

# Landscape Architecture PS & E Guide

SECTION 5

## Irrigation Plans

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# Irrigation Plans

## Standard Items Required on Irrigation Plans

- Standard North Arrow.
- CU “00000” EA “000001” (lower right corner) (CU = Charge Unit), (EA = Expenditure Authorization).
- Scale (plan sheets, i.e., 1:50).
- “BEGIN IRRIGATION WORK,” “END IRRIGATION WORK,” and “LIMIT OF IRRIGATION WORK” identified with stationing and post mile for ALL projects.
- REGISTRATION SEAL – Signature (CADD signature authorization) (Licensed Landscape Architect, Registered Civil Engineer, or Registered Electrical Engineer No. and current license expiration date inside registration seal in upper right corner) Individual Plan Sheets - Individual project plan sheets shall be affixed with one license seal, number, and signature of the licensed civil, electrical engineer, mechanical engineer, geologist, architect or landscape architect who is knowledgeable about, and in responsible charge for developing that plan. Licensed traffic engineers are not authorized to sign plans or specifications.
- SIGNATURE BLOCK – The printed name, registration number and license expiration date shall appear within the preprinted registration seal along with the registrant’s signature and date signed outside the registration seal and within the signature block on the line provided in the upper right hand corner of the sheet. The signature designation must appear with the registrant’s signature. Do not add job titles such as “Utility Engineer”, “Traffic Engineer”, “Project Studies Engineer”, etc.
- Match Lines identified as “MATCH TO SHEET X-XX.”
- Centerline stationing labeled at 100-foot intervals or a minimum of two stations per sheet and line designations (plan sheets only). Station tick marks at 10 feet using 1 through 9 only.
- Existing right of way (R/W) lines shown and identified (verified by R/W Branch).
- Existing fences and gates shown (verified from field notes).
- New fences and gates shown and identified.
- Existing guard railings, barriers and sound walls shown (verified from field notes).
- Existing ditch flow lines shown (verified from field notes).
- Existing curbs and dikes shown (verified from field notes).
- Existing pavements, sidewalks shown (verified from field notes).
- Cut and fill lines shown (verified from field notes).
- Slope factors and direction arrows shown (i.e., 2:1, 3:1) (Show arrow pointing down hill).
- “IRRIGATION PLAN” (sheet title) and “I - #” for Irrigation Plan projects or “HP - #” for Highway Construction projects (sheet identification code) in lower right corner.
- Abbreviations and symbols consistent with those shown in Irrigation Legend and/or conform to Standard Plans H1 & H2. Irrigation Legend conforms to format used on Standard Plan H2.
- Pipe appropriately labeled (size) and/or provided for in a pipe sizing chart or irrigation notes.
- Callouts for irrigation items shown with appropriate size and abbreviation as under “Standard Irrigation Symbols” and “Standard Sprinkler Symbols” in this section.
- “Connect to Existing System” symbol shown at all Points of Connection between existing and proposed irrigation facilities.

## General

Irrigation systems and components shall be designed to sustain the planting while conserving water, minimizing maintenance and worker exposure to traffic. The design should be simple, efficient, and straightforward. Irrigation concepts utilized should conform to local water conservation goals.

Irrigation systems should be simple, easy to operate and maintain. Facilities need to be adjacent to the R/W, near access gates or adjacent to Maintenance Vehicle Pullouts or access roads. Reduce the number of irrigation components to the minimum to appropriately irrigate the area.

Standard, commercially available irrigation components should be used and special features should not be specified unless they are required to solve unique problems of the site.

## *General continued*

The condition of existing irrigation crossovers must be evaluated prior to incorporating into a highway planting project. Generally, if the existing crossover is over 15 years old it is advisable to install new crossovers.

### *Valves and Sprinklers*

Locate control valves adjacent to access gates, maintenance vehicle pullouts, maintenance access roads or other areas away from traffic.

### *Controllers and Backflow Preventers*

The location of these items should be reviewed with maintenance in the field.

Controller enclosure cabinets shall be located so that the user is facing traffic when working on controllers. Controller enclosure cabinets shall be located outside the clear recovery zone whenever possible.

### *Backflow Preventers*

The use of reduced pressure principle backflow devices is required for highway planting projects. Master remote control valves should be used at all pressured water sources directly downstream of the backflow preventers. Backflow preventers shall be located in enclosures.

### *Gate Valves and Ball Valves*

Gate valves are to be used to divide large irrigation systems into smaller sections so when there is a malfunction the bad section may be isolated to keep the remaining sections functional. Gate valves are generally installed on each side of irrigation crossovers.

Ball valves are used in front of Electric Remote Control Valves that have been manifolded (clustered). This allows maintenance to service the valves without the mainline having to be drained and flooding the valve boxes.

Do NOT use ball valves at irrigation crossovers. Ball valves that are closed rapidly can cause water hammer.

### *Booster Pump Systems*

See the Memorandum on Booster Pump Plans on the Landscape Architecture web site at: [http://www.dot.ca.gov/hq/LandArch/policy/pdf/booster\\_pump.pdf](http://www.dot.ca.gov/hq/LandArch/policy/pdf/booster_pump.pdf)

# Irrigation Design

## Questions the Designer Should Ask Themselves

- Are controllers, backflow preventers and other serviceable equipment in safe and visible locations? Are they placed adjacent to a MVP, access gate, access road or other accessible location?
- Does this design minimize worker exposure to traffic?
- Are remote control valves clustered?
- Are the irrigation valves, sprinklers and risers maintainable, protected from vandalism and other damage, and in locations away from traffic where they can be safely serviced?
- Are irrigation enclosure cabinets placed so the user is facing traffic?
- Are plants with different water requirements watered with separate valves?
- Is the proposed irrigation system simple to understand, operate and maintain? Does the system minimize irrigation heads while providing appropriate coverage?
- Does the proposed irrigation system use or address reclaimed water? If reclaimed water is used, has it received tertiary treatment and is the irrigation system compatible? Are existing water and power sources, and irrigation facilities (booster pumps, backflow preventers, etc.) functioning and adequate for the proposed irrigation system?
- Will maintenance personnel require additional training to operate the proposed irrigation systems? Have the special provisions been written to provide training?
- If existing irrigation crossovers, water line crossovers, sprinkler control crossovers and bridge supply lines are to be utilized are they still there, in good condition and adequately sized for the project? Avoid the use of crossovers that are 15 years old or older.
- Are trees that are located in overhead watered ground cover areas being provided with supplemental basin irrigation?
- If this is a rehabilitation project, will the proposed improvements make the existing irrigation system easier to maintain?

## A Review of the DON'TS of Good Design

- Locate valves or supply lines next to traveled way if other locations are available.
- Locate valves on outside of curves.
- Expect the Contractor to pull old 2" GSP supply line (water crossover) out of a conduit (irrigation crossover) and replace it with a new supply line.
- Expect 30 year old asbestos cement pipe under roadways to be useable (verify their condition).
- Expect to use an existing irrigation system, especially existing irrigation crossovers that are more than 15 years old.
- Locate Maintenance Vehicle Pullouts in the middle of loop ramps or at the end of ramps on embankment slopes.
- Locate irrigation crossovers within narrow part of gore areas.
- Design complicated irrigation systems that are difficult to maintain.

## Irrigation Legend Options

### Option 1

Use Standard Plan H2 for the irrigation legend. To use Standard Plan H2, prepare the most current version of Standard Special Provision, "StdPln\_A##-##-##" indicating those standard plans that are pertinent to the project.

If the irrigation plan contains non-standard irrigation equipment, either existing or proposed, for which there is no standard symbol (per Standard Plan H2), develop a new symbol (including an item description and abbreviation, if necessary).

**Note:** Place the new symbol in a legend on the first sheet of the irrigation plans. If there is not enough room to show non-standard symbols on the first sheet of the irrigation plans a note must be added to direct the Contractor to where the legend is located in the plans, i.e., See sheet SD-1 for Irrigation Legend.

### Option 2

Place an Irrigation Legend on the first sheet of the irrigation plans for proposed and existing irrigation facilities. Show only the symbols (with their item description and abbreviation) being used on the project. The symbols (with their item description and abbreviation) shall be the same as those shown on Standard Plan H2.

Substituting or altering standard symbols or item descriptions is not allowed. In the event that non-standard items are needed, a new symbol (including an item description and abbreviation, if necessary) should be developed and added to the legend.

**Note:** If there is not enough room to show non-standard symbols on the first sheet of the irrigation plans a note must be added to direct the Contractor to where the legend is located in the plans, i.e., See sheet SD-1 for Irrigation Legend.

## Irrigation Notes

Irrigation notes must be shown on the first sheet of the irrigation plans.

OR

If there is not enough room for the irrigation notes on the first sheet of the irrigation plans a note must be added to the first page to direct the Contractor to where the irrigation notes are located in the plans, i.e., See sheet SD-1 for Irrigation Notes.

## Existing Irrigation Facilities

Standard symbols and item descriptions for existing irrigation facilities are stored electronically in the Caltrans Cell Library. The identical size and line weight must be used and shown on the plans. Existing irrigation symbols are composed of dashed lines. These symbols were hand drawn and not created by use of a standard dashed line. Use the symbols in the Caltrans Cell Library to get an accurate symbol.

OR

Base plans may be from previous project plans by using the dropout process whether or not the symbols match those shown in the Standard Plans. Place a Legend on the plans.

OR

If the plans are CADD drawn, the symbols for existing facilities should be dashed symbols as indicated in Standard Plan H2.

Non-standard symbols must be placed in a legend on the first sheet of the irrigation plans.

**Note:** If there is not enough room to show non-standard symbols on the first sheet of the irrigation plans a note must be added to direct the Contractor to where the legend is located in the plans, i.e., See sheet SD-1 for Irrigation Legend.

## Standard CADD Irrigation Symbols

Standard symbols and item descriptions (including abbreviations) shown on the Standard Plans “Planting and Irrigation Symbols,” sheet H2 and the standard sprinkler symbols discussed later in this section, shall be used for Irrigation Plans.

Substituting or altering standard symbols or item descriptions is not allowed. In the event that non-standard items are needed, a new symbol should be developed. Do not combine standard and non-standard symbols and descriptions.

### Cells

The CADD cell names for each existing and proposed symbol are found in the Caltrans [CADD Cell Library](#) (see page 5-15).

### Levels

Cells for proposed items are placed on level 50. Cells for existing items should be placed on level 29 and not level 5. Level 5 is a dropout level and using this level with the dashed symbols makes those symbols hard to see on the reproduced plans. It is suggested to use the dashed existing symbols on an undefined level, see page 2-3 for undefined levels available.

### Cell Line Weights for Standard Irrigation Symbols

The CADD line weight for all cells (new and existing) shall be “1” except for the following:

Control and Neutral Conductors	0
Ductile Iron Pipe (DIP) (Supply Line) (Main)	3
Galvanized Steel Pipe (GSP) (Supply Line) (Main)	3
Plastic Pipe (PR200) (Supply Line) (Main)	3

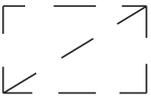
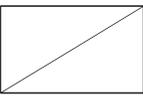
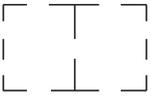
### Cell Text Weights for Standard Irrigation Abbreviations

Abbreviations shall be placed on level 5 for existing and on level 50 for proposed. Use Font = 1, Text = 1.8, Weight = 1.

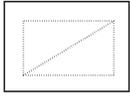
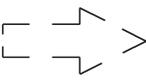
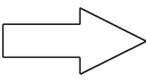
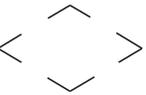
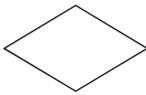
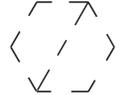
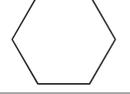
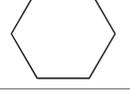
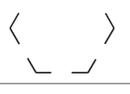
### Instructions for Using EXISTING and PROPOSED Irrigation Symbols

The instructions under the “ITEM DESCRIPTION” are given for ‘PROPOSED’ and ‘EXISTING’ irrigation symbols. The sizes of ‘EXISTING’ irrigation items should be shown only where the Contractor needs information in order to perform the proposed work. Size information is necessary for the Contractor, for work such as when an existing supply line (main and/or lateral) is being connected, where pipe will be pulled through irrigation crossovers and any other applicable irrigation equipment.

## Standard Irrigation Symbols / Irrigation Legend

Symbol For Existing	Symbol For Proposed	Item Description	Abbreviation On Plan
Instructions are given following item descriptions for <u>existing</u> and <u>proposed</u> items. Additional instructions for proposed items are on page <a href="#">5-4</a> and existing items are on page <a href="#">5-3</a> .			
		<b>Water Meter (WM)</b> Show size and abbreviation beside symbol. <b>Do not add (By Others)</b> For existing, show existing symbol only. However, if new work is to be connected to the WM, also show size and abbreviation beside symbol.	<b>WM</b>
		<b>Backflow Preventer Assembly (BPA)</b> Show size and abbreviation beside symbol. For existing, show existing symbol only. However, if new work is to be connected to the BPA, also show size and abbreviation beside symbol.	<b>BPA</b>
		<b>Backflow Preventer Assembly In Enclosure (BPAE)</b> Show the size of BPA and abbreviation beside symbol. For existing, show existing symbol only. However, if new work is to be connected to the BPA, also show size and abbreviation beside symbol.	<b>BPAE</b>

*Standard Irrigation Symbols / Irrigation Legend continued*

<i>Symbol For Existing</i>	<i>Symbol For Proposed</i>	<i>Item Description</i>	<i>Abbreviation On Plan</i>
Instructions are given following item descriptions for <u>existing</u> and <u>proposed</u> items. Additional instructions for proposed items are on page <a href="#">5-4</a> and existing items are on page <a href="#">5-3</a> .			
		<b>Backflow Preventer Enclosure (BPE)</b> Show abbreviation beside symbol. For existing, show existing symbol only.	BPE
		<b>Booster Pump (BP)</b> Show abbreviation beside symbol. For existing, show existing symbol only.	BP
		<b>Truck Loading Standpipe (TLS)</b> Show abbreviation beside symbol. For existing, show existing symbol only.	TLS
		<b>Flow Sensor (FS)</b> Show size beside symbol. For existing, show existing symbol only	NONE
<b>Stand Alone (pedestal mounted or attached to a structure) Irrigation Controllers</b> <i>For RICS Systems see page <a href="#">5-7</a></i>			
		<b>Master Irrigation Controller (MIC)</b> <i>See below for instructions.</i>	MIC – ‘A’12 Station 11 Stations Used
		<b>Auxiliary Irrigation Controller (AIC)</b> <i>See below for instructions.</i>	AIC - ‘A’ 12 Station 11 Stations Used
		<b>Irrigation Controller (IC)</b> <i>See below for instructions.</i>	IC - ‘A’ 12 Station 10 Stations Used
		<b>Irrigation Controller (IC) (Battery)</b> <i>See below for instructions.</i>	IC Battery - ‘C’ 8 Station 8 Stations Used
		<b>Irrigation Controller (IC) (Solar)</b> <i>See below for instructions.</i>	IC Solar - ‘A’ 8 Station 8 Stations Used

*The following instructions apply to the above Irrigation Controllers:*

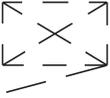
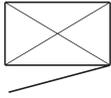
When the controller is stand alone (pedestal mounted or attached to a structure), show the “controller” symbol. Identify the symbol with the appropriate abbreviation (MIC, AIC, IC, IC BATTERY or IC SOLAR) along with the following:

1. The controller’s unique letter designation, i.e., A, B, C, etc.
2. The number of controller stations, i.e., 16 Station, 12 Station, etc.
3. Indicate number of stations used, i.e., 15 Stations Used, 12 Stations Used, etc.

For existing show the existing symbol and abbreviation on plan the same as “proposed.”

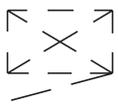
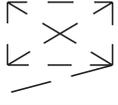
**Note:** When controller(s) are to be installed in a controller enclosure cabinet, use “Irrigation Controller(s) in Controller Enclosure Cabinet (ICC)” on next page.

Standard Irrigation Symbols / Irrigation Legend continued

Symbol For Existing	Symbol For Proposed	Item Description	Abbreviation On Plan
Instructions are given following item descriptions for existing and proposed items. Additional instructions for proposed items are on page 5-4 and existing items are on page 5-3.			
		<p><b>Irrigation Controller(s) in Controller Enclosure Cabinet (ICC)</b>                      When irrigation controllers are in an enclosure cabinet, show the “controller enclosure cabinet symbol” not the “controller” symbol.</p> <p>The abbreviation beside the symbol should be the controller enclosure cabinet abbreviation “ICC”* and the following notation:</p> <ol style="list-style-type: none"> <li>1. Each controller’s unique letter designation, i.e., A, B, C, etc.</li> <li>2. The number of controller stations, i.e., 16 Station, 12 Station, etc.</li> <li>3. The number of stations used, i.e., 15 Stations Used, 12 Stations Used, etc.</li> </ol> <p><b>Use the abbreviation ICC only once for each enclosure cabinet.</b></p> <p>* If a Master, Auxiliary or Battery controller is installed in an enclosure cabinet, identify the type of controller(s) (MIC, AIC, or BATTERY) to be installed in the cabinet after the controller enclosure cabinet abbreviation ICC and the above notations.</p> <p>For existing, show existing symbol and abbreviation beside the symbol on plan the same as for “proposed”.</p>	<p>ICC -‘A’ and ‘B’                      12 Stations Each                      All Stations Used                      Or                      ICC -‘A’ and ‘B’                      ‘A’ -12 Station                      12 Stations Used                      ‘B’ -24 Station                      20 Stations Used                      Or                      *ICC -MIC ‘B’ and AIC ‘A’                      12 Stations Each                      ‘B’ -10 Stations Used                      ‘A’ -11 Stations Used                      Or                      *ICC -AIC ‘C’ and ‘D’                      ‘C’ -12 Stations Each                      10 Stations Used                      ‘D’ -24 Station                      21 Stations Used                      Or                      *ICC-Battery ‘A’ and ‘B’                      12 Stations Each                      ‘A’ -10 Stations Used                      ‘B’ -12 Stations Used                      For RICS Systems see <a href="#">page 5-7</a></p>

**Remote Irrigation Control System (RICS)**

If a RICS is being installed, use an "Item Description" that fits the type of equipment being identified on the plans that matches the description of the equipment specified in the Special Provisions and the Engineers Estimate. Use the ICC symbol and abbreviation (ICC) once per cabinet and list the items being installed. Below are a few examples. Also make sure the Valve Code for the RCV's is shown on the plans. See page 5-14.

Symbol For Existing	Symbol For Proposed	Item Description	Abbreviation On Plan
Instructions are given following item descriptions for <u>existing</u> and <u>proposed</u> items. Additional instructions for proposed items are on page 5-4 and existing items are on page 5-3.			
		Central Control Unit (CCU)	ICC -CCU '1' 12 Station 11 Stations Used
		Satellite Controller (SAT)	SAT - '2' 12 Station 11 Stations Used
		Field Unit	ICC-Field Unit-'10' 12 Station 11 Stations Used

The Following Instructions Apply To The Above RICS Items:

1. Identify the above symbol with ICC followed with the appropriate name or abbreviation. If it is non-standard be sure to show it in a legend.
2. The RICS controller's unique number or letter designation, i.e., 1, 2, 3, etc. or A, B, C, etc.  
NOTE: Most RICS systems being installed use a number designation, i.e., 1, 2, 3, etc. The software for most RICS systems does not let the user use letters to identify controllers or valves.
3. The number of controller stations, i.e., 16 Station, 12 Station, etc.
4. Indicate number of stations used, i.e., 15 Stations Used, 12 Stations Used, etc.

**Note:** If the above equipment is going to be installed in an existing ICC then use the Controller Symbol as shown on page 5-6 beside the Existing ICC symbol. Make sure your SSP's cover removal of existing equipment from the cabinet. If the existing ICC is also going to be relocated use the proposed ICC Symbol and place an R inside the symbol. Show the new symbol in a legend. Use the Controller Symbol as shown on page 5-6 beside the Existing ICC symbol. Show one symbol for EACH controller being installed.

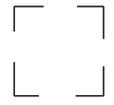
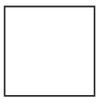
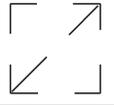
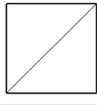
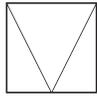
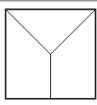
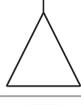
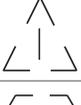
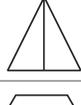
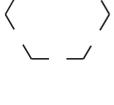
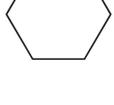
Standard Irrigation Symbols / Irrigation Legend continued

Symbol For Existing	Symbol For Proposed	Item Description	Abbreviation On Plan
Instructions are given following item descriptions for <u>existing</u> and <u>proposed</u> items. Additional instructions for proposed items are on page <u>5-4</u> and existing items are on page <u>5-3</u> .			
		<p><b>Control and Neutral Conductors (CNC)</b></p> <p>Use standard symbol to show routing of conductors. Sizes of conductors are covered in the Standard Specifications.</p> <p>or</p> <p>Add the following Irrigation note to the irrigation plans (one time):                      “Control and neutral conductors routing shall be the same as the irrigation systems main lines unless otherwise shown.”</p> <p>And only show the CNC symbol where it doesn’t follow the main supply lines.</p> <p><u>Showing only where CNC that are not installed in main line trenches is faster but be sure to take your time in calculating the quantity of CNC for the estimate.</u></p> <p>For existing, show existing symbol only.</p>	NONE
		<p><b>Sprinkler Control Conduit</b></p> <p>Use the Sprinkler Control Conduit symbol when rigid metallic conduit installation is not covered by Section 20-5.0271 “Conductors, Electrical Conduit and Pull Boxes” of the Standard Specifications.</p> <p>Show size beside symbol.</p> <p>When installing on or in an existing bridge (highway planting project), label with the size and installation location beside symbol. <u>See Irrigation Facilities To Be Installed On Bridge Or In Bridge on page 5-17 for additional important instructions.</u></p> <p><u>When installing in a proposed bridge (highway construction project), see Irrigation Facilities To Be Installed On Bridge Or In Bridge on page 5-17 for additional important instructions.</u></p> <p>For existing, show existing symbol only. However, if control and neutral conductors are to be installed in the conduit, also show size. See page 5-17 for <u>Irrigation Control Wire Conduit Sizing Charts</u>.</p>	<p>NONE</p> <p>On Bridge* or In Bridge*</p> <p>*Installation location</p>
		<p><b>Conduit</b></p> <p>See Section 7 page 7-4 through 7-6 for discussions on conduit used for Irrigation Crossovers on how to show and label on plans.</p>	
		<p><b>Irrigation Sleeve</b></p> <p>Show size for the irrigation sleeve beside the symbol. Use with SSP 20-120. Irrigation Sleeves are not Irrigation Crossovers.</p>	NONE

Standard Irrigation Symbols / Irrigation Legend continued

Symbol For Existing	Symbol For Proposed	Item Description	Abbreviation On Plan
Instructions are given following item descriptions for <u>existing</u> and <u>proposed</u> items. Additional instructions for proposed items are on page 5-4 and existing items are on page 5-3.			
-----	-----	<b>Galvanized Steel Pipe (GSP) (Supply Line) (Main)</b> Show both size and abbreviation beside symbol. When installed on or in an existing bridge (highway planting project), label with the size, abbreviation and installation location beside symbol. See <a href="#">Irrigation Facilities To Be Installed On Bridge Or In Bridge</a> on page 5-17 for additional important instructions. When installing in a proposed bridge (highway construction project), see <a href="#">Irrigation Facilities To Be Installed On Bridge Or In Bridge</a> on page 5-17 for additional important instructions. For existing, show existing symbol and size.	GSP  GSP On Bridge*  or  GSP In Bridge* * Installation location
----- dip -----	— D I P —	<b>Ductile Iron Pipe (DIP) (Supply Line) (Main)</b> Show size beside symbol. When installed on or in an existing bridge (highway planting project), label with the size and installation location beside symbol. See <a href="#">Irrigation Facilities To Be Installed On Bridge Or In Bridge</a> on page 5-17 for additional important instructions. When installed in a proposed bridge (highway construction project), see <a href="#">Irrigation Facilities To Be Installed On Bridge Or In Bridge</a> on page 5-17 for additional important instructions. For existing, show existing symbol and size.	NONE  On Bridge* or In Bridge* * Installation location
-----	-----	<b>Galvanized Steel Pipe (GSP) (Supply Line) (Lateral)</b> Show both size and abbreviation beside symbol. When installing on or in an existing bridge (highway planting project), label with size, abbreviation and installation location beside symbol. See <a href="#">Irrigation Facilities To Be Installed On Bridge Or In Bridge</a> on page 5-17 for additional important instructions. When installing in a proposed bridge (highway construction project), see <a href="#">Irrigation Facilities To Be Installed On Bridge Or In Bridge</a> on page 5-17 for additional important instructions. For existing, show existing symbol and size.	GSP  GSP On Bridge* or GSP In Bridge* * Installation location
-----	-----	<b>Plastic Pipe (PR200) (Supply Line) (Main)</b> Plastic pipe (main) sizes should be indicated next to the pipe. For existing, show existing symbol and size	NONE
-----	-----	<b>Plastic Pipe (PR200) (Supply Line) (Lateral)</b> Plastic pipe (lateral) sizes may be indicated by the following methods: next to the pipe, in pipe sizing chart or in an irrigation note, i.e., Unlabeled lateral plastic pipe supply line shall be 3/4". For existing, show existing symbol and size.	NONE

*Standard Irrigation Symbols / Irrigation Legend continued*

<i>Symbol For Existing</i>	<i>Symbol For Proposed</i>	<i>Item Description</i>	<i>Abbreviation On Plan</i>
Instructions are given following item descriptions for <u>existing</u> and <u>proposed</u> items. Additional instructions for proposed items are on page <a href="#">5-4</a> and existing items are on page <a href="#">5-3</a> .			
		<b>Plastic Pipe (Irrigation Line)</b> Plastic pipe may be sized by the following methods: next to the pipe, in pipe sizing chart or in an irrigation note, i.e., Unlabeled lateral plastic pipe shall be 3/4". Note: Irrigation line is flexible, non-rigid pipe. For existing, show existing symbol and size.	NONE
		<b>Remote Control Valve (RCV)</b> <b>Remote Control Valve (Master) (RCVM)</b> For Remote Control Valve (RCV) show the Valve Code beside standard symbol. See page <a href="#">5-13</a> . For Remote Control Valve (Master) (RCVM) show both size and abbreviation beside symbol. For existing, show existing symbol and the Valve Code. For RICS see <a href="#">Valve Codes</a> on page <a href="#">5-14</a> .	NONE  RCVM
		<b>Manual Control Valve (MCV)</b> Show "Valve Code" beside standard symbol. See page <a href="#">5-13</a> . For existing, show existing symbol and the Valve Code.	NONE
		<b>Valve Assembly Unit (VAU)</b> For Valve Assembly Unit show the Valve Code beside standard symbol. See page <a href="#">5-13</a> . For existing, show existing symbol and the Valve Code.	NONE
		<b>WYE Strainer (WS)*</b>	WS
		<b>Gate Valve (GV)*</b>	GV
		<b>Ball Valve (BV)*</b>	BV
		<b>Quick Coupling Valve (QCV)*</b> If the quick coupling valves are to be installed with a swing joint, an irrigation note may be used to denote this requirement. The Sprinkler Schedule should not be used to identify quick coupling valves.	QCV

\*Note: Unless otherwise noted, these notes apply. Show both size and abbreviation beside symbol. An irrigation note on the plans may be used if all valves are the same size. For example, "Wye Strainers shall be 2'" or "Check Valves shall be 2" unless otherwise noted.

For existing, show existing symbol only. However, if new work is to be connected to the existing item, also show size and abbreviation beside symbol.

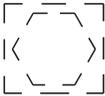
Standard Irrigation Symbols / Irrigation Legend continued

Symbol For Existing	Symbol For Proposed	Item Description	Abbreviation On Plan
Instructions are given following item descriptions for <u>existing</u> and <u>proposed</u> items. Additional instructions for proposed items are on page 5-4 and existing items are on page 5-3.			
		Pressure Reducing Valve (PRV)*	PRV
		Pressure Relief Valve (PRLV)*	PRLV
		Flow Control Valve (FCV)*	FCV
		Combination Air Release Valve (CARV)*	CARV
		Check Valve (CV)*	CV
		<b>Flush Valve (FV)</b> Show symbol only. All flush valves will be 3/4" as shown on Standard Plan H7. If the flush valves are all one different size than the standard, add an irrigation note on the plans, i.e., "Flush valves shall be 2". If flush valves are different sizes show the size and abbreviation by each flush valve. For existing, show symbol only.	NONE
		<b>Nozzle Line W / Turning Union (NL)</b> Show both size and abbreviation. Pipe sizes may be indicated by the following methods: next to the pipe, in pipe sizing chart or in an irrigation note. For existing, show existing symbol only.	NL
		<b>Irrigation System</b> Show symbol only. For existing, show existing symbol only.	NONE
		<b>Irrigation System To Be Removed</b> Show symbol only. For existing, show existing symbol and sizes when appropriate.	NONE

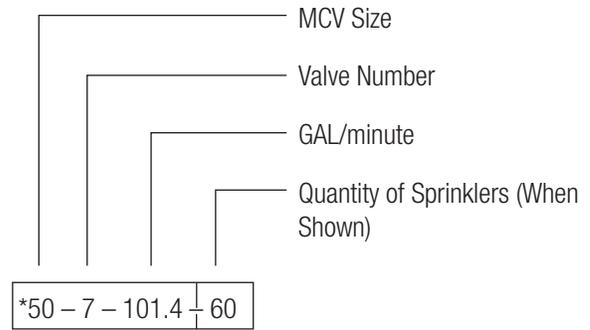
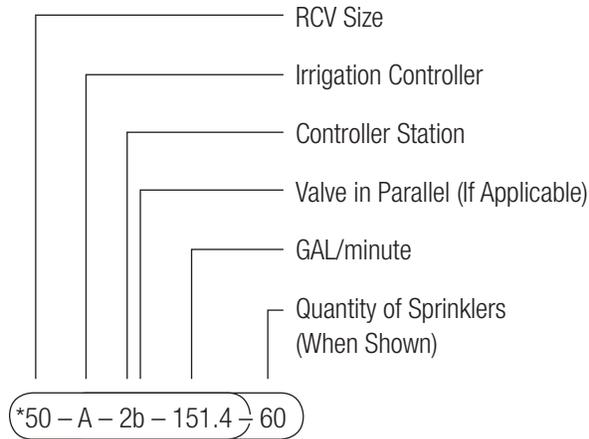
\*Note: Unless otherwise noted, these notes apply. Show both size and abbreviation beside symbol. An irrigation note on the plans may be used if all valves are the same size. For example, "Pressure Relief Valves shall be 2" or "Flow Control Valves shall be 2" unless otherwise noted.

For existing, show existing symbol only. However, if new work is to be connected to the existing item, also show size and abbreviation beside symbol.

Standard Irrigation Symbols / Irrigation Legend continued

Symbol For Existing	Symbol For Proposed	Item Description	Abbreviation On Plan
Instructions are given following item descriptions for <u>existing</u> and <u>proposed</u> items. Additional instructions for proposed items are on page 5-4 and existing items are on page 5-3.			
		<b>Chain Link Gate</b> Show width, type of gate and height beside symbol, i.e., 4' GATE (CL-6). This indicates a four foot wide gate in a six foot high chain link fence. For existing, show existing symbol only.	GATE (CL- )
		<b>Sprinkler W / Sprinkler Protector</b> Show standard symbol for the sprinkler type within the square standard symbol for sprinkler protector. For existing, show existing symbol only.	NONE
		<b>Quick Coupling Valve W/ Sprinkler Protector</b> Show standard symbol for quick coupling valve within the standard symbol for sprinkler protector. Show both size and abbreviation beside symbol. An irrigation note on the plans, i.e., Quick Coupling Valves shall be 3/4", may be used in lieu of showing the size for each quick coupling valve if all valves are the same size. If the quick coupling valves are to be installed with a swing joint, an irrigation note may be used to denote this requirement. For existing, show existing symbol only.	QCV
		<b>Cam Coupler Assembly</b> Show abbreviation beside symbol.	NONE
		<b>Connect To Existing System</b> Show a lead line from the "diamond" to the actual point of connection. For existing, show existing symbol only.	NONE
		<b>Cap</b> Capping a proposed supply Line. Existing cap on an existing supply line. Show symbol only.	NONE
		<b>Cap Existing</b> Capping an existing supply line. Show symbol only.	NONE

## Valve Codes



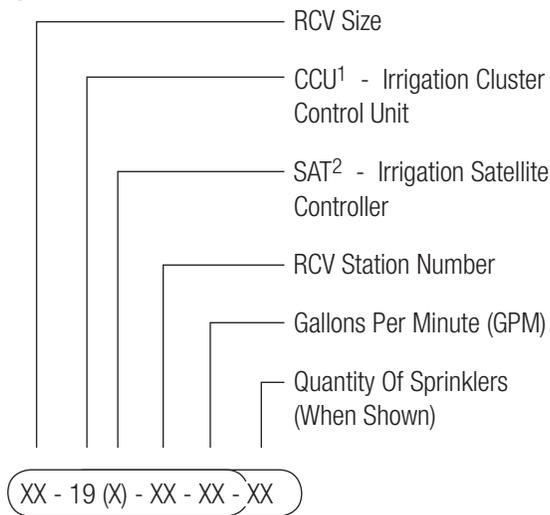
\*Valve Codes for Existing Valves are shown in a Dashed Enclosure.

## Non-Standard Irrigation Symbols / Irrigation Legend

Approved Non-Standard Symbols For Existing	Approved Non-Standard Symbols For Proposed	Approved Item Description	Abbreviation On Plan
		<p><b>Remote Control Valve (Master) W/Flow Meter (RCVMF)</b> For Remote Control Valve (Master) w/Flow Meter show "Valve Code" beside symbol. <i>See page 5-14. This item is used on RICS systems.</i> For existing, show existing symbol and "Valve Code". <b>An Irrigation Legend for the symbol must be placed on the Irrigation Plans.</b> See next page for suggested Valve Code.</p>	NONE

## Valve Code for RICS

*Example: Valve Code for RICS when no other irrigation system exists.*

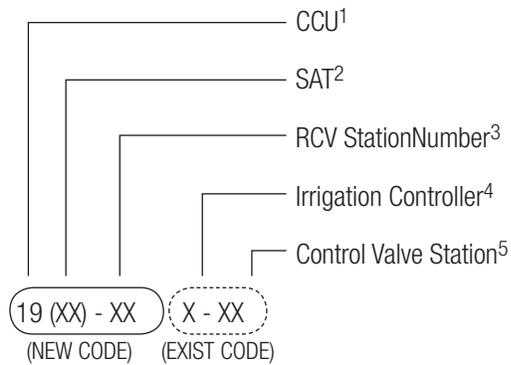


- 1 Use appropriate type of controller (CCU or MASTER, ETC.) as specified in the special provisions.
- 2 Use appropriate type of controller (SLAVE OR FIELD UNIT, ETC.) as specified in the special provisions.

**Note:** Both of the above callouts may not be necessary. Show the components that are being used in the field. Adjust Valve Code as necessary. **Valve Code MUST be in Legend.**

*Example: Valve Code used when converting existing irrigation systems to RICS.*

### VALVE CODE



- 1 Use appropriate type of controller (CCU or MASTER, ETC.) as specified in the special provisions.
- 2 Use appropriate type of controller (SLAVE OR FIELD UNIT, ETC.) as specified in the special provisions.

**Note:** Both of the above callouts may not be necessary. Show the components that are being installed the field. Adjust Valve Code as necessary.

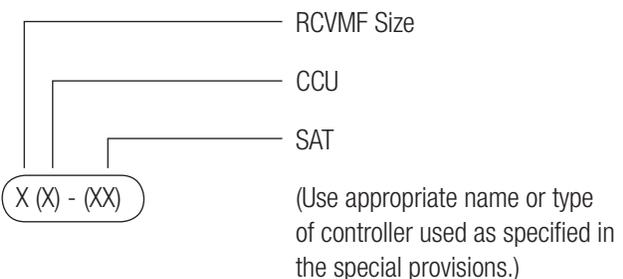
- 3 New RCV station number. For example: 1, 2, etc.
- 4 Existing Irrigation Controller callout. For example: 'A', 'B', etc.
- 5 Existing RCV station number. For example: 1, 2, etc.

**Note:** Valve Code MUST be in Legend.

## Approved Non-Standard Valve Code

(Must show Valve Code on the Irrigation Plans)

### VALVE CODE for RCVMF



# Irrigation Symbols Sheet w/Cadd Cell Names

REVISOR		DATE		CALCULATED-DESIGNED BY		CHECKED BY																																																																																																																																																																															
<table border="1"> <thead> <tr> <th>EXISTING CELL AND CELL NAME</th> <th>PROPOSED CELL AND CELL NAME SHOWN CONNECTED TO SUPPLY LINE FOR REFERENCE</th> <th>ITEM DESCRIPTION</th> <th>EXISTING CELL AND CELL NAME</th> <th>PROPOSED CELL AND CELL NAME SHOWN CONNECTED TO SUPPLY LINE FOR REFERENCE</th> <th>ITEM DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td>XWM</td> <td>WM</td> <td>WATER METER (BY OTHERS)</td> <td>XQCV</td> <td>CCV</td> <td>CAM COUPLING ASSEMBLY</td> </tr> <tr> <td>XBPA</td> <td>BPA</td> <td>BACKFLOW PREVENTER ASSEMBLY</td> <td>QCV</td> <td>QCV</td> <td>QUICK COUPLING VALVE</td> </tr> <tr> <td>XBPAE</td> <td>BPAE</td> <td>BACKFLOW PREVENTER ASSEMBLY IN ENCLOSURE</td> <td>XPRV</td> <td>PRLV</td> <td>PRESSURE REDUCING VALVE</td> </tr> <tr> <td>XBPE</td> <td>BPE</td> <td>BACKFLOW PREVENTER ENCLOSURE</td> <td>XPRLV</td> <td>PRV</td> <td>PRESSURE RELIEF VALVE</td> </tr> <tr> <td>XBP</td> <td>BP</td> <td>BOOSTER PUMP</td> <td>XFCV</td> <td>FCV</td> <td>FLOW CONTROL VALVE</td> </tr> <tr> <td>XTLS</td> <td>TLS</td> <td>TRUCK LOADING STANDPIPE</td> <td>XCARV</td> <td>CARV</td> <td>COMBINATION AIR RELEASE VALVE</td> </tr> <tr> <td>XFS</td> <td>FS</td> <td>FLOW SENSOR</td> <td>CV</td> <td>CV</td> <td>CHECK VALVE</td> </tr> <tr> <td>XMIC</td> <td>MIC</td> <td>MASTER IRRIGATION CONTROLLER</td> <td>XFV</td> <td>FV</td> <td>FLUSH VALVE</td> </tr> <tr> <td>XAIC</td> <td>AIC</td> <td>AUXILIARY IRRIGATION CONTROLLER</td> <td>XNLTU</td> <td>NLTU</td> <td>NOZZLE LINE TURNING UNION</td> </tr> <tr> <td>XIC</td> <td>IC</td> <td>IRRIGATION CONTROLLER IRRIGATION CONTROLLER (BATTERY)</td> <td>NLTUE</td> <td>NLTUE</td> <td>NOZZLE LINE TURNING UNION END</td> </tr> <tr> <td>XICC</td> <td>ICC</td> <td>IRRIGATION CONTROLLER(S) IN CONTROLLER ENCLOSURE CABINET</td> <td>(NONE)</td> <td>(NONE)</td> <td>IRRIGATION SYSTEM</td> </tr> <tr> <td>XCN</td> <td>CNC</td> <td>CONTROL AND NEUTRAL CONDUCTORS</td> <td>(NONE)</td> <td>(NONE)</td> <td>IRRIGATION SYSTEM TO BE REMOVED</td> </tr> <tr> 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XPP	PPSL	PLASTIC PIPE (PR 200)(SUPPLY LINE)(LATERAL)																																																																																																																																																																																			
XPPIL	PPIL	PLASTIC PIPE (IRRIGATION LINE)																																																																																																																																																																																			
XRCV	RCV	REMOTE CONTROL VALVE REMOTE CONTROL VALVE (MASTER)																																																																																																																																																																																			
XMCV	MCV	MANUAL CONTROL VALVE																																																																																																																																																																																			
XVAU	VAU	VALVE ASSEMBLY UNIT																																																																																																																																																																																			
XWS	WS	WYE STRAINER																																																																																																																																																																																			
XFAU	FAU	FILTER ASSEMBLY UNIT																																																																																																																																																																																			
XGV	GV	GATE VALVE																																																																																																																																																																																			
XBV	BV	BALL VALVE																																																																																																																																																																																			
<p>RCV SIZE IRRIGATION CONTROLLER CONTROLLER STATION VALVE IN PARALLEL (IF APPLICABLE) GPM QUANTITY OF SPRINKLERS (WHEN SHOWN)</p> <p>MCV SIZE VALVE NUMBER GPM QUANTITY OF SPRINKLERS (WHEN SHOWN)</p> <p>* VALVE CODES FOR EXISTING VALVES ARE SHOWN IN A DASHED ENCLOSURE.</p> <p style="text-align: center;"><b>VALVE CODE</b></p>																																																																																																																																																																																					
<p><b>STANDARD IRRIGATION SYMBOLS SYMBOL W/CADD CELL NAME FROM MASTER CELL LIBRARY "CTCELLIB" AND ITEM DESCRIPTIONS</b></p>																																																																																																																																																																																					

LAST REVISION: 00-00-00 DATE PLOTTED => 11/29/2008 TIME PLOTTED => 3:23:05 PM

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## Irrigation Control Wire Conduit Sizing Charts

\* Based on stds & info from D5 electrical (Mohd Gani) 7/00

For New Jobs (Based on 26% Fill Sched 40 ID)

14 Gauge UF Control Wires	
Number of Wires	Size of Conduit
19	1-1/2" (40mm)
31	2" (50mm)
44	2-1/2" (65mm)
68	3" (75mm)

12 Gauge UF Control Wires	
Number of Wires	Size of Conduit
16	1-1/2" (40mm)
26	2" (50mm)
37	2-1/2" (65mm)
58	3" (75mm)

10 Gauge UF Control Wires	
Number of Wires	Size of Conduit
13	1-1/2" (40mm)
22	2" (50mm)
31	2-1/2" (65mm)
49	3" (75mm)

For Rehab Jobs (Based on 35% Fill Sched 40 ID)

14 Gauge UF Control Wires	
Number of Wires	Size of Conduit
25	1-1/2" (40mm)
42	2" (50mm)
60	2-1/2" (65mm)
92	3" (75mm)

12 Gauge UF Control Wires	
Number of Wires	Size of Conduit
21	1-1/2" (40mm)
35	2" (50mm)
50	2-1/2" (65mm)
78	3" (75mm)

10 Gauge UF Control Wires	
Number of Wires	Size of Conduit
18	1-1/2" (40mm)
30	2" (50mm)
43	2-1/2" (65mm)
66	3" (75mm)

ID = Inside Diameter    UF = Multiconductor sheathed cable type

## Irrigation Facilities to be Installed "On Bridge" Or "In Bridge"

### Highway Planting Projects

When it is necessary to place irrigation facilities, i.e., Sprinkler Control Conduit, Ductile Iron Pipe and Galvanized Steel Pipe, on or in an existing bridge, approval must be obtained from the Office of Structures Maintenance and Investigations (OSMI).

Furnish OSMI with irrigation plan sheets and proposed Pipe Anchor detail(s) (Type I or Type II) of Standard Plan H9, and proposed standard special provisions early in the design process. OSMI will either approve the proposal or, if unusual conditions warrant special design work, provide specific plans, details, and special provisions. Also, OSMI should be included on the list for final district PS&E review.

### Highway Construction Projects

When irrigation facilities, i.e., Sprinkler Control Conduit, Ductile Iron Pipe and Galvanized Steel Pipe, are installed in a proposed bridge, show the following note(s) at each applicable structure on the irrigation plan:

- For Sprinkler Control Conduit: "See Electrical plans."
- For Ductile Iron Pipe and Galvanized Steel Pipe: "See Structure plans."

**NOTE:** When the irrigation facilities are being installed in an existing bridge follow the instructions required of a Highway Planting Project above for getting approval.

## Irrigation Notes

Irrigation notes, when needed, are placed on the first sheet of the irrigation plans. If there is not enough room to show the notes on the first page, a note MUST be shown to direct the Contractor to where the notes are located, i.e., Irrigation notes are located on sheet LD-I. However, when notes are specific for a particular location or an unusual circumstance, they are placed on the sheet where the work is shown. Notes shall only be shown once. Do not repeat the notes on each plan sheet except for the note discussed on page 5-17 under “[Highway Construction Projects](#)” and the following note:

Required note at the bottom of each irrigation plan sheet:

All Irrigation Equipment Sizes Are Shown In Inches (Diameter Nominal) Unless Otherwise Noted.

A few examples of typical general notes that have been used:

- Plastic Pipe (Supply Line) (Main) shall be 2”, unless otherwise shown.
- Quick Coupling Valves shall be 3/4” and shall be installed on a Swing Joint Type I and a Sprinkler Protector Type I.
- All Gate Valves shall be 2” unless otherwise noted.
- Unlabeled Plastic Pipe (PR200) (Supply Line) downstream of the valve shall be 3/4” unless otherwise noted.
- Plastic Pipe (Supply Line) down stream of the RCV shall be one size larger than the RCV unless otherwise noted.
- Length of flexible hose on Riser Type V shall be a minimum 2’.
- Sprinklers (Type C), when located on slopes, shall be installed on the uphill side of the basin.
- Valves, Wye Strainers, Backflow Preventer Assemblies, and Quick Coupling Valves shown near gates, shall be installed 10 to 12 feet from the gate.
- Plants in Plant Group ‘A’ shall have Sprinklers (Type C-2) with a discharge rate of 0.25 GPM and Plant Group ‘B’ shall have Sprinklers (Type C-2) with a discharge rate of 0.50 GPM.
- Existing Irrigation Crossovers consist of an 8” conduit with a 3” Waterline Crossover, a 2” Sprinkler Control Crossover and two #5 pull boxes at each end, unless otherwise noted.

## Irrigation Notes That Should Not Be Shown On Plans

- THE IRRIGATION PLANS ARE DIAGRAMMATIC. This is covered in the Standard Specifications Section 20-5.03 Installation, which states:
  - ♦ The irrigation systems as shown on the plans, except for sprinkler locations, are diagrammatic.
- Do not add sprinkler specifications as irrigation notes that can be shown on the Sprinkler Schedule. All sprinkler specifications must be shown on the Sprinkler Schedule.

## Acceptable Pipe Sizing Chart

<i>Size Of Pipe</i>	<i>Quantity Of Sprinklers Type E-5</i>
3/4”	1 - 16
1”	17 - 26
1 1/4”	27 - 44
1 1/2”	45 - 60
2”	61 - 90
2 1/2”	91 - 135

## Unacceptable Pipe Sizing Chart

<i>Size Of Pipe</i>	<i>Maximum GPM</i>
3/4”	10
1”	15
1 1/4”	25
1 1/2”	35
2”	55
2 1/2”	80

## Irrigation Restoration Projects

*In the debate of whether to specify an all new irrigation system vs. using existing facilities, is it cost effective to utilize existing lateral facilities?*

In order to make an educated assessment of the value of using existing facilities vs. installing new facilities, one must have an understanding of the type of costs faced when performing extra work on a force account basis to repair existing lateral facilities.

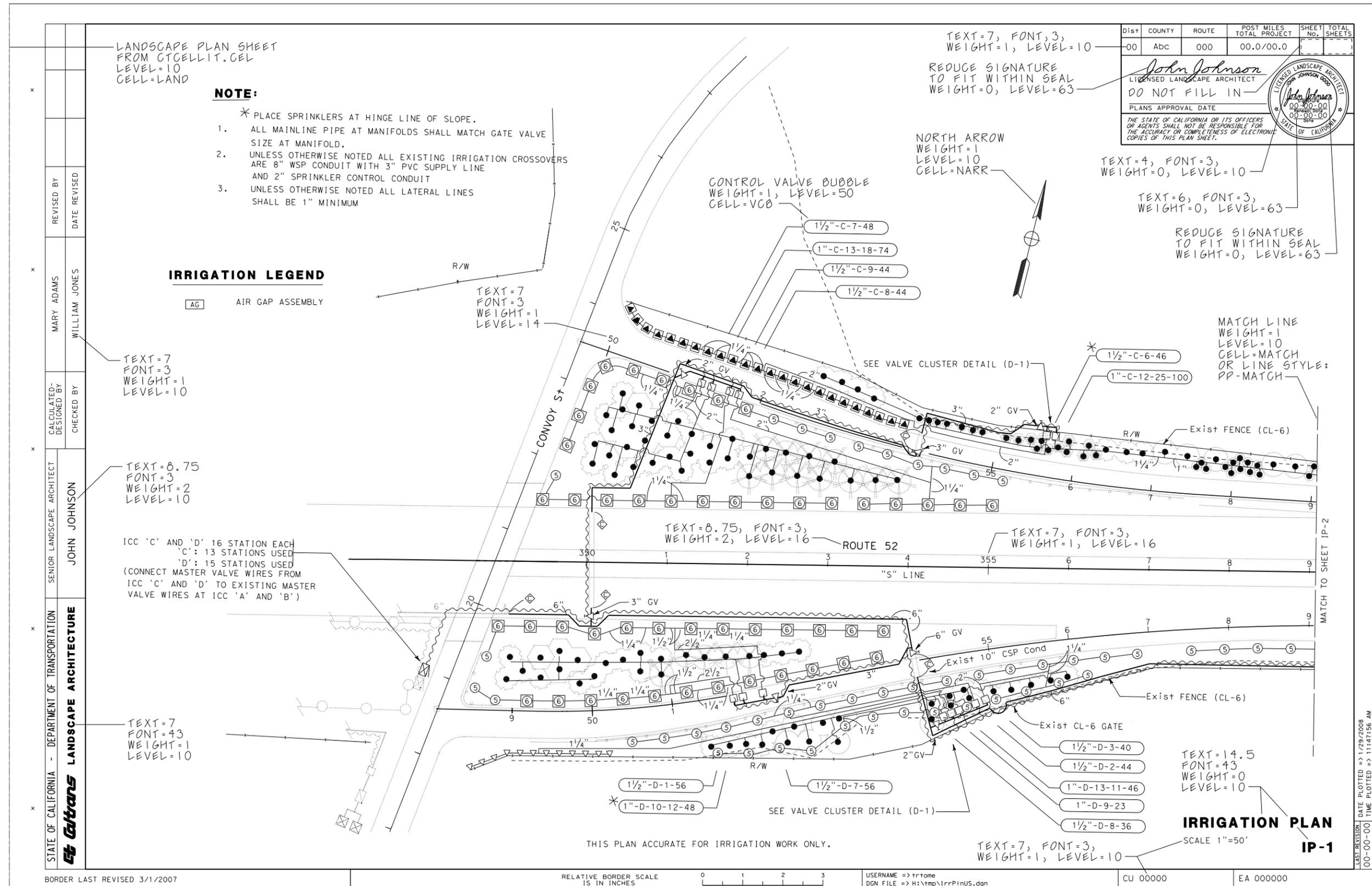
Look up the current straight-time hourly rate for utilizing the services of a landscape/irrigation laborer, normally used for this type of work. This wage rate may vary from district to district, but is fairly accurate throughout the State. On top of this rate, we are required to pay a labor surcharge of 18% to compensate the contractor for statutory payroll items stipulated by various governmental agencies. An additional markup of 33% is required to cover the costs of overhead, insurance, bonding and profit. Sometimes, we have to pay subsistence and travel allowance, further increasing the rate. Equipment and material usage also must be considered. Assuming a standard 3/4 ton or smaller pickup truck is used in performance of the work, look up the current hourly rate, and add a markup of 15%. Any materials incorporated in the work will be paid at invoice price plus 15% markup. In summary, this particular operation will end up costing the State the total of the above per hour for labor and equipment usage + the added cost of the materials. Please keep in mind that if the landscape contractor is a subcontractor, an additional 5% must be paid on top of everything else!

Considering all of the above, the condition and age of the existing facilities must be the determining factor in deciding the 'new' vs. 'old' debate. If extensive repairs are necessary to the existing irrigation facilities, the costs are going to increase at a significant rate.

Calculate a week's worth of repairs in labor and equipment usage. Material costs are extra. It may be far cheaper to abandon the existing lateral lines, due to the labor intensive effort to make all the identified repairs, while salvaging the existing sprinklers to be incorporated into the new lines. However, if the existing lines were just recently installed, not too many repairs may be necessary, and it may be deemed less expensive to reutilize. Since we are dealing with an existing system, future repairs may become necessary and will be required to be paid for by the State. Designers must communicate with Maintenance personnel and 'field check' to ascertain the most cost-effective alternative. Concurrently, the designer must consider the administrative duties associated with extra work that must be performed by construction personnel.

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Irrigation Plan w/CADD Information



Dist	COUNTY	ROUTE	POST MILES TOTAL PROJECT	SHEET No.	TOTAL SHEETS
00	Abc	000	00.0/00.0		

John Johnson  
LICENSED LANDSCAPE ARCHITECT  
DO NOT FILL IN  
PLANS APPROVAL DATE  
THE STATE OF CALIFORNIA OR ITS OFFICERS OR AGENTS SHALL NOT BE RESPONSIBLE FOR THE ACCURACY OR COMPLETENESS OF ELECTRONIC COPIES OF THIS PLAN SHEET.

LANDSCAPE PLAN SHEET FROM GTCCELLIT.CEL  
LEVEL=10  
CELL=LAND

**NOTE:**

- \* PLACE SPRINKLERS AT HINGE LINE OF SLOPE.
- 1. ALL MAINLINE PIPE AT MANIFOLDS SHALL MATCH GATE VALVE SIZE AT MANIFOLD.
- 2. UNLESS OTHERWISE NOTED ALL EXISTING IRRIGATION CROSSOVERS ARE 8" WSP CONDUIT WITH 3" PVC SUPPLY LINE AND 2" SPRINKLER CONTROL CONDUIT
- 3. UNLESS OTHERWISE NOTED ALL LATERAL LINES SHALL BE 1" MINIMUM

**IRRIGATION LEGEND**

AG AIR GAP ASSEMBLY

TEXT=4, FONT=3,  
WEIGHT=0, LEVEL=10

TEXT=6, FONT=3,  
WEIGHT=0, LEVEL=63

REDUCE SIGNATURE TO FIT WITHIN SEAL  
WEIGHT=0, LEVEL=63

NORTH ARROW  
WEIGHT=1  
LEVEL=10  
CELL=NARR

CONTROL VALVE BUBBLE  
WEIGHT=1, LEVEL=50  
CELL=VCB

MATCH LINE  
WEIGHT=1  
LEVEL=10  
CELL=MATCH  
OR LINE STYLE:  
PP-MATCH

TEXT=7  
FONT=3  
WEIGHT=1  
LEVEL=10

TEXT=8.75  
FONT=3  
WEIGHT=2  
LEVEL=10

ICC 'C' AND 'D' 16 STATION EACH  
'C': 13 STATIONS USED  
'D': 15 STATIONS USED  
(CONNECT MASTER VALVE WIRES FROM  
ICC 'C' AND 'D' TO EXISTING MASTER  
VALVE WIRES AT ICC 'A' AND 'B')

TEXT=7  
FONT=43  
WEIGHT=1  
LEVEL=10

TEXT=7, FONT=3,  
WEIGHT=1, LEVEL=10

REDUCE SIGNATURE TO FIT WITHIN SEAL  
WEIGHT=0, LEVEL=63

TEXT=7  
FONT=3  
WEIGHT=1  
LEVEL=14

TEXT=8.75, FONT=3,  
WEIGHT=2, LEVEL=16

TEXT=7, FONT=3,  
WEIGHT=1, LEVEL=16

TEXT=14.5  
FONT=43  
WEIGHT=0  
LEVEL=10

TEXT=7, FONT=3,  
WEIGHT=1, LEVEL=10

**IRRIGATION PLAN**  
SCALE 1"=50'  
IP-1

BORDER LAST REVISED 3/1/2007

RELATIVE BORDER SCALE 15 IN INCHES



USERNAME => trfome  
DGN FILE => H:\tmp\lrrrPinUS.dgn

CU 00000

EA 000000

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