PART 1 GENERAL

1.01 GENERAL CONDITIONS

The requirements of the University of Texas at Austin Uniform General Conditions and Supplementary General Conditions, 2013 Amended shall apply to all work of this section with the same force and effect as though repeated in full herein.

1.02 SCOPE OF WORK

Furnish all labor, materials, equipment, transportation, and services necessary to furnish and install the Irrigation System complete in place, as shown on the drawings and specified herein.

1.03 DEFINITIONS

A. Landscape Services Representative: University of Texas at Austin – Landscape Services Representative
B. Architect: Designer Representative
C. Contractor: General Contractor or any sub-contractor responsible for the work specified herein.
D. Final Acceptance of Installation: This acceptance will be granted upon completion of installation of the complete irrigation system according to the plans and as specified herein. Final Acceptance of Installation will not occur before the Final Inspection.
E. Final Inspection: The last inspection immediately prior to Final Acceptance of Installation.

1.04 STANDARDS

ASTM D1785 (ANSI B72.7): Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.

1.05 QUALITY ASSURANCE AND REQUIREMENTS

A. Contractor’s Qualifications: Demonstrated experience on projects of similar characteristics and size.
B. Licensed Irrigator: Installation of the irrigation system shall be under the direct supervision of a superintendent or foreman currently licensed as an Irrigator/Irrigation Installer by the State of Texas.
C. Permits and Inspections
   1. In all cases, where inspection of the irrigation system is required and/or where portions of the work are specified to be performed under the direction and/or
inspection of the Landscape Services Representative, the Contractor shall notify
the Landscape Services Representative at least 24 hours in advance of the time
when inspection and/or direction is required, or as specified under "Observation
Schedule".

2. Any necessary re-excavation or alterations to the system needed because of the
failure of the Contractor to have the required inspections shall be performed at
the Contractor's expense.

D. Ordinances and Regulations: All local, municipal and state laws, and rules and
regulations governing or relating to any portion of this work are hereby incorporated into
and made a part of these specifications, and their provisions shall be carried out by the
Contractor. Anything contained in these specifications shall not be construed to conflict
with any of the above rules and regulations or requirements of the same. However,
when these specifications and drawings call for or describe materials, workmanship, or
construction of a better quality, higher standard, or larger size than is required by the
above rules and regulations, the provisions of the specifications and drawings shall take
precedence.

E. Manufacturer's Directions: Manufacturer's directions and detailed drawings shall be
followed in all cases where the manufacturers of articles used in this contract furnish
directions covering points not shown in the drawings and specifications.

F. Explanation of Drawings:
1. Due to the scale of drawings, it is not possible to indicate all offsets, fittings, etc.
which may be required. The Contractor shall carefully investigate the structural
and finished conditions affecting all of their work and plan their 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. All work called for on the drawings by notes or details shall be furnished and
installed whether or not specifically mentioned in the specifications.

3. 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.
Such obstructions or differences should be brought to the attention of the
Landscape Services Representative. In the event this notification is not
performed, the Contractor shall assume full responsibility for any revision
necessary.

G. Damage to Existing Site Amenities
Damage to existing irrigation and electrical lines to remain shall be repaired within 24
hours of damage occurrence. If not repaired within the specified time, the Landscape
Services Representative has the right to make such repairs as necessary and all costs
incurred shall be charged to the Contractor.

1.06 CONTRACTOR'S RESPONSIBILITY
A. Prior to submittal of bids, Contractor shall acquaint himself with all matters and
conditions concerning the site and existing conditions.

B. Contractor shall be responsible for coordinating his work with the other trades so that all
phases of the work may be properly coordinated without delays or damage to any parts
of the work.

C. The Contractor shall be responsible for all sleeves and chases under paving, through
walls, etc., unless otherwise noted on the plans.
1. Any pipe installed under a sidewalk, driveway, or concrete area should be in a sleeve.
2. Sleeve should be twice the size of the pipe going through it.
3. An extra 2” sleeve shall be installed under any sidewalk, driveway, or concrete area.

1.07 SUBMITTALS

A. Material List:
1. The Contractor shall furnish the articles, equipment, materials, or processes specified by name in the drawings and specifications. No substitution will be allowed without prior written approval by the Landscape Services Representative.
2. Complete material list shall be submitted prior to performing any work if different from the plans. Material list shall include the manufacturer, model number and description of all materials and equipment to be used.
3. Equipment or materials installed or furnished without prior approval of the Landscape Services Representative may be rejected and the Contractor required removing such materials from the site at his own expense.
4. Approval of any item, alternate or substitute indicates only that the product or products apparently meet the requirements of the drawings and specifications on the basis of the information or samples submitted.
5. Manufacturer's warranties shall not relieve the Contractor of their liability under the guarantee. Such warranties shall only supplement the guarantee.

B. Record and As-Built Drawings:
1. The Contractor shall provide, and keep up to date, a complete “as-built” set of black or blue line prints which shall be corrected daily and show every change from the original drawings and specifications and the exact "as-built" locations, sizes, and kinds of equipment. Prints for this purpose may be obtained from the Landscape Services Representative. This set of drawings shall be kept on the site and shall be used only as a working set.
2. These drawings shall also serve as work progress sheets and shall be the basis for measurement and payment for work completed. These drawings shall be available at all times for inspection and shall be kept in a location designated by the Landscape Services Representative. Should these "as-built" progress sheets not be available for review or not be up-to-date at the time of any inspection, it will be assumed that no work is completed.
3. The Contractor shall make neat and legible notations on the "as-built" progress sheets daily as the work proceeds, showing the work as actually installed. For example, should a piece of equipment be installed in a location that does not match the plan, the Contractor must indicate that equipment has been relocated in a graphic manner so as to match the original symbols as indicated in the irrigation legend. The relocated equipment and dimensions will then be transferred to the original Record plan at the proper time.
4. After final inspection, but before final acceptance, the Contractor shall submit to the Landscape Services Representative the "as-built" prints. These prints shall be submitted before final payment will be made.
5. The Contractor shall dimension from two (2) permanent points of reference, building corners, sidewalk, or road intersections, etc., the location of the following items:
a. Connections to water lines.
b. Connection to electrical power.
c. Gate valves.
d. Routing or sprinkler pressure lines (Mainline and Lateral lines)
e. Sprinkler control valves.
f. Routing of control wiring.
g. Quick coupling valves.
h. Other related equipment as directed by the Landscape Services Representative.

6. GIS Requirements for University Operations

1. GIS data: Horizontal and vertical geometry and attribute data shall be loaded into or created in the LISwaterDistribution-4-12-16.mdb. At a minimum, record the following attributes for pipes and appurtenances:
   a. Type
   b. Diameter
   c. Material
   d. Manufacturer

2. For system components that have nameplates, document all information on the nameplate. This usually includes the following information:
   a. Manufacturer
   b. Model number
   c. Size
   d. Component material or model numbers (e.g., stem, disc, seat, class)
   e. Pressure rating
   f. In-service date

3. All new and existing active underground and underslab utilities and appurtenances exposed during construction shall be recorded. Coordinates with applicable field notes shall be recorded at:
   a. Any significant change in direction, material, or size
   b. Deviations from design greater than 6 inches in any direction
   c. All appurtenances (valves, junctions, etc.)
   d. Every 50 feet otherwise

4. The final deliverable coordinate system shall be:
   a. 2011 State Plane Texas Central FIPS 4203
   b. NAD83 (horizontal)
   c. NAVD88 (vertical)
   d. US Survey Feet
   e. Elevation above sea level

C. Operation and Maintenance Manuals:

1. Prepare and deliver to the Landscape Services Representative within ten calendar days prior to final inspection, one digital copy:
   a. Index sheet stating Contractor’s address and telephone number, list of equipment with name and address of local manufacturer’s representative.
b. Catalog and parts sheets on every material and equipment installed under this contract.
c. Complete operating and maintenance instructions on all major equipment.

2. In addition to the above mentioned maintenance manuals, provide the Landscape Services Representative with instructions for major equipment.

E. Equipment to be furnished to the Landscape Services Representative:

1. Supply as a part of this contract the following:
   a. Two (2) sets of special tools required for removing, disassembling and adjusting each type of irrigation head and valve supplied on this project, including solenoid wrenches.
   b. Two (2) keys for each automatic controller.
   c. Two (2) quick coupler keys with ells.

2. The above mentioned equipment shall be turned over to the Landscape Services Representative at the conclusion of the project before final inspection can occur.

1.08 DELIVERY, HANDLING, AND STORAGE

A. Delivery and Handling

1. Contractor is cautioned to exercise care in handling, loading, unloading, and storing of PVC pipe and fittings.
2. All PVC pipe shall be transported in a vehicle which allows the length of pipe to lie flat so as not to subject it to undue bending or concentrated external load at any point.
3. Any section of pipe that has been dented or damaged will be discarded and, if installed, shall be replaced with new piping at the expense of the Contractor.

B. Storage

1. If a storage site is necessary, the Landscape Services Representative will determine the storage site at the Pre-Construction Meeting after the award of the contract.
2. Contractor shall erect a temporary fence and store material inside of the fenced area.
3. Contractor shall be fully responsible for the management of the storage site.
4. Storage at the irrigation site shall not be permitted without written consent of the Landscape Services Representative.
5. All PVC pipe shall be covered or otherwise protected from ultraviolet light during storage.
6. Contractor shall maintain the storage area in a neat and orderly manner. If, in the opinion of the Landscape Services Representative, the storage area becomes unsightly, the Contractor shall clean up the storage area within two (2) days of notification.
7. At the completion of the contract, the Contractor shall remove the temporary storage fence and all debris in the area. The Contractor shall restore the storage area to original condition including, but not limited to, grading and turf re-establishment.

1.09 PUBLIC CONVENIENCE AND SAFETY
A. Materials stored about the work shall be so placed and work shall at all times be so conducted as to cause no greater obstruction to the travelling public than is considered necessary by the Landscape Services Representative.

B. The materials excavated, and the construction materials used in the construction of the work, shall be placed so as not to endanger the work or prevent free access to all fire hydrants, water valves, gas valves, manholes for the telephone, telegraph signal or electric conduits, sprinkler systems, sanitary sewers, and fire alarm or police call boxes in the vicinity.

C. The Landscape Services Representative reserves the right to remedy any neglect on the part of the Contractor as regards the public convenience and safety which may come to its attention, after twenty-four hours notice in writing to the Contractor, save in cases of emergency, when it shall have the right to remedy any neglect without notice and, in either case, the cost of such work done by the Landscape Services Representative shall be deducted from the monies due the Contractor.

D. This project is located on property which could be used by the Public during the course of this agreement. For this reason, the Contractor must observe the utmost care in regards to the Public's safety. Any possible hazards which could result in injury must be eliminated as soon as possible.

E. No trenches, ditches, etc. shall remain open overnight outside protective fencing without approval from the Landscape Services Representative.

F. Any ditches which are left open must be covered securely so as to prevent any possibility of injury. It shall be the Contractor's responsibility to eliminate any hazards during and after working hours and the Contractor must have personnel available who can eliminate hazards which are discovered after normal working hours and on the weekends and holidays.

G. Contractor assumes all responsibility for open trenches, ditches etc.

1.10 SUBSTITUTIONS
A. If the Contractor wishes to substitute any equipment or materials for the equipment or materials listed on the irrigation drawings and specifications, they may do so by providing the following information to the Irrigation Supervisor for approval:
1. Substitution requests will be considered only after award of the contract.
2. Substitution requests must be made within 30 days after award of the contract.
3. Provide a statement indicating the reason for making the substitution. Use a separate sheet of paper for each item to be substituted.
4. Provide descriptive catalog literature, performance charts, and flow charts for each item to be substituted.
5. Provide the amount of cost savings if the substituted item is approved.

B. The Landscape Services Representative shall have the sole responsibility in accepting or rejecting any substituted item as an approved equal to those equipment and materials listed on the irrigation drawings and specifications.

C. Decisions on substitutions by the Irrigation Supervisor are final.

1.11 CHANGES IN THE WORK
A. The Landscape Services Representative may, without invalidating the contract, order additional work or alterations to the contract.

B. Minor changes, such as head locations and controller location, which do not involve extra cost and are consistent with the purpose of the work, may be ordered by the Landscape Services Representative and no claim for an addition to the contract sum or time schedule will be considered.
C. Any changes which affect the contract price shall be requested in writing and the contract sum shall be adjusted. Any extension of time due to additions in work shall be adjusted at the time of the change order.

1.12 FINAL INSPECTION
A. A qualified person duly authorized in writing to represent the Contractor shall be present at the final inspection to demonstrate the system and prove the performance of the equipment.
B. Prior to the final inspection, all work under this division shall have been completed, tested, balanced and adjusted and in final operation condition.
C. Irrigation Supervisor or Landscape Services Representative will be present during inspection and must sign off on all irrigation work.

1.13 GUARANTEE
A. Materials and workmanship shall be fully guaranteed for one year after final acceptance. All material will be new and the current production model of the material specified.
B. Guarantee is limited to repair and replacement of defective materials or workmanship, including repair of backfill settlement.
C. The Contractor, at his expense, shall repair any defects or replace any defective parts found or occurring during the one year guarantee period within 48 hours of notification by the.

PART 2--PRODUCTS

2.01 MATERIALS
A. General: All materials and accessories shall be of new and unused material. Any section of pipe found to be defective before or after installation shall be replaced with new pipe at the expense of the Contractor. All new irrigation equipment shall be essentially the standard product of the manufacturer. All new equipment furnished shall have in-service performance records sufficient to verify published capabilities.
B. PVC Pressure Main Line Pipe and Fittings
1. Pressure main line piping shall be PVC Schedule 40, solvent weld joints, purple color.
2. Pipe shall be made from an NSF approved Type I, Grade II, PVC compound conforming to ASTM resin specification D1785. All pipes must meet requirements as set forth in Federal Specification PS-22-70, with an appropriate standard dimension ratio (SDR) (Solvent-weld pipe).
3. PVC solvent-weld fittings shall be Schedule 40, 1-2, II-I NSF approved conforming to ASTM test procedure D2466.
4. Solvent cement and primer for PVC solvent-weld pipe and fittings shall be of type and installation methods prescribed by the manufacturer. Primer must be purple IPS Weldon P-68 or approved equal.
5. All PVC pipe must bear the following markings:
   a. Manufacturer's name
   b. Nominal pipe size
   c. Schedule or class
   d. Pressure rating in P.S.I.
   e. NSF (National Sanitation Foundation) approval
6. All fittings shall bear the manufacturer's name or trademark, material designation, size, applicable I.P.S schedule, and NSF seal of approval.

C. PVC Non-Pressure Lateral Line Piping:
   1. Non-pressure lateral line piping shall be PVC Schedule 40, solvent-weld joints, purple color. No class 200 pipe to be installed.
   2. Pipe shall be made from NSF approved, Type I, Grade II PVC compound conforming to ASTM resin specification D1785. All pipes must meet requirements set forth in Federal Specification PS-22-70 with an appropriate standard dimension ratio.
   3. Except as noted in paragraphs 1 and 2 of section 2.01B, all requirements for non-pressure lateral line pipe and fittings shall be the same as for solvent-weld pressure main line pipe and fittings as set forth in section 2.01B of these specifications.
   4. Solvent cement and primer for PVC solvent-weld pipe and fittings shall be of type and installation methods prescribed by the manufacturer. Primer must be purple IPS Weldon P-68 or approved equal.

D. Ball Valves:
   1. Install one ball valve prior to each electric valve location for isolation purposes. Ball Valves shall be of size and type as indicated on the irrigation drawings.

E. Quick coupling Valves:
   1. Quick coupling valves shall have a brass two-piece body designed for working pressure of 150 P.S.I. with a .75 inch diameter outlet. Key size and type shall match the valve. Rainbird 33DRC with 33DK valve key or approved equal and with purple top.

F. Backflow Prevention Units:
   1. Backflow prevention units shall be of size and type indicated on the irrigation drawings. Install backflow prevention units in accordance with irrigation construction details.

G. Control Wiring:
   1. Connections between the automatic controllers and the electric control valves shall be made with direct burial copper wire AWG-U.F. 30 volt. Pilot wires shall be a different color wire for each automatic controller. Common wires shall be white with a different color stripe for each automatic controller. Install in accordance with valve manufacturer's specifications and wire chart. In no case shall wire size be less than #14. All electrical work shall conform to code.
   2. Lay one additional control wire from each controller to the farthest valve in each direction from the controller. This wire control is to be a different color from the other control and common wire.
   3. Wiring shall occupy the same trench and shall be installed along the same route as pressure supply or lateral lines wherever possible. All wire shall be placed under all pipes in the trench.
   4. Where more than one (1) wire is placed in a trench, the wiring shall be taped together at intervals of ten (10) feet.
   5. An expansion curl/coil shall be provided within three (3) feet of each wire connection. Curl must be 10 to 15 wraps around a .75 inch pipe. Expansion curl shall be of sufficient length at each splice connection at each electric control, so that in case of repair, the valve bonnet may be brought to the surface without disconnecting the control wire. Control wires shall be laid loosely in trench without stress or stretching of control wire conductors.
6. An expansion curl shall be provided every 125-150 feet along all wire runs.
7. All splices shall be made with Scotch-Lok #3576 Connector Sealing Packs, Rainbird Snap-Tite wire connector, or approved equal. Use one splice per connector sealing pack.
8. Limit wire splices between the automatic controller and electrical control valves, locate ALL WIRE SPLICES on "as built" drawings. Wire splice shall be installed in a separate box (minimal 10" box)
9. 2 extra wires (BLUE COLOR) from the controller to be run to the farthest irrigation zones.

H. Automatic Controllers:
1. Automatic controllers shall be of size and type shown on the plans. Ground the controller according to manufacturer's directions.
2. Final location of automatic controllers shall be approved by the Landscape Services Representative.
3. Install controller pedestal per the manufacturer's instructions.
4. Irrigation controller shall be a Calsense ET2000e LR, RR-E, -F, with TP board, and radio frequency of 452.6875.

I. Electrical Control Valves:
1. All electric control valves shall be as called for on the plans.
2. All electric control valves shall have a manual flow adjustment.
3. Provide and install one control valve box for each electric control valve.
4. A master valve shall be installed on all water sources.
5. All electric control valves shall be labeled with zone identification tags.
6. All electric control valves shall be installed in a manifold in a machine/valve room and large enough to accommodate backflow prevention valves, and controller. This room must have a floor drain, and an exterior entrance for 24-Hour access.
   In the event that a machine/valve room is not a possibility a concrete vault may be substituted as a last resort.
7. All valves shall be labeled to their corresponding valve number in the field.
8. Valve installed inside buildings shall be brass.
9. Weathermatic, Rainbird, and Hunter valves shall be installed.

J. Control Valve Boxes:
1. Use a 10 inch round box with purple locking cover for all gate valves, NDS, or approved equal. Extension sleeve shall be used where needed.
2. Use 12 X 17 valve boxes for valves up to 1 ½"; 17 X 30 for valves 2" and greater with purple locking cover for all electrical control valves, NDS or approved equal.

K. Irrigation Heads/Nozzles:
1. All irrigation nozzles shall be of the same size, type, and deliver the same rate of precipitation with the diameter (or radius) of throw and discharge as shown on the plans and/or as specified herein. All irrigation heads shall use HUNTER MP Rotary nozzles
2. Spray nozzles shall have a screw adjustment.
3. Riser units shall be fabricated in accordance with the details shown on the plans.
4. Riser nipples for all irrigation heads shall be the same size as the riser opening in the body of the head.
5. All irrigation heads of the same type shall be of the same manufacturer; pop-up spray heads: 1806 SAM PRS Rainbird (1812 SAM PRS in landscape beds), large turf heads/rotors: PGP Hunter series; athletic field turf heads/rotors: Hunter I series (25, 40, 60, 90) or approved equal.
6. All irrigation heads shall be installed on a swing joint.

L. Flow Sensor:
   1. Flow sensor shall be Calsense Flow meter.
   2. Size of flow meter will be based off highest and lowest zone flow (NOT BASED OFF MAINLINE SIZE)

M. Drip Irrigation:
   1. Drip irrigation shall be installed 4 inches below soil. No installation of drip pipe shall be directly under mulch.
   2. Drip emitter spacing shall be 12” at .9 GPH.
   3. All drip irrigation valves shall have a filter and pressure reducer on them.

N. Copper Piping:
   1. Any irrigation piping inside of a building must be Copper pipe and affixed with a water proof label with block lettering labeled “IRRIGATION”, per plumbing code.

O. Moisture Sensors:
   1. Minimal of four Toro TG-S2-R Dual Level Sensor shall be installed on the site.
   2. Minimal of one Toro repeater (Turf Guard) shall be installed on the site.

PART 3--EXECUTION
3.01 INSPECTION
A. Site Conditions:
   1. All scaled dimensions are approximate. The Contractor shall check and verify all size dimensions and receive Landscape Services Representative’s approval prior to proceeding with work under this section.
   2. Exercise extreme care in excavating and working near existing utilities. Contractor shall call Texas 811 prior to any digging and contacting UT Utilities. Contractor shall be responsible for damages to utilities which are caused by their operations or neglect. Verify existing utilities with the appropriate utility Landscape Services Representative i.e.: electricity, gas, cable, telephone.
   3. Damaged utilities shall be repaired by the Contractor the same day they are damaged.
   4. Coordinate installation of irrigation materials including pipe, so there shall be NO interference with utilities or other construction or difficulty in planting trees, shrubs, and ground covers.
   5. The Contractor shall carefully check all grades to satisfy themselves that they may safely proceed before starting work on the irrigation system.

3.02 PREPARATION
A. Physical Layout:
   1. Prior to installation, the Contractor shall stake out all pressure supply lines and valve locations.
   2. All layouts shall be approved by the Landscape Services Representative prior to installation.

B. Water Supply:
   1. Landscape Irrigation system shall be connected to water supply points of connection as indicated on the drawings.
   2. Contractor shall verify static water pressure prior to commencement of construction/installation. Should there be a discrepancy between the design pressure and the actual pressure, contact the Landscape Architect before proceeding with the work. Failure to do so will result in the Contractor making
necessary changes to the irrigation system without additional cost to the Landscape Services Representative.

3. The Contractor shall provide all required water taps and water meters necessary for the project as indicated on the plans.

4. Connections shall be made at approximated locations as shown on drawings. Contractor is responsible for minor changes caused by actual site conditions.

C. Electrical Supply:
1. Electrical service must be provided to the controllers by the Contractor. The Contractor shall make the final wiring of the controller. Electrical work shall conform to applicable codes.
2. Connections shall be made at approximate locations as shown on drawings. Contractor is responsible for minor changes caused by actual site conditions.

3.03 INSTALLATION
A. Trenching:
1. Dig trenches straight and support pipe continuously on bottom of trench. Lay pipe to an even grade. Trenching excavation shall follow layout indicated on drawings and as noted.
2. Provide for a minimum of eighteen (18) inches cover for all pressure supply lines.
3. Provide for a minimum cover of twelve (12) inches for all non-pressure lines.
4. Provide for a minimum cover of eighteen (18) inches for all control wiring.
5. Install pipe so that writing on pipe can been seen during inspection.
6. NO MACHINE TRENCHING IN THE CRITICAL ROOT ZONE. (This note must be included on plans in English and Spanish)

B. Backfilling:
1. The trenches shall not be backfilled until all required tests are performed and inspections are made by UT – Austin Landscape Services staff. Partial backfilling between joints is acceptable to prevent pipe from floating. Trenches shall be carefully backfilled with the excavated materials approved for backfilling, consisting of earth, loam, sandy clay, sand, or other approved materials, free from large clods of earth or stones. Backfill shall be mechanically compacted in landscaped areas to a dry density equal to adjacent undisturbed soil in planting areas. Backfill will conform to adjacent grades without dips, sunken areas, humps or other surface irregularities.
2. Flooding of trenches is an acceptable means of settling soil in the trench.
3. If settlement occurs and subsequent adjustments in pipe, valves, sprinkler heads, lawn or planting, or other construction are necessary, the Contractor shall make all required adjustments without cost to the Landscape Services Representative.

C. Trenching and Backfill Under Paving:
1. All piping and wiring under existing and proposed paving shall be in appropriate sized sleeves. REFERENCE 1.06.C
2. Trenches with pipe and wire to be located under areas where paving, asphaltic concrete or concrete will be installed shall be backfilled with sand (a layer three (3) inches below the pipe and six (6) inches above the pipe) and compacted in layers to 95% compaction, using manual or mechanical tamping devices. Trenches for piping shall be compacted to equal the compaction of the existing adjacent undisturbed soil and shall be left in a firm unyielding condition. All trenches shall be left flush with the adjoining grade. The Contractor shall set in-place, cap, and pressure test all piping under paving.
3. Generally, piping under existing walks is done by jacking or boring, but where any cutting or breaking of sidewalks and/or concrete is necessary, it shall be done and replaced by the Contractor as part of the contract cost. Permission to cut or break sidewalks and/or concrete shall be obtained from the Landscape Services Representative.

4. Provide for a minimum cover of eighteen (18) inches between the top of the pipe and the top of pavement for all pressure and non-pressure piping installed under any paving.

5. NO MACHINE TRENCHING IN THE CRITICAL ROOT ZONE. (This note must be included on plans in English and Spanish)

D. Assemblies:
1. Routing of irrigation lines as indicated on the drawings is diagrammatic. Install lines (and various assemblies) in such a manner as to conform with the details and plans.
2. Install NO multiple assemblies in plastic lines. Provide each assembly with its own outlet.
3. Install all assemblies specified herein in accordance with respective detail. In absence of detail drawings or specifications pertaining to specific items required to complete work, perform such work in accordance with best standard practice with prior approval of Landscape Services Representative.
4. PVC pipe and fittings shall be thoroughly cleaned of dirt, dust, and moisture before installation. Installation and solvent welding methods shall be as recommended by the pipe and fitting manufacturer.
5. On PVC to metal connections, the Contractor shall work the metal connections first. Teflon paste shall be used on all threaded PVC to PVC, and on all threaded PVC to metal joints. Light wrench pressure is all that is required. Where threaded PVC connections are required, use threaded PVC adapters into which the pipe may be welded.

E. Automatic Controller: Install as per manufacturer’s instructions. Remote control valves shall be connected to controller in numerical sequence as shown on the drawings.

F. 120 Volt wiring for Automatic Controller: Wire controllers per appropriate code. Install liquid tight conduit when wire must be run above the ground.

G. Remote Control Valves: All electric control valves shall be installed in a manifold in a machine/valve room and large enough to accommodate backflow prevention valves, and controller. This room must have a floor drain, and an exterior entrance for 24-Hour access. In the event that a machine/valve room is not a possibility a concrete vault may be substituted as a last resort.
   1. Acquire approval from Landscape Services Representative for all valve locations when inside installation is not possible. When grouped together, allow at least twenty-four (24) inches between valve boxes. Install each remote control valve in a separate valve box.
       1. Minimal 6” clearance between valve and pea gravel.

H. Flushing of System:
1. After all new irrigation pipe lines and risers are in place and connected, all necessary diversion work has been completed, and prior to installation of irrigation heads, the control valves shall be opened and full head of water used to flush out the system.
2. Irrigation heads shall be installed only after flushing of the system has been accomplished to the complete satisfaction of the Landscape Services Representative.

I. Irrigation Heads:
1. Install the irrigation heads as designated on the drawings.
2. Spacing of heads shall not exceed the maximum indicated on the drawings and shall achieve head to head coverage. In no case shall the spacing exceed the maximum recommended by the manufacturer.

3.04 TEMPORARY REPAIRS
A. The Landscape Services Representative reserves the right to have made temporary repairs as necessary to keep the irrigation system equipment in operating condition. The exercise of this right by the Landscape Services Representative shall not relieve the Contractor of their responsibilities under the terms of the guarantee as specified herein. Costs incurred from these repairs shall be charged to the Contractor, or withheld from monies due to the Contractor.

3.05 FIELD QUALITY CONTROL
A. Adjustment of the System:
1. The Contractor shall flush and adjust all irrigation heads for optimum performance and to prevent over-spray onto walks, roadways, and buildings.
2. If it is determined those adjustments in the irrigation equipment will provide proper and more adequate coverage, the Contractor shall make such adjustments. Adjustments may also include changes in nozzle sizes and degrees of arc as required. Any and all changes shall be recorded on the Record Drawings.
3. All irrigation heads shall be set perpendicular to finished grades unless otherwise designated on the plans.

B. Testing of Irrigation System:
1. The Contractor shall request the presence of the Landscape Services Representative in writing at least 48 hours in advance of testing for inspection and witness of test.
2. Test all pressure lines under hydrostatic pressure at operating pressure, and prove watertight.
   Note: Testing of pressure mainlines shall occur after installation of electric control valves.
3. All piping under paved areas shall be tested under hydrostatic pressure at operating pressure and proved watertight.
4. Sustain pressure in lines for not less than two (2) hours. If leaks develop, replace joints and repeat test until entire system is proven watertight.
5. All hydrostatic tests shall be made in the presence of the Landscape Services Representative. No pipe shall be backfilled until it has been inspected, tested, and approved in writing. It is permissible to backfill between pipe joints to prevent pipe float. Leave all joints and connections exposed for inspection.
6. When the irrigation system is completed, perform a coverage test in the presence of the Landscape Services Representative, to determine if the water coverage for planting areas is complete and adequate. Furnish all materials and perform all
work required to correct any inadequacies of coverage due to deviations from plans, or where the system has been willfully installed as indicated on the drawings when it is obviously inadequate, without bringing this to the attention of the Landscape Services Representative. This test shall be accomplished before any planting takes place.

7. Upon completion of each phase of work, the entire system shall be tested and adjusted to meet site requirements.

8. An irrigation audit shall be completed on the irrigation zones for DU (Distribution Uniformity) with all zones having at least 65% DU. The audit should be done by a certified Irrigation Auditor and a formal report shall be delivered to Landscape Services at final inspection.

3.06 MAINTENANCE
A. 90 Day maintenance on the irrigation system.
B. The Landscape Services Representative reserves the right to waive or shorten the maintenance period.

3.07 CLEAN-UP
A. Clean-up shall be made as each portion of work progresses. Refuse and excess dirt shall be removed from the site and disposed of at the Contractors expense.
B. At the end of each work day, the Contractor shall leave the site area broom-clean and shall wash down all paved areas within the contract area, leaving the premises in clean condition. All sidewalks, paths, curbs and roads shall be left in a clean, safe condition.
C. All scars, ruts or other marks in the ground or surrounding area caused by this work shall be repaired to the original condition.

3.08 FINAL INSPECTION PRIOR TO FINAL ACCEPTANCE
A. The Contractor shall operate each system in its entirety for the Landscape Services Representative at time of final inspection. Any items deemed not acceptable by the Landscape Services Representative shall be reworked to the complete satisfaction of the Landscape Services Representative.

3.09 OBSERVATION SCHEDULE
A. Contractor shall be responsible for notifying the Landscape Services Representative in advance for the following observation meetings, according to the time indicated:

   1. Pressure supply line installation and testing--48 hours
   2. Automatic controller installation--48 hours
   3. Control wire installation--48 hours
   4. Lateral line and head installation--48 hours
   5. Coverage test--48 hours
   6. Final inspection--7 days

END OF SECTION