

Engineering Standards

H. LANDSCAPING & IRRIGATION

The provisions of the Engineering Standards apply to the following landscape projects:

- New construction and rehabilitated landscapes for institutional, commercial and multi-family development projects with a landscape area equal to or greater than 2,500 square feet which are otherwise subject to a building permit or development review.
- Developer-installed single-family residential landscapes and common areas of a project with a landscape area equal to or greater than 2,500 square feet which are otherwise subject to a building permit or development review. Where model homes are included, the developer shall install at least two model homes with landscapes that comply with the City Engineering Standards requirements and include signs and printed materials explaining design strategies and plant materials for water conservation.
- New construction landscapes which are homeowner-provided and/or homeowner-hired in single-family projects with a total project landscape area equal to or greater than 5,000 square feet requiring a building permit or development review.

Submittals

Development Review. For projects that require development review (tentative parcel map, tentative tract, development plan or conditional use permit), project applicants shall submit the following documentation:

1. A completed Maximum Applied Water Allowance for the conceptual landscape design.
2. A conceptual landscape design plan which demonstrates that the landscape will meet the landscape design specifications of the City Engineering Standards Uniform Design Criteria for Landscaping and Irrigation.
3. A conceptual irrigation design plan which notes the irrigation methods and design actions that will be employed to meet the irrigation specifications of the City Engineering Standards Uniform Design Criteria for Landscaping and Irrigation.
4. A grading plan which demonstrates the landscape will meet the specifications of the City Engineering Standards Uniform Design Criteria for Landscaping and Irrigation.

Building Application. Prior to the issuance of a building permit, project applicants shall submit the following:

1. A completed Maximum Applied Water Allowance form (Appendices City Engineering Standards) based on the final landscape design plan.
2. A final landscape design plan that includes all the criteria required in the City Engineering Standards Uniform Design Criteria for Landscaping and Irrigation.
3. A final irrigation plan that includes all the criteria required in the City Engineering Standards Uniform Design Criteria for Landscaping and Irrigation.

4. A soils management report that includes at a minimum the criteria required in the City Engineering Standards Uniform Design Criteria for Landscaping and Irrigation.
5. A final grading plan that includes all the criteria required in the City Engineering Standards Uniform Design Criteria for Landscaping and Irrigation.
6. A hydrozone table (Appendices City Engineering Standards).
7. Plans must comply with City Engineering Drafting Standards.

Project Completion. Upon completion of the installation of the landscape and irrigation system and prior to the issuance of the Certificate of Occupancy, the project applicant shall submit the following:

1. A Certification of Completion (Appendices City Engineering Standards) signed by the professional of record for the landscape and irrigation design certifying that the project was installed per the City approved landscape design, irrigation and grading plans and meets or exceeds an average landscape irrigation efficiency of 0.71. The City reserves the right to inspect and audit any irrigation system which has received an approval through the provisions of this chapter.
2. A project applicant shall develop and provide to the owner or owner representative and the City an irrigation schedule that assists in the water management of the project and utilizes the minimum amount of water required to maintain plant health. Irrigation schedules shall meet the criteria in the City Engineering Standards Uniform Design Criteria for Landscaping and Irrigation.
3. A regular maintenance schedule shall be submitted by the project applicant with the Certificate of Completion that includes: routine inspections, adjustment and repairs to the irrigation system, aerating and dethatching turf areas, replenishing mulch, fertilizing, pruning and weeding. The maintenance schedule will be provided to the owner or owner representative.

Landscaping. For the efficient use of water, a landscape shall be designed and planned for the intended function of the project. For each landscape project, applicants shall submit a landscape design plan in accordance with the following:

- Any combination of plant materials that do not exceed the Maximum Applied Water Allowance (MAWA). The method to calculate the Maximum Applied Water Allowance and Estimated Total Water Use shall be in accordance with Appendix E.
- Plant factors used to calculate the MAWA shall be derived from the most recent edition of the Department of Water Resources “Water Use Classification of Landscape Species (WUCOLS)”.
- Each hydrozone shall have plant materials with similar water requirements.
- Plants shall be selected and planted appropriately based upon their adaptability to the climatic, soil, and topographical conditions of the project site, and water attributes.
- Turf is not allowed on slopes greater than 15% (1 foot rise for every 6.5 feet of horizontal distance) where the toe of the slope is adjacent to an impermeable hardscape.

- Turf shall not be used in areas less than 8 feet by 8 feet in size, irregularly shaped areas, street medians, traffic islands, planter strips, bulbouts of any size or raised beds for maximum water efficiency and ease of maintenance.
- Low and moderate water-use plants can be mixed, but the entire hydrozone will be classified as moderate water use for MAWA calculations.
- High water-use plants shall not be mixed in the same hydrozone with low or moderate water-use plants.
- Invasive plants as listed by the Cal-IPC are prohibited.
- Recirculating water systems shall be used for water features.
- The surface area of water features, including swimming pools, will be included in a high water-use hydrozone.
- A landscape design plan for projects in fire-prone areas shall address fire safety and prevention. A defensible space or zone around a building or structure is required per Public Resources Code Section 4219 (a) and (b). Avoid fire-prone plant materials and highly flammable mulches.

Irrigation Plan. The irrigation system and its related components shall be planned and designed to allow for proper installation, management, and maintenance. Project applicants shall submit an irrigation design plan that is designed and installed to meet irrigation efficiency criteria:

- Soil types and infiltration rates shall be considered when designing irrigation systems. All irrigation systems shall be designed to avoid runoff, low-head drainage, overspray, or other similar conditions where water flows onto adjacent property, non-irrigated areas, walks, roadways, or structures.
- Proper irrigation equipment and schedules, including features such as repeat cycles, shall be used to closely match application rates to infiltration rates, to minimize or eliminate runoff.
- Overhead irrigation shall not be permitted within 24 inches of any non-pervious surface, so as to prevent runoff and overspray. Allowable irrigation within the setback from non-pervious surfaces may include drip, drip line, or other low flow or non-spray technology. These restrictions may be modified if the adjacent non-pervious surfaces are designed and constructed to drain entirely to landscaping.
- Irrigation systems shall be designed, maintained, and managed using such techniques as low-precipitation heads, drip irrigation, moisture sensors, check valves, matched precipitation rates of sprinkler heads and other emission devices, and other water-conserving techniques where appropriate.
- Each valve shall irrigate a hydrozone with similar site, slope, sun exposure, soil conditions, and plant materials with similar water use. A single valve shall not irrigate hydrozones that mix high water-use plants with moderate or low water-use plants.
- Irrigation systems shall be designed, maintained, and managed to meet or exceed an average landscape irrigation efficiency of 0.71 where irrigation efficiency means the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices.

- Rain sensors, either integral or auxiliary, that suspend or alter irrigation operation during rainy weather conditions shall be required on all irrigation systems.
- Head-to-head coverage is required unless otherwise directed by the manufacturer's specifications.
- Low volume irrigation is required where plant height at maturity will affect the uniformity of an overhead system.
- The irrigation system shall be designed to ensure that the dynamic pressure at each emission device is within the manufacturer's recommended pressure range for optimal performance.
- Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) shall be required, as close as possible to the point of connection of the water supply, to minimize water loss in case of an emergency (such as a main line break) or routine repair.
- Automatic irrigation controllers utilizing either evapotranspiration or soil moisture sensor data shall be required for irrigation scheduling in irrigation systems for applicable projects in section 17.87.020 (A) (1) of the Municipal Code.
- If the project is within the *Water Reuse Master Plan* area, the irrigation system shall be designed and operated consistent with recycled water standards described in the City's *Procedures for Recycled Water Use*, including the requirement that sites utilizing recycled water include backflow protection on all potable service connections.
- For municipal projects, pullbox spacing shall not exceed 200', and conduit fill shall not exceed 26%.

Soils Management Report. In order to reduce runoff and encourage healthy plant growth, soil amendment, mulching and soil conditioning recommendations shall be prepared by a licensed landscape architect, licensed landscape contractor, licensed civil engineer or licensed architect.

- If the characteristics of the project's soil are known, the minimum requirements of the report shall include the following:
 - a. A minimum of 6 inches of non-mechanically compacted soil shall be available for water absorption and root growth in the planted areas.
 - b. Incorporation of compost or other natural fertilizer into the soil at a rate recommended by a soil science or other qualified professional.
 - c. A minimum of 2 inches of mulch shall be applied on all exposed soil surfaces of planting areas except in turf areas, creeping or rooting groundcovers or direct seeding applications. Plant mulch shall be shredded redwood bark unless otherwise approved by the City Engineer.
- If the characteristics of the project's soil are unknown, the project applicant shall submit soil samples to a laboratory for analysis and recommendations.
 - a. Soil sampling shall be conducted in accordance with laboratory protocol, including protocols regarding adequate sampling depth for the intended plants.

- b. The soil analysis may include: soil texture; infiltration rate determined by laboratory test or soil texture infiltration rate table; pH; total soluble salts; sodium; percent organic matter; and recommendations.
- The soil analysis report shall be made available, in a timely manner, to the professionals preparing the landscape design plans and irrigation design plans to make any necessary adjustments to the design plans.
- The project applicant shall submit documentation verifying implementation of soil analysis report recommendations to the City with Certificate of Completion.

Grading Design Plan. For the efficient use of water, grading of a project site shall be designed to minimize soil erosion, runoff, and water waste.

- The project applicant shall submit a landscape grading plan that indicates finished configurations and elevations of the landscape area including:
 - a. Height of graded slopes;
 - b. Drainage patterns;
 - c. Pad elevations;
 - d. Finish grade; and
 - e. Stormwater retention improvements, if applicable.
- To prevent excessive erosion and runoff, grading shall comply with the following to the maximum extent practicable:
 - a. Grade so that all irrigation and normal rainfall remains within property lines and does not drain onto non-permeable hardscapes;
 - b. Avoid disruption of natural drainage patterns and undisturbed soil;
 - c. Avoid soil compaction in landscape areas; and
 - d. Preserve natural drainage channels.

Miscellaneous Municipal Project Provisions:

Irrigation System Operational Requirements for Turf Areas

Design shall insure areas of turf are not under watered, relative to the rest of the turf, resulting in brown patches. The designer may review the irrigation installation and make recommendations for corrective action on the part of the installer; however, if the system cannot, in spite of proper installation and adjustment of the irrigation, be operated to provide proper coverage, the designer shall redesign and direct revised installation at his/her cost until the system can be shown to operate properly via an audit and empirical data.

Hardscape

Walkways and pads for appurtenances in parks shall be concrete or pervious concrete built in accordance with City Standards for sidewalk construction and graded to prevent water from ponding on the walkway or pad. Unless variances are justified and approved by the City Engineer, walkways must meet current ADA accessibility requirements.

Pads in sod areas, such as picnic table pads, shall be round, oval or have rounded edges to allow mowing without damage to mow blades and pads.

Median islands

Median island noses shall have a 5-foot section of standard sidewalk concrete at intersections. Island noses should not extend into intersection crosswalk areas. Island areas 4 feet or less shall be hardscaped. All hardscaped surfaces within median islands, except for the 5-foot section within the island nose, shall be decorative.

Playgrounds and Miscellaneous areas

An engineered wood surfacing, meeting accessibility requirements, shall be used under play equipment. Alternative surfaces shall be submitted to the City Engineer for review and approval.

Benches and picnic tables shall be of a low maintenance material such as rubber coated steel. No wood is allowed. Alternative materials shall be submitted to the City Engineer for review and approval.

Boxes

Irrigation boxes shall be placed in landscaped areas whenever possible. If irrigation boxes are set in hardscape areas, they shall be concrete boxes. The boxes shall be traffic rated if the area is open to public traffic or used by maintenance vehicles. Irrigation boxes in playing fields shall be buried 4 inches below grade.

System Pressure

Where an existing meter or irrigation system is present, the designer shall obtain the current line pressure to use in design. Where no existing system exists, the City of San Luis Obispo Utilities Department shall be contacted to determine approximate existing system pressures.

For systems that will be temporarily connected to the potable water system and eventually connected to the recycled water system, or for areas that may be set up to use both systems, the designer shall consider the pressure in both systems and design the irrigation system so that it will work with either pressure.

The designer shall contact the responsible maintenance division for the landscaped area (City of San Luis Obispo Public Works for City projects or areas to be dedicated) to determine the watering window to be used for the area. The designer shall use that window in determining the number of valves turned on at any given time and the resulting load on the system. Calculations of system capacities and any assumptions made about the system shall be submitted for review and approval. Calculations submitted shall clearly show an accounting for system losses and concurrent loading to prevent undersizing of the system. Where systems do not operate as needed to provide even distribution of water, including problems resulting from an undersized service, the designer will be responsible to provide any needed redesign and to pay for necessary field corrections.

The irrigation design shall include a pressure reducer or booster pump to be installed, if needed, based on the actual pressure in the new irrigation system. System shall be designed for maximum efficiency.

Controller – City Park Facilities

Irrigation designers must contact the Parks Maintenance Supervisor to determine what, if any, telemetry control equipment will be required. Systems are to be designed to current City Standards for Controller equipment where an irrigated area is City owned or to be dedicated. If control is to be via phone line, the designer must coordinate with the City's telephone system representative or City project manager to arrange for hook up.

Appendix E – Calculating Maximum Applied Water Allowance

Section A1. Maximum Applied Water Allowance (MAWA). An online calculator is available at www.slocity.org/utilities to assist with this calculation.

Maximum Applied Water Allowance (MAWA) means the upper limit of annual applied water for the established landscaped area. It is based upon the area's reference evapotranspiration, the ET Adjustment Factor, and the size of the landscaped area. The Estimated Total Water Use shall not exceed the Maximum Applied Water Allowance. Special Landscape Areas, including recreation areas, areas permanently and solely dedicated to edible plants such as orchards and vegetable gardens, and areas irrigated with recycled water, are subject to the MAWA with an Evapotranspiration Adjustment Factor (ETAF) not to exceed 1.0. The ETAF for all other areas is 0.7.

The project's Maximum Applied Water Allowance (irrigation water budget) shall be calculated using this equation:

$$\text{MAWA} = (\text{ET}_o) (0.62) [(0.7 \times \text{LA}) + (0.3 \times \text{SLA})]$$

where:

- MAWA= Maximum Applied Water Allowance (gallons per year)
- ET_o = Reference Evapotranspiration from either Cal Poly or Dairy Creek CIMIS stations
- 0.7 = ET Adjustment Factor (ETAF)
- LA = Landscaped Area includes Special Landscape Area (square feet)
- 0.62 = Conversion factor (to gallons per square foot)
- SLA = Portion of the landscape area identified as Special Landscape Area (square feet)*
- 0.3 = the additional ET Adjustment Factor for Special Landscape Area (1.0 - 0.7 = 0.3)

* Special Landscape Area” (SLA) means an area of the landscape dedicated solely to edible plants, areas irrigated with recycled water, water features using recycled water and areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface.

Maximum Applied Water Allowance = _____ gallons per year

Show calculations or submit printout from the online calculator.

Section A2. Estimated Total Water Use (ETWU). An online calculator is available at www.slocity.org/utilities to assist with this calculation.

The project's Estimated Total Water Use (irrigation water demand) is calculated using the following formula:

$$ETWU = (ET_o)(0.62) \left(\frac{PF \times HA}{IE} + SLA \right)$$

where:

- ETWU = Estimated total water use per year (gallons per year)
- ET_o = Reference Evapotranspiration (inches per year)
- PF = Plant Factor from WUCOLS
- HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
- SLA = Special Landscape Area (square feet)
- 0.62 = Conversion Factor (to gallons per square foot)
- IE = Irrigation Efficiency (minimum 0.71)

Hydrozone Table for Calculating ETWU

Please complete the hydrozone table(s). Use as many tables as necessary.

Hydrozone	Plant Water Use Type(s)	Plant Factor (PF)	Area (HA) (square feet)	PF x HA (square feet)
			Sum	
	SLA			

Estimated Total Water Use = _____ gallons

Show calculations or submit a printout from the online calculator.

Hydrozone Table

This worksheet is to be filled out by the project applicant and it is a required element when applying for a building permit. Please complete the hydrozone table(s) for each hydrozone. Use as many tables as necessary to provide the square footage of landscape area per hydrozone.

Hydrozone*	Zone or Valve	Irrigation Method**	Area (Sq. Ft.)	% of Landscape Area
Total				100%

Summary Hydrozone Table		
Hydrozone*	Area (Sq. Ft.)	% of Landscape Area
High Water Use		
Moderate Water Use		
Low Water Use		
Total =		100%

***Hydrozone**

- HW= High Water Use Plants
- MW=Moderate Water Use Plants
- LW=Low Water Use Plants

****Irrigation Method**

- MS=Micro-spray
- S=Spray
- R=Rotor
- B=Bubbler
- D=Drip
- O=Other

CERTIFICATE OF COMPLETION

To be filled out by the project applicant upon completion of the landscape project.

PART 1. PROJECT INFORMATION SHEET

Date		
Project Name		
Name of Project Applicant	Telephone No.	
	Fax No.	
Title	Email Address	
Company	Street Address	
City	State	Zip Code

Project Address and Location:

Street Address		Parcel, tract or lot number, if available.	
City		Latitude/Longitude (optional)	
State	Zip Code		

Property Owner or his/her designee:

Name	Telephone No.	
	Fax No.	
Title	Email Address	
Company	Street Address	
City	State	Zip Code

Property Owner

“I/we certify that I/we have received copies of all the documents required by the City and the Certificate of Completion and that it is our responsibility to see that the project is maintained in accordance with the Landscape and Irrigation Maintenance Schedule.”

Property Owner Signature Date

PART 2. CERTIFICATION OF INSTALLATION ACCORDING TO THE APPROVED PLANS

"I/we certify that based upon periodic site observations, the work has been substantially completed in accordance with the ordinance and that the landscape planting and irrigation installation conform with the criteria and specifications of the City approved landscape and irrigation plans

Signature*	Date	
Name (print)	Telephone No.	
	Fax No.	
Title	Email Address	
License No. or Certification No.		
Company	Street Address	
City	State	Zip Code

*Signer of the landscape design plan, signer of the irrigation plan, or a licensed landscape contractor or property owner.

PART 3. IRRIGATION SCHEDULING

Attach parameters for setting the irrigation schedule on controller per the City’s Engineering Standards.

PART 4. SCHEDULE OF LANDSCAPE AND IRRIGATION MAINTENANCE

Attach schedule of Landscape and Irrigation Maintenance per the City’s Engineering Standards.

PART 5. SOIL MANAGEMENT REPORT

Attach soil analysis report, if not previously submitted with the building application submittal. Attach documentation verifying implementation of recommendations from soil analysis report .