



**SPECIAL PROVISIONS
FOR
IRRIGATION SYSTEM**

**Dubuque County
SB-IA-2100(675)--7T-31**

**Effective Date
September 15, 2015**

THE STANDARD SPECIFICATIONS, SERIES 2012, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

PART 1 - GENERAL

1.01 SCOPE

- A. The work consists of the installation of a complete irrigation system as shown on the plans and as specified hereafter. Contractor shall provide a low volume irrigation system, Rain Bird or equal, including:
 - 1. Pump Station
 - 2. System Controls, Wiring and Control Panel
 - 3. Suction and Supply Line Piping and Fittings
 - 4. Control Zone Kits
 - 5. Distribution and Dripline Tubing and Components
 - 6. Flush Point Valves
 - 7. Light Pole Hanging Basket Low Flow Emitters, Fittings and Appurtenances
- B. Contractor shall provide all labor, materials, supplies, equipment, tools, transportation, permits, perform tests necessary and all operations in connection with and reasonably incidental to the complete installation of the drip irrigation system, and guarantee/warranty as shown on the drawings, the installation details, and as specified herein.

1.02 SUBMITTALS

- A. Qualification Data: Include certification documentation and list of similar projects completed by qualified Installer or Technician, demonstrating capabilities and experience.
- B. Shop Drawings: Submit shop drawings for products proposed for installation, their relative locations, and critical dimensions to the Engineer for review and acceptance no later than 21 days before installation of the irrigation system will begin. The Engineer is solely responsible for review and approval of submittals. The project Landscape Architect can only make

observations and general recommendations at the request of the Engineer but cannot change the contract or approve results.

Note modifications to installation details as part of shop drawing documentation. Furnish information in three ring binder with table of contents and index sheet. Index sections for different components and label with specification section number and name of component. Furnish submittals for components on material list. Indicate which items are being supplied on catalog cut sheets when multiple items are shown on one sheet.

- C. Materials List: Include supply line and distribution tubing and components, dripline and low-volume irrigation components, pump station and components, control zone kits and components, and other components shown on drawings and installation details for the items listed in 1.01, A above. Quantities of materials need not be included.
- D. Manufacturers' Data: Submit manufacturers' catalog cut sheets, specifications, and operating instructions for equipment shown on materials list.
- E. Submit manufacturer's recommendations for adjustments to the system layout and components that are identified on the drawings in order to accommodate components of selected manufacture. Engineer will determine suitability of recommended adjustments for inclusion in the overall system. Costs associated with adjustments to system layout and components shall be considered incidental.
- F. Provide schedule of values for each item listed in 1.01, A, along with any other major work items considered when developing the lump sum unit price listed in the bid.

1.03 QUALITY ASSURANCE

- A. Installer Qualifications: A Certified Irrigation Contractor with a qualified Irrigation System Installer or Technician whose work with irrigation systems and other applications has resulted in successful design installations and similarly designed systems.
 - 1. Experience: 3 years experience in irrigation systems installation.
 - 2. Field Supervision: Maintain an experienced and qualified Installer or Technician on Project site at all times when work is in progress.
- B. Conduct a Preinstallation Conference at the project site with, at a minimum, the qualified Installer or Technician, the General Contractor, and Engineer present. Review methods and procedures related to installation including, but not limited to, the following:
 - 1. Location(s)
 - 2. Construction schedule. Verify ability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Material verification.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Provide and install specified equipment and materials, delivered new to the site in unopened containers and confirmed to be without flaws or defects.
- B. System components are to be delivered in good condition free from shipping damage. Protect from damage after delivery to construction staging area and/or site. At all times, handle units to prevent damage; chipped, cracked, or otherwise damaged units will be replaced at no additional cost to the Contracting Authority.
- C. Store geosynthetics in manufacturer's original packaging with labels intact. Store and handle geosynthetics to prevent deterioration or damage due to sunlight, chemicals, flames, temperatures above 160°F or below 32°F, and other conditions that might damage them. Verify

identification of geosynthetics before using and examine them for defects.

1.05 PROJECT CONDITIONS

- A. Field Measurements: Verify actual final grade elevations, service and utility locations, and dimensions by field measurements before proceeding with installation of work.
- B. Interruption of Existing Services or Utilities: Do not interrupt existing or new services or utilities.
- C. Weather Limitations: Proceed with piping installations only when existing and forecasted weather conditions permit work to be performed when beneficial and optimum results may be obtained.
- D. Work Area: Shall be kept clean and orderly during the installation period. Under no condition shall debris from installation activities result in a safety hazard on-site or to adjacent off-site property.

Contractor shall protect all adjacent plants, lawns, and grass areas from damage at all times. Damaged plants, lawns or grass areas shall be repaired, replaced or treated as required to conform to specifications herein for fresh stock. Damage to lawns adjacent to construction and/or plantings incurred as a result of operations shall be repaired, replaced or treated by the Contractor at no cost to the Contracting Authority.

1.06 GUARANTEE/WARRANTY AND REPLACEMENT

- A. Contractor shall guarantee/warranty irrigation materials, equipment, and workmanship against defects for period of 1 year from final payment. This shall also include restoring landscape, utilities, structures and site features damaged by settlement of irrigation trenches or excavations, as well as filling and repairing depressions. Repair damage to premises caused by defective items. Make repairs within 7 days of notification from Engineer.
- B. Replace damaged items with new and identical materials, using methods specified in contract documents or applicable codes. Make replacements at no additional cost to Contracting Authority.
- C. Guarantee/warranty applies to originally installed materials and equipment, and replacements made during guarantee/warranty period.

PART 2 – MATERIALS

2.01 PUMP STATION

- A. Pump station shall be Rain Bird DP, 60Hz, 3-phase power, 460V, with a 2 inch flanged inlet and discharge connection, capable of providing 5-25 gpm at 40 psi outlet pressure, with a minimum suction lift capability of 4 feet and maximum lift capability of 11.5 feet. Pump shall be provided with swing check valve and intake screen to keep pump primed for suction lift. See Special Provisions for Electrical System for additional control and electrical requirements.
- B. Provide concrete pad with opening for suction line, discharge line and electrical conduits pump station per manufacturer’s recommendations.
- C. Supply proper power to pump station per all applicable codes.

2.02 SYSTEM CONTROLS, WIRING AND CONTROL PANEL

- A. Electromechanical controller shall be Rain Bird ESP-4M. The controller shall be housed in a

wall-mountable, weather resistant plastic cabinet with a key-locking cabinet door suitable for outdoor installation.

- B. The controller shall have a base unit with four stations as well as three expansion slots capable of receiving station modules of three stations each to create a controller of up to 13 stations. Station 13 shall be called an "auxiliary station" and shall have the capability of bypassing an active rain sensor or of functioning as a normal station output. Station timing shall be from 0 minutes to 6 hours. Run time resolution shall be in 1 minute increments from 0 to 59 minutes and 10 minutes from 1 to 6 hours.
- C. The controller shall have three separate and independent programs which can have different start times, station timing and watering days. Each program shall have up to four start times available. The controller shall stack multiple start times in sequence to prevent hydraulic overload. The controller shall be capable of operating two 24 VAC solenoid valves per station plus a master valve or remote pump start relay.
- D. The controller shall have a 365 day calendar with a permanent day off feature that allows a day(s) of the week to be turned OFF on any cycle (odd/even/1-31day cycle). A day set to "Permanent Off" shall override the normal repeating schedule and shall display the words "Day Always Off/Day Off" in the LCD screen.
- E. The controller shall have a 12 hour AM/PM or 24 hour military (for 230VAC models) clock with a midnight day change over. The controller shall have a sensor circuit for connection to a rain sensor or to an underground moisture sensor system that will interrupt a scheduled watering under "wet" or "moist" conditions. The controller shall have an indicator on the LCD screen and one LED light to indicate that a sensor is connected and active and that watering has been temporarily disabled.
- F. The controller shall have access to a variety of "hidden features" by turning the dial to a specific location on the dial and pushing the ON OFF buttons simultaneously. These features shall include: 1) save a custom default program 2) retrieve a custom default program 3) bypass an active rain sensor on the Auxiliary Station 4) allow the Auxiliary Station to be interrupted by an active rain sensor 5) Clear memory 6) Set a day as "Permanently Off" 7) Set master valve/pump start circuit by station 8) Set programmable delay between station.
- G. The controller shall have a removable, battery programmable front panel for conveniently programming the controller away from the installation site or for teaching irrigation scheduling.
- H. The controller shall have the capacity for the program to be erased allowing the user to start programming with a blank controller. The controller shall have multiple knockouts, sizes and locations, including the back of the cabinet, to facilitate installation and provide a clean professional look. The controller shall have a factory default program that runs 10 minutes every day beginning 8 hours after power resumption.
- I. The controller shall have a reset button to reset the controller in the case of micro-controller "lock-up" due to power surges or frequent interruption to the power supply.
- J. Valve wiring shall be a minimum of No. 14 gauge copper single-conductor wire with vinyl insulation. Wiring connectors shall be waterproof grey connectors, equal to Rain Bird.

2.03 CONTROL ZONE KITS

- A. Control zone kit assemblies for dripline irrigation zones must include control valve, filtration, and pressure regulation components sized to meet the hydraulic demands and flow requirements of the zones that they service. Control zone kits shall be provided in single valve box with removable locking lid.

1. Rain Bird XCZ-PRB-100-COM Medium Flow Commercial Control Zone Kit for dripline zones with flows from 3.0 to 20.0 gpm, including PVC ball valve, PESB control valve, and PRB-QKCHK pressure regulating quick-check basket filter.
 - a. PESB control valve assembly component specifications include:
 - 1) PVC full-port ball valve with female threaded inlet and outlet connections.
 - 2) The electric remote control valve shall be a normally closed 24 VAC 50/60 Hz (cycles/sec) solenoid actuated globe pattern design capable of having a flow rate of 20 gpm with a pressure loss not to exceed 3.0 psi. The valve pressure rating shall not be less than 200 psi.
 - 3) The valve body and bonnet shall be constructed of heavy-duty glass-filled chemical/UV-resistant nylon and have stainless steel studs and flange nuts; diaphragm shall be of nylon reinforced nitrile rubber.
 - 4) The valve shall have both internal and external manual open/close control (internal and external bleed) for manually opening and closing the valve without electrically energizing the solenoid. The valve's internal bleed shall prevent flooding of the valve box.
 - 5) The valve shall house a fully-encapsulated, one-piece solenoid. The solenoid shall have a captured plunger with a removable retainer for easy servicing and a leverage handle for easy turning. This 24 VAC 50/60 Hz solenoid shall open with 19.6 VAC minimum at 200 psi. At 24 VAC, average inrush current shall not exceed 0.41 amps. Average holding current shall not exceed 0.28 amps.
 - 6) The valve shall have a brass flow control stem for accurate manual regulation and/or shut-off of outlet flow. The valve must open or close in less than 1 minute at 200 psi and less than 30 seconds at 20 psi.
 - 7) The PESB valve shall have a 90 mesh self-cleaning stainless steel screen designed for use in dirty water applications. The valve construction shall be such as to provide for all internal parts to be removable from the top of the valve without disturbing the valve installation.
 - b. Pressure Regulating Quick Check Basket Filter component specifications include:
 - 1) Basket style body and jar-top cap constructed of heavy-duty glass-filled, UV-resistant polypropylene, with 150 psi operating pressure rating. Maximum dimensions of filter body; Height: 6 1/2 inches, Length: 6 1/2 inches, Width: 3 1/2 inches
 - 2) Indicator incorporated into filter cap that changes color from green to red during operation when the filter element requires cleaning.
 - 3) Standard 200 mesh filter screen constructed of stainless steel attached to propylene frame. Screen is serviceable for cleaning purposes by unscrewing cap from filter body and removing filter element.
 - 4) Normally-open in-line pressure regulating device, constructed of durable, UV resistant non-corrosive material able to accommodate an inlet pressure rating of not less than 150 PSI, with preset outlet pressure of approximately 40 psi. Pressure regulating device allows full flow with minimal pressure loss unless inlet pressure is greater than preset level. As inlet pressure increases above preset level, internal spring compresses to reduce downstream pressure.
 - 5) Male threaded 1 inch inlet and outlet connections.
 - c. Irrigation Valve Box
 - 1) Valve boxes shall be used as durable, rigid enclosures for valves or other irrigation system components requiring subsurface protection for installation or maintenance. The valve box shall be made of structural foam HDPE resin that is resistant to UV light, weather, moisture, and chemical action of soils.
 - 2) The rectangular body shall have knock-outs molded into the ends that can be readily removed. The knock-outs shall remain an integral part of the body unless removed to run pipes or wires through the valve box. The valve box shall have corrugated sides.
 - 3) Extension models shall have vertical ribs inside that make them capable of

being mounted directly over the top of another box. Boxes shall have a stepped feature on the bottom that securely interlocks two boxes together when mated bottom-to-bottom for use in a deep installation.

- 4) There shall be no hole in the valve box lid unless the bolt-hole knock-out is removed in order to use the locking bolt. Lids shall have beveled edges to minimize potential damage from lawn equipment. Lids shall be clearly marked with the words "Irrigation Control Valve" molded onto the top. The locking bolt, washer, and clip shall be made of stainless steel.

2.04 DISTRIBUTION AND DRIPLINE TUBING AND COMPONENTS

- A. Distribution and dripline tubing and shall be sized as shown on the plans, and specified herein. Provide insert or compression fittings manufactured by Rain Bird that are compatible with tubing.
 1. Rain Bird XBS-P 1/2 inch blank distribution tubing with purple stripe for nonpotable water system
 2. Rain Bird Easy Fit Compression Fittings
 - a. Tee: MDCFTEE
 - b. Coupling: MDCFCOUP
 - c. Elbow: MDCFEL
 - d. Adapters:
 - 1) 1/2 inch Male pipe thread adapter: MDCF50MPT
 - 2) 1/2 inch Female pipe thread adapter: MDCF50FPT
 - e. Flush Cap end closure for nonpotable system: MDCFPCAP
 - f. Easy Fit compression fitting specifications and features include:
 - 1) Easy Fit directional fittings and flush cap fittings constructed from molded UV-resistant ABS material with Buna-N rubber seal for long-term, leak free connections
 - 2) Easy Fit adapters constructed from UV-resistant ABS materials for use exclusively with Easy Fit Compression Fittings
 - 3) Easy Fit Compression Fittings are intended for use with polyethylene tubing from 0.630 inch to 0.710 inch OD to provide a leak-free compression fit
 - 4) Maximum pressure loss for the Easy Fit adapters estimated to be 0.1 psi per adapter
 - 5) Operating pressure range for Easy Fit compression fittings and adapters is 0 to 60 psi
 3. Rain Bird ARV12 Air Relief Valves
 4. Rain Bird XQ 1/4 inch Distribution Tubing
 5. Rain Bird LDQ 1/4 inch Landscape Dripline, with 0.8 gph flow at 12 inch spacing
 6. 1/4 inch Barb Transfer Fittings
 - a. XBF1CONN: 1/4 inch Barb Connector
 - b. XBF2EL: 1/4 inch Barb x Barb Elbow
 - c. XBFTEE: 1/4 inch Barb x Barb Tee
 - d. 1/4 inch Barb Transfer Fittings specifications and features include:
 - 1) Three fitting configurations:
 - a) Connector
 - b) Elbow
 - c) Tee
 - 2) Designed for connections of Rain Bird XQ 1/4 inch distribution tubing
 - 3) Barbed on one end to permit easy insertion into any 1/2 inch or 3/4 inch polyethylene tubing using a Rain Bird Xeriman® tool (XM-TOOL)
 - 4) Constructed from UV resistant acetyl.
 - 5) Operating pressure range between 0 to 50 psi
 7. Rain Bird Diffuser Bug Cap
 - a. DBC-025-PPL (Purple); for non-potable water source
 - b. Diffuser Bug Cap specifications and features include:

- 1) Barb inlet designed to fit into 1/4 inch distribution tubing with ID of 0.16 inch
- 2) Flanged shield designed to diffuse water to minimize soil erosion at emission point
- 3) Constructed from polyethylene material
- 4) Operating pressure range between be 0 to 50 psi

PART 3 – EXECUTION

3.01 INSPECTIONS AND REVIEWS

- A. Pre-construction Site Inspection
 1. Verify construction site conditions and note irregularities affecting work of this section. Report irregularities in writing to Engineer prior to beginning work. Commencement of work implies acceptance of existing site conditions.
- B. Utility Locates ("Call Before You Dig")
 1. Arrange and coordinate Utility Locates with local authorities prior to construction.
 2. Repair underground utilities that are damaged during construction. Make repairs at no additional cost to contract price.

3.02 DRIPLINE LAYOUT OF WORK

- A. Stake out dripline irrigation system. Items staked include manifold/header pipe and tubing, sleeves, control zone assemblies, flush valves, air relief valves, and check valves.
- B. Dripline Irrigation System Layout Review: Dripline irrigation system layout review will occur after staking has been completed. Notify Engineer one week in advance of review. Modifications will be identified by Engineer at this review.

3.03 DRIPLINE EXCAVATION, TRENCHING, AND BACKFILL

- A. Excavate and install pipes at minimum cover indicated in drawings. Excavate trenches at appropriate width for connections and fittings.
- B. Backfill only after buried lines have been reviewed, tested, and approved.
- C. Excavated material is generally satisfactory for supply and distribution line backfill. Use backfill free from rubbish, vegetable matter, frozen materials, and stones larger than 2 inches in maximum diameter. Remove material not suitable for backfill. Use backfill free of sharp objects next to pipe.
- D. Dress backfilled areas to original grade. Incorporate excess backfill into existing site grades. Dispose of excess backfill off site.
- E. Contact Engineer for trench depth adjustments where utilities conflict with irrigation trenching and pipe work.

3.04 ASSEMBLING PIPE AND FITTINGS

- A. General:
 1. Keep pipe free from dirt and debris. Cut pipe ends square, debur and clean as recommended by pipe manufacturer.
 2. Keep ends of assembled pipe capped. Remove caps only when necessary to continue assembly.
- B. PVC Pipe and Fittings:

1. Use only strap-type friction wrenches for threaded plastic pipe.
 2. PVC Solvent Weld Pipe and Fittings:
 - a. Use appropriate primer and solvent cement. Join pipe in manner recommended by pipe and fitting manufacturers and in accordance with accepted industry practices.
 - b. Cure for 30 minutes before handling and 24 hours before pressurizing or installing with vibratory plow.
 - c. Snake pipe from side to side within trench.
 3. PVC Threaded Connections:
 - a. Use only factory-formed threads. Field-cut threads are not permitted.
 - b. Apply thread sealant in manner recommended by component, pipe and sealant manufacturers and in accordance with accepted industry practices.
- C. Dripline Tubing and Fittings:
1. Use only Rain Bird Easy Fit Compression Fittings for transitions as recommended by the Manufacturer's representative for the specific site and system conditions.
 2. Dripline Insert Fittings:
 - a. Install dripline tubing and fittings in manner recommended by manufacturer and in accordance with accepted industry practices.
 3. Dripline Compression Fittings:
 - a. Install dripline tubing and fittings in manner recommended by manufacturer and in accordance with accepted industry practices.

3.05 INSTALLATION OF DRIPLINE IRRIGATION COMPONENTS

- A. Control Zone Kit Assembly:
1. Flush mainline pipe before installing Control Zone Kit assembly.
 2. Locate where shown on drawings. Connect control wires to remote control valve wires using specified wire connectors and waterproof sealant. Provide connectors and sealant per manufacturer's recommendations.
 3. Install a maximum of four Low Flow or Medium Flow Control Zone Kits per standard rectangular valve box. Install a maximum of one Medium Flow Commercial Control Zone Kits per standard rectangular valve box. Install a maximum of one High Flow Commercial Control Zone Kits per jumbo rectangular valve box.
 - a. Locate valve boxes at least 12 inches from, and align with, nearby walls or edges of paved areas.
 - b. Group Control Zone Kit assemblies together where practical. Align grouped valve boxes in uniform patterns. Allow at least 12 inches between valve boxes.
 - c. Brand controller letter and station numbers on valve box lid in 2 inch high letters.
- B. Lateral Piping and Dripline Tubing:
1. Install lateral piping and dripline tubing at locations and in grid patterns as indicated on drawings and installation details, and in strict accordance with manufacturer recommendations.
 2. Thoroughly flush PVC lateral piping, supply headers, and dripline tubing immediately upon installation.
- C. Air Relief Valve Kit Assembly: Install at all high points in dripline tubing grid.
- D. Flush Point Assembly: Install in flush header or at ends of each dripline zone segment as shown and directed on drawings and installation details. Install at least 12 inches from and align with adjacent walls or edges of paved areas.

3.06 FLUSHING AND TESTING

- A. Schedule testing with Engineer a minimum of 3 days in advance of testing.

- B. Provide clean, clear water, pumps, labor, fittings, and equipment necessary to conduct line flushing and testing procedures.
- C. Dripline and Emitter Lateral Flushing Procedures.
 1. Contractor shall flush the system every 2 weeks for the first 6 weeks and check the water that is flushed out for cleanliness. Establish a regular system flushing schedule for the future based on results from the initial 6-week flushing schedule.
 2. Contractor shall flush the system completely after any repairs are made and monitor system operation closely under regular system flushing schedule.
 3. Contractor shall check the pressure at the supply and flush headers on a regular basis and compare with the pressure readings taken after installation.
- D. Dripline and Emitter Lateral Leakage Testing Procedures.
 1. Subject installed dripline tubing and emitter lateral piping to water pressure equal to specified operating pressure for 10 minutes. Test with control zone components and dripline flush valve components installed.
 2. Partially backfill buried pipe and tubing to prevent movement under pressure. Expose couplings, fittings, and valve components.
 3. Visually inspect valve assemblies and fittings for leakage and replace defective pipe, fitting, joint, valve, or appurtenance. Repeat test until test segment is free from leaks. Cement or caulking to seal leaks is prohibited.
- E. Dripline and Emitter Lateral Operational Testing Procedures.
 1. Activate each dripline and emitter lateral control zone valve in sequence from controller. Provide either one additional person with radio or use handheld remote to activate remote control valves from controller. Manually activating remote control valve using manual bleed mechanism at remote control valve is not an acceptable method of activation. Engineer will visually observe operation, water application patterns, and leakage.
 2. Replace or adjust defective valve, fitting, dripline segment, emitter lateral segment, or appurtenance to correct operational and coverage uniformity deficiencies.
 3. Repeat test(s) until each dripline or emitter lateral test segment passes testing procedures. Repeat tests, replace components, and correct deficiencies at no additional cost.

3.07 PROJECT RECORD (AS-BUILT) DRAWINGS

- A. Document field changes from original design and construction documents. Maintain on-site and separate from original construction documents, one complete set of documents labeled "Project Field Documents". Keep documents current. Do not permanently cover work until accurate "as-built" information is recorded.
- B. Record pipe network alterations on a daily basis. Record work that is installed differently than shown on construction documents. Record accurate reference dimensions, measured from at least two permanent reference points, of each control zone kit assembly, each dripline zone boundary, each air relief valve assembly, each flush point assembly, and other dripline irrigation components enclosed within valve box.
- C. Obtain from Engineer one set of reproducible Mylar drawings or CAD files prior to construction completion. Duplicate information contained on "Project Field Documents" maintained on-site using technical drafting pen or AutoCAD. Label each sheet "Record Drawing".
- D. Provide "Record Drawings" to Engineer. Completion of Record Drawings is required prior to final construction review at completion of irrigation system installation.

3.08 WINTERIZATION AND SPRING START-UP

- A. Winterize irrigation system in fall following completion, or partial completion, of irrigation system construction. Start-up irrigation system in spring following completion, or partial completion, of irrigation system construction. Repair any damage caused in improper winterization at no additional cost to Contracting Authority. Coordinate winterization and start-up with landscape maintenance personnel.

3.09 MAINTENANCE

- A. Maintain irrigation system for duration of 30 calendar days from formal written acceptance by Engineer. Make periodic examinations and adjustments to irrigation system components in order to achieve the most efficient and uniform application of water.
- B. Following completion of Contractor's maintenance period, Contracting Authority will be responsible for maintaining system in working order during remainder of guarantee/warranty period, for performing necessary minor maintenance, for protecting against vandalism, and for preventing damage after landscape maintenance operation.

3.10 CLEANUP

- A. Remove from site machinery, tools, excess materials, and rubbish upon completion of work.

3.11 MEASUREMENT AND PAYMENT

- A. Approximate quantities are provided in the drawings. However, the Contractor shall be responsible for determining the actual total required to complete the work as specified and account for the actual totals in the lump sum unit price bid for the work. All costs associated with installation, startup, and testing of the irrigation system for the project shall be included in the lump sum unit price bid.