recirculation system

Plan Submittal Requirements

Plans Submittal Requirements

1. Compliance Form completely filled out, signed and dated.
2. A detailed irrigation plan (include all parts, pressure regulators, valves, piping, heads, drip)
3. A detailed landscape plan (include all plants, water use needs, size, areas being modified).
4. A hydrozone plan (call-out each zone and indicate micro-climate, watering needs).
5. A hydrozone matrix (visit www.sustainable-sm.org for an on-line form).

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Plans

- Landscape Plan
 - Irrigation Plan
 - Hydrozone Plan and matrix
-

Hydrozones

Group plants by watering needs and microclimate conditions

Irrigation systems are typically divided into several zones based on one or more of the following:

- ~ Sun exposure
- ~ Type of plants
- ~ Type of irrigation

SAMPLE PLANTING PLAN

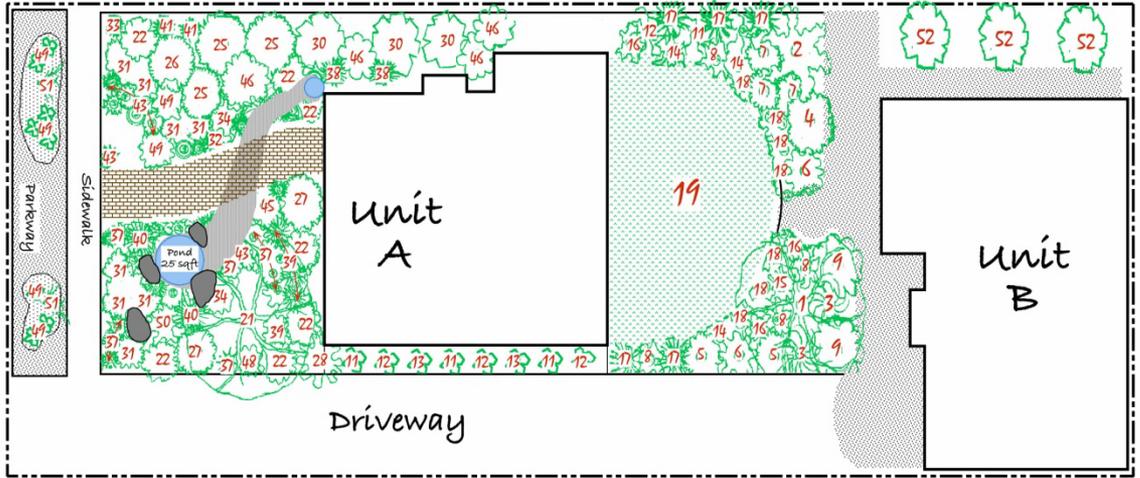


- Bricks set in sand
- Decomposed Granite
- Dry Stream Bed
- Boulders

#	Quantity	Size	Plant
1.	1	24" box	Acer palmatum 'Atropurpureum'
2.	1	1.5 gal	Syringa vulgaris 'Lavender Lady' (Lilac)
3.	2	5 gal	Asplenium bulbiferum
4.	2	5 gal	Azalea 'Fielders White'
5.	2	5 gal	Azalea 'Formosa'
6.	2	5 gal	Fuchsia x hybrida
7.	3	5 gal	Gardenia augusta 'August Beauty'
8.	2	5 gal	Hosta 'Krossa Regal'
9.	2	5 gal	Hydrangea macrophylla 'Nikko Blue'
11.	1	5 gal	Rosa 'Angel Face'
12.	1	5 gal	Rosa 'Iceberg'
13.	1	5 gal	Rosa 'Queen Elizabeth'
14.	3	1 gal	Alstromeria hybrid
15.	4	1 gal	Begonia 'semperflorens'

- A. Parcel Size including parkway 7264 sq ft
- B. Total Building Footprints 2178
- C. Total existing hardscape (sidewalk + driveway) 1436
- D. Total existing landscapable area (A minus B minus C) 3650
- E. Total area to be Landscaped 3316 sq ft

#	Quantity	Size	Plant
16	3	Flats	Campanula poscharskyana
17	5	1 gal	Hemerocallis (Hybrids)
18	22	Quart	Impatiens
19	559	sq ft	Marathon #2 Turf
21	1	1.5 gal	Lyonothamnus floribundus asplenifolius
22	6	5 gal	Arotostaphylos 'Greensphere'
25	3	5 gal	Ceanothus 'Concha'
26	1	5 gal	Ceanothus 'Dark Star'
27	2	5 gal	Ceanothus 'Snowball'
28	1	5 gal	Philadelphus lewisii
30	5	5 gal	Rhamnus californica 'Mound San Bruno'
31	7	1 gal	Arotostaphylos uva-ursi 'Point Reyes'
32	5	1 gal	Carex tumulicola
33	6	1 gal	Deschampsia caespitosa 'Northern Lights'



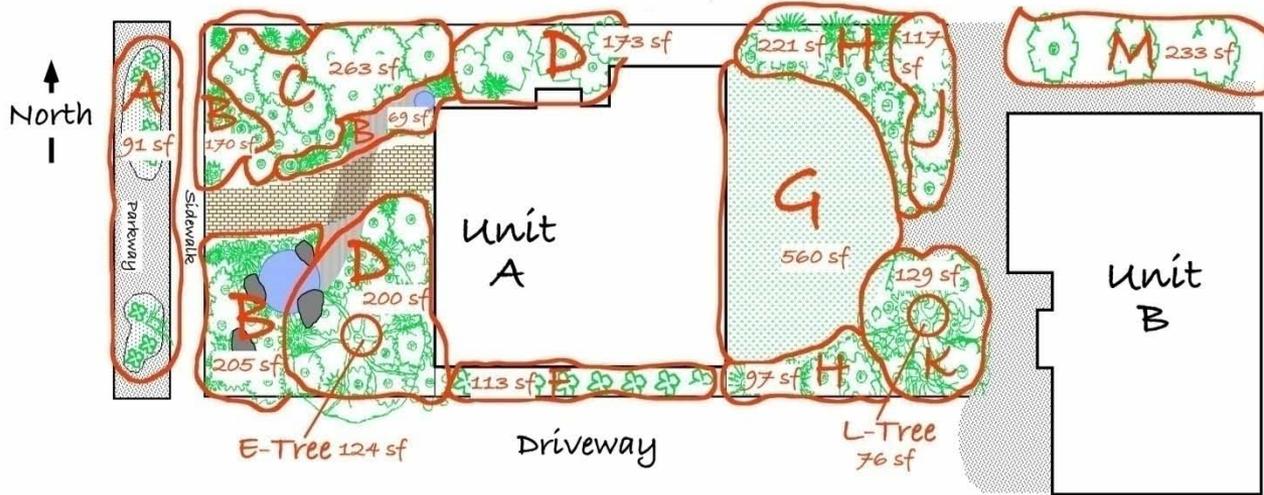
#	Quantity	Size	Plant
34	2	1 gal	Eucelia californica
37	8	1 gal	Iris 'Pacific Coast Hybrids'
38	3	1 gal	Juncus effusus var. Pacificus 'Quartz Creek'
39	4	1 gal	Juncus patens 'Elk Blue'
40	3	1 gal	Muhlenbergia rigens
41	7	1 gal	Nasella pulchra
43	1	1 gal	Penstemon centranthifolius
45	1	1 gal	Salvia 'Whitely Blue'

#	Quantity	Size	Plant
46	1	1 gal	Salvia apiana
48	3	1 gal	Salvia spathacea
49	2	1 gal	Salvia leucophylla 'Frankensense'
50	3	1 gal	Sphaeralcea 'La Luna'
51	170	Quart	Carex praegracilis
52	3	1.5 gal	Citrus TBD

- Project Limit
- Border of Landscaped Area
- Adjacent Property

SAMPLE HYDROZONE PLAN

1720 Elm Street, Santa Monica CA 90405
Original Plan: 6/30/08 Revised: 7/28/08



Hydrozone = A grouping of plants with similar watering requirements based on plant type, irrigation method, sun exposure, soil type, slope or other criteria.

SAMPLE HYDROZONE MATRIX

Hydro zone	SQ FT	% of Tl Area	Plant Type	Planting Form	Hydrozone Basis	Hydrozone Description	Exposure	Irrigation Method	Irrigation Device Mfr / Model / Number	Zone Pressure	Precip Rate	Zone GPM	Controller Station
A	91	2%	LVL	1G, P	PL	Native Grass / Shrub	Sun all day	D	Solco PST-2	25	0.39	0.2	5
B	444	11%	LVL	1G	SU	Medium Low-Water Shrub	Sun all day	D	Agrifim SFPC-8R-7212-05	25	0.64	3.0	4
C	263	7%	LVL	1G	PL	Large Low-Water Shrub	Sun all day	D	Agrifim SFPC-8R-7212-05	25	0.64	1.8	3
D	173	4%	LVL	1G	SU	Medium Low-Water Shrub	Shade most of day	D	Agrifim SFPC-8R-7212-05	25	0.64	1.1	1
E	124	3%	LVL	15G	PL	Native Tree	Shade part of day	B	Rain Bird RWS-8-C-1401	30	0.43	3.0	2
F	113	3%	H	1G	PL	Mixed Roses	Sun all day	D	Agrifim SFPC-8R-7212-05	25	0.64	0.8	7
G	560	14%	T	50	PL	Warm Season Turf	Sun all day	S	Hunter / MP Rotator / See Plan	30	0.45	2.3	12
H	318	8%	M	1G	PL	Medium Shrub	Sun most of day	D	Agrifim SFPC-8R-7212-05	25	0.64	2.1	11
J	117	3%	M	1G	PL	Large Shrub	Sun all day	D	Agrifim SFPC-8R-7212-05	25	0.64	0.8	8
K	129	3%	M	1G	SU	Medium Shrub	Shade most of day	D	Agrifim SFPC-8R-7212-05	25	0.64	0.9	10
L	76	2%	M	15G	PL	Flowering Tree	Sun all day	B	Rain Bird RWS-8-C-1401	30	0.43	3.0	9
M	233	6%	M	5G	PL	Mixed Citrus Trees	Sun all day	D	Agrifim SFPC-8R-7212-05	25	0.64	1.6	6
PLANT TYPE*					PLANTING FORM			HYDROZONE BASIS			IRRIGATION METHOD		
T	Turf				SE	Seed		PL	Plant Type		D Drip		
H	High				SO	Sod		IR	Irrigation Method		S Small Rotor		
M	Medium				F	Flat		SU	Sun Exposure		L Large Rotor		
LVL	Low, Very Low				P	Plug		SO	Soil Type		B Bubbler		
O	Other				Q	Quart		SL	Slope		M Microspray		
					1G	1 Gallon		O	Other		O Other		
					5G	5 Gallon							
					15G	15 Gallon							
					24	24" Box							
					36	36" Box							
					48	48" Box							
* Based on Water Use Classification of Landscape Species (WUCOLS) published by State of CA Dept of Water Resources													

Hydro zone	SQ FT	% of Ttl Ls Area	Plant Type	Planting Form	Hydrozone Basis	Hydrozone Description	Exposure	Irrigation Method	Irrigation Device Mfgr / Model / Number	Zone Pressure	Precip Rate	Zone GPM	Controller Station
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D	173	4%	LVL	1G	SU	Medium Low-Water Shrub	Shade most of day	D	Agrifim SFPC-BR-7212-05	25	0.64	1.1	1
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G	560	14%	T	SO	PL	Warm Season Turf	Sun all day	S	Hunter / MP Rotator / See Plan	30	0.45	2.3	12
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J	117	3%	M	1G	PL	Large Shrub	Sun all day	D	Agrifim SFPC-BR-7212-05	25	0.64	0.8	8
K	129	3%	M	1G	SU	Medium Shrub	Shade most of day	D	Agrifim SFPC-BR-7212-05	25	0.64	0.9	10
L	76	2%	M	15G	PL	Flowering Tree	Sun all day	B	Rain Bird RWS-B-C-1401	30	0.43	3.0	9
M	233	6%	M	5G	PL	Mixed Citrus Trees	Sun all day	D	Agrifim SFPC-BR-7212-05	25	0.64	1.6	6

PLANT TYPE*

T	Turf
H	High
M	Medium
LVL	Low, Very Low
O	Other

* Based on Water Use Classification of Landscape Species (WUCOLS) published by State of CA Dept of Water Resources

PLANTING FORM

SE	Seed
SO	Sod
F	Flat
P	Plug
Q	Quart
1G	1 Gallon
5G	5 Gallon
15G	15 Gallon
24	24" Box
36	36" Box
48	48" Box

HYDROZONE BASIS

PL	Plant Type
IR	Irrigation Method
SU	Sun Exposure
SO	Soil Type
SL	Slope
O	Other

IRRIGATION METHOD

D	Drip
S	Small Rotor
L	Large Rotor
B	Bubbler
M	Microspray
O	Other

SAMPLE IRRIGATION PLAN

1720 Elm Street, Santa Monica CA 90405
Original Plan: 6/30/08 Revised: 7/23/08

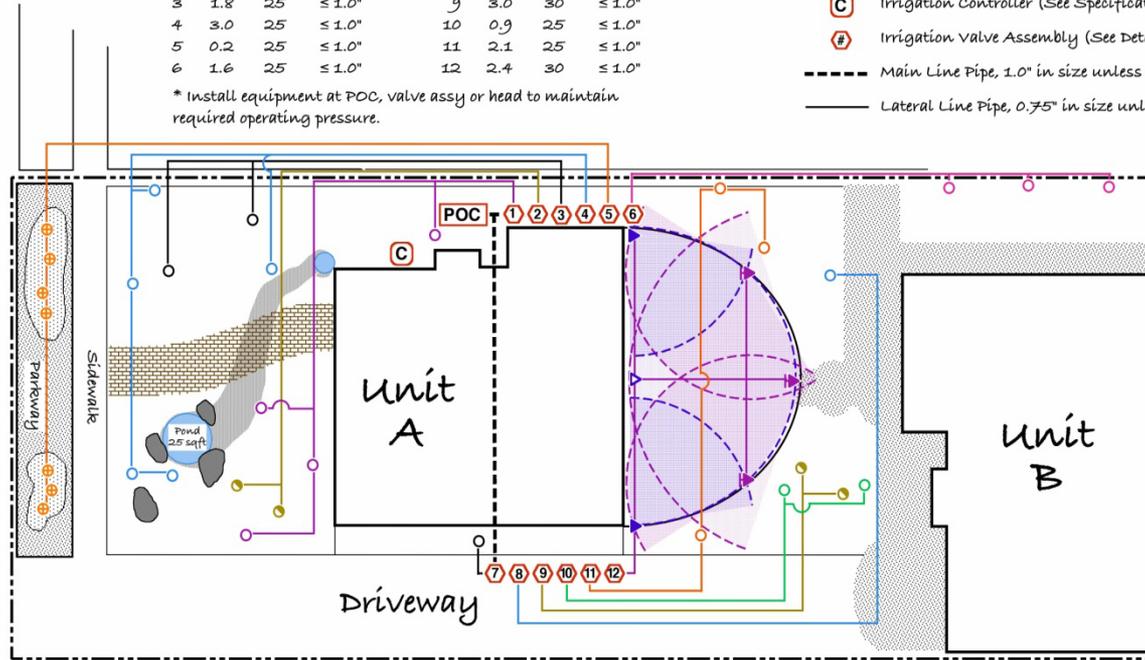
20 Feet



#	GPM	PSI*	Valve Size	#	GPM	PSI*	Valve Size
1	1.1	25	≤ 1.0"	7	0.8	25	≤ 1.0"
2	3.0	30	≤ 1.0"	8	0.8	25	≤ 1.0"
3	1.8	25	≤ 1.0"	9	3.0	30	≤ 1.0"
4	3.0	25	≤ 1.0"	10	0.9	25	≤ 1.0"
5	0.2	25	≤ 1.0"	11	2.1	25	≤ 1.0"
6	1.6	25	≤ 1.0"	12	2.4	30	≤ 1.0"

* Install equipment at POC, valve assy or head to maintain required operating pressure.

- POC** Irrigation Point of Connection (See Detail #1)
- C** Irrigation Controller (See Specifications for mfg & Part #)
- #** Irrigation Valve Assembly (See Detail #2)
- Main Line Pipe, 1.0" in size unless otherwise indicated
- Lateral Line Pipe, 0.75" in size unless otherwise indicated



- O Drip Irrigation Riser Unit (see detail #3 & #6)
- Tree Bubbler Assembly (See Hydrozone Matrix for Mfg & Part #)
- ⊕ 2.0 GPH Fixed-Riser Emitter (see detail #4)
- ▶ 45° - 105° Rotor Nozzle, arc & radius as shown (see detail #5)
- ▷ 90° - 210° Rotor Nozzle, arc & radius as shown (see detail #5)
- ◀ 90° - 210° Rotor Nozzle, arc & radius as shown (see detail #5)

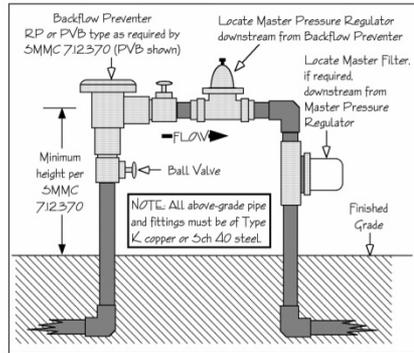
Inspections - There are two inspections required for construction of Irrigation systems in Santa Monica. Call Russell Ackerman at 310/458-8405 or email russell.ackerman@smgov.net for details.

SAMPLE IRRIGATION DETAILS

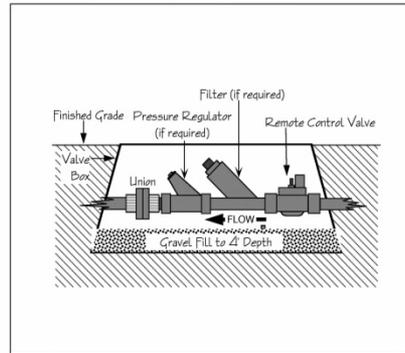
No Scale unless otherwise indicated

1720 Elm Street, Santa Monica CA 90405

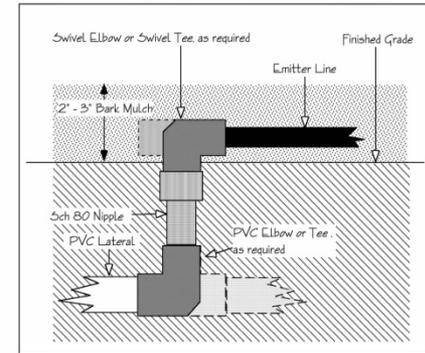
Original Plan: 6/30/08 Revised: 7/23/08



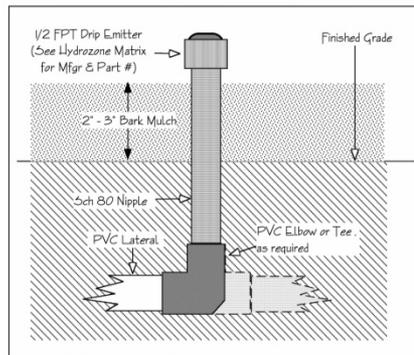
1 Typical Point-of-Connection Assembly



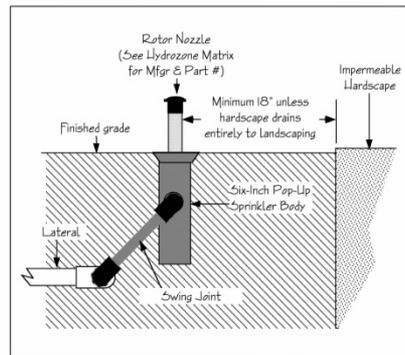
2 Typical Remote Control Valve Assembly



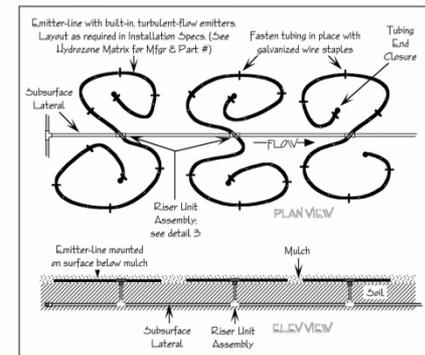
3 Typical Riser Unit Assembly



4 Typical Hard-Mounted PVC Drip Irrigation Assembly



5 Typical Pop-up Sprinkler Assembly



6 Typical Drip Irrigation Layout using Polyethylene Tubing

GENERAL SPECIFICATIONS

PURPOSE OF PROJECT (PoP)

The Purpose of the Project is to construct a landscape at 1720 Elm Street which is in keeping with the climate of Santa Monica and balances the clients desires for a low-maintenance front yard with native plants and a more lush rear yard with recreational turf, flowers and fruit trees. The project must also reflect the client's desire to make "green building" choices wherever possible.

INTENT OF PLANS & SPECIFICATIONS (P&S)

The intent of these plans and specifications is to install a landscape and irrigation system free from defects in materials and workmanship which satisfies the PoP.

In the event of any discrepancies between the plan and the specifications, the final decision must be made by the Project Designer (PD) and/or the Irrigation Designer (ID) as appropriate.

SCOPE OF WORK

The work included in the P&S consists of supplying all labor, tools, materials, permits and taxes necessary for satisfying the PoP.

ORDINANCES & REGULATIONS

All municipal, county and state laws, rules and regulations governing any portion of this work must be considered a part of these specifications.

BIDS

The Property Owner (PO) reserves the right to accept or reject any and/or all bids, or any part of a bid submitted.

Bids must take into account all existing site conditions and/or limitations applying to the work. The bid price must be sufficient to accomplish the PoP in light of those conditions and/or limitations. Additional billings based on overruns due to preexisting conditions will not be accepted.

Bids must be based on the latest P&S in existence at the time of bidding. All bids must make specific reference to the dates of the P&S the bid is based on. Requests for adjustments to the bid price based on later changes of the P&S may be submitted after signing of the contract. Substitutions of alternate materials or procedures will only be considered after the signing of the contract.

Bids must include the specifications of the guarantees and/or warranties the installer is offering in regard to the project.

MATERIAL SPECIFICATIONS

IRRIGATION MATERIAL

All materials must be new and of the size, type and/or brand called for in the P&S. All materials required but not specified in the plan (such as, but not limited to, PVC cement and plant ties) must be supplied by the PC.

POINT OF CONNECTION ASSEMBLIES

Cross-Connection Prevention

Equipment to prevent both back-flow and back-syphonage which meets the approved guidelines of the Los Angeles County Department of Health Services and complies with SMMC X.XX.XXX is required. See Detail X.

Master Pressure Regulator (MPR)

An MPR is required at the Point of Connection (POC). The MPR must be 1" in size, have a maximum inlet pressure of 300 psi and a regulated range of 25 - 75 psi. Suggested brand / model: Wilkins 600. See Detail X.

PVC PIPE

Below-Grade Rigid PVC Pipe

All below-grade rigid PVC pipe must be recognized commercial grade and marked with appropriate size, class/schedule, SDR and lot numbers as required by the P&S.

There are two inspections:

- Open-Trench
- Final

Open-Trench Inspection Items:

- Backflow Device(s)
- Valves
- Pressure Regulation
- Piping
- Watering Devices
- Water Features

Final Inspection - Landscaping

- Turf matches plan (20% Rule)
- Invasive species check
 - Trees planted according to plan

Final Inspection - Irrigation

- Hydrozones match plan
- Drip for plants \geq one gallon
- Controller according to plan
- Run system for three minutes per zone
 - ~ Valves function properly; no leaks
 - ~ No overspray or runoff
- No drainage after shut-down
- Check water feature

- **Planning Department reviewing landscape and irrigation plans**
- **Building and Safety issues Single Trade irrigation permits**
- **Building and Safety does underground and final inspections**
- **Code Compliance enforces the GBO**

New Landscape Grant Program:

- Any property within the City of Santa Monica
- Project must include irrigation improvement
- Grant amount = Up to \$5,000 per property
 - Up to \$3500 for irrigation upgrades
 - Up to \$1500 for climate appropriate plant

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