SECTION 700

DESIGN CRITERIA FOR LANDSCAPING AND IRRIGATION SYSTEMS

700.1 DESCRIPTION

These Marina Coast Water District (District) requirements promote efficient water use through landscape design and irrigation management appropriate to the local climate.

700.2 APPLICABILITY

After January 1, 2010, these landscape design criteria apply to:

- New construction and rehabilitated landscapes for public agency projects and private development projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review;

- New construction and rehabilitated landscapes which are developer-installed in single-family and multi-family residential projects with a landscape area equal to or greater than 2,500 square feet requiring a building or landscape permit, plan check, or design review;

- New construction landscapes which are homeowner-provided and/or homeowner-hired in single-family and multi-family residential projects with a total project landscape area equal to or greater than 5,000 square feet requiring a building or landscape permit, plan check, or design review;

These design criteria do not apply to:

- Registered local, state, or federal historical sites;

- Ecological restoration projects that do not require a permanent irrigation system;

- Mined-land reclamation projects that do not require a permanent irrigation system; or

- Plant collections, as part of botanical gardens and arboretums open to the public.

There are often other applicable regulations of the local jurisdiction that may apply to particular projects. The more restrictive criteria of all regulatory agencies shall apply. One local agency may designate another agency, such as a city or special district, to implement some or all of the design standards contained in this document. It is important that applicants meet with all their local regulative authorities to verify compliance with various planning and development standards and ordinances.

700.3 DEFINITIONS

The terms used in this document have the meaning set forth below:

Applied Water: The portion of water supplied by the irrigation system to the landscape.

Automatic Irrigation Controller: An automatic timing device used to remotely control valves that operate an irrigation system. Automatic irrigation controllers schedule irrigation events using either evapotranspiration (weather-based) or soil moisture data.

Backflow Prevention Device: A safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.

Certificate of Completion: The document signed by the owner of the landscape project verifying the landscape and irrigation system was installed according to approved plans.

Certified Irrigation Designer: A person certified to design irrigation systems by an accredited academic institution, a professional trade organization, or other program such as the US Environmental Protection Agency's Water Sense Irrigation Designer certification program and Irrigation Association's Certified Irrigation Designer program.

Certified Landscape Irrigation Auditor: A person certified to perform landscape irrigation audits by an accredited academic institution, a professional trade organization, or other program such as the US Environmental Protection Agency's Water Sense Irrigation Auditor certification program and Irrigation Association's Certified Landscape Irrigation Auditor program.

Check Valve or Anti-Drain Valve: A valve located under a sprinkler head or other location in the irrigation system to hold water in the system to prevent drainage from the lower elevation sprinkler heads sprinkler heads when the system is off.

Common Interest Developments: Community apartment projects, condominium projects, planned developments, and stock cooperatives per Civil Code Section 1351.

Conversion factor (0.62): The number that converts acre-inches per acre per year to gallons per square foot per year.

Drip Irrigation: Any non-spray low volume irrigation system utilizing emission devices with a flow rate measured in gallons per hour. Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

Ecological Restoration Project: A project where the site is intentionally altered to establish a defined, indigenous, historic ecosystem.

Effective Precipitation or Usable Rainfall (Eppt): The portion of total precipitation which becomes available for plant growth.

Emitter: A drip irrigation emission device that delivers water slowly from the system to the soil.

Established Landscape: The point at which plants in the landscape have developed significant root growth into the soil. Typically, most plants are established after one or two years of growth.

Establishment Period: The first year after installing the plants in the landscape or the first two years if irrigation will be terminated after establishment.

Estimated Total Water Use (ETWU): An estimate of the total water required for the landscape annually.

ET Adjustment Factor (ETAF): A factor of 0.7, that, when applied to reference evapotranspiration, adjusts for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape. A combined plant mix with a site wide average of 0.5 is the basis of the plant factor portion of this calculation. For purposes of the ETAF, the average irrigation efficiency is 0.71. Therefore, the ET Adjustment Factor (0.7) = (0.5/0.71). ETAF for a Special Landscape Area shall not exceed 1.0. ETAF for a Special Landscape Area shall not exceed 1.0. ETAF for existing non-rehabilitated landscapes is 0.8.

Evapotranspiration Rate: The quantity of water evaporated from adjacent soil and other surfaces and transpired by plants during a specified time.

Flow Rate: The rate at which water flows through pipes, and valves and emission devices, measured in gallons per minute, gallons per hour, or cubic feet per second.

Hardscapes: Any durable material (pervious and non-pervious).

Homeowner-provided Landscaping: Any landscaping either installed by a private individual for a single family residence or installed by a licensed contractor hired by a homeowner. A homeowner is a person who occupies the dwelling he or she owns. This excludes speculative homes, which are not owner-occupied dwellings.

Hydrozone: A portion of the landscaped area having plants with similar water needs. A hydrozone may be irrigated or non-irrigated.

Infiltration Rate: The rate of water entry into the soil expressed as a depth of water per unit of time (e.g., inches per hour).

Invasive Plant Species: Species of plants not historically found in California that spread outside cultivated areas and can cause damage to environmental or economic resources. Invasive species may be regulated by county agricultural agencies as noxious species. “Noxious weeds” means any weed designated by the Weed Control Regulations in the Weed Control Act and identified on a Regional District noxious weed control list. Lists of invasive plants are maintained at the California Invasive Plant Inventory and USDA invasive and noxious weeds database.

Irrigation Audit: An in-depth evaluation of the performance of an irrigation system conducted by a Certified Landscape Irrigation Auditor. An irrigation audit includes, but is not limited to: inspection, system tune-up, system test with distribution uniformity or emission uniformity, reporting overspray or run off that causes overland flow, and preparation of an irrigation schedule.

Irrigation Efficiency (IE): 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. The minimum average irrigation efficiency for purposes of these design standards is 0.71. Greater irrigation efficiency can be expected from well designed and maintained systems.

Irrigation Survey: An evaluation of an irrigation system that is less detailed than an irrigation audit. An irrigation survey includes, but is not limited to: inspection, system test and written

recommendations to improve performance of the irrigation system.

Irrigation Water Use Analysis: An analysis of water use data based on meter readings and billing data.

Landscape Architect: A person who holds a license to practice landscape architecture in the state of California (Business and Professions Code, Section 5615).

Landscape Area: All of the planting areas, turf areas, and water features in a landscape design plan subject to the Maximum Applied Water Allowance calculation. The landscape area does not include footprints of buildings or structures, sidewalks, driveways, parking lots, decks, patios, gravel or stone walks, other pervious or non-pervious hardscapes, and other non-irrigated areas designated for nondevelopment (e.g., open spaces and existing native vegetation).

Landscape Coefficient: A coefficient used in the MCWD ET-based irrigation scheduling spreadsheets to calculate water loss from unique landscape plantings or hydrozones. It is product of three individual factors having an effect on water loss of landscape plantings; plant species, vegetation density, and microclimate. The plant species factor range is 0.1 to 0.9, the range for planting density is 0.5 – 1.3, and the range for individual microclimates is 0.5 – 1.4. More specific information on calculating a landscape coefficient can be found in the Department of Water Resources 1999 publication "Water Use Classification of Landscape Species."

Landscape Contractor: A person licensed by the state of California to construct, maintain, repair, install, or subcontract the development of landscape systems.

Landscape Documentation Package: Collectively, all the documents required and submitted to the District for plan check procedures and construction documentation.

Landscape Project: The total area of landscape in a project as defined in "Landscape Area" and meeting the requirements of section 700.2.

Lateral Line: The water delivery pipeline that supplies water to the emitters or sprinklers from the valve.

Local Agency: A city or county, including a charter city or charter county, that is responsible for adopting and implementing the ordinance. The local agency is also responsible for the enforcement of this ordinance, including but not limited to, approval of a permit and plan check or design review of a project."

Local Water Purveyor: Any entity, including a public agency, city, county or private water company that provides retail water service.

Low Volume Irrigation: The application of irrigation water at low pressure through a system of tubing or lateral lines and low-volume emitters such as drip, drip lines and bubblers. Low volume irrigation systems are specifically designed to apply small volumes of water slowly at or near the root zone of plants.

Main Line: The pressurized pipeline that delivers water from the water source to the valve or outlet.

Maximum Applied Water Allowance (MAWA): 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 calculated for the same area shall not exceed the Maximum Applied Water Allowance. Special Landscape Areas, including recreational turf areas and areas permanently and solely dedicated to edible plants such as orchards and vegetable gardens are subject to the MAWA but are given an additional allocation of water equal to 30% of the local reference evapotranspiration rate. ETAF for these areas shall not exceed 1.0.

Microclimate: The climate of a small, specific area that may contrast with the climate of the overall landscape area due to factors such as: wind, sun exposure, plant density or proximity to reflective surfaces.

Mined-land Reclamation Projects: Any surface mining operation with a reclamation plan approved in accordance with the Surface Mining and Reclamation Act of 1975.

Mulch: Any organic material such as leaves, bark, straw or inorganic mineral materials such as rocks, gravel, and decomposed granite left loose and applied to the soil surface for the beneficial purposes of reducing evaporation, suppressing weeds, moderating soil temperature and preventing soil erosion.

New Construction: A new building with a landscape or other new landscape, such as a park, playground, or greenbelt without an associated building.

Operating Pressure: The water pressure, at which the parts of an irrigation system are, as designed by the manufacturer, too operate.

Overhead Sprinkler Irrigation Systems: Systems that deliver water through the air (e.g., spray heads and rotors).

Overspray: The irrigation water which is delivered beyond the target area.

Permit: An authorized document issued by local agencies for a new construction or rehabilitated landscapes.

Pervious: Any surface or material that allows the passage of water through the material and into the underlying soil.

Plant Factor or Plant Water Use Factor: A factor, when multiplied by the ETo estimates the amount of water needed by plants. For purposes of these standards, the plant factor shall be the highest of the various plant species coefficients for a specific hydrozone. The plant factor range for a low water use plant grouping is 0 to 0.3, the plant factor range for a moderate water use plant grouping is 0.4 to 0.6, and the plant factor range for a high water use plant grouping is 0.7 to 1.0. More information on calculating plant factors can be found in the Department of Water Resources 2000 publication “Water Use Classification of Landscape Species (WUCOLS).”

Precipitation Rate: The rate of application of water measured in inches per hour.

Project Applicant: The individual or entity submitting a Landscape Documentation Package to request a permit, plan check, or design review from the District. A project applicant may be the property

owner or his/her designee.

Rain Sensor or Rain Sensing Shutoff Device: A component which automatically suspends an irrigation event when it rains.

Record Drawing or As-builts: A set of reproducible drawings which show significant changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the contractor.

Recreational Turf: Turf area dedicated to active play such as parks, sports fields and golf courses. These are areas where turf provides a playing surface. Areas of turf used for ornamental purposes, special events, or as preserved open space, and plantings of grasses used to control erosion or used as an ornamental feature are not considered areas of recreational turf.

Recycled Water, Reclaimed Water, or Treated Sewage Effluent Water: Treated or recycled waste water of a quality suitable for non-potable uses such as landscape irrigation and water features. This water is not intended for human consumption.

Reference Evapotranspiration (ETo): A standard measurement of environmental parameters which affect the water use of plants. ETo is given in inches per day, month, or year and is an estimate of the evapotranspiration of a large field of four- to seven-inch tall, cool season turf that is well watered. Reference evapotranspiration is used as the basis of determining the Maximum Applied Water Allowances so that regional differences in climate can be accommodated.

Rehabilitated Landscape: Any re-landscaping project that requires a permit, plan check or design review. The modified landscape area is equal to or greater than 2,500 square feet, is 50% of the total landscape area, and the modifications are completed within one year.

Runoff: Water which is not absorbed by the soil or landscape to which it is applied and flows from the landscape area. For example, runoff may result from water that is applied at too great a rate (application rate exceeds infiltration rate) or when there is a slope.

Soil Moisture Sensing Device or Soil Moisture Sensor: A device that measures the amount of water in the soil. The device may also suspend or initiate an irrigation event.

Soil Texture: The classification of soil based on its percentage of sand, silt, and clay.

Special Landscape Area (SLA): An area of the landscape dedicated solely to edible plants, water features, or Recreational Turf.

Sprinkler Head: A device which delivers water through a nozzle.

Static Water Pressure: The pipeline or municipal water supply pressure when water is not flowing.

Station: An area served by one valve or by a set of valves that operate simultaneously.

Swing Joint: An irrigation component that provides a flexible, leak-free connection between the emission device and lateral pipeline to allow movement in any direction and to prevent equipment damage.

Turf: A groundcover surface of mowed grass. Annual bluegrass, Kentucky bluegrass, Perennial ryegrass, Red fescue, and Tall fescue are common cool-season grasses. Bermudagrass, Kikuyugrass, Seashore Paspalum, St. Augustinegrass, Zoysiagrass, and Buffalo grass are common warm season grasses.

Valve: A device used to control the flow of water in the irrigation system.

Water Conserving Plant Species: A plant species identified as having a low plant factor.

Water Feature: A design element where open water performs an aesthetic or recreational function. Water features include ponds, lakes, waterfalls, fountains, artificial streams, spas and swimming pools (where water is artificially supplied). The surface area of water features is included in the MAWA and ETWU calculations. The area of water features is considered as a high water use hydrozone of the landscape area when calculating the ETWU of a metered area. Constructed wetlands used for on-site wastewater treatment or storm water best management practices that are not irrigated and used solely for water treatment or storm water retention are not water features and, therefore, are not subject to the water budget calculation.

Watering Window: The time of day irrigation is allowed.

WUCOLS: Water Use Classification of Landscape Species published by the University of California Cooperative Extension, the Department of Water Resources and the Bureau of Reclamation, 2000.

700.4 PROCEDURES

Prior to construction, the project applicant shall:

1) Submit payment to the District for plan check procedures.
2) Submit three (3) copies of the Landscape Documentation Package to the District for plan check procedures, the development of comments, and if required, a listing of requested revisions. The Landscape Documentation Package will to be reviewed as many times as needed until the District requirements and standards are satisfied.
3) Receive the District's authorization to construct and record the date of the District authorization in the Certificate of Completion.
4) Submit a copy of the District approved Landscape Documentation Package to the planning department of the local jurisdiction to facilitate issuance of a permit to construct.
5) Submit a copy of the District approved Landscape Documentation Package to the property owner or his/her designee.

Prior to construction, the District shall:

1) Provide the project applicant with an outline of the District's procedures for project authorization.
2) Provide a receipt for payment of fees, deposits, and charges.
3) Review the submitted Landscape Documentation Package, develop comments, and if required, request revisions to the documents submitted by the project applicant.
4) Approve or deny the Landscape Documentation Package; and
5) Upon approval, provide District authorization to construct.

After completion of the landscape project installation, the applicant shall:

1) Have an irrigation audit performed immediately following the completion of construction or rehabilitation and prior to submission of the Certificate of Completion to the District. The irrigation audit report shall be submitted to the District for acceptance.

2) Submit a completed MCWD Certificate of Completion and a set of record drawings (as-built drawings) to the District for acceptance. If the submitted documents are denied, the District shall provide information to the project applicant regarding reapplication, appeal or other assistance.

After all requested documentation is received and compliance with the standards is verified, the District shall:

1) Provide a signed copy of the Certificate of Completion to the applicant.
2) Keep a record of the documentation for water use evaluation.
3) Administer programs that may include, but not be limited to, irrigation water use analysis, irrigation audits, and irrigation surveys for compliance with the Maximum Applied Water Allowance.

700.5 PENALTIES

The District may establish penalties for noncompliance with these standards.

700.6 REQUIRED DESIGN ELEMENTS FOR IRRIGATION SYSTEMS USING RECYCLED WATER.

Local agencies, during development review, shall determine the extent to which developments shall use recycled water for landscape irrigation. As set forth in the District Water Code, where recycled water is not immediately available for use when the design area is ready for construction, and if the District or local jurisdiction has determined that recycled water will be supplied in the future, the on-site facilities shall be designated to use recycled water. The irrigation system shall be designed and constructed to meet all the District's Standards and Specifications. Provisions shall be made as directed by the District and specifications followed to prepare and allow for connection to the recycled water facilities when they become available.

1) The installation of recycled water irrigation systems (dual distribution systems) shall be required to allow for the current and future use of recycled water, unless a written exemption has been granted by the District.

2) Irrigation systems shall make use of recycled water unless a written exemption has been granted by the District, stating that recycled water meeting all health standards is not available and will not be available in the foreseeable future.

3) The recycled water irrigation systems shall be designed and operated in accordance with all local and state rules and regulations.

In preparation for the conversion to recycled water, and as referred to below, an On-Site Recycled Water User Plan shall be prepared by the applicant, owner, developer, or customer and submitted to the District. Required elements of this document are outlined in Appendix 19.

700.7 TEMPORARY IRRIGATION SYSTEM DESIGN

Before design submittals, the developer shall obtain approval from the District for any temporary irrigation system designs.

Please refer to Section 600 of the District's Procedures, Guidelines, and Design Requirements for the specific use of recycled water in temporary irrigation systems.

700.8 WATER METERS FOR IRRIGATION

Points of connection to the water distribution system and meter locations shall be approved by the District. Consideration shall be given to the likelihood that if not already provided, recycled water may become available, and appropriate irrigation system points of connection may change. Provisions shall be made, as directed by the District and these specifications, to design the irrigation system in a manner that allows for connection to the recycled water facilities as these facilities become available. Meters shall be located at the property boundary or in the public utility easement.

Landscape irrigation use, excluding that used around single-family dwellings with landscape area less than 5000 square feet, shall have dedicated landscape water meters.

700.9 LANDSCAPE DOCUMENTATION PACKAGE

The applicant shall submit the following items for review and approval by the District. These submittals are consistent with state guidelines promoting water conservation in landscape projects. The documents below, identified with an asterisk, are available as standard District forms and can be obtained in electronic format at the District website, http://www.mcwd.org/engr.html.

The Landscape Documentation Package shall include the following elements:

1) On-Site Recycled Water User Plan (not required of single-family residential projects or those projects with granted exemption from the use of recycled water)
2) * MCWD Water Efficient Landscape Worksheet
3) * MCWD ET-Based Irrigation Schedule for the Establishment Period
4) * MCWD ET-Based Irrigation Schedule for the Mature Landscape
5) Irrigation System Map
6) Individual Station Maps
7) Landscape and Irrigation System Maintenance Schedule(s)
8) Soil Management Report
9) Landscape Design Plan
10) Irrigation Design Plan
11) Grading Design Plan

12) Technical Specifications (if available)

13) * MCWD Certificate of Completion (submitted after project completion)

a) Landscape Irrigation Audit Report

b) Documentation verifying implementation of the soil report recommendations

14) Public Information Plan (applicable to development projects consisting of eight or more homes)

700.9.1 On-Site Recycled Water User Plan

Refer to Section 600.4.12 for details on this requirement.

An example of an On-site Recycled Water Users Plan is shown in Appendix 19.

700.9.2 MCWD Water Efficient Landscape Worksheet

A project applicant shall complete the MCWD Water Efficient Landscape Worksheet which contains the following sections:

1) Project Information

2) Checklist of Submitted Documentation

3) Landscape Site Data Table

4) Irrigation Station Information Table(s)

5) Water Budget Calculations

a) Maximum Applied Water Allowance (MAWA)

b) Estimated Total Water Use (ETWU)

6) Calculation of Effective Precipitation and the Effective Precipitation Disclosure Statement (optional)

7) Owners agreement to comply

An example of the MCWD Water Efficient Landscape Worksheet is shown in Appendix 31.

The MCWD Water Efficient Landscape Worksheet is available as a standard District form and can be obtained in electronic format at the District website, http://www.mcwd.org/engr.html.

700.9.2.1 Landscape Site Data Table

For each complete project site, each individual lot, and each individual landscape water meter, the applicant shall provide the square footage and acreage for the categories shown in the table below.

Example Landscape Site Data Table

Categories	Site	Typ. Lot	Meter
1) Total project area	**acres**	**acres**	**N/A**
	sq. ft.	**sq. ft.**	
2) Area of structures, hardscape	**acres**	**acres**	**N/A**
	sq. ft.	**sq. ft.**	
3) Area of non-irrigated open space	**acres**	**acres**	**N/A**
	sq. ft.	**sq. ft.**	
4) Landscape area (irrigated planting area)	**acres**	**acres**	**acres**
	sq. ft.	**sq. ft.**	**sq. ft.**
A) Landscape plantings	**acres**	**acres**	**acres**
	sq. ft.	**sq. ft.**	**sq. ft.**
B) Ornamental turf	**acres**	**acres**	**acres**
	sq. ft.	**sq. ft.**	**sq. ft.**
i) Special landscape area	**acres**	**acres**	**acres**
	sq. ft.	**sq. ft.**	**sq. ft.**

In some instances, as required, the site data requested may be presented in a format different than the District provided format as shown above and as found in the Water Efficient Landscape Worksheet. It is requested that the document provided to the District be a separate 8.5”x11” attached document(s).

The data requested in the Landscape Site Data Table may also be shown on the landscape plans.

700.9.2.2 Irrigation Station Information Table(s)

Information contained in the Irrigation Station Information Table is to be used to help program the irrigation controller at the landscape site. Each station shall be a unique portion of the landscaped area having plants of similar water needs and/or water application devices. An Irrigation Station Information Table shall be completed for each metered point of connection. Individual stations are to be identified by controller and valve identification numbers or letters. All water features shall be included and identified as a unique station and shall be assigned a plant factor of 1.0.

700.9.2.3 Calculation of Maximum Applied Water Allowance

The Maximum Applied Water Allowance (MAWA) is 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. Special Landscape Areas, including recreational turf areas and areas permanently and solely dedicated to edible plants such as orchards and vegetable gardens are subject to the MAWA but are given an additional allocation of water equal to 30% of the local reference evapotranspiration rate.

The Maximum Applied Water Allowance calculation shall adhere to the following requirements:

1) Where there are multiple service connections at a single project, the MAWA calculation shall be completed for the whole site and each individual landscape meter connection.

2) The project applicant shall use a local, historical, reference evapotranspiration (ETo) value from the table below (Source: California Irrigation Management Information System).

Region	ET Values												Total ET
Castroville	**1.4**	**1.7**	**3.0**	**4.2**	**4.6**	**4.8**	**4.0**	**3.8**	**3.0**	**2.6**	**1.6**	**1.4**	**36.2**
Monterey	**1.7**	**1.8**	**2.7**	**3.5**	**4.0**	**4.1**	**4.3**	**4.2**	**3.5**	**2.8**	**1.9**	**1.5**	**36.0**
Salinas	**1.6**	**1.9**	**2.7**	**3.8**	**4.8**	**4.7**	**5.0**	**4.5**	**4.0**	**2.9**	**1.9**	**1.3**	**39.1**

3) The surface area of water features shall be included in the calculation of Landscape Area.

4) Special Landscape Area shall be identified. Special Landscape Areas include recreational turf areas and areas permanently and solely dedicated to edible plants such as orchards and vegetable gardens.

The landscape project's Maximum Applied Water Allowance shall be calculated using this equation:
MAWA = (ETo)(0.62)[(0.7 x LA) + (0.3 x SLA)]

where:

MAWA = Maximum Applied Water Allowance (gallons per year)

ETo = Local, Historical Reference Evapotranspiration Rate (inches per year)
0.7 = ET Adjustment Factor
LA = Landscaped Area including the designated 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)

The example calculations below are hypothetical to demonstrate proper uses of the equations and do not represent an existing and/or planned landscape project.

Example MAWA Calculation #1:
A hypothetical landscape project in Fresno, CA with an irrigated landscape area of 50,000 square feet without any Special Landscape Area (SLA= 0, no edible plants or recreational turf areas). To calculate MAWA, the annual reference evapotranspiration value for Fresno is 51.1 inches.

MAWA = (ETo)(0.62)[(0.7 x LA)+(0.3 x SLA)]
MAWA = (51.1 inches)(0.62)[(0.7 x 50,000 square feet) + (0.3 x 0)]
= 1,108,870 gallons per year

To convert from gallons per year to hundred-cubic-feet per year:
= 1,108,870/748 = 1,482 hundred-cubic-feet per year (100 cubic feet = 748 gallons)

Example MAWA Calculation #2:
In this next hypothetical example, the landscape project in Fresno, CA has the same ETo value of 51.1 inches and a total landscape area of 50,000 square feet. Within the 50,000 square foot project, there is now a 2,000 square foot soccer field. This 2,000 square foot area of recreational turf is considered to be a Special Landscape Area.

MAWA = (ETo) (0.62)[(0.7 x LA)+(0.3 x SLA)]
MAWA = (51.1 inches)(0.62)[(0.7 x 50,000 square feet) + (0.3 x 2,000 square feet)]
= 31.68 x [35,000 +600] gallons per year
= 31.68 x 35,600 gallons per year
=1,127,808 gallons per year or 1,508 hundred-cubic-feet per year

700.9.2.4 Calculation of Estimated Total Water Use

The Estimated Total Water Use shall be calculated using the equation shown below. Estimated Total Water Use; the sum of the Estimated Water Use for all individual hydrozones within a specific area shall not exceed the MAWA calculation for the same area.
Where there are multiple service connections at a single project, the calculation should be completed for the complete project and each individual landscape meter connection.

1) The project applicant shall use a local, historical, reference evapotranspiration (ETo) value from the table below (Source: California Irrigation Management Information System).

Region	ET Values												Total ET
Castroville	**1.4**	**1.7**	**3.0**	**4.2**	**4.6**	**4.8**	**4.0**	**3.8**	**3.0**	**2.6**	**1.6**	**1.4**	**36.2**
Monterey	**1.7**	**1.8**	**2.7**	**3.5**	**4.0**	**4.1**	**4.3**	**4.2**	**3.5**	**2.8**	**1.9**	**1.5**	**36.0**
Salinas	**1.6**	**1.9**	**2.7**	**3.8**	**4.8**	**4.7**	**5.0**	**4.5**	**4.0**	**2.9**	**1.9**	**1.3**	**39.1**

2) The surface area of water features shall be included in the calculation and assigned a high water use plant factor of 1.0.

3) Hydrozones classified as Special Landscape Area shall be identified. There is no plant factor multiplier for the Special Landscape Area.

4) The plant factor used shall be the highest of the various plant species coefficients for a specific hydrozone. The plant factor range for a low water use plant grouping is 0 to 0.3, the plant factor range for a moderate water use plant grouping is 0.4 to 0.6, and the plant factor range for a high water use plant grouping is 0.7 to 1.0.

5) Temporarily irrigated areas shall be included as a low water use hydrozone.

$$ETWU = (ETo)(0.62)[(PF \times HA/IE) + SLA]$$

Where:

ETWU = Estimated Total Water Use per year (gallons)
ETo = Local, Historical Reference Evapotranspiration Rate (inches per year)
PF = Highest of a Hydrozone's Plant Factors. Derived from WUCOLS.
HA = Hydrozone Area [high, medium, and low water use areas] (square feet)
SLA = Special Landscape Area (square feet)
0.62 = Conversion Factor
IE = Hydrozone's Expected Irrigation Efficiency (minimum 0.71)

Example ETWU Calculation #1:

The total landscape area is 50,000 square feet. The plant water use category, highest plant factor, hydrozone area, and each hydrozone's expected irrigation efficiency are shown in the table below. The product of these three values equals the Adjusted Area of an individual hydrozone. The ETo value is 51.1 inches per year. There are no Special Landscape Areas (recreational turf area or area permanently and solely dedicated to edible plants).

Hydrozone	**Plant Water Use Category**	**Highest Plant Factor (PF)**	**Area (square feet)**	**Irrigation Efficiency (IE)**	**Adjusted Area PF x Area/IE (square feet)**
1	High	0.8	7,000	0.71	7,887
2	High	0.7	10,000	0.71	9,859
3	Medium	0.5	16,000	0.71	11,268
4	Low	0.3	7,000	0.71	2,958
5	Low	0.2	10,000	0.71	2,817
		Sum	**50,000**		**34,789**
	SLA		0		0

ETWU = (51.1)(0.62)(34,789 + 0)
= 1,102,185 gallons per year

Compare ETWU with MAWA. The ETWU (1,102,185 gallons per year) is less than MAWA (1,108,870 gallons per year). In this example, the water budget complies with the MAWA.

Example ETWU Calculation #2:

The total landscape area is 50,000 square feet, 2,000 square feet of which is a soccer field. The soccer field area is considered to be a Special Landscape Area. The plant water use category, highest plant factor, hydrozone area, and each hydrozone's expected irrigation efficiency are shown in the table below. The product of these three values equals the Adjusted Area of an individual hydrozone. The reference evapotranspiration value is 51.1 inches per year.

Hydrozone	**Plant Water Use Type(s**	**Highest Plant Factor (PF)**	**Area (square feet)**	**Irrigation Efficiency (IE)**	**Adjusted Area PF x Area/IE (square feet)**
1	High	0.8	7,000	0.71	7,887
2	High	0.7	9,000	0.71	8,873
3	Medium	0.5	15,000	0.71	10,563
4	Low	0.3	7,000	0.71	2,958
5	Low	0.2	10,000	0.71	2,817
		Sum	**48,000**		**33,098**
6	SLA		2,000		2,000

ETWU = (51.1)(0.62)(33,098 + 2,000)
= 1,111,975 gallons per year

Compare ETWU with MAWA. For this example:
MAWA = (51.1)(0.62)[(0.7 x 50,000) +(0.3 x 2000)]
= 31.68 x [35000 +600]
= 31.68 x 35,600
=1,127,808 gallons per year

The ETWU (1,111,975 gallons per year) is less than MAWA (1,127,808 gallons per year). For this example the water budget complies with the MAWA.

700.9.3 MCWD ET-Based Irrigation Schedule for the Establishment Period

This spreadsheet illustrates how the watering frequency and watering duration change when using an ET-based irrigation controller. The spreadsheet shows that watering frequency and duration change each month of the first year, based upon specific site characteristics, plant water requirements, and historical evapotranspiration data for the region. Typically, the MCWD ET-Based Irrigation Schedule for the Establishment Period shows a more frequent application of water due to the young landscape plantings smaller root depth and/or a desired, lower Maximum Allowable Depletion (MAD) of soil moisture.

Each ET-based irrigation controller at a site will generate its own unique irrigation schedule based on the site data entered or received. Actual irrigation schedules may differ from those produced in the MCWD ET-Based Irrigation Schedules.

Each ET-based irrigation controller installed at a site may operate irrigation valves on only one associated metered connection.

The MCWD ET-Based Irrigation Schedule for the Establishment Period includes an Estimated Applied Water Use calculation. The Estimated Applied Water Use is an estimate of the total annual amount of water that will be applied through the ET-based Irrigation system.

An example MCWD ET-Based Irrigation Schedule for the Establishment Period is shown in Appendix 36.

The MCWD ET-Based Irrigation Schedule for the Establishment Period is available as a standard District form and can be obtained in electronic format at the District website, http://www.mcwd.org/engr.html.

700.9.4 MCWD ET-Based Irrigation Schedule for the Mature Landscape

This spreadsheet illustrates how the watering frequency and watering duration change when using an ET-based irrigation controller. The spreadsheet shows that watering frequency and duration change each month, based upon specific site characteristics, plant water requirements, and historical evapotranspiration data for the region. Typically, the MCWD ET-Based Irrigation Schedule for the Mature Landscape shows a more infrequent application of water, when compared to the watering schedule for the establishment period, due to the mature landscape plantings deeper root depth and/or a higher permitted Maximum Allowable Depletion (MAD) of soil moisture.

Each ET-based irrigation controller at a site will generate its own unique irrigation schedule based on the site data entered or received. Actual irrigation schedules may differ from those produced in the MCWD ET-Based Irrigation Schedules.

Each independent ET-based irrigation controller installed at a site may operate irrigation valves on only one associated metered connection.

The MCWD ET-Based Irrigation Schedule for the Mature Landscape includes an Estimated Applied Water Use calculation. The Estimated Applied Water Use is an estimate of the total annual amount of water that will be applied through the ET-based Irrigation system.

An example MCWD ET-Based Irrigation Schedule for the Mature Landscape is shown in Appendix 37.

The MCWD ET-Based Irrigation Schedule for the Mature Landscape is available as a standard District form and can be obtained in electronic format at the District website, http://www.mcwd.org/engr.html.

700.9.5 Irrigation System Map

An 8.5 x 11" Irrigation System Map shall be submitted as part of the Landscape Documentation Package. The map shall be provided to the installation contractor for attachment inside each irrigation controller. The map shall illustrate and clearly identify the following:

1) Location of the unique site in relation to major roadways, landscape markers, buildings, site features, and/or other adjacent properties.

2) Areas of recycled water use shall be clearly delineated from areas of potable water use.

3) Location of potable and/or recycled water distribution lines.

4) Meter locations

5) Controller locations

6) Valve locations

An example Irrigation System Map is shown in Appendix 39.

700.9.6 Individual Station Maps

8.5 x 11" Individual Station Maps shall be prepared showing the location of irrigation system control and application components and clearly identifying separate application areas by station. These maps shall be provided to the installation contractor for attachment inside each irrigation controller.
The map shall illustrate, clearly identify and include the following:

1) Location of potable and/or recycled water distribution lines.

2) Valve location and station number

3) Description of area watered

4) Illustration of area watered

5) Application device used

6) Unique station statistics including:

   a) flow rate
   b) application rate

   c) station efficiency

d) designed operating pressure

7) Unique Hydrozone information (used to program the controller) including:

a) plant factor

b) soil type

c) sun exposure

d) slope

e) allowable water deficiency

f) root zone depth

An example Individual Station Map is shown in Appendix 40.

700.9.7 Landscape and Irrigation System Maintenance Schedules

Maintenance schedules satisfying the following conditions shall be submitted as part of the Landscape Documentation Package:

1) The designer shall specify the recommended service periods and tasks required to adequately maintain the landscape plant material. The Landscape Maintenance Schedule shall include but not be limited to fertilization, weed control, pruning, mowing, mulching, staking, aerating, de-thatching, and removing litter.

2) The Irrigation Maintenance Schedule will specify the recommended service periods and tasks required to adequately maintain the irrigation equipment and monitor water use. The Irrigation Maintenance Schedule shall include but not be limited to checking, cleaning, adjusting, and repairing application devices; checking service laterals and monitoring for leaks, checking and/or adjusting the automatic controls, cleaning strainers, adjusting pressures, and monitoring consumption.

Whenever possible, repair of irrigation equipment shall be done with the originally specified materials or their equivalents. Project applicants are encouraged to implement sustainable or environmentally-friendly practices for overall landscape maintenance.

A sample Landscape and Irrigation System Maintenance Schedule is available in Appendix 41.

700.9.8 Soil Management Report

A Soil Management Report shall be submitted to the District as part of the Landscape Documentation Package. Only when mass grading is planned; and therefore the soil sample collection delayed, will the soil analysis and soil amendment recommendation be submitted separately from the Landscape Documentation Package. In such cases, in addition to the soil analysis and soil amendment recommendation, documentation verifying implementation of the soil amendment recommendations must be submitted with the Certificate of Completion once construction is complete.

The Soil Management Report shall include a laboratory soil analysis and a professional recommendation specifying the quantity and type of soil amendment to be incorporated into the soil to achieve

horticultural suitability. Multiple recommendations may be required for individual hydrozones, plant species, or plant type.

The soil analysis shall include:

1) Determination of soil texture, indicating the percentage of organic matter.

2) A specification of the type and quantity of soil amendments and fertilizers to be incorporated into each 1000 square feet of planting area.

3) An approximate soil infiltration rate (either measured or derived from soil texture/infiltration rate tables.) A range of infiltration rates shall be noted where appropriate.

4) Measure of pH, and total soluble salts.

5) A specification of the type and quantity of mulch material required to provide at least a two inch deep layer of mulch to all planting areas (except turf).

A sample Soil Analysis and Soil Amendment Recommendation is available in Appendix 42.

700.9.9 Landscape Design Plan

A landscape design plan meeting the following requirements shall be submitted as part of the landscape documentation package.

700.9.9.1 Water Features

1) Recirculating water shall be used for water features.

2) Pool and spa covers are highly recommended.

3) The surface area of water features shall be included in the water use calculations and assigned a high water use plant factor of 1.0.

4) Where available, recycled water shall be used in water features.

700.9.9.2 Plant Selection and Grouping

1) Any plants may be used in the landscape, providing the Estimated Total Water Use does not exceed the Maximum Applied Water Allowance. The selection of water-conserving plant and turf species is highly recommended.

2) Plants having similar water use shall be grouped together in distinct hydrozones that are irrigated by separate valves.

3) Avoid invasive plant species.

4) Fire prevention needs shall be addressed in areas that are fire prone. Consider and address fire safety and prevention when selecting landscape plants. Avoid fire-prone plant materials and highly

flammable mulch materials. Information about fire prone areas and appropriate landscaping for fire safety is available from local fire departments or the California Department of Forestry.

5) Plants should be selected appropriately based upon their pest and disease resistance, and adaptability to the climatic, geologic, and topographical conditions of the site. Protection and preservation of native species and natural areas is encouraged.

6) The selection of trees shall be based on applicable local tree ordinances or tree shading guidelines. The planting of appropriate trees is encouraged wherever it is consistent with the other provisions of these design criteria. Consider the solar orientation for plant and tree placement to maximize summer shade and winter solar gain. Avoid underground utilities. Recognize that plantings of considerable size may be limited in rights of ways and easements.

7) The use of turf is discouraged where other low water use plants or alternative landscape materials are appropriate. The District recommends that no more than 25% of the irrigated landscape area be planted with low-water demand varieties of turf, providing the Estimated Total Water Use is within the Maximum Applied Water Allowance. Local agency restrictions on turf shall be followed. Large turf areas should be limited to only those approved by the responsible agency as recreational space. Turf areas with overhead irrigation should be bordered by planting beds or alternative permeable landscape materials to prevent the migration of surface runoff outside the target area. Small "pocket lawns" less than 500 square feet in size are not permitted unless low volume irrigation is used. The overhead application of water to these small turf areas is not permitted. Turf is not allowed on slopes greater than 25% where the toe of the slope is adjacent to an impermeable hardscape and where 25% means 1 foot of vertical elevation change for every 4 feet of horizontal length (rise divided by run x 100 = slope percent).

700.9.9.3 Landscape Design Plan Requirements

1) The landscape design plan shall contain the following signed statement:

   "I have complied with the criteria of the design standards and applied them accordingly for the efficient use of water in the landscape design plan"

   The statement shall be signed by a licensed landscape architect, licensed landscape contractor or any other applicable landscape professional, person, licensed or unlicensed, as listed in the Business and Professions Code, California Code of Regulations, or Food and Agriculture Code.

   Note: Authority Cited: Section 65595, Gov. Code and Section 1353.8, Civil Code. Reference: Section 65596, Gov. Code and Section 1353.8, Civil Code.

2) Delineate and label each hydrozone by number, letter, or other method. Identify each hydrozone as low, medium, or high water use by finding the highest of the various plant species coefficients for a specific hydrozone.

3) Landscape materials, trees, shrubs, groundcover, turf, and other vegetation. Planting symbols shall be clearly drawn and plants labeled by botanical name, common name, container size, spacing, and quantities of each group of plants indicated.

4) Property lines and street names.

5) Streets, driveways, walkways, and other paved areas.

6) Pools, ponds, water features, fences, and retaining walls.

7) Existing and proposed buildings and structures including elevation if applicable.

8) Natural features including but not limited to rock outcroppings, existing trees, shrubs that will remain.

9) Tree staking, plant installation, soil preparation details, and any other applicable planting and installation details.

10) Clearly delineate Special Landscape Areas including areas permanently and solely dedicated to edible plants and recreational turf areas.

11) At least two inches of mulch material on top of the soil surface shall be specified for planting beds.

12) Stabilizing mulching products shall be used on slopes.

13) Laboratory soil analysis and a professional recommendation shall specify the quantity and type of soil amendment to be incorporated into the soil to achieve horticultural suitability. Multiple recommendations may be required for individual hydrozones, plant species, or plant type.

14) Identify the location and installation details of any applicable storm water best management practices that encourage on-site retention and infiltration of storm water. Project applicants shall refer to the local agency or Regional Water Quality Control Board for information on any storm water ordinances and storm water management plans. Storm water best management practices are encouraged in the landscape design plan and examples include, but are not limited to:

    a) Infiltration beds, swales and basins that allow water to collect and soak into the ground;

    b) Constructed wetlands and retention ponds that retain water, handle excess flow and filter pollutants;

    c) Pervious or porous surfaces (e.g., permeable pavers or blocks, pervious or porous concrete, etc.) that minimize runoff;

    d) Identify any applicable rain harvesting or catchment technologies (e.g., rain gardens, cisterns, etc.).

700.9.10 Irrigation Design Plan

These irrigation design requirements promote the efficient use of applied water.

An irrigation design plan meeting the following design criteria shall be submitted as part of the Landscape Documentation Package.

1) Overhead irrigation is permitted for turf, seeded grass areas, and areas planted with ground covers that spread by rhizomes or runners. Otherwise, low volume irrigation is required to maximize water infiltration into the root zone, reduce evaporative water loss, and prevent runoff.

2) Overhead spray irrigation systems are prohibited in roadway median strips, parking islands, roadside planting strips and other narrow areas bordered by hardscape and measuring less than eight feet in width. In these areas where planter width is greater than eight feet, fan-type spray nozzles are not permitted. The use of low trajectory and low precipitation rate stream type nozzles is permitted and encouraged.

3) Overhead irrigation shall not be permitted within 24 inches of any non-permeable surface. Allowable irrigation within the setback from non-permeable surfaces may include drip, drip line, or other low flow non-spray technology. The setback area may be planted or unplanted. The surfacing of the setback may be mulch, gravel, or other porous material. These restrictions may be modified if:

   a) The landscape area is adjacent to permeable surfacing and no overspray and runoff occurs;

   b) Or the adjacent non-permeable surfaces are designed and constructed to drain entirely to landscaping;

   c) Or the irrigation designer specifies an alternative design or technology, as part of the Landscape Documentation Package, and clearly demonstrates strict adherence to irrigation system design criteria. Prevention of overspray and runoff must be confirmed during an irrigation audit.

4) Slopes greater than 25% shall not be irrigated with an irrigation system having a precipitation rate exceeding 0.75 inches per hour. This restriction may be modified if the landscape designer specifies an alternative design or technology, as part of the Landscape Documentation Package, and clearly demonstrates no runoff or erosion will occur. Prevention of runoff and erosion must be confirmed during irrigation audit.

5) The District may require the use of drip irrigation or low volume application devices in certain cases where it is determined during plan check procedures that otherwise permitted overhead spray irrigation may result in waste of water due to excessive runoff or wind drift away from the application target.

6) Soil types and water 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 applied water could flow outside the Landscape Area, onto adjacent property, into non-irrigated areas, and onto 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, therefore minimizing applied water runoff.

7) Special attention shall be given to avoid runoff on slopes and to avoid overspray in narrow planting areas with a width less than eight feet, and in median strips over eight feet in width.

8) The height of all sprinklers risers shall exceed the height of mature plant material. Appropriate sprinkler offset or height clearance shall be provided when placed adjacent to parking stalls.

9) The design of the irrigation system shall conform to the hydrozones of the landscape design plan.

   a) Each valve shall irrigate a hydrozone with similar site, slope, sun exposure, soil conditions and plant materials with similar water use.

   b) Sprinkler heads and other emission devices shall be selected based on what is appropriate for the plant type within that hydrozone.

   c) Trees shall be placed on separate valves from shrubs, groundcovers and turf.

   d) Individual hydrozones that mix plants of moderate and low water use or moderate and high water use, may be allowed if:

i) Plant factor calculation is based on the proportions of the respective plant water uses and their plant factor; or

ii) The plant factor of the higher water using plant is used for calculations.

e) Individual hydrozones that mix high and low water use plants shall not be permitted.

f) On the landscape design plan and irrigation design plan, hydrozone areas shall be designated by number, letter or other designation. On the irrigation design plan, designate the areas irrigated by each valve, and assign a number to each valve. Use this valve number in the Irrigation Station Information Table (Appendix 31). This table can also assist with pre- and final inspections of the irrigation system, and programming the controller.

700.9.10.1 Irrigation Design Plan Requirements

The irrigation design plan submitted to the local agency shall follow standard industry practices and applicable local agency requirements. The irrigation plans shall include the following:

1) The irrigation design plan shall contain the following signed statement:

"I have complied with the criteria of the design standards and applied them accordingly for the efficient use of water in the irrigation design plan"

The statement shall be signed by a licensed landscape architect, licensed landscape contractor or any other applicable landscape professional, person, licensed or unlicensed, as listed in the Business and Professions Code, California Code of Regulations, or Food and Agriculture Code.

Note: Authority Cited: Section 65595, Gov. Code. Reference: Section 65596, Gov. Code.

1) The irrigation design plan shall be drawn on project base sheets. It shall be separate from, but use the same format and scale as, the landscape design plan.

2) Location, size, area served (square feet), yearly water requirement (acre-feet), and peak flow rate of separate connections and water meters for the landscape.

3) Location, type, size, model, manufacturer of all components of the irrigation system, including automatic controllers, main and lateral lines, valves, sprinkler heads, moisture sensing devices, rain switches, quick couplers, filters, and backflow prevention devices.

4) Flow, pressure, radius, application rate, sprinkler offset, and sprinkler pattern for specified application devices.

5) Static water pressure at the point of connection to the public water supply.

6) Expected dynamic pressure and flow rate when designed with booster pumps.

7) Flow rate (gallons per minute), valve number, controller number, application rate (inches per hour), and design operating pressure (psi) for each station.

8) The irrigation window shall be clearly identified on all schedules and in the irrigation notes. For recycled water, the irrigation window is from 9:00 P.M. to 6:00 A.M. and for potable water, 5:00P.M. to 10:00 A.M..

9) Clear differentiation shall be shown between recycled water irrigation systems and potable water irrigation systems.

10) Specifications required of Section 600 – Design Criteria, Recycled Water Facilities. Irrigation system designs for recycled water use shall be prepared to meet all standards required for submission of an On-Site Recycled Water User Plan and the request for recycled water service.

11) Pipe separation, trenching, wiring, connection, flow control, backflow prevention, filtration, pipe routing, coverage, and any other applicable irrigation and related electrical installation details.

12) Meter Data - The following information shall be provided and shown at each proposed meter location shown on the plans:

    a) The meter location and size (inches).

    b) The peak flow through the meter (gpm).

    c) The (static) design pressure available at the meter (psi).

    d) The total area served through the irrigation meter (acres).

    e) An estimate of the yearly water requirement through the meter (acre-feet).

13) Irrigation Equipment Legend - For irrigation systems, a legend showing the pertinent data for the materials used in the system shall be recorded on the plans. The legend shall include a pipe schedule listing pipe sizes and materials of construction, a listing of valve types and quick couplers (quick couplers are not permitted for residential dual plumbed homes), and the following information for each type of sprinkler head:

    a) Manufacturer name and model number.

    b) Sprinkler radius (feet).

    c) Operating pressure (psi).

    d) Flow (gpm).

    e) Sprinkler pattern.

14) Irrigation Details - The following irrigation details and notes shall be provided on each plan set

    a) Irrigation System Schematic Layout: Potable Water and Recycled Water Services

    b) Irrigation Plan Legend

    c) Automatic Controller

    d) Rain Shut-off Switch

    e) Buried Electric Remote Control Valve

    f) Pipe Trenching

    g) Pipe Trenching Under Pavement

h) Sprinkler Installation and Offset from Hardscape

i) Backflow Prevention Unit (when required)

j) Wye or Basket Strainer

k) Pressure Reducing Valve

l) General On-Site Recycled Water Notes

15) Sheets to be Included - The following sheets shall be included in the set:

a) Cover sheet showing project location and all recycled and potable on-site water lines.

b) Irrigation application sheet showing coverage areas by individual stations and meters.

c) Irrigation plans and irrigation details.

700.9.10.2 Irrigation Equipment.

To promote water conservation the following equipment is required.

1) District-approved, weather- based irrigation controllers or soil moisture-based irrigation controllers shall be installed by the developer to control watering systems in:

a) All parcels and lots with irrigated landscape area equal to or greater than 500 square feet. This includes private residential home sites and lots where irrigated landscaping is probable.

b) Multiple parcels and lots served by a single point of connection and having an aggregate landscape area greater than 2,500 square feet.

2) All controllers must adjust watering parameters automatically based upon current, local reference evapotranspiration data, provided by a remote or localized weather-based information system, or based upon immediate, automated soil moisture measurements.

3) Irrigation controllers shall be capable of utilizing various input data to develop unique irrigation schedules for the plant establishment period and the established landscape. To develop the unique irrigation schedules, each irrigation controller shall consider all of the following that apply:

a) Irrigation interval (days between irrigation);

b) Irrigation run times (hours or minutes per irrigation event to avoid runoff);

c) Number of cycle starts required for each irrigation event;

d) Application rate setting;

e) Plant type setting;

f) Soil type;

g) Slope factor setting;

h) Shade factor setting; and

i) Irrigation uniformity or efficiency setting.

4) Each independent ET-based irrigation controller installed at a site may operate irrigation valves on only one associated metered connection.

5) All irrigation control systems shall be equipped with rain sensing devices to prevent irrigation during periods of rain unless otherwise specified by the device manufacturer.

6) Sprinkler irrigation systems using potable water shall have a wye strainer located downstream of the meter and on the riser of the backflow prevention device. The backflow device and wye strainer may be replaced with a basket strainer, below grade in a box, when recycled water is used.

7) A pressure-reducing valve must be installed down-stream of the strainer for each system using recycled water, unless otherwise determined to be inappropriate.

8) On irrigation systems using recycled water, strainers and pressure-reducing valves shall be installed below grade in a purple colored rectangular box of sufficient size to easily allow repair or replacement of the unit(s).

9) Bubbler flow rates shall not exceed 1.5 gallons per minute per device. Adjustable bubblers are not permitted.

10) Pop-up sprinklers shall have a minimum riser height of 6-inches.

11) All electronic irrigation control valves shall include design and construction features allowing trouble-free use in harsh conditions including use with non-potable, reclaimed effluent water. These advanced features include brass or industrial-strength nylon housing, flow control, port filtration, captured solenoid plungers, manual external bleeding, and “scrubber” type debris removal.

12) Dedicated landscape water meters shall be installed for all landscape projects except for single family homes.

13) Sprinkler heads and emitters shall have consistent application rates and match precipitation rates within each control valve circuit. Sprinkler heads shall be selected for proper area coverage, application rate, operating pressure, adjustment capability, and ease of maintenance.

14) At a minimum, head to head coverage of sprinkler pattern overlap is required. Greater overlap may be required in windy situations. Sprinkler spacing shall be set to achieve distribution uniformity using the manufacturer’s specifications.

15) Anti-drain (check) valves shall be designed into drip irrigation systems, at strategic points, to minimize or prevent low-head drainage.

16) In-head pressure regulation and check valve devices are required in overhead sprinklers when the device is available from the manufacturer.

17) It is recommended that soil moisture sensing devices be considered where appropriate.

700.9.10.3 Additional Irrigation Equipment for Large Landscapes

These requirements provide additional protection against water waste in larger landscape projects equal to or greater than 21,780 square feet (0.5 acre) of landscape area as defined in these design criteria. This equipment or equipment features are in addition to the requirements in sub-section 700.9.10.2.

1) The District-approved, weather- based irrigation controllers or soil moisture-based irrigation controllers installed in large landscapes must have water use monitoring, recording, and alarm features. The controllers must be capable of:

   a) shutting off malfunctioning individual stations automatically without disrupting the remaining programs and;

   b) shutting off the master control valves in the event of a mainline or valve failures.

2) Automatically operated master control valves must be installed to protect against water loss due to mainline breaks or system malfunction.

3) Flow meters must be installed to allow observation, water loss protection, and recording of irrigation parameters.

700.9.11 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. A grading design plan shall be drawn on project base sheets. It shall be separate from but use the same format as the landscape design plan. The grading design plan shall indicate finished configurations and elevations of the landscaped area, including the height of graded slopes, drainage patterns, pad elevations, and finish grade. The plan should clearly identify storm water retention improvements. To prevent excessive erosion and runoff, it is highly recommended that project applicants:

1) Grade the site so that all irrigation and normal rainfall remains within property lines and does not drain on to non-permeable hardscapes.

2) Avoid disruption of natural drainage patterns and undisturbed soil.

3) Avoid soil compaction in landscape areas.

The grading design plan shall contain the following signed statement:

“I have complied with the criteria of the design standards and applied them accordingly for the efficient use of water in the grading design plan”

The statement shall be signed by a licensed landscape architect, licensed landscape contractor or any other applicable landscape professional, person, licensed or unlicensed, as listed in the Business and Professions Code, California Code of Regulations, or Food and Agriculture Code.

Note: Authority Cited: Section 65595, Gov. Code and Section 1353.8, Civil Code. Reference: Section 65596, Gov. Code and Section 1353.8, Civil Code.

700.9.12 MCWD Certificate of Completion

The MCWD Certificate of Completion is available as a standard District form and can be obtained in electronic format at the District website, http://www.mcwd.org/engr.html.

Upon completion of the landscape and irrigation system installation, the Landscape Contractor and Landscape Architect, Irrigation Designer, Independent Landscape Consultant, or a licensed or certified landscape professional, shall conduct field observations and sign the MCWD Certificate of Substantial Completion verifying the landscape was installed according to the MCWD approved plans and specifications. The document is then signed by the owner or the owner's representative, recognizing that the project has been constructed as planned, the required irrigation audit performed, the soil report recommendations implemented, and that the owner now has responsibility to maintain the site. A copy of the signed Certificate of Completion is then to be delivered to the District, along with the irrigation audit report, for approval or denial. If denied, the District shall provide information to the project applicant regarding reapplication, appeal or other assistance.

This document also includes a statement recognizing the owner's responsibility to conduct an additional irrigation audits, performed by a Certified Landscape Irrigation Auditor, if the sites future water use exceeds the sites Maximum Applied Water Allowance. Water use of all landscapes over 5000 square feet with dedicated irrigation service connections shall be monitored by the District and water use compared to the calculated MAWA for the landscape area served.

An example Certificate of Completion is available in Appendix 43.

700.9.13 Irrigation Audit

For all projects too which these standards apply, and installed after January 1, 2010, the project applicant shall have an irrigation audit performed immediately following the completion of construction or rehabilitation and prior to submission of the Certificate of Completion to the District. The irrigation audit report shall be submitted to the District with the Certificate of Completion. The report may include, but is not limited to: inspection, system tune-up, system test with distribution uniformity, reporting overspray or run off that causes overland flow, and preparation of an irrigation schedule.

All irrigation audits submitted to the District, weather as part of the landscape documentation package or as required by the Water Conservation Ordinance shall:

1) Comply with the "Irrigation Association Certified Landscape Irrigation Auditor Training Manual (2004 or most current version).

2) All landscape irrigation audits shall be conducted by a Certified Landscape Irrigation Auditor.

The District will administer programs that may include, but not be limited to, irrigation water use analysis, irrigation audits, and irrigation surveys for compliance with the Maximum Applied Water Allowance.

700.9.14 Public Education Plan

Development projects consisting of eight or more homes shall provide documentation to the District outlining a comprehensive plan to provide water conservation education materials and displays to new home owners within the development. The plan shall include the following actions by the developer:

1) Provide publications to owners of all new, single family residential homes regarding the design, installation, and maintenance of water efficient landscapes.
2) Provide literature about water efficient landscape design and the efficient use of landscape water throughout the community.
3) Demonstrate via signs and information the principles of water efficient landscapes in all model homes. The signs shall be used to identify the model as an example of a water efficient landscape and featuring elements such as hydrozones, irrigation equipment and others which contribute to the overall water efficient theme.
4) Information shall be provided at the model homes about designing, installing, and maintaining water efficient landscapes.
5) The installation of water efficient public demonstration gardens throughout the community is encouraged.

An example document outlining the work by one developer to fulfill this requirement is shown in Appendix 44.

700.10 DISTRICT PROVIDED LANDSCAPE DOCUMENTATION FORMS

Many of the documents mentioned in these design criteria are available as forms from the District staff or can be found on the District website at http://www.mcwd.org/engr.html. Examples of completed forms are also available as appendixes of this document and are available for viewing on the District website. Considerable effort has been made to make these application forms and landscape documentation forms simple to understand and easy to complete. These electronic forms provide the District with standard, uniform documents that include all the pertinent information necessary to understand, evaluate, comment, and process your application.

The District provided Landscape Documentation Forms and example landscape documents include the following:

1) MCWD Water Efficient Landscape Worksheet (Appendix 31)
   a) Project Information
   b) Checklist of Submitted Documentation
   c) Landscape Site Data Table
   d) Irrigation Station Information Table(s)
   e) Water Budget Calculations
      iii) Maximum Applied Water Allowance (MAWA)
      iv) Estimated Total Water Use (ETWU)
      v) Calculation of Effective Precipitation and the Effective Precipitation Disclosure Statement (optional)
   f) Owners agreement to comply
2) On-Site Recycled Water User Plan (Appendix 19).
3) MCWD ET-Based Irrigation Schedule for the Establishment Period (Appendix 36)
4) MCWD ET-Based Irrigation Schedule for the Mature Landscape (Appendix 37)
5) Irrigation System Map (Appendix 39)
6) Individual Station Maps (Appendix 40)

7) Landscape and Irrigation System Maintenance Schedule(s) (Appendix 41)
8) Soil Management Report (Appendix 42)
9) MCWD Certificate of Completion (Appendix 43)
   a) Landscape Irrigation Audit Report
   b) Documentation verifying implementation of the soil report recommendations.
10) Public Information Plan (Appendix 44)

END OF SECTION