# Part 1 GENERAL

* 1. **SECTION INCLUDES**

1. Landscape irrigation systems.
2. Work of this section includes the furnishing, adjusting, installing and testing of mains, laterals, risers and fittings, quick couplers, gate valves, backflow preventers, excavation and backfill, and all other work in accordance with the plans and specifications for a complete operating system. All work shall be in accordance with applicable City and County codes, and these plans/specifications.
3. Work noted as “NIC.”(Not In Contract) is not part of this section.

# REFERENCES

* + 1. The editions of standards and specifications published by the following organizations, and referenced herein, apply to the work only to the extent specified by the reference. Refer to Section 01420 for information concerning availability and use of references.

American Society for Testing and Materials (ASTM) American Society of Sanitary Engineers (ASSE) American Water Works Association (AWWA)

National American National Standards Institute (ANSI) Sanitation Foundation (NSF)

# SUBMITTALS

1. Product Data:
   1. Submit a list of irrigation equipment to be used, accompanied by manufacturer's catalog data, specifications, or other literature clearly indicating compliance with specification requirements for each item.
   2. Submit manufacturer's maintenance manuals and operating instructions for valves and automatic controllers.
   3. On the inside surface of the cover of each automatic controller, prepare and mount a chart showing the valves and sprinkler heads serviced by that particular controller. Number valves to match the operation schedule and the drawings. Only those areas controlled by that controller shall be shown. The chart shall be a plot plan, entire or partial, showing building(s), walks, roads and walls. A photo-static print of this plan, reduced as necessary and legible in all details, shall be made to a size that will fit into the controller cover. This print shall be reviewed and approved prior to being hermetically sealed by plastic. Secure to the inside of the cover, as directed by the District.
2. Record Drawings: Before final acceptance, make sure the following information is included on the record set of drawings specified in Section 01770.
   1. Changes in location of items or type of installations from that indicated.
   2. Valves shall be numbered, and corresponding numbers shall be shown.
   3. Remote control valves and shut-off valves shall be located by measured dimensions. Dimensions shall be given to permanent objects and shall be to the nearest one-half foot.
   4. Immediately upon the installation of buried pipe or equipment, indicate the locations of said equipment. Dimensions shall be given from permanent objects such as buildings, sidewalks, curbs and driveways.

# REGULATORY REQUIREMENTS

1. State and Municipal Codes and Regulations locally governing this construction, providing that requirements indicated and specified do not conflict; however, those exceeding the Code Requirements shall govern, unless written permission to the contrary is granted by the Architect.
2. The contractor shall obtain and pay for all permits and inspections required by outside agencies with no additional cost to the district .

# DELIVERY, STORAGE, AND HANDLING

1. Because of the nature of plastic pipe and fittings, exercise caution in handling, loading and storing, to avoid damage.
2. Store pipe and fittings under cover until used. Transport pipe in a vehicle with a bed long enough to allow the length of pipe to lay flat so as not to be subjected to undo bending or concentrated external load at any point.
3. Discard pipe that has been dented or damaged unless such dent or damaged section is cut and rejoined with a coupling.

# SEQUENCING AND SCHEDULING

1. Install landscape headers, sidewalks, and mowing bands before installation of sprinkler system, except that sleeves and mainlines under paving shall be in place before paving construction.
2. Specimen trees (24 inch box and larger) shall be installed before the location of the irrigation system. Insure that irrigation is available for tree watering prior to installation of trees.
3. Obtain permission, in writing, from the District at least two working days before shutting off existing in-use water lines. The Contractor shall receive instructions from the District as to the exact length of time of each shut-off.

# MAINTENANCE MATERIALS

1. Deliver the following items to the District when construction activities in connection with the irrigation system are completed and before final acceptance of the work:
   1. Two remote control valve keys.
   2. Two wrenches for removing each different type of sprinkler heads.
   3. Two keys for opening and locking each automatic controller.
   4. All manufacturers’ warranty information stating length of warranty and how to exercise warranty on all valves, irrigation controllers and sprinkler heads.
   5. Rain Master Pro-Max remote control set.

# EXPLANATION OF DRAWINGS

1. Due to the scale of drawings, it is not possible to indicate all offsets, fittings, sleeves, etc., which may be required. The Contractor shall carefully investigate the structural and finished conditions affecting all of his work and plan his work accordingly, furnishing such fittings, etc., as may be required to meet such conditions. Drawings are generally diagrammatic and indicative of the work to be installed. The work shall be installed in such a manner as to avoid conflicts between irrigation systems, planting, and architectural features.
2. The word Architect as used herein shall refer to the Landscape Architect.
3. The word Authorized Representative as used herein shall refer to the District’s Construction Manager.
4. All work called for on the drawings by notes or details shall be furnished and installed whether or not specifically mentioned in the specifications.
5. The Contractor shall not willfully install the irrigation system as shown on the Drawings when it is obvious in the field that obstructions, grade differences or discrepancies in area dimensions exist that might not have been considered in engineering. Such obstructions or differences shall be brought to the attention of the Architect. In the event this notification is not performed, the irrigation contractor shall assume full responsibility for any revisions necessary.
6. Work of this Section that is allied with the work of other trades shall be coordinated as necessary.

# GUARANTEE

* + 1. Guarantee for the sprinkler irrigation system shall be made in accordance with the following form. The general conditions and supplementary conditions of these specifications shall be filed with the District or its representative prior to acceptance of the irrigation system.
    2. A copy of the guarantee form shall be included in the operations and maintenance manual.
    3. The guarantee form shall be retyped onto the Contractor’s letterhead and contain the following information:

# GUARANTEE FOR SPRINKLER IRRIGATION SYSTEM

We hereby guarantee that the sprinkler irrigation system we have furnished and installed is free from defects in materials and workmanship, and the work has been completed in accordance with the drawings and specifications, ordinary wear and tear and unusual abuse or neglect expected.

We agree to repair or replace any defects in material or workmanship that may develop during the period of one year from the date of acceptance and also to such defects at no additional cost to the District. We shall make such repairs or replacements within a reasonable time, as determined by the District, after receipt of written notice from the District, we authorize the District to proceed to have said repairs or replacement made at our expense and we will pay the costs and charges therefore upon demand.

PROJECT: CONTRACTOR:

ADDRESS:

PHONE: BY:

DATE OF ACCEPTANCE:

BY:

# 1.10 MAINTENANCE PERIOD

**A.** Maintain the entire irrigation system for a period of 90 days from the date of acceptance. Date of acceptance to be determined by the owner’s representative at the time of final inspection of the irrigation system.

# Part 2 PRODUCTS

* 1. **MANUFACTURERS**

The design of the irrigation system is based on the manufacturers and products indicated. Substitutions will be permitted only with the Architects approval in accordance with Section 01600. Where such substitution will change the coverage or flow rates of the sprinkler heads, the request for substitution shall include layout plans showing revised sprinkler head locations. Such revised layout plan shall provide coverage and watering rates equivalent to those indicated.

# Pipe, Fittings and Connections

* + 1. **Mainline Pipe**
       1. Pressure mainlines 3” and larger: ASTM D 2241-94, PVC 1120/1220 or CL200 PVC Twinseal gasketed pipe.
       2. Pressure mainline 2 ½” or smaller: ASTM D 1785-94, PVC 1120/1220 or schedule 40 streamline solvent weld pipe.
       3. All lateral lines 1” and above shall be CL200 for landscape applications and Schedule 40 for hardscape applications.

# Mainline Fittings

* + - 1. Pressure mainline fittings for 2.5” pipe and below shall be Lasco Schedule 40, solvent weld.
      2. Pressure mainline fittings for 3” pipe and above shall be Lasco Schedule 80, solvent weld.

# Brass Pipe, Fittings, and Connections:

1. Pipe: ASTM B 43-94, IPS, Standard weight, 125 pounds, and 85 percent red brass.
2. Fittings and Connections: ANSI B16.15-85, Standard 125-pound class, threaded, 85 percent red brass.
   * 1. Threaded lubricant shall be Teflon ribbon-type, suitable for threaded installations as per manufacturer’s recommendations.
     2. Steel pipe and fittings: Shall conform to ASTM A 53 for Grade B welded or seamless pipe. Discharge piping 6” and smaller shall be schedule 40. All welded fittings shall be seamless, conforming to ASTM A 234, with a pressure rating not less than 150 psi. All welded flanges shall be forged steel slip-on or weld neck type.

# AUTOMATIC CONTROLLER(S) AND RELATED EQUIPMENT

* + 1. Controller(s) shall be as indicated on the drawings. Controller shall be installed per manufacturer’s specifications, as shown on the drawings, and as specified herein.
       1. All controllers shall be Rain Master Eagle Plus (Model EGP-TWI-S or equivalent Rain Master model) up to 48 stations w/ heavy duty lockable stainless steel outdoor enclosure – wall mounted @ 6’ above finish floor.
          1. Each Controller to have the iCentral Data Service Plan-Bronze Level for a 5 year period, at no additional cost to the Owner.
       2. Provide total number of stations as necessary for the project, minimum of 48 stations.
       3. Provide one Rain Master Pro-Max-UA remote control set.

# CONTROL WIRE

* + 1. All wire for control for valves and pump start relays shall be insulated with solid copper conductor of type approved for direct burial. Use color-coded wire for pilot wires, a different color for all valves of each controller, and install per valve manufacturer’s specifications and wire chart. Common wire for each controller shall be white with stripe of same color as pilot wires. Extra wires shall be black.
    2. Sizing of wire shall be in accordance to manufacturer’s recommendations, in no case less than #14 in size. All common wire shall be 12 gauge.

1. Wire connectors shall be King Brother’s silicone filled, size as required.
2. All wire splices to be made at surface and contained in a valve box.
3. Wire should run alongside of mainline, **not underneath. Wire should not contact iron valves, fittings or concrete.**
4. Wire should not be stretched tight in trenches or pulled tight around corners.
5. Sleeve wire into pull/splice boxes. Sleeving is to be electrical conduit, sized accordingly and with the appropriate 90’s, minimum 5 feet. Slurry all pull/splice boxes.

# SPRINKLER HEADS

* + 1. **Large Turf Rotor**
       1. Rainbird Falcon 6504 Series.
       2. 40’ to 44’- #8 nozzle (green).
       3. 45’ to 49’- #12 nozzle (beige).
       4. 50’ to 55’ (maximum spacing)- #16 nozzle (brown).
       5. Install part circle and full circle heads on separate valves.
       6. 96 GPM maximum per valve
       7. Maximum run time per valve:
       8. F4PC = 20 minutes.
       9. F4FC = 40 minutes

# Medium Turf Rotor

* 1. 30’ to 39’ Rainbird 5004 PC SAM, 5004 FC SAM.
  2. 90°- #3 Standard Nozzle
  3. 180° & 360°- #6 Standard Nozzle
  4. Install FC & PC heads on separate valves
  5. 25’ to 29’ Rainbird 3504 PC SAM, 3504 FC SAM
  6. 20’ to 24’ Rainbird 3504 PC SAM, 3504 FC SAM
  7. 50 GPM maximum per valve
  8. Maximum run time per valve:
  9. RB 5004PC = 20 minutes
  10. RB 5004FC = 40 minutes
  11. Toro XP300 = 50 minutes
  12. Toro Stream Rotor = 40 minutes

# Small Turf/Shrubs/Planters

* 1. Rainbird 1804- 12’ and 15 plastic MPR nozzle (Max. 12’ and 15’ )
  2. Turf/Planter cover strips up to 6’ wide use Rain bird 1804 15-SST on 12’ centers (square pattern), double row.
  3. Contact FUSD Grounds Dept. for spacing of special pattern nozzles (8’ flat, etc.)
  4. 50 PGM maximum per valve
  5. Maximum run time per valve:

1. Turf spray = 15 minutes.
2. Planter spray = 5 minutes

# Tree Wells/Drip Irrigation

* 1. 20’ coil/20 emitters (min) Hunter RZWS-18 per tree well
  2. **Raised Planters only**-Hunter RZWS-18, maximum 12” spacing between rows.
  3. Flush valve- Netafim TL050MFV-1
  4. Pressur Regulators – Netafim (PRV075HF or PRV150).
  5. Rainbird RWS

# Valves and Valve Assemblies

* + 1. Remote Control Valve: Irritrol 200B Series.
       1. 1” 214B GPM Range = 29 or less Mainline outlet and riser = 1½”
       2. 1½” 216B GPM Range = 30-49 Mainline outlet and riser = 2”
       3. 2” 217B GPM Range= 50-95 Mainline outlet and riser = 3”
    2. Shut Off/Gate Valves for Mainline:
       1. 1½” and below Watts B-3000.
       2. 2” and above Watts 403RT-RW w/operating nut.
       3. 2” and above (above grade) Watts 406-NRS-RW (below grade w/operating nut)
       4. PVC utility ball valve-Spears threaded #2621 ASTM-D1784 with Polypropylene handle-pressure rated @ 150 psi.
    3. Backflow Preventer: Reduced Pressure Type: Febco
    4. Wye Strainers:
       1. Strainers 2” and smaller: Wilkins YB Series.
       2. Strainers 2½” inch and larger: Wilkins FSC Series.
    5. Pressure Reducing Valve:
       1. Below 3” Cla-Val 90-01KC, 150lbs. flanged, std. trim 30-300psi, options A, B, & S.
       2. Above 3” Bermad 720-00-Y-C-A5-EB-CB-V. Contact Grounds Dept. for Bermad representative's contact information when ordering valve.
    6. Pressure Relief Valve:
       1. Cla-Val 50-01KC, 150lbs. flanged, std. trim, 20-200psi, options B & S.
    7. Pressure Regulators:
       1. 2” and below – Wilkins 500 SC
       2. 2 ½”and above – Wilkins 500 FC

# 2.7 WATER PRESSURE BOOSTER SYSTEM

* + 1. Prefabricated Unit: Furnish and install a prefabricated Munro water pressure booster system as designed and fabricated by Munro Systems, Murrieta, CA (800 494-5140). The system shall be completely prefabricated system with pump, piping, electrical and structural elements. The system shall be capable of providing a minimum system pressure of 110 PSIG while supplying a flow rate from 0 to 200 GPM with a minimum suction pressure of 90 PSIG.
    2. Pumps: Pump shall be single stage, end suction close coupled centrifugal, cast iron bronze fitted construction, equipped with mechanical shaft seal and back pullout design. Impeller shall either be keyed or locked to the shaft with a hex head impeller nut and washer or shall be threaded directly to the end of the shaft. Pump shaft shall either be high strength S.A.E. 1045 carbon steel protected in the stuffing box area by a replaceable bronze shaft sleeve or shall be stainless steel with no sleeve. Pump shall be directly coupled to a C-face electric motor.
    3. Motor: Electric motor shall be of the squirrel cage induction type suitable for full voltage starting. Motor shall be ODP to aid in cooling. Electric motor shall be rated for continuous service. The motor shall have horsepower ratings such that the motor will carry the maximum possible load to be developed under the designed pumping conditions and not overload the motor beyond the nameplate rating of the motor. Motor shall have a 1.15 service factor. The motor shall conform to the latest NEMA standards for motor design and construction.
    4. Control System: Pump control panel shall have a NEMA 4X plain front non- metallic enclosure with padlock latches. Includes power and control re-settable thermal circuit breakers, heavy-duty magnetic starter with adjustable overload protection. Hand-off-auto switch to select mode of operation and heavy duty numbered terminal strips for power and control wiring lead terminations. A metal oxide varistor protected pump start relay(s) shall be incorporated in the panel to start pump with signal from each irrigation controller.
    5. All system piping shall be type “L” copper. All fittings shall be copper or brass, with unions or flanges to allow for system disassembly or major component removal. System shall incorporate an integral full pipe size bypass line with isolation valve to allow for pump removal and repair without disrupting water supply to system.
    6. Isolation valves shall be all brass quarter turn ball valves with hard chrome ball on lies 2” and less. Isolation valves shall be lug style butterfly valves with Buna-N elastomeric seats, ductile iron nickel coated disc and stainless steel stem with handle and ten position galvanized memory plate on lines 2-1/2” and greater.
    7. Gauges shall be 2-1/2” diameter face, glycerin filled with stainless casing and brass internals.
    8. Flow activated paddle style magnetically coupled flow switch, sensitive to flows as low as one fps. Mounted on piping and interconnected to time delay relay to shut down pump on no-flow conditions with time delay relay adjustable from 0 to 5 minutes.
    9. Pump system shall be mounted on a structural aluminum skid with mounting flanges on front and back to allow for mounting of skid to concrete pad. Skid shall be equipped with pipe support on suction and discharge piping. All nuts and bolts and washers shall be heavy zinc coated steel on skid and piping. Skid shall include mounting hardware for integral aluminum enclosure.
    10. System enclosure shall be vandal and weather resistant, marine grade aluminum alloy 5052-H32 construction with rectangular punch-outs for viewing and heat dissipation. The enclosure shall be low profile hinged top design with padlock provision. The cover shall be secured to the concrete pad with stainless steel hardware.
    11. Pump Specifications: Munro Systems pump: model number shall be as indicated on drawings with a 200 gpm flow rate @ 110 psi. Electrical requirements shall be 480 vac, 3 phase, 60 hz.

# Backflow Enclosure (Chain link)

* + 1. Post spacing =4’ maximum. Footings and pipe gauge per FUSD Chainlink Specification Section 2821
    2. 4 x 6’ walk gate with locking hardware
    3. 8’ enclosure height-Top to be covered and cross braced on post centers.
    4. Length and width as required, to provide a 3’ clear work space between equipment and enclosure. (see backflow enclosure detail)
    5. Sides to have horizontal bracing at 4’ high and along the bottom. (1½” Top Rail)
    6. 4” thick concrete pad-(see backflow enclosure detail)

# ACCESSORY MATERIALS

* + 1. Valve Boxes: Boxes adjacent to paved areas subject to vehicular traffic shall be pre-cast concrete with cast iron lids designed to resist vehicular traffic. Boxes in all other areas shall be plastic valve boxes with lockable covers. Minimum sizes of valve boxes shall be as follows:
       1. Carson 1419-12 Series-standard rectangular. Use 1419 T-cover
       2. Carson 1220-12 Series
       3. Carson 910 Series-10” round. Use 910 bolt down T-cover
       4. Brooks 3MB with #3 T-cast iron cover
       5. Brooks 11MB with #11 T-cast iron cover

# Note: Boxes #1,2 and 3 are for landscape areas, boxes 4 and 5 for hardscape areas only

* + 1. Quick Couplers: Rainbird 44RC-1”. Stabilizer arm assembly (see detail). Spears swing joint riser assembly 5806-01012.
    2. Wire Connectors: King silicone filled – size as needed.
    3. Concrete for thrust blocks and footings shall conform to Section 03300 for compressive strength of 2,000 psi concrete at 28 days.
    4. Sand bed and backfill shall be Class A clean fill sand.
    5. Solvent Cement: Use IPS Weld-On P-70 primer, IPS Weld-On 2711 (gray) cement.

# Part 3 EXECUTION

* 1. **EXAMINATION**

1. Prior to start of installation of the irrigation system, examine the site to:
   1. Verify location of existing underground utilities valves, manholes, catch basins, and other appurtenances that will affect the layout of the sprinkler system.
   2. Verify location of existing trees, new specimen trees, and other obstructions that will affect the layout of the sprinkler system.
   3. Verify location of stub outs and points of connection to the water supply system.
   4. Verify grades to determine that work may safely proceed, keeping within the specified trench depths.
   5. Verify location of electrical service points of connection.

# PREPARATION

1. Locations indicated are diagrammatic and approximate only and shall be changed and adjusted as necessary and as directed to meet existing conditions and obtain complete water coverage.
2. Sprinkler lines shall have a minimum clearance of 6 inches from each other and from other utility lines. Do not install parallel lines directly over one another.
3. Stake out locations of all pipe, valves, equipment and irrigation heads using an approved staking method and maintain the staking of the approved layout until installation is completed.
4. Do not install any RCV, SOV or mainline in any raised areas – locate in nearby flat, accessible area.
5. Do not locate any trees within 15’ of mainline or within 20’ of valve boxes.
6. Protect all existing utilities and repair any damage to existing utilities with matching new materials, at no increase in the contract price.
7. The contractor shall maintain, continuously, a competent superintendent or foreman, who shall be present at all times during execution of this portion of the work. They shall be thoroughly familiar with the type of materials being installed and the manufacturer’s recommended methods of installation. They shall direct all work performed under this section. The superintendent shall be authorized to represent the contractor.

# EXCAVATION AND BACKFILLING OF TRENCHES

1. Excavation and backfilling of trenches shall comply with the following additional requirements:
   1. When trenching through areas where topsoil has been spread, deposit topsoil on one side of trench and subsoil on opposite side.
   2. For mainline trenching provide sand bedding a minimum of 4 inches under, 4 inches around and 6 inches above the top of pipe. (24”total cover).
   3. For lateral line trenching provide sand bedding a minimum of 2 inches under and around pipe and 4 inches around sprinkler heads. Install 2-inch bed and 4” cover of clean, rock free, backfill material. (12”total cover).
   4. Level bed material before installing pipe and use bell holes to provide uniform support.
   5. Final backfill shall not contain rock or debris larger than ¾” diameter.

# INSTALLATION OF SLEEVES

1. Sleeves shall be installed where indicated on the drawings. Sleeving shall be installed by trenching and/or boring as determined by the Contractor.
2. Soil compaction beneath paved areas in sleeve trenches shall be 95%.
3. Do not install gasketed pipe or make wire connection inside sleeves or beneath paved areas.
4. Do not sleeve any pressure mainline pipe.
5. Do not sleeve any non-pressure water lines. Except pass thru for planter walls.
6. Sleeves for both irrigation pipe and control wires shall be schedule 40 pipe, twice the diameter of the irrigation pipe.
7. See FUSD Sleeving Detail

# INSTALLATION OF PIPE

1. Connections to Water Supply: Connect new underground sprinkler piping to existing water supply line(s). Provide flanges, adapters and other necessary fittings required to make the connections.
2. Polyvinyl Chloride Pipe:
   1. Pipe shall be cut using approved PVC pipe cutters only. Sawed joints will not be permitted. All field cuts shall be beveled to remove burrs and excess before fitting and gluing together.
   2. Pipe ends and fittings shall be wiped with MEK, or other primer recommended by the pipe manufacturer, before welding solvent is applied. Socket joints shall be made in accordance with recommended procedures for joining PVC plastic pipe and fittings with PVC solvent cement by the pipe and fitting manufacturer and procedures outlined in the Appendix of ASTM D 2564-93. Welded joints shall be given a minimum of 15 minutes to set before moving or handling.
   3. When connection is plastic to metal, PVC female adapters shall be used with short (not close) brass threaded nipples if needed to complete the connection. Joints shall be made with 2 wraps of Teflon tape and **hand tightened plus one turn with a strap wrench.**
   4. Assemble and place pipe lines having rubber ring seal joints in accordance with manufacturer's written instructions.
   5. Snake pipe from side-to-side of trench bottom to allow for expansion and contraction.
   6. Center load pipe with small amount of backfill to prevent arching and slipping under pressure. Leave joints exposed for inspection during testing.
   7. No water shall be permitted in the pipe until inspections have been completed and a period of at least 24 hours has elapsed for solvent weld setting and curing.
   8. Do not install gasketed joints within 5’ of solvent weld fittings.
   9. Install thrust blocks at all horizontal change of direction fittings 6” and up and terminal ends on gasketed mainlines. Do not encase pipe, fittings or wire in concrete.
   10. All drip irrigation tubing must be installed 4” below finish grade.
   11. Do not staple drip irrigation tubing to the surface.
3. Installation of Brass Pipe:
   1. Cut piping by power hacksaw, circular cutting machine using an abrasive wheel, or hand hacksaw. Do not cut brass piping with metallic wheel cutter of any description. Ream and remove rough edges or burrs so smooth and unobstructed flow is obtained.
   2. Make threaded pipe connections using Teflon tape applied to male threads only.
4. Dielectric Bushings:
   1. Shall be used for connections of piping of dissimilar metal materials.

# INSTALLATION OF AUTOMATIC CONTROL COMPONENTS

1. Automatic Sprinkler Controller: Test the controller after completion of electrical connections. Provide temporary power to the controller for operation and testing purposes.
   1. Make connections to control wiring within the controller cabinet. All wire shall follow the pressure main insofar as possible.
   2. Install electrical wiring from controller to electrical outlet or junction box in rigid PVC plastic conduit. Installation of wiring and disconnect switch to the sub-panels, clocks, or elsewhere as required, in order to complete this installation is specified in Division 16. Snake wire in conduit to allow for slack.
   3. Install wall mounted controllers 6’ above grade, measured to the top of the enclosure.
   4. See FUSD Controller Installation Detail
2. Remote Control Wiring:
   1. Provide one control wire and one common ground wire to service each valve in system. Provide four-foot minimum expansion loop at each valve to permit removal and maintenance of valves.
   2. Install control wires at least 24 inches below the finish grade and a minimum of four inches from the pipe or fittings except at terminal points. Wire shall run alongside mainline piping, not beneath.
   3. Wire shall not make contact with iron valves, iron fittings or concrete.
   4. Wires shall not be stretched tight in trenches or pulled tight around trench corners at changes in direction.
   5. Sleeve wire into pull/splice boxes and slurry boxes in place.
   6. Provide three additional control wires to the most distant remote control valves throughout the site for future connections.
   7. Control Wire Splices: Allow only on runs of more than 300 feet, spliced as follows:
      1. Strip off minimum of 2-1/2 inches of insulation from each wire.
      2. Install King Brothers silicone filled wire connectors per manufacturer’s recommendations.
      3. All splices shall be made at the surface and shall be housed in valve boxes.
   8. Numbering and Tagging: Identify direct burial control wires from automatic valves to terminal strips of controller at terminal strip by tagging wire with number of connected valve.
3. Remote Control Valves:
   1. Install remote control valves in locations indicated, with a cover of 8 inches minimum over top of flow control stem. Fit each valve with a valve box; set over 1 cubic foot of pea gravel, and a cover.

# INSTALLATION OF SPRINKLER HEADS

1. Nozzle size of sprinkler heads shall be adjusted to suit any particular conditions of the area. This shall be done after the system has been thoroughly tested, immediately after written notification by the Architect to do so.
2. All sprinklers shall be installed on triple swing joints with outlets facing landscape areas.

All swing joint threads shall be covered with Teflon tape. All swing joint assemblies shall match inlet size of sprinkler head.

1. Set all sprinkler heads at finish grade.
2. See FUSD Sprinkler Installation Details for each type of sprinkler

# INSTALLATION OF VALVES AND VALVE ASSEMBLIES

1. Valve Boxes: Install valve boxes as indicated. Install no more than one valve per box.

Brand valve number and controller letter on top side of valve box lid. Trim out boxes so that they do not rest on pipe. Provide a minimum of 1” clearance between box opening and pipe.

1. Backflow Preventer: the site utility contractor shall install the backflow preventer(s).

Verify the exact location and positioning on the site. Coordinate installation with the local water purveyor.

1. Install shutoff valve followed by a “Y” strainer in front of all backflow devices, and other points of connections.
2. Install pressure-reducing valves on all pressure mains as follows:
   1. Between “Y” strainer and backflow device (above grade, inside enclosure).
   2. Downstream of pump and bypass (above grade, inside enclosure).
   3. At branches of mainline to low pressure systems (above grade, inside enclosure).
3. Install pressure-relief valves on all pressure mainlines as follows:
   1. Downstream of backflow and pressure reducing valve (above grade, inside enclosure).
   2. Downstream of pump, bypass, and pressure reducing valve (above grade, inside enclosure.)
4. See FUSD Details pertaining to all valves

# INSTALLATION OF BOOSTER PUMP SYSTEM

1. Install per manufacturer’s recommendations and details on drawings.
2. Following installation, services of a factory representative or trained service professional shall be made available on the project site to check installation, perform the start-up and instruct operating personnel. A start-up report containing voltage and amperage readings, suction and discharge pressure readings, estimated flow conditions and general operating characteristics shall be submitted to the Owner.
3. Four sets of operating and maintenance manuals shall be provided to the owner after start-up and shall include parts manuals for major components, performance curve for pump, general sequence of operation and electrical schematic for control panel.

# FIELD QUALITY CONTROL

1. Testing: Subject the main and lateral lines to a pressure test of 125 psi for a period of four hours. Perform testing in the presence of the Project Inspector (PI). Obtain approval before backfilling trenches. Do not cover lines until they have been inspected and approved.
2. Inspection: In cases where inspection of the sprinkler system construction is required or where portions of the construction are specified to be performed under the direction or inspection of the PI, notify the PI at least 48 hours in advance of the time such inspection or direction is required.
3. Inspection will be required for the following parts of the construction:
   1. Upon installation and testing of main lines and lateral lines; when pipes are laid and are to be submitted to pressure tests. Do not cover lines until they have been inspected and approved.
   2. Upon installation and testing of valves, backflow preventer device, automatic controllers, and control valves and wires.
   3. When the sprinkler system is complete, perform a coverage test, in the presence of the Architect and Owner’s representative and Grounds Dept. Supervisor, to determine if the coverage of water afforded the lawn and planting areas is complete and adequate. Furnish materials and perform construction required to correct inadequacies in the coverage.
   4. Final inspection and performance test shall be at the same time as the final inspection of the landscape construction.

# CLEAN-UP

* + 1. As project progresses, maintain the site in a neat manner and remove unsightly debris as necessary. After completion of construction, remove debris and containers used in accomplishing construction. Sweep and clean sidewalks, asphalt, and concrete areas adjacent to plantings.

# MAINTENANCE

1. Prior to the commencement of the 90-day maintenance period and after initial germination and mowing of the turf areas, the Contractor shall make controller schedule modifications to insure that the turf areas are not being over-watered.
2. Inspection of valves, and other pressurized above ground connections shall be performed on a minimum weekly basis throughout maintenance period.
3. Inspection of irrigation heads to correct alignment, clear laterals, adjust spray patterns, clean screens, and repair damaged heads shall be performed before commencement of maintenance period and prior to final acceptance at the end of the maintenance period.
4. Contractor shall be responsible for interrupting irrigation program to eliminate watering during rainstorms throughout maintenance period.
5. Contractor shall, on a weekly basis throughout maintenance period, inspect system for damage. Any problems shall be brought to the attention of the District and rectified immediately.
6. Irrigation contractor shall be responsible for replacing or repairing any acts of theft or vandalism during the construction and the maintenance periods.

# END OF SECTION















































