IFB WOLF SWAMP PARK ATHLETIC FIELD RENOVATIONS LONGMEADOW, MA

ADDENDUM No. 1
August 14, 2020

The attention of bidders submitting proposals for the subject project, as noted above, is called to the following addendum to the Contract Documents. The items set forth herein, whether of omissions, addition, substitution, or clarification are all to be included in and form a part of the proposal submitted. Acknowledge the receipt of Addendum No.1 on the Bid Submission Forms.

REVISED BID DEADLINE

Per IFB Addendum No.1, sealed bids should be mailed and delivered to the Longmeadow Purchasing Department at 735 Longmeadow Street, Suite 101, Longmeadow, MA 01106. Bids will be accepted until the bid deadline of: **Wednesday, August 26, 2020 at 2:00PM** (the revised bid deadline). Bids should be labeled **'**IFB: Wolf Swamp Park Athletic Field Renovations'**,** followed by the bidder's company name, address and contact information. Late bids will be rejected. For bid delivery enter at the lower stairwell door located at the back of the building (the parking lot side), other doors may be locked. Bids received will then be opened remotely through zoom.com beginning at 2:30PM the same day as the bid deadline. The public bid opening through Zoom will be recorded. To access the meeting call 646-558-8656, Meeting ID:919 3157 8594, Password: 997319. Provided is the real time video access to the zoom meeting:
https://zoom.us/j/91931578594?pwd=OGZqUXZJUkhhY1ZsOFBVNmkwSzFTQT09

REVISED DEADLINE FOR BIDDER'S QUESTIONS

The revised deadline for questions and inquiries will be 144 hours (6 days) before the bid deadline. Questions received after the deadline for questions will not be answered. Forward questions to cthompson@longmeadow.org .

ADDITIONAL PROJECT INFORMATION ATTACHED

1. **Separated specifications:**
    - *a.* **Irrigation**
    - *b.* **Irrigation Cistern/Wet Well & Well Pump Systems**

BID LIST OF THOSE REGISTERED TO DATE

Those that have requested to be added to the bid list as of August 13, 2020 includes the following:

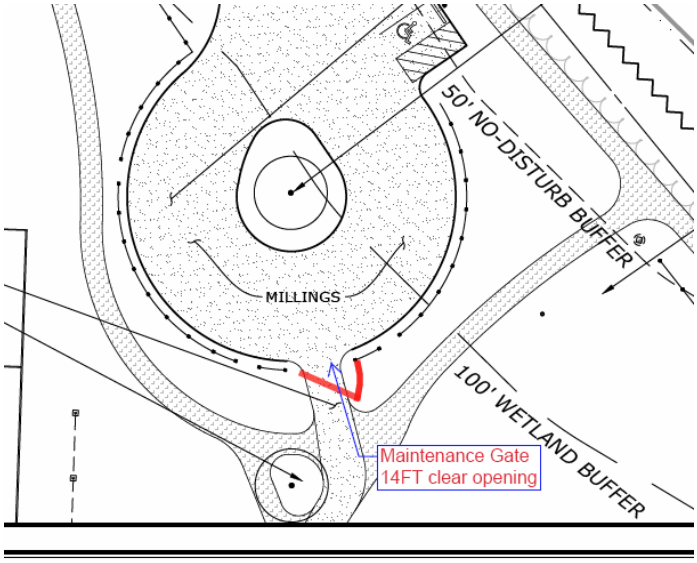
Next Gen Sports; JL Construction; Dugout USA, Crystal River, FL; Bid Prime Inc., Austin, TX; Hera Sports; Crestview Construction, Southwick, MA; Dodge Data Analytics; Elm Electrical, Inc., Westfield, MA; Mountain View Landscapes and Lawncare, Inc.; Act Global, Bow, NH; R.A.D. Sports, Rockland, MA; Geeleher Enterprises, Inc., Southampton, MA; Nunes Companies; Coastal Materials Testing Lab, LLC, West Have, CT; Green Acres Landscape & Construction Co. Inc., Lakeville, MA; Anser Advisory, Boston, MA; M.L. Schmitt Inc., Springfield, MA; SportsEdge; Construct Connect; CFB, Bow, NH; Taylor Davis Landscape and Construction, Amherst, MA; Cole Contracting Inc.; CBS Inc., Somersworth, NH; Caracas Construction Corporation, Ludlow, MA; Baltazar Contractors, Ludlow, MA; Winterberry Irrigation, Southampton, CT; CMS Landscaping, Holyoke, MA; Ray Haluch Inc., Ludlow, MA; TPK Inc., Allison Park, PA; Western Earthworks

RESPONSE TO BIDDERS QUESTIONS

1. **The plans reference bleachers and dugouts but there is no detail or specification provided.**

    a. *Bleachers and dugouts are shown for owner's purposes and are not part of the contractor's work.*

2. **There's a detail for a maintenance gate. Where is this located on the plan? How many are required? What is the width?**



3. **Is there an existing irrigation system that needs to be removed?**

    a. *There is no irrigation system to remove.*

4. **Confirm the well is in place.**

    a. *The well is dug, the pump is not installed.*

5. **Could you please forward one pdf file of the irrigation spec. It's currently spread across three different documents and doesn't seem complete based on the page numbers and sections. Thanks.**

    a. *Separated irrigation specifications are attached.*

6. **Can you confirm if the fields are sod or seeded?**

    a. *The fields are to be seeded.*

7. **Is there artificial turf on this project?**

    a. *No artificial turf is proposed.*

8. **The skinned infield surface detail on SD-3 references the specifications for the infield and sand materials, however no specifications is provided except for 01 10 00 1.4 N4 which mentions New England Specialty Soils Native Mix. Please provide the sand specifications.**

    a. *The Town uses New England Specialty Soils – Native Plus infield mix.*

9. **The seed mix on MA-1 & MA-2 calls for 40% Kentucky Blue, 30% Rye and 30% Fine & Red Fescue, however 32 90 00 2.2 B is 90% Kentucky Bluegrass (4 varieties) and 10% hard fescue. Please confirm which is correct.**

    a. *Please ignore the seed list on the plan sheets and use the specification seed mix.*

10. **Please confirm that hydromulch is an acceptable / preferred alternative to the straw mulch method described in the 32 90 00 3.3 D. The straw application in the specification is highly susceptible to displacement given that it does not require a tackifier and will likely breakdown prior to full establishment in the Spring 2021. Given the late October seeding schedule, straw mulch would increase the likelihood of erosion through the winter and delay permanent establishment.**

    a. *Regarding mulch, the contractor is responsible for establishment, the irrigation would keep the straw mulch damp but seeing the contractor owns establishment they can use other methods so long as the grass is established.*

SECTION 32 84 00
IRRIGATION SYSTEM

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS

A. Include GENERAL CONDITIONS and applicable parts of Division 1 as part of this Section.

B. Coordinate work of this Section with other underground utilities and with trades responsible for their installation. Refer to respective drawings pertaining to other work.

1.2 WORK TO BE DONE

A. Work to be done includes furnishing labor, materials, equipment and services required to complete the irrigation work indicated on the drawings, as specified herein, or both.

B. Point of connection for the potable water supply enclosure shall be to the existing 4-inch ductile iron pipe where indicated on the drawings.

C. Point of connection shall be to the 6-inch discharge of the new cistern/wet well pump system where indicated on the drawings (See Section 32 84 10).

D. Electrical point of connection shall be a 120-volt, 20-amp, electrical circuit for the irrigation controller from the building where indicated on the drawings.

E. Drawings and specifications must be interpreted and are intended to complement each other. Furnish and install parts, which may be required by the drawings and omitted by the specifications, or vice versa, just as though required by both. Should there appear to be discrepancies or question of intent, the matter shall be referred to the Owner's Representative for decision, and his interpretation shall be final, conclusive and binding.

F. Necessary changes to the drawings to avoid obstacles shall be made with the approval of the Owner's Representative.

G. Excavation, backfilling and bedding materials, together with the testing of the completed installation shall be included in this work.

H. Work shall be constructed and finished in every respect in a good, workmanlike and substantial manner, to the full intent and meaning of the drawings and specifications. Parts necessary for the proper and complete execution of the Work, whether the same may have been specifically mentioned or not, or indicated on the drawings, shall be done or furnished in a manner corresponding with the rest of the work as if the same were specifically herein described.

I. Record drawing as well as Operating & Maintenance Manual generation, in accordance to these specifications shall be included in this work.

1.3 SCOPE

A. Irrigation system shown on the drawings and described within these specifications represents a single controller, athletic field irrigation system supplied from stored ground and potable water. The system is designed for 220 gallons per minute at 80 psi dynamic pressure at full system flow downstream of pump system.

1.4 RELATED WORK

A. Carefully examine the Contract Documents for requirements that affect the Work of this Section.
   1. Earthwork: Division 31
   2. Excavating and Backfilling for Utilities: Section 26 0543
   3. Planting: Section 32 9000
   4. Electrical Power Supply: Division 26
   5. Site Improvements: Section 32 30 00
   6. Cistern/Pump System: Section 32 84 10

1.5 ORDINANCES, PERMITS AND FEES

A. Work under this Section shall comply with ordinances and regulations of authorities having jurisdiction.

B. Permits, tests and certifications required for the execution of Work under this Section shall be obtained and paid for.

C. Furnish copies of permits, certifications and approval notices to the Owner's Representative prior to requesting payment.

1.6 EXAMINATION OF CONDITIONS

A. Be fully informed of existing conditions on the site before submitting bid, and be fully responsible for carrying out work required to fully and properly execute the Work of the Contract, regardless of the conditions encountered in the actual Work. No claim for extra compensation or extension of time will be allowed on account of actual conditions inconsistent with those assumed, except those conditions described in the GENERAL CONDITIONS.

1.7 QUALITY ASSURANCE

A. Installer: A firm which has at least five (5) years' experience in work of the type (athletic fields) and size required by this Section and which is acceptable to the Owner's Representative.

B. References: Supply five references for work of this type and size with the bid including names and phone numbers of contact person(s).

C. Applicable requirements of accepted Standards and Codes shall apply to the Work of this Section and shall be so labeled or listed:
   1. American Society for Testing & Materials (ASTM)
      a. ASTM: B43-98 Brass pipe.
      b. ASTM: A536 Ductile Iron Castings
      c. ASTM: D1784 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.

d. ASTM: D1785 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and Cl200.
e. ASTM: D2464 Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
f. ASTM: D2466 Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
g. ASTM: D2564 Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Pipe Systems.
h. ASTM: F477 Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

2. National Standard Plumbing Code (NSPC)
3. National Electric Code (NEC)
4. National Sanitary Foundation (NSF)
5. American Society of Agricultural and Biological Engineers (ASABE)
6. Underwriters Laboratories, Inc. (UL)
7. Occupational Safety and Health Administration (OSHA)
8. American Society of Irrigation Consultants (ASIC)

1.8 TESTS

A. Observation: Owner’s Representative will be on site at various times to ensure the system is being installed according to the specifications and drawings.

B. Coverage Test: After completion of the system, test the operation of entire system and adjust sprinklers as directed by the Owner's Representative. Demonstrate to the Owner's Representative that irrigated areas are being adequately covered. Furnish and install materials required to correct inadequacies of coverage due to deviations from the drawings or where the system is obviously inadequate or inappropriate. (See Part 3 - Execution).

C. Owner’s Representative shall be notified 7 days in advance for observations.

1.9 SHOP DRAWINGS

A. Provide copies of product specification sheets on proposed equipment to be installed to the Owner's Representative for approval prior to the start of work, in accordance with the parameters of Division-1. Work on the irrigation system may not commence until product sheets are submitted and approved. Submittals shall be marked up to show proper nozzles, sizes, flows, etc. Equipment to be included:

1. Sprinklers
2. Valves: Manual, Ball, Modulating and Automatic
3. Controller and Enclosure
4. Valve Boxes
5. Wire and Connectors
6. Quick Coupling Valves
7. Weather Sensor
8. Air Vacuum/Release Valves
9. Water Supply Ductile Iron Pipe and Fittings
10. PVC Pipe and Fittings
11. Irrigation Ductile Iron Fittings
12. Sleeving Pipe
13. Master Valve
14. ID Tags
15. Grounding Equipment
16. Water Meter
17. Backflow Prevention Device
18. Water Supply Enclosure

19. Pressure Gauge
20. Miscellaneous Materials

B. Project Record Documents:
1. Provide and keep up-to-date a complete redlined record set of drawings of the system as the project proceeds. Drawings shall be corrected daily, showing every change from the original drawings and specifications. Record drawings shall specify and exactly locate sprinkler type; pop up height and nozzle for each sprinkler installed. Each valve box location to be referenced by distance from a minimum of two permanent locations. Controller, weather sensor, quick coupling valves and other equipment shall be indicated on the drawings. Wire routing, wire size and splices shall be indicated. Mainline pipe, lateral pipe and each wire route shall have four (4) distinctly different graphic symbols (line types). This redlined record set of drawings shall be kept at job site and shall be used only as a record set.
2. Make neat and legible notations on this record set of drawings 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, indicate that equipment in a graphic manner in the location of installation and so as to match the original symbols as indicated in the irrigation legend. Should the equipment be different from that specified, indicate with a new graphic symbol both on the drawings and the irrigation legend. The relocated equipment dimensions and northing and easting coordinates should then be transferred to the appropriate drawing in the record set of drawings at the proper time.
3. On or before the date of final field observation, deliver corrected and completed AutoCAD computer plots of “record drawings” on vellum and AutoCAD electronic files on disk to Owner’s Representative as part of contract closeout. Delivery of plots will not relieve the responsibility of furnishing required information that may have been omitted from the prints. Record drawings shall not be marked up design drawings. Record drawings shall be on Contractors own title block with installed, not proposed irrigation information.

1.10 DELIVERY, STORAGE AND HANDLING

A. Store and handle materials in compliance with manufacturer instructions and recommendations. Protect from possible damage. Minimize on-site storage.

1.11 GUARANTEE

A. Obtain in the Owner's name the standard written manufacturer's guarantee of materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. These guarantees shall be in addition to, and not in lieu of, other liabilities that the Company performing the work under contract may have by law.

B. In addition to the manufacturers guarantees, the new irrigation equipment shall be warrantied, both parts and labor for a period of one (1) year from the date of acceptance by the Town of Longmeadow

C. As part of the one-year warranty the first year-end winterization and spring start-up for the new irrigation system shall be performed.

D. Should any problems develop within the warranty period because of inferior or faulty materials or workmanship, they shall be corrected to the satisfaction of the Owner’s Representative at no additional expense to the Owner.

E. A written warranty showing date of completion and period of warranty shall be supplied upon completion of the project.

1.12 COORDINATION

A. Work shall be coordinated closely with the Owner's Representative to avoid misunderstandings and to efficiently bring the project to completion. Owner's Representative shall be notified as to the start of work, progression and completion, as well as changes to the drawings before the change is made. Coordinate work with those of other trades.

B. Be responsible and pay for damage to other work caused by work or workmen. Repair such damage as directed by the Owner's Representative.

1.13 MAINTENANCE AND OPERATING INSTRUCTIONS

A. Include in Bid an allowance for four (4) hours of instruction of Town of Longmeadow's personnel upon completion of check/test/start-up/adjust operations by a competent operator (Owner's Representative office shall be notified at least one (1) week in advance of check/test/start-up/adjust operations).

B. Upon completion of work and prior to application for acceptance and final payment, a minimum of three (3), three ring hard cover binders titled MAINTENANCE AND OPERATING INSTRUCTIONS FOR THE WOLF SWAMP PARK IRRIGATION SYSTEM, shall be submitted to the Owner's Representative office. After review and approval, the copies will be forwarded to the Town of Longmeadow. Included in the Maintenance and Operating binders shall be:

1. Table of Contents
2. Written description of Irrigation System.
3. System drawings:
    a. One (1) copy of the original irrigation plan;
    b. One (1) copy of the Record Drawing;
    c. One (1) reproducible of the Record Drawing;
    d. One (1) copy of the controller valve system wiring diagram
4. Listing of Manufacturers.
5. Manufacturers' data where multiple model, type and size listings are included; clearly and conspicuously indicating those that are pertinent to this installation.
    a. "APPROVED" submittals of irrigation equipment;
    b. Operation: User's Manuals
    c. Maintenance: including complete troubleshooting charts.
    d. Parts list.
    e. Names, addresses and telephone numbers of recommended repair and service companies.
6. A copy of the suggested "System Operating Schedule" which shall call out the controller program required (zone run time in minutes per day and days per week) in order to provide the desired amount of water to each area under "no-rain" conditions.
7. Winterization and spring start-up procedures.
8. Guarantee data.

1.14 PROCEDURE

A. Notify public utility owners concerned, of the time and location of any work that may affect them. Cooperate and coordinate with them in the protection and/or repairs of any utilities.

B. Provide and install temporary support, adequate protection and maintenance of structures, drains, sewers and other obstructions encountered. Where grade or alignment is obstructed, the obstruction shall be permanently supported, relocated, removed or reconstructed as directed by the Owner's Representative.

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials to be incorporated in this system shall be new and without flaws or defects and of quality and performance as specified and meeting the requirements of the system. Material overages at the completion of the installation shall be removed from the site.

B. Material substitutions from the irrigation products described in these specifications and shown on the drawings shall be made without prior approval and acceptance from the Owner's Representative.

2.2 WATER SUPPLY DUCTILE IRON PIPE AND FITTINGS

A. Ductile iron pipe shall be Class 52, cement lined and tar coated per AWWA, ASTM and Harvard University specifications. Pipe shall be mechanical joint connected. Pipe shall be as manufactured by U.S. Pipe and Foundry, Atlantic States, American Pipe and Supply or approved equal.

B. Fittings shall be flanged, conforming to ANSI/AWWA C110/A21.10-98.

C. Stainless steel nipples shall conform to ASTM A733. Threads shall conform to ANSI B1.20.1. Pipe used for nipple manufacturing shall conform to ANSI A312/SA312.

2.3 BRASS PIPE AND FITTINGS

A. Brass pipe shall be 125lb., cast bronze, ground joint pattern, threaded, ASTM B43-98.

B. Brass fittings shall be cast bronze, screwed, 125lb. Class.

2.4 PVC PIPE AND FITTINGS

A. Pipe shall bear the following markings: Manufacturer's name, nominal pipe size, schedule or class, pressure rating in psi, and date of extrusion.

B. Pipe 2-1/2 inches and below shall be PVC, Class 200, Type 1120, SDR 21, Solvent-Weld PVC, conforming to ASTM No. D2241 as manufactured by Ipex, JM Eagle, Silverline or equal.

C. Irrigation pipe 3-inches and above shall be PVC, Class 200, Type 1120, SDR 21, Gasket-Joint PVC, conforming to ASTM No. D1784 as manufactured by Ipex, JM Eagle, Silverline or equal.

D. Pipe insertion mark shall be visible to show the proper depth into spigot.

E. Fittings for solvent weld PVC pipe, 2-1/2 inch and smaller in size, shall be Schedule 40 solvent weld PVC fittings as manufactured by Dura, Lasco, Spears or equal.

F. Fittings shall bear manufacturer's name or trademark, material designation, size, and applicable I.P.S. schedule.

G. PVC threaded connections in and out of valves shall be made using Schedule 80 toe nipples and Schedule 40 couplers or socket fittings. Schedule 40 threads will not be approved for installation.

H. PVC solvent shall be NSF approved, for Type I and Type II PVC pipe, and Schedule 40 and 80 fittings. Cement is to meet ASTM D2564 and FF493 for potable water pipes. Cement shall be medium set not fast (no wet and dry or hot). PVC solvent cement shall be Rectorseal Gold, IPS Weld-ON 711, Oatey Heavy Duty Cement or equal, and shall be used in conjunction with the appropriate primer. Primer shall be NSF approved, and formulated for PVC and CPVC pipe applications. Primer is to meet ASTM F 656. Primer shall be Rectorseal Jim PR-2, IPS Weld-ON P-70, Oatey Primer for PVC and CPVC, or equal. Clear primers and cements are no acceptable.

I. Nipples to be schedule 80 PVC.

J. Fittings for PVC directional changes, pipe reductions and plugs 3- inch and larger in size shall be deep bell push-on gasket joint ductile iron fittings for PVC pipe. Fittings shall be manufactured of ductile iron, grade 70-55-05 in accord with ASTM A536 and gaskets shall meet ASTM F477. Fittings shall be as manufactured by Harrington Corporation - Harco, or equal.

K. For mainline pipe to zone valve / lateral pipe connections, Harrington - Harco or equal push-on gasket swivel joint ductile iron service tees with ductile iron lateral 90's shall be used. Saddles, (strap, bolt down or snap) will not be approved for installation.

2.5 PVC PIPE SLEEVES

A. Pipe sleeves beneath non-soil areas shall be PVC, Class 160 water pipe as manufactured by Ipex, National, JM Eagle or equal. Sleeve size shall be as indicated on the drawings. Minimum sleeve size to be 4-inch.

2.6 WIRE CONDUIT

A. Conduit for wiring beneath non-soil areas shall be 2-inch PVC, SCH-40 conduit with solvent-weld joints, as manufactured by Cresline, Carlon, JMM, or equal.

B. Sweep ells shall be standard electrical type PVC schedule 40 long sweep elbows. Cap sweep ell with tri-plug with the ring for securing nylon pull rope.

C. Conduit for above ground wiring to weather sensor and controller shall be Schedule 40 rigid conduit.

2.7 MPROTATOR SPRINKLERS

A. Full and part circle pop up spray sprinklers with multi-stream rotary nozzles shall be pressure regulating (40-psi), plastic construction with ratcheting riser, removable nozzle and check valve. Nozzle size shall be as indicated on the drawing and in the legend. Pop-up height shall be 6 inches.

B. Multi-stream rotary nozzles shall be manufactured by Hunter Industries, MP1000 for 12-foot spacing, MP2000 for 18-foot spacing, MP3000 for 25-foot spacing and MPCorner where indicated on the drawings.

C. Sprinkler shall carry a minimum 3-year exchange warranty against defects. Sprinklers shall be manufactured by Hunter Industries model PROS-06/12-PRS40.

1.1 SMALL/MEDIUM ROTARY SPRINKLERS

D. Small/medium rotary sprinklers shall be gear-driven, rotary type sprinklers, designed for in-ground installation with integral check valves and in-riser flow shut-off capability. Sprinkler shall be capable of covering a 25-44-foot radius and flow range of 0.9-7.0 gpm at 50-55 pounds per square inch of pressure. Sprinklers shall have a one hundred percent warranty for two years' minimum against defects in workmanship.

E. Nozzle assembly shall elevate minimum four inches when in operation and retraction shall be achieved by a stainless-steel spring. Riser assembly shall be stainless-steel. A nozzle wiper seal shall be included in the sprinkler for continuous operation under the presence of sand and other foreign material.

F. Sprinkler parts shall be removable through the top of the unit through the removal of a heavy-duty threaded cap. The sprinkler shall have a three quarter-inch (3/4") IPS water connection on the bottom of the sprinkler.

G. Sprinklers shall be manufactured by Hunter Industries model I20-04-SS.

H. Approved Performance Chart (35' Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Hunter I20-04-SS	50 psi	90 Deg.	2.0	2.0	38'
Hunter I20-04-SS	50 psi	180 Deg.	4.0	4.2	41'
Hunter I20-04-SS	50 psi	360 Deg.	8.0	6.8	44'

2.8 LARGE ROTARY SPRINKLERS

A. Large rotary sprinklers shall be gear-driven, rotary type with drain check valve and stainless-steel riser designed for in-ground installation. The nozzle assembly shall elevate three inches when in operation and retraction shall be achieved by a stainless-steel spring. Check valve shall be capable of holding up to 10 feet of elevation. Sprinkler shall be capable of covering a 49-61-foot radius and flow range of 7.5 to 15.7 gpm at 60 pounds per square inch of pressure.

B. Sprinkler parts shall be removable through the top of the unit by removing a heavy-duty threaded cap. The sprinkler shall have a one- inch (1") IPS water connection on the bottom of the sprinkler.

C. Sprinklers shall be manufactured by Hunter Industries model I25-04-SS.

D. Approved Performance Chart (45' Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Hunter I25-04-SS	60psi	90 Deg.	5	5.3	45'
Hunter I25-04-SS	60psi	180/360 Deg.	8	9.2	50'

E. Approved Performance Chart (50' Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Hunter I25-04-SS	60psi	90 Deg.	7	7.5	48'
Hunter I25-04-SS	60psi	180/360 Deg.	13	12.3	54'

F. Approved Performance Chart (55'/60' Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Hunter I25-04-SS	60psi	90 Deg.	8	9.2	50'
Hunter I25-04-SS	60psi	180/360 Deg.	18	15.7	59'

G. Approved Performance Chart (60' Spacing):

Model	Pressure	Arc	Nozzle	Flow	Radius
Hunter I25-04-SS	60psi	90 Deg.	15	14.3	57'
Hunter I25-04-SS	60psi	180/360 Deg.	25	23.5	66'

2.9 ELECTRIC CONTROL VALVES

A. Electric control valves shall be one, one and one half and two-inch remote control, diaphragm type, fiberglass or reinforced nylon body plastic valves with manual flow control, manual bleed screw, dirty water filter and 200 psi pressure rating.

B. Valves shall be manufactured by Hunter Industries model ICV.

2.10 VALVE BOXES

A. Valve boxes shall be manufactured from unformed resin with a tensile strength of 3,100-5,500 psi conforming to ASTM D638. Boxes shall be green or black in color.

B. Valve box for mainline ringtite isolation gate valves shall be 5-1/4-inch round valve boxes with poly-iron (detectable) sleeves and plastic covers. Top piece shall be 15-1/2 inches long and bottom piece 24 inches. Top shall turn on bottom section to allow for adjustment to grade. Boxes to be as manufactured by Highline Products. "T" handle wrench must fit well inside of box.

C. Valve boxes for wire splices and quick coupling valves shall be 10-inch round valve boxes with metal detection, T-top lids and bolt down covers. Splice boxes shall have gray lids. Splices shall be in separate valve boxes and not included with isolation valves.

D. Valve boxes for flow sensors, master valve, single valves with isolation and dual 1-inch electric valves with isolation shall be 12-inch standard valve boxes with metal detection, T-top lids and

bolt down covers. When multiple 1-inch electric valves are installed in the same area, they are to be installed two (2) valves per box in a 12-inch standard box.

E. Valve boxes for single 2-inch valves and dual 1-1/2 and 2-inch electric valves with isolation shall be 18-inch jumbo valve boxes with metal detection, T-top lids and bolt down covers. When multiple 1-1/2 inch 2-inch electric valves are installed in the same area, they are to be installed two (2) valves per box in an 18-inch standard box.

F. Valve box extensions shall be provided and installed as required for proper box depth. Valve box extensions shall be made by the same manufacturer as the box.

G. Grated covers for ground rods and plates shall be 4-inch round, green plastic with detection as manufactured by NDS or equal.

H. Valve boxes shall be manufactured by Dura Plastics, Highline Products or Olde Castle Specification Grade.

2.11 FILTER

A. Filters for MPRotator zone valves shall be a plastic filter consisting of a two-piece threaded housing with O-ring seal. The filter screen shall be 140-mesh size. Filters shall be sized to not exceed 2.5-PSI pressure loss.

B. Filter shall be as manufactured by Landscape Products, Netafim, Rain Bird or equal.

2.12 AUTOMATIC CONTROLLER

A. Controller shall be electronic in construction with capability of 1 second to 12 hour run times per zone. Controller to have minimum 32 independent programs, 20 station simultaneous operation, auto/off switch and be capable of manual, semi-automatic and automatic operation. Controller shall have water budgeting feature, cycle and soak feature, sensor input terminal, locking, weather resistant stainless-steel cabinet and internal transformer. Terminal strip connection shall be easily accessible. The controller shall be U.L. listed, 120-volt, 60 Hertz, A.C. type.

B. Controller shall have flow monitoring and flow management capabilities with compatible flow sensor connection. Controller shall be capable of automatic flow learning per station and have station level flow diagnostics and alarm shutdown.

C. Controller shall have 5-year warranty.

D. Controller shall be as manufactured by Hunter Industries, model A2C-1200-75D-P with Hunter Solar Sync (weather sensor).

2.13 SURGE ARRESTOR (CONTROLLER)

A. Modular surge arrester shall be a single phase, two pole arrester designed to protect single or split phase 120 volt or 120/240-volt electrical system. Electrical connection shall be embedded in a UL recognized epoxy to seal and protect them from moisture and corrosion.

B. Surge arrestor shall be molded from weather and UV resistant polycarbonate, complying with the UL Standard for flame and strength resistance.

C. Arrestor shall include green LED operating light.

D. Surge arrester shall be manufactured by Paige Electric, model, 250090LED with mounting bracket or equal.

2.14 DECODERS

A. Decoders shall be installed between controller and the electric control valves to provide the opening and closing signal for individual valves. Decoder shall be available in 1, 2 or 4-station devices. 6 station decoders shall not be used. Decoder shall have a unique serial number and controllers-assigned address to identify it in the network.

B. Decoder shall be manufactured by Hunter Industries, model ICD-XX.

C. Flow sensor decoder shall be Hunter ICD-SEN.

2.15 AUTOMATIC WIRELESS WEATHER SENSOR

A. Controller shall be able of accepting weather data from an on-site weather sensor and using this data to automatically adjust the irrigation schedule. Sensor shall have rain and freeze shutoff.

B. Weather sensor shall be polycarbonate in construction with adjustable interruption point and metal extension arm. Wireless weather sensor shall operate up to 200 feet from receiver unit and have built-in bypass switch on receiver panel.

C. System operating frequency shall be 433MHz. Package shall be UL listed; FCC approved.

D. Receiver input power shall be 24 VAC from controller~~s~~.

E. Weather Sensor package shall carry a five (5) year warranty.

F. Weather sensor shall be manufactured by Hunter Industries, model Solar Sync. Solar Sync package shall include Solar Sync module, Solar Sync sensor (Transmitter) and Wireless Solar Sync (Receiver).

2.16 WIRE

A. Valve control wire from the decoder to the valve shall be minimum #14-awg, single strand, solid copper; UL- approved direct burial AWG-U.F. 600V and shall meet state and local codes for this service.

B. In ground wire connections, shall be UL listed (486D), manufactured by 3M, model DBR/Y splice kits. Wire splices shall be made in valve boxes, electrical junction boxes, at the controller or at decoder/valves.

C. Valve control wire from the controller to the decoder shall be through two (2), blue and orange, #12/#12 AWG, two-wire paths. Wiring shall be polyethylene double-jacketed or UF-B UL PVC double-jacketed two-conductor solid copper designed for direct burial systems. Connections shall be installed as per their manufacturers' instructions. Wire shall be manufactured by Paige Electric P7354D or approved equal.

D. Wire type and method of installation shall be in accordance with local codes for NEC Class II circuits of 30-Volt A.C. or less.

E. Wiring shall be in strict accordance with national, state and local electrical codes.

2.17 QUICK COUPLING VALVES

A. Valve body shall be of cast brass construction with a working pressure of 125 psi. The valve seat disc plunger body shall be spring loaded so that the valve is normally closed under conditions when the key is not inserted.

B. Top of the valve body receiving the key shall be equipped with ACME threads and smooth face to allow the key to open and close the valve slowly. The quick coupling valve shall be equipped with a vinyl cover.

C. Valve body construction shall be such that the coupler seal washer may be removed from the top for cleaning or replacement without disassembling any other parts of the valve.

D. Keys shall be ACME with 1-inch male thread and 3/4-inch female thread at the top. Each key shall include a ball valve shut off before the swivel hose ell. Ball valve and nipples shall be brass.

E. Quick coupling valves, keys and swivels shall be manufactured by Hunter Industries, model HQ-44RC-AW, HK-44A and HS-1 or equal.

2.18 ISOLATION VALVES

A. Isolation ball valves for air/vacuum release valves shall be of bronze construction, US Manufacture, minimum 3/4 port, 600 WOG with stainless steel handle and chrome plated ball. Ball valves are to be as manufactured by Apollo, Boston, Watts or equal.

B. Isolation valves 2-1/2 inches and smaller shall be gate type, of bronze construction, US Manufacture, 200 WOG with bronze cross handle and 200 psi rating. Gate valves to be as manufactured by Nibco model 113-K, Apollo model 102T or equal.

C. Inground isolation valves 3 inches and larger in size shall be cast iron epoxy coated inside and outside, ringtite valves, 200 psi rated, ductile iron gland flange, bronze stem-seal replaceable under pressure, stainless steel stem, US Manufacturer, 2-inch operating nut and resilient wedge replaceable disc conforming to AWWA C-509 as manufactured by Waterous 500 Series, Clow 2630 Series or Kennedy Ken-Seal Series.

2.19 SWING JOINTS

A. ½-inch and 3/4-inch sprinklers shall be installed on prefabricated swivel joint assemblies as manufactured by Lasco, Spears or equal.

B. Large rotary sprinklers shall be installed on 1-inch prefabricated PVC unitized swing joint assemblies with double O-ring seals, minimum 315 psi rating and minimum length of 12 inches. Prefabricated PVC swing joints shall be as manufactured by Dura, Lasco or Spears.

C. Quick coupling valves to be installed on 1-inch prefabricated PVC unitized swing joint assemblies with double O-ring seals, minimum 315 psi rating and minimum length of 12 inches with brass

insert and stabilizer (unless stabilizer is an integral part of the quick coupling valve). Prefabricated PVC swing joints shall be as manufactured by Dura, Lasco or Spears.

2.20 IDENTIFICATION TAGS

A. Valves shall have ID tags attached. ID tags shall be manufactured from Polyurethane Behr Desopan. Provide one tag for each electric valve. Use one maxi size tag for electric control valve. Each tag shall provide valve, decoder and station ID information.

B. Tags shall be as manufactured by Paige Electric, T. Christy Enterprises or equal.

2.21 BRASS FITTINGS AND NIPPLES

A. Brass/bronze fittings and nipples shall be used for air/vacuum release valve discharges and quick coupler keys and as otherwise detailed. Brass/bronze fittings shall be cast conforming to ASA B16.15. Threads shall conform to ASA B2.1.

2.22 COMBINATION AIR VACUUM/RELEASE VALVE

A. Combination air vacuum/release valve to be Crispin, Model IC-10 or equal with 1-inch NPT inlet and a 1-inch air and vacuum outlet with a 3/32-inch pressure air release orifice. The valve body shall be cast iron body with stainless steel internals and float and Buna-N seating material. The valves shall exhaust large quantities of air on system start-up and allow air to re-enter the pipeline when the line is being emptied or drained. The valves shall also automatically vent air that accumulates while the system is under pressure.

B. A 1-inch ball valve and 1-inch bronze wye strainer shall be installed below the air/vacuum release valve. Wye strainer shall utilize a 3/4-inch boiler drain for cleaning. See detail.

C. Release valve outlet shall be piped with brass elbows and nipples to direct the air out of the valve as shown on the detail.

2.23 NORMALLY OPEN MASTER VALVE

A. Normally open master control valve shall be in 3-inch in size. Valve shall provide dirty water protection and have no minimum flow feature.

B. Valve shall come with two-piece upper diaphragm and lower seat assembly. Valve shall operate within a pressure range of 20psi-200psi and have an in-rush current of 0.45amps and a holding current of 0.30 amps at 24VAC.

C. Valve shall be designed with removable filter and metering rod assembly and non-continuous flow through the solenoid. Rubber parts shall be EPDM rubber parts.

D. Master valve shall be brass construction as manufactured by Buckner/Superior, model 3325300-RW or approved equal.

2.24 FLOW SENSOR

A. Flow sensor for potable water supply shall be 3-inch, with 150 psi pressure rating. Sensor shall have flow range of 6 to 300 gpm and be installed in a PVC saddle tee. Output shall be two wire standard pulse. Flow sensor shall be as manufactured by Creative Sensor Technologies, model CSI-FS1-S30-001 w/saddle.

2.25 CONTROLLER ENCLOSURE

A. Enclosure shall be vandal and weather resistant in nature manufactured entirely of 304-grade stainless steel. The main housing door shall be louvered at the bottom and equipped with a hollow center thermoplastic door seal. The entry lip shall be louvered on the backside. Filter screens shall cover louvers. The top entry lid shall have two gas springs, for easy access, a continuous stainless-steel piano hinge, and a three-point locking mechanism with provisions for padlock. Removable stainless-steel tray shall be provided and installed for the mounting of electronics and other equipment.

B. Enclosure shall be a NEMA 3R Rainproof Enclosure as listed by Underwriters Laboratories, Inc.

C. Controller enclosure shall be 16 inches wide x 15.5 inches deep x 38 inches tall, as manufactured by Strong Box, model SB-16SS with OPT-HUN-ACC mounting tray.

2.26 CONTROLLER GROUNDING

A. Controller shall include factory-installed and factory-recommended lightning protection and shall be connected to a 5/8-inch diameter x 10-foot long copper clad grounding rod with minimum #6 AWG, solid, bare copper wire and 4-inch x 96-inch x 0.0625-inch copper grounding plates as outlined below. Minimum 20-foot separation between rod and plate. Minimum 12-foot separation between controller and ground rod. Connection to rod shall be with exothermic connectors as specified. Connection to plate shall be performed by the plate manufacturer with 25-feet of bare copper wire already attached. Grounding rod is to be covered by a 4-inch round, grated top, plastic valve cover with metal detection and six inches of 4-inch drainage pipe. Plate shall be installed in ground enhancement material. Plate shall be covered with 4-inch plastic grated cover with detection and minimum 36 inches of 4-inch drainage pipe. Ground rod and plate shall be UL listed.

B. Controller shall be grounded to one rod and one plate. 10-foot rod shall be installed penetrating into the soil to its full length. Plate shall be installed at a 36-inch depth with 50 lbs. of ground enhancement material spread evenly below the plate and 50 lbs. spread evenly above the plate in accordance with manufacturer’s requirements. Grounding electrodes shall be installed at least 10 feet from wires connected to the controller.

2.27 COMMUNICATION PATH GROUNDING

A. Two-wire communication path shall be grounded at 600-foot maximum intervals, at every termination of a part of the wire path to a surge arrestor decoder where indicated on the drawings, and 50 feet from the controller. Each surge arrestor shall be connected to a 5/8-inch diameter x 8-foot long copper clad grounding rod and 4-inch x 36-inch grounding plate with minimum #10 AWG, solid, bare copper wire. Minimum 8-foot separation between rod and other equipment. Connections to rods shall be with exothermic connectors as specified. Each grounding rod is to be covered by a 4-inch round, grated top, plastic valve cover with metal detection and six inches of 4-inch drainage pipe. Plate shall be installed at a 36-inch depth with 25 lbs. of ground

enhancement material spread evenly below the plate and 25 lbs. spread evenly above the plate. Plates shall be covered with 4-inch plastic grated cover with detection and minimum 36 inches of 4-inch drainage pipe. Ground rods and plates shall be UL listed.

2.28 MODULATING BUTTERFLY VALVE

A. Modulating butterfly valve shall be in 2-inch in size installed in water supply enclosure.

B. Valve shall have F05/F07 ISO flanges on both sides with quarter turn actuator and NEMA 4 enclosure. Valve shall operate within a pressure range of 20psi-150psi and have a start current of 1.2-amps and 1-amp current rating at 115VAC. Valve shall have emergency handwheel.

C. Valve shall be as manufactured by Bernard, model OA8 or approved equal.

2.29 WATER METER

A. 3-inch water meter shall be Neptune compound meter w/ 3-inch strainer as approved by the Town of Longmeadow Public Works Department.

2.30 BACKFLOW PREVENTION DEVICE

A. Reduced pressure backflow prevention device shall be 3-inch, Watts LF909 w/NRS gate valves as approved by the Town of Longmeadow Public Works Department.

2.31 WATER SUPPLY ISOLATION VALVES

A. Isolation valve for water supply shall be flanged resilient wedge ductile iron gate valve with non-rising stem, US Manufacture.

2.32 WATER SUPPLY ENCLOSURE

A. Enclosure shall be of a vandal and weather resistant nature manufactured entirely of aluminum with 1-1/2-inch insulated aluminum with locking hasp.

B. Enclosure shall contain two (2), 120-volt, 1000-watt heaters with thermostat switch capable of maintaining 4°C (40°F) inside the enclosure when subjected to 34°C (-30°F) outside air temperature.

C. Enclosure shall be designed to support a minimum vertical load of 100 lb./sf.

D. Depth of water within the enclosure shall not exceed 6 inches during full flow of the backflow preventer relief discharge.

E. Enclosure shall be designed to be accessed and provide sufficient room for testing and maintenance; shop drawings shall be submitted from the manufacturer.

F. Enclosure shall meet ASSE Standard 1060.

G. The enclosure interior dimensions shall be 85 inches long x 55 inches wide x 57 inches tall. Unit shall be as manufactured by Hubbell Systems, Hot Box, Model HB3E-DS.

2.33 PRESSURE GAUGE

A. Pressure gauge shall be glycerin filled with accuracy conforming to ANSI Grade B or greater. Gauges shall be provided minimum on main discharge pipe before and after wye strainer.

2.34 CONCRETE/CONCRETE BASES

A. Concrete bases shall be standard concrete mix in accordance with ASTM C150, ASTM C-33, and ASTM C-94 with a compressive strength (28 days) of 3,000 psi.

B. Cement concrete for thrust blocks shall be 3,000 psi, 1-1/2-inch aggregate.

C. Concrete base for controller enclosure shall be 24-inch x 24-inch x 6 inches deep as indicated on the detail.

D. Concrete base for water supply enclosure shall be 68 inches long x 38 inches wide x 6 inches deep.

E. Bases shall be installed on minimum 6-inch crushed stone.

2.35 CRUSHED STONE

A. 1/2-inch crushed stone shall be washed at the source facility to remove fine-grained soils and shall be well graded within the following limits:

Sieve Size (ASTM D422)	Percent Passing by Weight
3/4 inch	100
1/2 inch	90-100
3/8 inch	0-20
No. 4	0-5

2.36 SAND

A. Shall consist of well-graded natural sand, free from organic, other weak or compressible materials, or frozen materials, conforming to the following gradation:

Sieve No.	Percent Passing by Weight
#8	100
#50	15-40
#100	2-10
#200	0-5

2.37 SPARE PARTS

A. Supply the following tools and equipment to the Owner's Representative before final observation:
1. Two (2) wrenches or keys for disassembling and adjusting each type of sprinkler provided.
2. Four (4) quick coupler key assemblies.

B. Before final observation can occur, written evidence that the Owner's Representative has received the tools and equipment must be shown.

PART 3 - EXECUTION

3.1 GENERAL

A. Before work is commenced, hold a conference with the Owner's Representative to discuss general details of the Work.

B. Examine Contract Documents applying to this Section noting any discrepancies and bringing the same to the attention of the Owner's Representative for timely resolution.

C. Work indicated on drawings shall be provided whether or not specifically mentioned in the specifications.

D. If there are ambiguities between drawings and specifications, and specific interpretation or clarification is not issued prior to bidding, the interpretation or clarification will be made only by Owner's Representative, and compliance with the decisions shall be required. In the event the installation contradicts the directions given, the installation shall be corrected at no additional cost to the Town of Longmeadow.

E. Verify dimensions and grades at job site before work is commenced. Do not proceed with installation of the irrigation system when it is apparent that obstructions or grade differences exist or if conflicts in construction details, legend or specific notes are discovered. Such obstructions, conflicts, or discrepancies shall be brought to the attention of the Owner's Representative.

F. Make field measurements necessary for the work noting the relationship of the irrigation work to the other trades. Coordinate with other trades. Project shall be laid out essentially as indicated on the Irrigation Plans. Major changes shall be reviewed with the Owner's Representative prior to proceeding.

G. Layout of sprinklers and sprinkler lines indicated on drawings is diagrammatic. Location of sprinkler equipment is contingent upon and subject to integration with other underground utilities and the final field layouts. Employ data contained in the Contract Documents and verify this information at the construction site to confirm the manner by which it relates to the installation.

H. Coordinate installation of irrigation materials, including pipe, to avoid conflict with trees, shrubs or other plantings.

I. During progress of work, a competent superintendent and assistants necessary shall be on site and shall be satisfactory to the Owner's Representative. The superintendent shall not be changed, except with the consent of the Owner's Representative, unless that person proves unsatisfactory and ceases to be employed. Directions given to the superintendent shall be binding.

J. Protect new and existing paving, structures, walls, footings, etc. from damage. Inadvertent damage to the work of another trade shall be reported at once.

3.2 PIPE AND FITTINGS INSTALLATION

A. Using proper equipment, excavate a straight (vertical) and true trench to a depth of 2-inch of pipe invert elevation.

B. Loam or topsoil encountered within the limits of trench excavation for irrigation mains and branch lines shall be carefully removed to the lines and depths as shown on the drawings and stockpiled

for subsequent replacement in the upper 6 inches of the trench from which it is excavated. Such removal and replacement of the quantities of loam shall be considered incidental to the irrigation system and no additional compensation will be allowed therefore.

C. Pipe shall be laid on undisturbed trench bottom provided suitable base is available - no rock; if not, excavate to 2-inch below pipe invert and provide and install sand base or crushed stone upon which to lay pipe.

D. Backfilling shall be accomplished as follows: backfill material shall contain no foreign matter and no rock. Carefully place material around pipe and wire and tamp in place. Remainder of backfill shall be laid-up in 6-inch (maximum) lifts and tamped to compaction with mechanical equipment. Compact backfill in trenches to dry density equal to the adjacent undisturbed soil, and conform to adjacent grades without dips, sunken area, humps, or other irregularities. Frozen material shall not be used for backfill.

E. Clean bell and spigot ends and make gasketed joints in strict accordance with manufacturer's recommendations, making certain not to apply an excess of lubricant, and wiping off any excess lubricant from each connection. Maximum deflection per joint shall not exceed manufacturer's recommendations.

F. Make solvent-weld joints in strict accordance with manufacturer's recommendations, making certain not to apply an excess of primer or solvent, and wiping off excess solvent from each connection. Allow welded joints at least 15 minutes set-up/curing time before moving or handling. When the temperature is above 80º F, allow connections to set minimum 24 hours before pulling or pressure is applied to the system. When temperature is below 80º F, follow manufacturer's recommendations. Provide and install for expansion and contraction as recommended. Wire shall be laid in same trench as mainline and at pipe invert (see Wire Installation).

G. Mainline, cistern potable water pipe and well supply pipe shall have minimum 22 inches of COVER (excavate to invert as required by pipe size). Lateral pipe shall have minimum 16 inches or COVER (excavate to invert as required by pipe size.

H. Cut plastic pipe with handsaw or pipe-cutting tool, removing burrs at cut ends. Pipe cuts are to be square and true. Bevel cut end as required to conform to Manufacturer's specifications.

I. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. At times, when installation of the pipe is not in progress, the open end(s) of the pipe shall be closed by a watertight plug or other means. Pipe which cannot temporarily be joined, shall be sealed to make as watertight as possible. This provision shall apply during the lunch hour as well as overnight. Pipe not to be installed that day shall not be laid out. Should water enter the trench during or after installation of the pipe, no additional pipe may be installed or backfilled until water is removed from the trench. Pipe shall not be installed when water is in the trench, when precipitation is occurring, or when the ambient temperature is at 40º F or below. Pipe installed at temperatures below 40º F shall be removed and replaced at no cost to the Town of Longmeadow. Pipe shall be snaked in the trench to accommodate for expansion and contraction due to changes in temperature.

J. Maintain 6-inch minimum clearance between sprinkler lines and lines of other trades. Do not install sprinkler lines directly above another line of any kind.

K. Maintain 1-inch minimum between lines which cross at angles of 45 to 90 degrees.

L. Throughout the guarantee period refill any trenches that have settled due to incomplete compaction.

M. Pulling of pipe, 2-1/2 inches and below, will be allowed provided soil is suitable and specified depth of bury can be maintained.

3.3 THRUST BLOCKING

A. Ringtite bell-end fittings, pump station outlet pipes and isolation valves shall be blocked with an adequately sized thrust block as per ASAE Standard S376.2 and as depicted in the details. Blocking shall be in accordance with pipe and fitting manufacturer's recommendations. Thrust blocks shall be required at changes in size and direction of bends, reducers, plugs and tees. Thrust blocks shall be installed against undisturbed soil. Concrete thrust blocks shall utilize 3,000-psi standard concrete mixture. Bricks, stones, boulders, etc. will not be accepted as thrust blocks or thrust block material. Sakrete will not be permitted as a thrust blocking material. Supply material needed for thrust blocking.

B. Size of thrust block shall be determined by working pressure, size and type of fitting, and soil conditions. Calculate area required for concrete thrust block in contact with soil. Refer to fittings manufacturer’s thrust block sizing table to determine size of thrust block for each condition.

C. Ensure stability of thrust blocks.

D. Under no circumstances will concrete block be approved for thrust blocks.

3.4 ELECTRICAL WIRE CONDUIT INSTALLATION

A. Electrical conduit shall be installed in non-soil areas, as well as for above ground wiring where wire passes under or through walls, walks and paving to controller, pump station and weather sensor.

B. Conduit shall extend 18 inches beyond edges of walls and hardscapes.

3.5 PIPE SLEEVING INSTALLATION

A. Sleeving shall be installed wherever pipe is going under non-soil areas and where indicated on the drawings. Minimum cover over sleeving pipe shall be 24 inches as shown on the detail.

B. Sleeving shall extend 18 inches beyond edges of walls and pavement/pavers. Prior to the installation of irrigation pipe and wiring, the ends of sleeving shall be field marked with a vertical wooden stake extending above grade to allow field location at the time of irrigation installation.

C. Ensure required sleeving is installed prior to starting any pavement/paver operations. Review sleeve locations in the field to confirm that sleeves are properly located for the required irrigation pipe runs. In no case will saw cutting into newly installed pavements/pavers or jacking under new pavements/pavers be permitted to install sleeving which was not installed in proper sequence or in the required orientations or locations.

3.6 ISOLATION VALVE INSTALLATION

A. Install isolation valves per detail where indicated on the drawings. Install isolation valves on a level crushed stone base so that they can be easily opened or closed with the appropriate valve wrench. Install specified valve box over each isolation valve.

B. Check and tighten valve bonnet packing before valve box and backfill installation.

C. Provide and install thrust blocks for ringtite valves as per detail.

3.7 VALVE BOX INSTALLATION

A. Furnish and install a valve access box for each electric valve, flow meter, master valve, quick coupling valve, isolation valve and wire splice.

B. Valve access boxes shall be installed on a minimum 4-inch crushed stone base. Finish elevation of boxes shall be at grade. Supply crushed stone and install before valve box. Crushed stone shall not be poured into previously installed valve boxes.

C. Valve boxes shall be installed neatly. Boxes shall be parallel or perpendicular to hardscape edges and equidistance to other valve boxes installed in the same location. A sufficient amount of turf shall remain in place between each valve box and between valve boxes and hardscapes

D. Valve box extensions shall be provided as required on valve boxes in order to install valve box covers at grade.

E. Bricks, stones, etc. shall not be used to support valve boxes.

F. Install isolation valves per detail where indicated on the drawings. Install isolation valves on a level crushed stone base so that they can be easily opened or closed with the appropriate valve wrench. Install specified valve box over each isolation valve.

G. Check and tighten valve bonnet packing before valve box and backfill installation.

H. Center valves in valve boxes for servicing.

3.8 24 VOLT CONTROL VALVE INSTALLATION

A. Control valves shall be installed on a level crushed stone base. Grade of bases shall be consistent throughout the project so that finish grades fall within the limits of work. Valves shall be set plumb with adjusting handle and bolts, screws and wiring accessible through the valve box opening. Valves shall be set in a plumb position with 24-inch minimum maintenance clearance from other equipment.

B. Install at sufficient depth to provide more than 6-inch, nor less than 4-inch cover from top of valve to finish grade.

C. MPRotator zones shall include filters installed after the valves.

D. Adjust zone valve operation after installation using flow control device on valve.

3.9 WIRING INSTALLATION

A. Sufficient slack for expansion and contraction shall be maintained and wiring shall at no point be installed tightly. Provide and install an additional 8 inches to 12 inches slack at changes of direction. Wiring in valve boxes shall be a sufficient length to allow the valve solenoid, decoder, splice and connections to be brought above grade for servicing. This additional slack shall be coiled for neatness in the valve box.

B. Wire shall be laid in trenches and shall be carefully backfilled to avoid any damage to the wire insulation or wire conductors themselves. In areas of unsuitable material, the trench shall have a 2-inch layer of sand or stone dust on the bottom before the wires are laid into the trench and backfilled. The wires shall have a minimum of 22 inches of cover (See Detail). Wire not to be installed that day shall not be laid out.

C. An expansion curl shall be provided and installed within 6 inches of each wire connection to a solenoid or decoder on the #14 wire – do not curl two-wire communication cable. Expansion curls can be formed by wrapping five (5) turns of wire around a 1-inch diameter or larger pipe and then withdrawing the pipe.

D. Service wiring in connection with drawings and local codes for low voltage service. In-ground wire connections shall be waterproofed splice kits. Splices shall be made in valve boxes (wire runs requiring splices between valve locations shall be provided and installed in splice box-valve box shall be used). Splice locations shall be shown on the record drawings.

E. Provide a complete wiring diagram showing wire routing for the connections between the controller and valves. See section one for the inclusion of wiring diagram in operation and maintenance manuals.

F. Two-wire communication cables (orange and blue) shall be installed along mainline path and indicated on the record drawings separately.

3.10 3.10 CONTROLLER AND ENCLOSURE INSTALLATION

A. Install controller in enclosure, per detail using Hunter ACC Kit (#621215) or equal for the Strongbox or equal enclosure. Wire decoder cables and weather sensor into controller and set proper programs.

B. Wire controller to electrical supply at controller location from building circuit provided by the Town of Longmeadow.

C. Controller shall be mounted in the specified VIT Strongbox or equal stainless-steel enclosure. Wiring within the enclosure shall be neatly run, bundled, and cinched.

D. Controller shall be installed on a new reinforced concrete base of minimum dimensions shown on the detail, poured-in-place. Expansion shields shall not be used. Contractor to use template to install poured-in-place stainless steel "J" bolts to fasten enclosure to base. Prefabricated controller base shall not be approved for installation. Controller shall be installed on the pad to allow the operator to stand on the pad in front and back of the controller during programming and maintenance.

E. Install minimum one (1), 2-inch PVC conduit sweep ell and spool piece through controller pad as required for decoder cables. Install minimum one (1), 1-1/2-inch PVC conduit sweep ell and spool piece through controller pad for #6 AWG bare copper wire. Install minimum one (1), 1-inch PVC conduit sweep ells and spool pieces through controller pad for power. Maintain required depth of bury in/out of pad.

F. Controller power wire, decoder cable, flow sensor cable and #6 AWG bare copper wire shall be brought to the exterior through separate sleeves in the support pad. Grounding wire shall be installed through the controller concrete pad through a separate 1-1/2-inch sleeve and not through the controller enclosure.

G. Contractor shall install control and other irrigation-related wiring.; as well as 120-volt service to controller.

H. Above ground wire, other than in controller enclosure shall be installed in conduit.

I. Grounding system shall be minimum as specified and installed per manufacturer's recommendations. A third party shall certify in writing after testing the results of the grounding system megging readings.

J. Surge arrestor ground shall be installed per manufacturers installation instructions.

K. Seal enclosure sweep holes with expandable foam insulation.

L. Controller shall be installed level on pad and tight to the base (no gaps).

M. Keys shall be turned over to Owner’s Representative.

3.11 WIRELESS WEATHER SENSOR INSTALLATION

A. Install weather sensor on exterior of building on roof eave in sensor guard, where indicated on the detail. Weather sensor shall be in direct contact with the weather and not in contact with the irrigation spray. Weather sensor shall be installed on eave so as not to be obstructed from the prevailing wind and so that the freeze sensor points south.

B. Firmly attach weather sensor receiver within bottom section of the controller enclosure.

3.12 FLOW SENSOR INSTALLATION

A. Irrigation mainline flow sensor shall be installed with accompanying saddle on 6-inch PVC pipe where indicated on the drawings in jumbo valve box upstream of the master valve. Wire water supply flow meter to pump control panel and then Hunter ACC or equal controller with ICD-SEN decoder in series per manufacturers requirements.

B. Water supply flow sensor shall be installed in a 3-inch PVC saddle on PVC pipe where indicated on the drawings in standard valve box. Wire flow meter to pump control panel per manufacturers requirements.

3.13 MASTER VALVE INSTALLATION

A. Master valve shall be installed on the exterior PVC mainline pipe where indicated on the drawings downstream of the quick coupler and isolation valve using ductile iron fittings and reducers.

3.14 GROUNDING INSTALLATION

A. Grounding rods shall be driven into the ground their full length 12-feet from controller and 8-foot for surge arrestors and connected via exothermic connections to #6/#10 solid, bare copper wire. The copper wire is to be installed in as straight a line as possible, and if it is necessary to make a turn or bend, it shall be done in a sweeping curve with a minimum radius of 8 inches and a minimum included angle of 90 degrees. There shall be no splices in the bare copper wire. The top of the ground rods shall be driven below the ground surface. A 4-inch grated cover as specified, set a minimum of 1-inch below grade, shall be placed over the ground rods and

exothermic connection for periodic maintenance. Covers shall be installed on a minimum of 6 inches of 4-inch corrugated polyethylene, perforated drainage pipe. Plates shall be installed 36 inches below grade with 50 lbs. of ground enhancement material spread evenly below the plate and 50 lbs. of ground enhancement material spread evenly above the plate for the controller and 25 lbs. of ground enhancement material spread evenly below the plate and 25 lbs. of ground enhancement material spread evenly above the plate for the surge arrestors in accordance with the manufacturer's requirements. Plates shall also be covered with a 4-inch grated cover as specified, set a minimum of 1-inch below grade, to facilitate drainage onto the plates. Covers shall be installed on a minimum of 36 inches of corrugated polyethylene, perforated drainage pipe.

B. When tested, grounding grid shall have an earth resistance no greater than 10 ohms. If earth resistance is greater than 10 ohms, additional grounding rods and/or plates and enhancement material shall be added to system until desired test results have been meet.

3.15 SPRINKLER INSTALLATION

A. ½ and 3/4-inch sprinklers shall be installed flush (perpendicular) to grade on swivel joint assemblies.

B. Large rotary sprinklers shall be installed flush to grade on 1-inch prefabricated PVC unitized swing joint assemblies with integral O-rings, minimum length 12 inches.

C. Sprinklers shall not exceed maximum spacing indicated.

D. Adjust sprinkler zone after installation using flow control device on valve.

3.16 AIR VACUUM/RELEASE VALVE INSTALLATION

A. Install air vacuum/release valve as per detail at location shown on the drawings.

B. Provide ball valve shut-off, boiler drain and wye strainer under air vacuum/release valve as per detail. Ball valve shut-off shall be easily accessible through the valve box. Install boiler drains on discharge of wye strainers.

C. Drill thirty-two (32), 3/8-inch holes in air vacuum/release valve box covers for air passage.

D. Air vacuum/release valve shall be installed straight up from mainline and not on the side.

3.17 QUICK COUPLING VALVE INSTALLATION

A. Provide and install quick coupling valves where indicated on the drawings.

B. Quick coupling valves to be mounted on 1-inch prefabricated PVC unitized swing joint assemblies with integral O-rings, minimum length 12 inches with brass insert and stabilizer as per details.

1.2 ENCLOSURE INSTALLATIONS

C. Install enclosures on concrete bases as indicated on the details, where indicated on the drawings. Final location of enclosures shall be coordinated with the Owner's Representative as to best screen the enclosures and deter vandalism. ‘

D. Concrete base for controller enclosure shall be minimum 24 inches wide by 24 inches deep by 6 inches thick. Base shall be installed on a minimum 6-inch crushed stone per details.

E. Concrete pad for water supply enclosure shall be minimum 97 inches long by 676 inches wide by 6 inches thick. Base shall be installed on a minimum 6-inch crushed stone per details.

F. Install two (2) 8-inch Schedule 40 sleeves through concrete pad into enclosure for water in and irrigation out as per detail.

G. Install two (2) 2-inch and one (1)1-inch Schedule 40 electrical conduits through concrete pad into enclosure for heaters and actuator valve as per detail.

3.18 WATER SUPPLY INSTALLATION

A. Install modulating butterfly valve, water meter, backflow prevention device, pressure gauge and associated pipe and valves in enclosure as outlined on the detail.

3.19 CHECK/TEST/START-UP/ADJUST

A. Flushing:
1. After pipe, valves, sprinkler bodies, pipes and risers are in place and connected, but prior to installation of sprinkler internals open the control valves and flush out the system under a full head of water.
2. Sprinkler internals shall be installed only after flushing of the system has been accomplished to the full satisfaction of the Owner’s Representative.
3. Flush the entire system after installation is complete and service any clogged nozzles for thirty (30) days after substantial completion of this portion of the irrigation system.

B. Testing:
1. Leakage test: test lines for leaks under operating pressure. Repair leaks and re-test.
2. Coverage test: perform a coverage test in the presence of the Owner's Representative (notify Owner’s Representative at least seven (7) days in advance of scheduled coverage test). Representative will determine if the water coverage is complete and adequate. Readjust sprinklers and sprinkler locations as necessary or directed to achieve proper coverage.
3. Testing shall be at no additional expense to the Owner.

3.20 CLEANING AND ADJUSTING

A. At the completion of the work, parts of the installation shall be thoroughly cleaned. Equipment, pipe, valves and fittings shall be cleaned of grease, metal cuttings and sludge which may have accumulated by the operation of the system for testing.

B. Adjust sprinklers, valve boxes and quick coupling valves to grade as required, so that they will not be damaged by maintenance operations.

C. Continue sprinkler coverage adjustment as required by settlement, etc., throughout the guarantee period.

D. Each control zone shall be operated for a minimum of 5 minutes and sprinklers checked for consistency of delivering water. Adjustments shall be made to sprinklers that are not consistent to the point that they match the manufacturer's standards. Sprinklers, valves, timing devices or

other mechanical or electrical components, which fail to meet these standards, shall be rejected, replaced and tested until they meet the manufacturer's standards.

3.21 ACCEPTANCE AND OPERATION BY OWNER

A. Upon completion of the work and acceptance by the Town of Longmeadow, train the Owner's Personnel in the operation of the system (provide minimum 7-day written notice in advance of test). Furnish, in addition to the record drawings and operational manuals, copies of available specification sheets and catalog sheets to the Owner's personnel responsible for the operation of the irrigation system. Guarantee parts and labor for a minimum period of one (1) year from date of acceptance.

3.22 CLEAN UP

A. Upon completion of installation work remove leftover materials and equipment from the site in a safe and legal manner.

B. Remove debris resulting from work of this section.

C. Regrade, lightly compact, and replant around sprinklers where necessary to maintain proper vertical positioning in relation to established grade.

D. Fill depressions and eroded channels with sufficient soil mix to adjust grade to ensure proper drainage. Compact lightly, and replant filled areas in accord with drawings requirements.

END OF SECTION 32 84 00

SECTION 32 84 10
IRRIGATION CISTERN/WET WELL & WELL PUMP SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Include GENERAL CONDITIONS and applicable parts of Division 1 as part of this Section.

B. Coordinate work of this Section with other underground utilities and with trades responsible for their installation. Refer to respective drawings pertaining to other work.

1.2 SUMMARY

A. Irrigation cistern/wet well pump system shown on the drawing and described within this specification represents a 220 gallon per minute (gpm) at 80-psi (185 feet of Total Dynamic Head (TDH)) system drawing from a cistern/wet well backed up by a combination of ground and potable water.

B. Well pump system shown on the drawings and described within this specification requires 200 gpm at approximately at 175 feet of total dynamic head drawing water from an existing 8-inch well.

C. Work to be done includes furnishing labor, materials, equipment and services required to complete cistern/wet well pump system work indicated on the drawing, as specified herein, or both.

D. Electrical point of connection for the cistern/wet well pump system control panel shall be to an existing 480/277-volt, 3 phase, 100-amp electrical disconnect on the building exterior.

E. Drawing and specifications must be interpreted and are intended to complement each other. Contractor shall furnish and install parts, which may be required by the drawing and omitted by the specifications, or vice versa, just as though required by both. Should there appear to be discrepancies or question of intent, Contractor shall refer the matter to the Owner’s Representative for decision, and his interpretation shall be final, conclusive and binding.

F. Work shall be constructed and finished in every respect in a good, efficient and substantial manner, to the full intent and meaning of the detail and specifications. Parts necessary for the proper and complete execution of the work, whether the same may have been specifically mentioned or not, shall be done or furnished in a manner corresponding with the rest of the work as if the same were specifically herein described.

G. Operating & Maintenance Manual generation, in accordance to these specifications shall also be included in this work.

1.3 SHOP DRAWINGS

A. Contractor shall provide copies of product specification sheets and shop drawings on proposed equipment to be installed to the Owner's Representative for approval prior to the start of work, in accordance with the parameters of this specification. Work on the cistern/wet well pump

system may not commence until product sheets and shop drawings are submitted and approved. Submittals shall be marked up to show proper pump curve, sizes, flows, etc. Equipment to be included, but not limited to:

1. Cistern/Wet Well
2. LinkSeals
3. Pump Station Pumps
4. Pump Station Motors
5. Well Pump
6. Manual Valves
7. Control Panel
8. VFD's
9. Starters (Well and Jockey Pumps)
10. Disconnects
11. Pressure Transducer
12. Wye Strainer/Screen
13. Flow Meters
14. Level Controls
15. Check Valves
16. Pitless Adapter
17. Pressure Gauges
18. Electrical Conduit
19. Foot Valve
20. Pressure Relief Valve
21. Grounding Equipment
22. Alarm Light
23. Listing of Alarms
24. Pump Station Enclosure
25. Fertigation System
26. Miscellaneous Materials

1.4 GUARANTEE

A. Contractor shall obtain in the Owner's name the standard written manufacturer's guarantee of materials furnished under this Section where such guarantees are offered in the manufacturer's published product data. These guarantees shall be in addition to, and not in lieu of, other liabilities that the Contractor may have by law.

B. In addition to the manufacturers guarantees, warrant the cistern/wet well pump system, both parts and labor for a period of two (2) years from the date of acceptance by the Town of Longmeadow.

C. Should any problems develop within the warranty period because of inferior or faulty materials or workmanship, they shall be corrected to the satisfaction of the Owner's Representative at no additional expense to the Town of Longmeadow.

D. A written warranty showing date of completion and period of warranty shall be supplied upon completion of the cistern/wet well pump system installation and start-up.

1.5 COORDINATION

A. Contractor shall coordinate his work closely with the Owner's Representative to avoid misunderstandings and to efficiently bring the cistern/wet well pump system installation to completion. Owner's Representative shall be notified as to the start of work, progression and completion, as well as any changes before the change is made.

B. Contractor shall be held responsible for and shall pay for damage to other work caused by his work, workmen or sub-contractors. Repairing of such damage shall be done by the Contractor who installed the work, as directed by the Owner's Representative.

1.6 MAINTENANCE AND OPERATING INSTRUCTIONS

A. Contractor shall include in their Bid an allowance for four (4) hours of instruction of Town of Longmeadow's personnel upon completion of check/test/start-up/adjust operations by a competent operator (Owner's Representative office shall be notified at least one (1) week in advance of check/test/start-up/adjust operations).

B. Upon completion of work and prior to application for acceptance and final payment, a minimum of three (3), three-ring, hard cover binders titled MAINTENANCE AND OPERATING INSTRUCTIONS FOR THE WOLF SWAMP ROAD IRRIGATION CISTERN/WET WELL PUMP SYSTEM, shall be submitted to the Owner's Representative office. After review and approval, the copies will be forwarded to the Town of Longmeadow. Included in the Maintenance and Operating binders shall be:

1. Table of Contents

2. Written description of cistern/wet well pump system.

3. Listing of Manufacturers.

4. Manufacturers' data where multiple models, type and size listings are included; clearly and conspicuously indicating those that are pertinent to this installation.

    a. "APPROVED" submittals of equipment, including pump curves

b. Operation Procedures and set points

c. Maintenance: including complete troubleshooting charts.

d. Parts list.

e. User's manuals.

f. Names, addresses and telephone numbers of recommended repair and service companies.

5. Start up and shut down procedures.

6. Guarantee data.

1.7 QUALITY ASSURANCE

A. Manufacturer: City of Longmeadow will not consider cistern/wet well pump system bids from manufacturers who have not successfully manufactured at least five (5) stations comparable to what is specified herein within the past three years.

B. Installer: Firm that has at least five (5) years' experience in work of the size and type required by this section and which is acceptable to the Owner's Representative.

PART 2 - PRODUCTS

2.1 GENERAL

A. Materials to be incorporated shall be new and without flaws or defects and of quality and performance as specified and meeting requirements of system. Material overages at the completion of the installation are the property of Contractor and shall be removed from the site.

B. No material substitutions from the products described in these specifications and shown on drawing shall be made without prior approval and acceptance from Owner's Representative.

C. Provide manufacturers' products called for "or approved equal" in which case a product substitution to Owner's Representative shall be approved. Certain manufacturer's names and model numbers are used throughout these specifications to denote a standard. Alternate manufacturer's products are acceptable when products of equal or better quality and performance are submitted and approved as outlined below. Alternative products must be equal to, or better, to qualify as an "or approved equal" product.

D. For each item proposed as equal, submit a request which includes:

1. Drawings and samples as appropriate

2. Comparison of the qualities of the proposed item with that specified

3. Changes required in other elements of the work because of the substitution

4. Name, address and telephone number of vendors

5. Manufacturer's literature regarding installation, operation and maintenance

E. Requests for approval constitute a representation that:

1. Proper investigation of substitute products, materials, etc. has determined that it is equal or superior in all respects to that specified

2. Substitute product will provide at least the same warranties for the specified item

3. Substitute product is compatible with interfacing items

4. Coordination of the installation of the approved substitution will occur and all changes required in other elements of the work because of the substitution will be carried out.

2.2 UNDERGROUND IRRIGATION CISTERN/WET WELL

A. Pump station cistern/wet well shall be constructed of precast concrete sections having an inside diameter of 5 feet round x 6.5 feet deep inner chamber depth. Cistern/wet well shall be as shown on the drawings and applicable requirements of the specification.

B. Strength of the precast concrete to be equal to or exceed 4,000 psi at 28 days and shall be of sufficient strength to withstand a minimum load produced by earth pressure plus hydrostatic pressure at the location site.

C. Joints between any precast reinforced sections shall be formed so that adjoining sections will fit and seat properly and the gap between sections shall be no more than 3/8 inches.

D. Cistern/wet well shall be provided with 40-inch circular opening at the location shown in the cover.

E. Joints between the precast sections shall be made water tight with a preformed plastic sealing compound meeting U.S. Federal Specification SSS-210A. A non-shrink epoxy grout shall be used on the inside and outside of the joints between precast sections.

F. Cistern/wet well shall be manufactured of pre-cast concrete meeting the following standards:

1. Cement used shall be Portland Cement which conforms to the “Standard Specifications for Portland Cement” of the ASTM Designation C150, latest revision and shall be Type I or II

2. Sand used shall be clean, hard, strong and durable particles, free of chemicals; coatings or clay and other fine materials and shall meet the requirements of ASTM C33

3. Stone used shall conform with the above specifications for sand, size shall be ASTM C33 No. 57 (1-inch maximum) and in addition no particle shall be larger in size than three-fourths of the minimum clear spacing between reinforcing bars

4. Water used shall be potable, fresh, clean and free from detrimental amounts of alkali, oil, acid, organic matter and other deleterious substances

5. Admixtures used shall conform to ASTM C260 for air entrainment and ASTM C494 for water reducers. Calcium chloride or salts shall not be used

G. Concrete mix design shall meet the following requirements:

1. Compressive Strength: 4,000 psi @ 28 days

2. Maximum Slump: 4 inches

3. Maximum Water/Cement Ratio (by weight): 0.45

4. Minimum Cement Content: 564 pounds /cubic yard

5. Air Content: 6%, + 1-1/2%.

6. Air entraining mixture required

H. Reinforcing bars shall be deformed type, new billet steel, conforming to ASTM A-615, Grade 60.

I. Cistern/wet well shall consist of one (1) chamber to achieve required storage volume. Minimum total storage capacity of cistern/wet well shall be 954 gallons, Cistern/wet well shall be placed on a bed of transit-leveled crushed stone of 6 inches thick and a 2-inch sand bedding layer.

J. Cistern/wet well shall have polypropylene plastic steps integrated with concrete wall for cistern/wet well access (as shown on drawings).

K. Concrete cistern/wet well shall be manufactured by Oldcastle Precast, Scituate Concrete, Shea Concrete or equal.

2.3 CISTERN/WET WELL SEALS

A. Cistern/wet well shall utilize link seals for inlet pipe. Holes shall be cored to exact tolerances as necessary to connect pipes and conduits as shown on the drawings. 3-inch well water and 3-inch potable water supply wet well wall penetrations shall be sealed with a properly sized Link-Seals, model LS-300 for 3-inch pipe (6-inch hole).

2.4 PUMP SYSTEM

A. Main Irrigation Pump

1. Main irrigation pump shall be vertical turbine type capable of providing 185 feet of Total Dynamic Head (TDH) plus station and lift losses at 220 gpm for irrigation system at cistern/wet well pump system discharge. Pump shall start and stop from a pressure transducer and flow meter wired to the cistern/wet well pump system control panel logic and VFD.

2. Main irrigation pump motor shall not exceed 20 horsepower, operating on 480-volt, 3-phase power from pump control panel.

3. Entire pump assembly including the bowl assembly, column and shafting shall be of a single United States manufacture. Pump Manufacturer shall have a network of service centers and pump technicians to handle service, repair, and the handling of warranty procedures.

4. Bowl assemblies including suction case, intermediate bowls and discharge bowls shall be cast iron. Closed impellers shall be of 201 stainless-steel construction statically balanced. Impellers shall have perihedral seals to provide vertical cylindrical and horizontal surface impeller sealing. This seal shall prevent pump shaft stretch from affecting pump performance. Impellers shall be adjusted vertically by means of an adjusting nut located at the top of the driver.

5. Pump suction case shall incorporate vanes to guide fluid and have a "flare" to minimize shock and entrance losses.

6. Pump shaft shall be turned, ground and polished stainless steel, 410 AISI alloy with 100,000 psi tensile strength and have a chromium content of not less than 12 percent. The pump shaft shall meet the requirements of size, horsepower rating, smoothness and straightness tolerances of AWWA. The shaft is to be supported by bearings above and below each impeller.

7. Suction case bearing, constructed of bronze alloy, shall stabilize the bottom of the pump shaft and provide accurate alignment of impellers. The bearing shall be a minimum of five shaft diameters in length and shall have a bronze collar immediately above to prevent abrasives from entering the bearing.

8. Pump strainer shall be galvanized heavy basket type, corrosive resistant. The open area of the strainer shall not be less than four times the suction bell inlet area.

9. Discharge column pipe shall conform to ASTM A106 standards and shall be A53 Grade B Schedule 40 furnished in interchangeable 10-foot sections. Column end shall be machine faced to provide a butt fit between column sections to maintain alignment throughout pump column assembly. Discharge column piping shall be furnished in interchangeable sections with flanged or threaded couplings. Line shafts shall be polished 416 stainless-steel utilizing non-corrosive sleeves at each bearing. Line shafts shall have steel couplings with left hand threads.

10. Discharge head shall support the entire pump assembly and shall be an open style head. Discharge header shall be constructed with a minimum 60,000 psi tensile strength with a safety factor of 5 to 1 to provide maximum strength. The discharge header shall be flanged with the top diameter matching the diameter of the motor base to evenly distribute the load. Discharge header shall be equipped with a mechanical seal assembly located where the line shaft protrudes through the discharge head. The mechanical seal assembly shall consist of a main housing, shaft sleeve assembly, locking and drive collars. The shaft sleeve shall be machined from 416 stainless steel. The locking and driving collars shall be machined from 7075 aluminum. Integral to the seal housing, a permanently lubricated ball bearing shall be mounted, located out of the pumping media. The mechanical seal shall be resistant to corrosion and abrasives, totally self-lubricating, and rated for no less than 300 PSI. The seal assembly shall require no bypass tubes or related devices to provide cooling or lubrication. (No packing boxes shall be approved.)

11. Pump shall have a relief line to relieve water to prevent the pump from over-heating during shut-off conditions. Discharge from the relief line shall be piped back to the cistern/wet well.

12. For biding purposes pump shall have a 5.5-foot set from the bottom of the strainer to the top of the pump station skid support. Manufacturer shall coordinate set with Irrigation Consultant before assembling pump shaft.

13. Minimum pump efficiency shall be 82 percent.

B. Motor

1. Motor shall be of U.S. manufacture, 1800 RPM, 3 Phase, 480-volt rated for 60 cycle, 40-degree C ambient, continuous performance. Pump motor shall be squirrel cage induction type vertical hollow shaft motor with rodent screens, conforming to the latest standards of the current American National Standard Association including rating, characteristics, and tests. The pump and motor shall be connected by a bolt-down coupling located in the motor. Motor temperature rise shall conform to NEMA MG-1-12.42 for Class F

installations. Motor shall have a thrust bearing of significant rating to carry the weight of rotating parts and the hydraulic thrust of the pump. Bearing should be sized for a minimum life of 5 years.

2. Motor shall be equipped with a non-reverse ratchet to protect the pump from reverse rotation damage caused by a check valve failure or incorrect electrical phasing.

3. Motor shall be sized so that the maximum possible load developed under pumping conditions specified will not exceed the nameplate horsepower. Pumps designed with the motors running in their service factor at design point will be rejected.

4. Pump station Manufacturer shall provide a 120-volt, single phase space heater of ample size to prevent condensation within the motor. Space heater shall be de-energized when the motor is running.

5. Minimum motor efficiency shall be 94.5 percent.

6. Horsepower shall not exceed 20 horsepower.

C. Jockey Pump

1. Jockey pump shall be electric motor driven; vertical multi-stage centrifugal. Motor shall be mounted directly to the top of the pump. Pump shall be capable of delivering approximately 50 gpm when operating at a total head of 185 feet plus station losses. Pump shall be capable of operating continuously at temperatures of 5 degrees to 250 degrees Fahrenheit. Pump suction/ discharge chamber, impellers, pump shaft, diffuser chamber, outer discharge sleeve and impeller seal ring retainers shall be constructed of 316 stainless steel. Motor shall be constructed of cast iron isolated from the pump fluid by a 316-stainless steel insert. Pump shaft coupling shall be constructed of stainless-steel. Impellers shall be secured directly to the pump shaft by means of a splines shaft arrangement. Intermediate and lower shaft bearings shall be Tungsten Carbide and ceramic. Pump shall be equipped with a high temperature mechanical seal assembly with Tungsten Carbide/Carbon or Tungsten Carbide seal faces mounted in stainless steel seal components.

2. Minimum pump efficiency shall be 60%. Pump shall be as manufactured by Gould’s or Grundfos.

3. Jockey pump motor shall be of United States Manufacturer, close-coupled type with rodent screens on ventilating passages. Motor shall no more than 5 HP at 3450 RPM, open drip proof. Radial and thrust bearings of ample capacity to accommodate the hydraulic thrust of the pump shall be incorporated into the motor. Motor shaft shall be of high strength steel. Temperature rise of the motor shall meet NEMA Standard MG-1-12/42 for Class B or Class F insulation. Motor shall be sized so that the maximum possible load developed under pumping conditions specified will not exceed the nameplate horsepower. Pumps with motors running in their service factor will be rejected.

4. Pump to be equipped with a temperature sensor to monitor volute overheating due to loss of suction.

5. Pump motor shall be equipped with a 120-volt space heater in the motor windings to prevent condensation from occurring during non-use times. Heater shall be deactivated while the motor is running.

6. Motor efficiency shall be minimum 82%. Motor shall be manufactured by Baldor or approved equal.

D. Pipe and Fittings

1. Cistern/wet well pump system piping shall be Schedule 40 painted steel.

2. Fittings and connections shall be welded, flanged or Victaulic.

3. Pipe 2-inches and below shall be stainless steel.

E. Isolation valves

1. Isolation valves shall be installed on individual pump discharges and pressure relief valve within the enclosure. Valves shall have lever handle. Pressure rating shall be 200 psi. Trim shall include stainless steel stem, bronze or nickel coated iron streamlined disc, and full faced resilient seats. Butterfly valves to be as manufactured by Victaulic, Gruvlok, Watts or equal.

F. Check Valves

1. Check valves to be 150# rated, center pivot, spring loaded, non-slam, silent type cast iron check valve. Sealing surfaces shall have resilient Buna-N-Rubber as manufactured by Valmatic or equal. Pressure loss not to exceed 3 psi at full discharge capacity. Butterfly or swing type check valves shall not be approved for installation.

2.5 FLOW METER

A. Pump station shall include a flanged magnetic flow meter having the ability to report the gallons per minute being pumped and the totalized flow volume to the control panel. The magnetic flow meter must be accurate to within plus or minus 0.25% of full scale. Flow meter shall be installed according to Manufacturer's recommendations. Flow meter to be as manufactured by Krohne, Siemens or approved equal.

B. Flow meter shall be wired to pump station control panel and then Hunter ACC or equal controller with ICD-SEN decoder in series per manufacturers requirements

2.6 HIGH VOLTAGE IRRIGATION PUMP CONTROL PANEL

A. Electric control panel shall be located on the cistern/wet well pump system skid with dead front enclosure. Panel shall receive a dedicated 480-volt, 3 phase power circuit.

B. Control panel as a unit shall be UL-Listed. Units constructed of UL components in lieu of UL Listing shall not be accepted.

C. Panel shall meet National Electric Code, Longmeadow and Massachusetts codes. In the event of a conflict among the codes, the current National Electric Code shall predominate provided it meets minimum local standards.

D. Door gasket seals shall be close-cell neoprene sufficient to protect interior components from moisture and dust. Electrical panel doors shall be constructed of 12-gauge steel with locking screws and latches. Internal components of the enclosure shall be mounted on removable back panels. Mounting screws for the components shall not be tapped into the panel enclosure. Panel penetrations must maintain NEMA1 (indoor) integrity. Wiring within and interconnecting the panels and pumps shall be complete. Wiring troughs and cable raceways shall be self-contained within the enclosures and no external cable trays or wiring troughs will be permitted.

E. Panel shall recognize alarm conditions within the cistern/pump station, including, but not limited to:

1. Low Cistern/Wet Well Water Level
2. Low Discharge Pressure
3. High Discharge Pressure
4. Loss of Phase

F. Three-pole, fused main system disconnect shall be mounted in the control panel to isolate completely the electrical system from the incoming power. Disconnect shall conform to NEC requirements. The main disconnect shall have a dead front lockable operating handle on the front or side of the panel

G. Panel shall include a widow to view the drive.

H. Panel shall include corrosion inhibiting modules.

I. Jockey (5 hp) starter shall be across the line starter and shall be protected on each power leg by a time delay fuse of the needed amperage and have a reset button. Overload relays shall be ambient-compensating, differential-tripping type installed on each power leg and shall be set to trip at 105% of motor full load current rating. Starter shall be horsepower rated and conform to the standards and recommended practices of NEMA as manufactured by Allen Bradley or approved equal.

J. Pumps shall have an ON/OFF switch with position indicator mounted on the outside of the control panel.

K. Pump running light (green) is to be installed in the control panel door. The pump run light is to be illuminated whenever the pump motor is drawing electrical current. This light may be integrated as part of the ON/OFF switch.

L. The incoming power to the motor (unless included in the starter) shall be protected by a phase-failure/low voltage system dropout relay to de-energize the well pump in case either phase failure, reversal or low voltage condition occurs. The phase-failure cutout condition will remain in effect after power is restored until manually reset.

M. Panel shall be manufactured by Watertronics or approved equal.

2.7 PRESSURE GAUGE

A. Pressure gauges on the station will be of same size and scale, 0 - 200 psi. Gauges shall be glycerin filled with accuracy conforming to ANSI Grade B or greater. Gauges shall be provided minimum on main discharge pipe before and after wye strainer.

2.8 VARIABLE FREQUENCY DRIVES

A. Inverter manufacturer shall have a minimum of 5 years' experience in invertors and shall have a minimum 4 years' experience with IGBT transistors used with the drive to produce the output PWM waveform, allowing quiet motor operations.

B. Adjustable speed inverters shall be a pulse width modulated (PWM) design that has a carrier frequency of 3KHZ or higher so no acoustic noise will be produced onto the motor. The adjustable speed drive shall generate a sine-coded, adjustable voltage/frequency three-phase output for complete speed control of any NEMA B VAV duty squirrel cage induction motor. The adjustable speed drive shall maintain a 120% current overload capability for sixty seconds with automatic stall prevention and boost to prevent a nuisance tripping during load or line side transient conditions. The adjustable speed drive shall maintain a power factor of not less than 0.95 throughout its speed range.

C. Adjustable speed drives shall have the following basic design:

1. Inverter shall consist of a modular assembly consisting of diode rectifier and capacitor assembly, which will first convert, then filter and maintain a fixed DC voltage source from the fixed voltage and frequency input.

2. Inverter shall use Insulated Gate Biopolar Transistor (IGBT) with a minimum rating of 1000 VDC on 480 VAC controls to invert the converter fixed DC voltage into a sine-coded pulse width modulated output.

3. Control logic shall consist of a single printed circuit board for all horsepower sizes and incorporate an 8 bit or larger, microcomputer central processing unit to control all inverter, converter, base drive and external interface functions.

4. Terminal strip for input and output signals must be provided.

5. Drive to be mounted in the high voltage control panel.

D. Adjustable speed drives to include, as a minimum, the following design features as standard:

1. 3KHz or higher sine-coded, pulse width modulated output

2. Eight-bit microcomputer control logic

3. Maximum and minimum speed adjustment capability

4. Controlled speed range of minimum 20:1

5. Overload capability of 120% for 60 seconds, 110% continuous

6. Process follower 4-20m ADC, 0-5 VDC, 01-10 VDC or 0-135-ohm resistance input

7. Minimum of three selectable output frequency ranges

8. Sixteen selectable volts/hertz patterns

9. A four-segment digital readout displaying frequency, status, percent current, percent voltage and percent response signal

10. Current limiting circuit

11. Coast or ramp to stop

12. Electronic reversing

13. Adjustable acceleration and deceleration

14. Fault indicators

15. Fault contacts

16. Drive shall have an open-collector output signal to indicate when the drive's output is at maximum and minimum speed

E. Adjustable speed drives shall have as a minimum the following protective features:

1. Ground fault protection

2. Thermal motor overload relay

3. Current limit adjustable from 60% - 100%

4. Current limited stall prevention during acceleration, deceleration and run conditions

5. Automatic restart after momentary power loss or over voltage. The drive shall not restart into faults other than over voltage, under voltage, or over current due to acceleration rate set to fast, because other faults, such as over current to blown transistor or a short circuit on the output, could cause damage to the inverter. No restart into ground fault.

6. Start into a rotating motor

7. Fault indicators shall indicate the following fault conditions. Faults should be displayed by flashing on the LED display on the front panel of the inverter. When a fault occurs, the drive shall have built in diagnostic functions that assist in determining the cause and source of the fault. The drive shall also indicate the level of current and voltage and the frequency at the time of the fault.

i	Over current while running
ii	Over current on output
iii	Internal short circuit
iv	Overload
v	Over voltage during deceleration
vi	Over voltage due to power surge
vii	Over temperature
viii	Control function error
ix	Ground fault

8. DC bus discharge indicator. The drive must have a visual indication that is visible with the door closed as to whether hazardous voltage still remains on the DC bus so servicing technicians may avoid exposing themselves to dangerously high voltage.

9. Current limiting DC bus fuse

10. Isolated operator controls

11. Phase-to-phase short circuit protection

12. High speed current limiting fuses before drive

13. Contactors in front of drive

xi Adjustable speed drives shall have the following adjustments available:

14. Acceleration - 0.1 to 300 seconds

15. Deceleration - 0.1 to 300 seconds

16. Volts/hertz adjustments

17. Maximum frequency range

18. Minimum frequency (0 to 100% speed)

19. Maximum frequency (0 to 100% speed)

20. Carrier frequency (3KHZ to 16KHZ)

21. Bias and gain adjustment for 4-20mA, 0-5VDC, 0-10VDC follower

    a. Adjustable speed drive shall be designed to operate within the following environmental and service conditions:

22. Ambient service temperature: -10 C to 40 C

23. Ambient storage temperature: -20 C to 60 C

24. Humidity: non-condensing to 90%

25. Altitude to 3300 feet

26. Service factor: 1.1

27. Input voltage: 380/400/480VAC +/- 10% for 480VAC series

28. Input frequency: 50/60 hertz +/- 3%

F. Adjustable speed drives shall be subject to the following parameters and tests:

1. All integrated circuits (TTL) and all components used for circuit board construction shall be tested to an acceptance criterion of 0.5% AQL (Accepted Quality Level).

2. In-circuit testing of all printed circuit boards shall be conducted to insure proper mounting and correct value for all components.

3. Final printed circuit board assemblies shall be functionally tested via computerized test equipment where all tests and acceptance criteria are pre-programmed and test results are stored as detailed quality assurance data.

4. All fully assembled controls shall be combined-tested for performance and functionality at the manufacturer's factory with fully loaded VAV rated induction motors. The combined test data shall then be analyzed to insure adherence to quality assurance specifications.

G. Adjustable speed drives shall be designed and built to the following standards:

1. U.L. listed

2. NEMA listed

3. IEEE 587

H. Inverter may be programmed locally from a standard front mounted programming panel or through a serial communication port.

I. Variable frequency drives shall have an internal DC link choke to prevent electrical noise from the drive to power source.

J. Drives shall be installed for the pump station main pump and the well pump,

K. Inverter manufacturers shall have the following available:

1. Service engineer

2. Training/Service schools

3. 24-hour phone service

L. Drive manufacturer shall be as manufactured by ABB, Danfoss, Square D or equal.

M. Pressure transducer

1. Pressure transducer shall be a solid-state bonded strain gage type with accuracy of plus/minus 0.25% and constructed of stainless steel. Transducer shall be rated for system discharge pressure as shown on technical data sheet, and shall provide gauge pressure output, rather than an absolute. Pressure transducer shall be constructed of stainless steel. Pressure transducer shall be 4-20mA analog type with 7- 33 VDC supply range

2. Pressure transducer shall have a stainless-steel diagram and 200 psi burst pressure rated for submersible applications. Transducer shall also have built-in surge protection.

3. Transducer shall have a ¼-inch NPT welded pressure port adapter for installation into water piping. Transducer shall measure pump discharge pressure and have a range of 0-120 psi gauge.

4. Pressure transducer shall be compatible with specified pump control panel.

5. Pressure transducer shall be as manufactured by IFM or approved equal.

N. Sensor termination enclosure

1. Sensor termination enclosure is required for the transducer cable, prior to connection to the variable frequency drive controller. Enclosure shall have desiccant to remove moisture. Sensor Termination Enclosure shall be manufactured by Druck Model STE-110 or approved equal.

O. Fertigation run relay

1. Manufacturer shall supply an electrical/mechanical interface package to allow for the automatic control of any fertigation and/or injection package provided off the skid. Electrical terminations shall be provided. The interface package shall include minimum the items listed below:

2. Manufacturer shall supply within the electrical control enclosure an electronic signal optical isolator. The optical isolator shall allow additional monitoring of the pumping station flow signal. This signal may be utilized for items such as, fertigation controls, irrigation control systems and any additional system that may require a flow signal to operate. Optical isolator shall be as manufactured by Data Industrial, or approved equal.

3. Pump station Manufacturer shall include dry contact relays with terminal strip wiring points to allow the activation of fertigation and/or injection pumps. The dry contacts shall

close during the automatic operation of any pump, not including pumps utilized for pressure maintenance purposes.

P. Wye strainer

1. An iron body flanged wye type strainer having a working pressure of 175 psi shall be part of the pumping station. The screen in the strainer shall be made from AIAI 304 perforated stainless steel reinforced for liquid service, with 1/16-inch screen covered with a 50-mesh cover. The strainer shall have a bolted cover flange machined to securely receive the screen, and the screen shall be positively secured in both the body and cover flange. The strainer should be sized so that "the clean" pressure drop is no more than 3.0 psi as manufactured by Watts Regulator or equal.

2. Provide a 2-inch manual ball valve for wye strainer relief.

3. Discharge from the wye strainer shall be piped 4 inches past to the edge of the pump station enclosure by the Manufacturer through a 2-inch stainless-steel return line securely fastened to prevent movement. Manufacturer shall supply additional pipe and fittings as necessary to bring the discharge to 4-inches outside of the enclosure and covered with a mesh screen that passes water and debris.

Q. Pressure release valve

1. Pressure relief valve shall be installed downstream of the pumps where indicated on the drawing. The valve is to relieve pressure in excess of system pressure and is to protect the irrigation system against surge on closing.

2. Valve shall seal by means of a corrosion-resistant seat and resilient, rectangular seat disc. These and other parts shall be replaceable in the field; such service and adjustments to be possible without removing the valve from the line. The stem of the valve shall be guided top and bottom by integral bushings. The control valve and its pilot control system shall contain no packing glands or stuffing boxes. The diaphragm shall not be used as a seating surface nor shall pistons be used as an operating medium.

3. Valve shall be operationally and hydrostatically tested prior to shipping and shall carry a one-year warranty against failure due to defects in workmanship or materials.

4. Discharge from the relief valve shall be piped backed into the cistern/wet well through a stainless-steel/steel return line.

5. Pressure relief valve shall be 1 inch as manufactured by Cla-Val, model 50-01 or equal.

R. Wire/wiring

1. Pump power wiring from the control panel to the motors shall be in liquid-tight conduit with copper conductors rated not less than 600 VAC and of proper size to carry the full load amperage of the motors without exceeding 67% capacity of the conductor. Ground control panel as specified in accordance with National Electric Code.

2. Wiring to pressure transducer and flow meter shall be multi-conductor shielded cable suitable for Class II low voltage controls.

3. Wiring within variable frequency drive, pump control panel and components of the pumping system shall be completed by manufacturer at factory.

S. Sequence of operation

1. Jockey pump shall start on predetermined drop in pressure for demands less than 50 gallons per minute. Variable speed main pump shall start on flow. Motor frequency shall vary to provide required station demand in gallons per minute at a constant pressure until demand is met or exceeds the pump capacities. Pumps shall retire in the reverse order.

2. Jockey pump shall be used to maintain system pressure at zero flow.

3. Pump station shall be capable of providing flows of 0 to approximately 220 gallons per minute at 80-psi discharge pressure at all times as required by the irrigation system demand.

4. Irrigation pump control panel shall continually monitor centrifugal pump temperature throughout pump operation. When temperature rises above pre-programmed level, control panel shall shut down the centrifugal pump.

5. When final valve closes on scheduled irrigation or hand watering, irrigation control panel shall shut down pump system based on a rise in pressure as sensed by pressure transducer.

6. Pump control panel shall continually monitor cistern/wet well level throughout pump operation.

    a. When level drops below a pre-programmed maximum wet well level, control panel shall turn on well pump and shut down the well pump when the water level reaches back to the maximum pre-programmed level.

    b. When level drops below a pre-programmed minimum level control panel shall open potable water fill line modulating butterfly valve then shut the valve off when the water level reaches another maximum preprogrammed level (refer to pumping details).

    c. When level drops below the low water level hard shut down pre-programmed level, control panel shall shut down the pump station.

    d. Potable water supply and well pump flows to meet irrigation system demand shall be settable through the cistern/wet well control panel. Potable water supply flow shall utilize modulating butterfly valve and flow meter. Well pump system flow shall utilize well pump VFD and flow meter.

T. Grounding equipment

1. Grounding rod to be 5/8-inch x 10-foot copper clad, UL Listed.

2. Grounding plate to be 4-inch x 96-inch x 0.06-inch copper alloy with integral connection of 25 feet of #6 AWG insulated, solid copper wire, UL Listed conforming to the minimum requirements of Section 250 of the National Electric Code. Connection of the wire to plate shall be performed by the plate Manufacturer.

3. Grounding connections to utilize an exothermic welding process.

4. Grounding wire shall be#6 AWG, solid, bare copper wire.

5. Ground enhancement material shall be PowerSet as manufactured by Loresco or approved equal, 50-pound bags.

U. FOOT VALVE

1. Jockey pump suction piping shall include a 2-inch vertical aluminum foot valve with strainer. Strainer mesh shall be 2-5/8 inches high with ¼ inch, 5-inch diameter aluminum screen. Open area shall be 17 square inches. Foot valve and strainer shall bolt onto 2-inch threaded suction pipe. Foot valve shall be as manufactured by Sur-Flo Fittings, model SFVV2FP or approved equal.

V. Outlet pipe

1. Pump system discharge pipe shall be flange connected to pump station discharge pipe and plain end or mechanical joint connected to irrigation system 6-inch PVC mainline a minimum of 24 inches below grade. Outlet pipe shall include two 90-degree elbows, no 45-degree elbows.

W. Electrical conduit

1. Electrical conduit shall be installed as required for electrical wiring. Couplings, elbows and other fittings used shall secure a waterproof installation. Elbows shall be sweep ells. 90-degree elbows are not to be used.

2. Electrical conduit shall be installed for electrical wires for power circuits. Conduit shall be sized as required per NEC.

3. Conduits shall be watertight.

2.9 WELL PUMP SYSTEM

A. GENERAL

1. Materials to be incorporated in the well pump system shall be new, without flaws or defects and shall conform to all standards set forth in these specifications and as approved by the Owner's Representative.

2. Well pump system to be installed by the Contractor in the existing well.

3. Power supply, three phase, 460-volt, 60 hertz and shall be brought to the well from the pump system control panel by the Contractor.

4. Well pump shall be capable of pumping up to 200 gpm at a head of 35 feet (15 psi) at well discharge at grade.

5. Well is 8-inch diameter, 710 feet deep. Pump set shall be approximately 665 feet from bottom of motor to grade. 45 feet off bottom of well.

B. CONSTRUCTION

1. Nuts, bolts, washers and fasteners shall be zinc or cadmium plated for corrosion resistance.

2. Well drop pipe shall be constructed from 4-inch Schedule 40 standard weight galvanized steel. No galvanized pipe or fittings shall be allowed except for well drop pipe.

3. Well pump system to connect to wet well with Schedule 80 PVC.

4. Install a 3/4-inch PVC pipe form top of pump to top of well to be able to check water level.

C. PITLESS ADAPTER

1. Pitless adapter unit shall be of steel construction as self-contained, pre-fabricated unit to fit with 8-inch well casing to 4-inch discharge pipe.

2. Pitless adapter unit shall have stainless steel O-ring and spool seat.

3. Pitless adapter unit shall have vented top and neoprene gasket as part of watertight well cap.

4. Pitless adapter unit shall have torque arrestor to prevent spool rotation.

5. Pitless adapter unit shall have integral electrical junction box.

6. Pitless adapter unit shall be as manufactured by MAASS Midwest, Campbell Manufacturing, or approved equal.

D. SUBMERSIBLE PUMP AND MOTOR

1. Pump system shall include multistage turbine type submersible pump capable of pumping 200 gpm at 35 feet (15 psi) as it leaves the well at grade. Pump shall include 100,000 psi stainless steel shaft, type 416 with water lubricated bronze suction, discharge and intermediate bowl bearings. Impellers shall be enclosed cast-bronze balanced and be constructed from C836 bronze and cast-iron bowls shall meet ASTM-A48, class 30. The inlet area shall have a net open area of at least four times the eye area of the impeller. Submersible pump shall be as manufactured by Gould's, model 225H257 or equal.

2. Maximum 25 Hp submersible motor shall meet NEMA standards and operate within the nameplate horsepower for any point on the operating curve. The motor shall be of corrosion resistant construction, 316 stainless steel shell, splines stainless steel shaft, cast iron end bells, hermetically sealed windings, Kingsbury-type thrust bearings, pressure equalizing diaphragm, removable water-bloc lead connector and UL recognized.

3. Contractor shall use a properly installed submersible splice kit to connect to the submersible motor. The power cable shall be UL Listed, type TW rated for 600 volts with ground wire.

4. Submersible pump shall be installed approximately 655 feet below grade.

E. VFD DRIVE

1. Well pump system shall include a VFD drive. See above for specifications.

F. CHECK VALVE

1. Check valve to be flanged, 150# rated, center pivot, spring loaded, non-slam, silent type cast iron check valve in addition to any included on the pump as indicated on the drawings. Sealing surfaces shall have resilient Buna-N-Rubber as manufactured by Val-Matic or approved equal. Pressure loss is not to exceed 3 psi at full discharge capacity. Butterfly or ball type check valves shall not be approved for installation.

2. Submersible pump shall have a check valve mounted on the discharge pipe in addition to any in the pump itself.

G. DISCONNECT

1. A three pole, knife or approved type disconnect shall be mounted in the well control panel to completely isolate the electrical system from the incoming power. The disconnect shall

conform to NEC requirements. The well disconnect shall have an operating handle on the front or side of the panel. Rotary handles shall include actuator supports to enhance alignment.

H. WIRING

1. Well pump system wiring from the control panel to the motor shall be in conduit with copper conductors rated not less than 600 VAC and of proper size to carry the full load amperage of the motors without exceeding 70% capacity of the conductor. A grounding cable sized to current National Electric Code requirements shall be included in the liquid-tight conduit. There shall be no splices between the well pump system motor and the motor VFD connection at the pump control panel.

I. ISOLATION VALVE

1. Isolation valve shall be installed on well discharge pipe. Valve shall have lever handle. Pressure rating shall be 200 psi. Trim shall include stainless steel stem, bronze or nickel coated iron streamlined disc, and full faced resilient seats. Butterfly valves to be as manufactured by Victaulic, Gruvlok, Watts or equal.

J. FLOW METER

1. Flow sensor for well pump shall be 3-inch, with 150 psi pressure rating. Sensor shall have flow range of 6 to 300 gpm and be installed in a PVC saddle tee. Output shall be two wire standard pulse. Flow sensor shall be as manufactured by Creative Sensor Technologies, model CSI-FS1-S30-001 w/saddle.

2. Well pump system flow sensor shall be installed on 4-inch PVC pipe where indicated on the drawings in standard valve box between the well and the cistern. Install pump system flow meter per manufacturers requirements. Wire flow meter to pump control panel per manufacturers requirements.

K. SEQUENCE OF OPERATION

1. Submersible well pump shall start and stop manually based on level sensor in the wet well.

2. Well pump system shall be capable of providing a flow of minimum 0-200 gallons per minute at 15 psi discharge pressure at grade through the use of the VFD drive and flow meter.

3. Well pump flow shall vary based on the flow requirements set in the cistern/wet well control panel.

L. OUTLET PIPE

1. Outlet pipe shall be 4-inch (discharge) PVC pipe as specified to cistern/wet well a minimum of 24 inches below grade.

2.10 FERTIGATION SYSTEM

A. System shall include a complete commercial grade fertigation system as manufactured by EZ-FLO Fertilizing Systems or approved equal.

B. System shall include but not limited to:

1. Two (2) 6-inch x 1-inch SVF venturi saddle injectors for 6-inch mainline
2. One (1) 25-gallon EZ025-HC PVC fertilizer tank (36-inch x 19-inch x 23-inch)
3. One (1) 36-inch x 24-inch x 24-inch valve box
4. Two (2) 10-inch round valve boxes for injectors
5. Pressure relief valve
6. Vacuum Breaker
7. Required tubing and connectors

C. Contact EZ-FLO for application specifics prior to ordering materials.

2.11 WIRES AND CABLES

A. Cable from the pump station control panel to potable water supply and well pump system flow sensors shall be jacketed, four conductor, two pair cable. The cable shall be suitable for direct burial in the earth and also may be installed in ducts or conduits. Conductors shall be high density insulated tin coated copper conductors. Conductors shall have a 0.00235-inch aluminum/mylar shield helically applied and a #20 AWG drain wire to drain off electrical, magnetic or RF interference. The cable shall be rated 600 volts. The four conductors shall be seven strand, #18 AWG, 0.015 high density PE insulation wall. The two pair shall be color coded red/black and blue/orange and shall be soft annealed tin coated copper conforming to ASTM B-33. Insulation shall be high density polyethylene conforming to ICEA S-56-434. Outer jacket shall be 0.045-inch polyethylene conforming to ICEA S-61-402. The communication type cable shall be marked on the jacket as follows: "2 Pr #18 AWG Shld D/B Paige P7171D". Wire shall be as manufactured by Paige Electric, P7171D or approved equal.

B. Power cables from pump control panel to well pump shall be “Tray Cable”, #6/3 with #10 ground. Cable shall be UL listed, type TC, 600 volts, VW-1 rated, 90 degree centigrade dry, 75 degree centigrade wet. Cable shall be high dielectric PVC insulation with a nylon insulation armor and overall PVC jacket. Cable shall consist of a single jacketed four wire combination. Four individual jacketed conductors shall not be allowed. Wire shall be as manufactured by Paige Electric, P7267D or equal.

C. Communication cable from pump station control panel to irrigation controller shall be 2-wire communication cable as specified for the irrigation system with flow senor decoder.

D. Modulating butterfly valve wire shall be UL Listed, 14/2 rated for direct burial

E. Wire to heaters from pump control panel shall be UL listed, #10/2 w/ground.

2.12 CRUSHED STONE BASE

A. Concrete pad and wet well shall be installed on a compacted dense graded, minimum 6-inch-thick, 3/4-inch crushed stone base.

2.13 PUMP STATION ENCLOSURE

A. Skid/enclosure shall be marine grade aluminum, with stainless steel base, approximately 89 inches long x 60 inches high x 56 inches wide. Enclosure shall house all cistern/wet well pump system equipment including pump, check valve, PRV, wye strainer, VFD drives, disconnect, water meter, backflow preventer, etc.

B. Enclosure shall be locking with access from the front side.

C. Enclosure shall be securely lagged to concrete pad at each corner.

D. Enclosure color shall be determined by the Owner's Representative

PART 3 - EXECUTION

3.1 GENERAL

A. Examine documents applying to the cistern/wet well pump system installation noting any discrepancies and bringing the same to the attention of the Owner's Representative for timely resolution.

B. Work indicated on drawing shall be provided whether or not specifically mentioned in the specifications and vice-versa.

C. Make field measurements necessary for the work noting the relationship of the cistern/wet well pump system work to the other trades. Coordinate with other trades (landscaping and other site work trades). Major changes shall be reviewed with the Owner's Representative prior to proceeding.

D. Protect existing fences, landscaping, paving, structures, walls, footings, etc. from damage. Any inadvertent damage to the work of another trade shall be reported at once.

3.2 CISTERN/WET WELL INSTALLATION

A. Excavation for installation of the cistern/wet well shall be performed by mechanical equipment of the proper size. Care shall be taken to minimize the diameter of the excavation while maintaining safe and clean working conditions, as outlined by OSHA standards.

B. Backfill around the cistern/wet well shall be new, clean, compacted material provided by the Contractor. Contractor shall be responsible for settling of the enclosure due to improper compaction of the new material around the cistern.

C. Excess excavated material shall be disposed of by the Contractor on site in a safe and legal manner.

3.3 SITE PREPARATION

A. Contractor shall grade and firmly compact the cistern/wet well area for installation of crushed stone, using new material provided by the Contractor. Contractor shall provide compaction testing to assure 98% proctor density in accordance with ASTM D1557. Compaction testing

results shall be approved by the Engineer. Contractor shall be responsible for settling due to improper compaction.

3.4 MAIN PUMP SYSTEM INSTALLATION

A. Site work to be complete before arrival of pump station from manufacturer.

B. Following installation of cistern, new pump station shall be installed. Coordinate installation schedule with the Owner's Representative.

C. Pump station shall be securely lagged to cistern/wet well using four (4) 5/8-inch stainless steel bolts 8 inches long and four (4) 4-inch x 8 inch, 1/4-inch-thick steel plates painted same color as pump station enclosure.

D. Connect discharge piping without strain to flanged outlet of pump station. Pump station shall not be used as thrust block. 6-inch PVC irrigation piping shall be connected to outlet of pump station using a mechanical connection or gasketed connection.

E. Release valve discharge will be piped in painted steel or stainless-steel pipe back into the wet well.

F. Wye strainer discharge will be piped in painted steel or stainless-steel to the outside edge of the enclosure and terminated with a screen flanged so water can pass through it to atmosphere.

G. Connect piping and electrical connections associated with cistern/wet well pump system installation as specified.

H. Procure, coordinate and pay for crane, rigging equipment and other equipment required for safe and timely offload, set and installation of cistern/wet well pump system and its appurtenances on predetermined schedule with the Owner's Representative.

I. Whether or not specified, provide complete installation of cistern/wet well pump system including electrical work.

3.5 FERTIGATION SYSTEM INSTALLATION

A. Install fertigation system approximately where indicated on the drawings as approved by the Owner's Representative.

B. Install system complete in place per manufacturer's written installation instructions and the details.

3.6 WELL PUMP SYSTEM INSTALLATION

A. New pump shall be installed in existing well per AWWA guidelines

B. Contractor shall be responsible for installing pipe and wire associated with the well pump system installations as specified. Discharge piping shall include check valve and isolation valves connected without strain to well pump system discharge pipe as indicated on the drawings.

C. Contractor shall be responsible for wiring the well pump to the well pump VFD in the pump station control panel.

D. Contractor shall be responsible for procuring, coordinating and paying for equipment required for the safe and timely installation of the well pump and its appurtenances on a predetermined schedule with the Owners Representative.

E. Well discharge piping shall be connected without strain to 4-inch cistern fill pipe by the Contractor.

F. Contractor shall be responsible for installing all piping associated with the well pump system installation as specified.

3.7 GROUNDING INSTALLATION

A. Pump station controls shall include factory-installed and factory-recommended lightning protection and shall be connected to a 5/8-inch diameter x 10-foot long copper clad grounding rod with minimum #6 AWG, solid, insulated copper wire and 4-inch x 96-inch x 0.0625-inch copper grounding plate as outlined below. Minimum 20-foot separation between rod and plate. Minimum 12-foot separation between control panel and ground rod. Connection to rod shall be with exothermic connector as specified. Connection to plate shall be performed by the plate manufacturer with 25-feet of insulated copper wire already attached. Grounding rod is to be covered by a 4-inch round, grated top, plastic valve cover with metal detection and six inches of 4-inch drainage pipe. Plate shall be installed in ground enhancement material. Plate shall be covered with 4-inch plastic grated cover with detection and minimum 36 inches of 4-inch drainage pipe. Ground rod and plate shall be UL listed.

B. Control panel shall be grounded to one rod and one plate. The 10-foot rod shall be installed penetrating into the soil to its full length. Plate shall be installed at a 36-inch depth with 50 lbs. of PowerSet or equal ground enhancement material spread evenly below the plate and 50 lbs. spread evenly above the plate in accordance with manufacturer’s requirements. The grounding electrodes shall be installed at least 10 feet from wires connected to the control panel.

3.8 CISTERN/WET WELL PUMP SYSTEM TESTS

A. TECHNICAL START-UP OF THE SYSTEM – When pump control panel and electrical connections have been completed for the cistern/wet well pump system and well pump, the contractor shall provide the following:

1. Start-up the cistern/wet well pump system and pressurize irrigation system.

2. Conduct training to familiarize the Owner’s Representative with the system operation, maintenance and adjustments.

3. Adjust valves and pump pressures and flows for optimum performance of the irrigation system and prevent frequent on/off cycling of the pumps.

4. Adjust control panel for optimum cistern/wet well pump system performance and efficiency.

5. Adjust cistern level controls for optimum well pump and potable water feed performance and efficiency for the flows indicated or as dictated by the Owner’s Representative.

6. Monitor a partial cycle of the irrigation system if possible and authorized by the Owner's Representative to identify any problems with the cistern/wet well pump system.

B. SYSTEM TESTING

1. Cistern/wet well pump system, well pump shall operate without undue vibration throughout the range of operating conditions. The cistern/wet well pump system and well pump as well as the potable water feed shall be given a running test of normal start and stop operations. During such tests, the pumps shall demonstrate their ability to operate without undue vibration and shall demonstrate without question its general fitness for service. Defects shall be corrected and adjustments made without expense to the Town of Longmeadow. Tests shall be repeated until satisfactory results are obtained.

2. Cistern/wet well pump system and the well pump shall show that the safeties incorporated in the systems are also functioning.

3. Contactor/manufacturer shall test the logic between the cistern/wet well pump system, well pump and potable water feed for proper on/off level points for each water supply system.

4. Manufacturer and Contractor shall notify the Owner's Representative in advance of final test.

5. Test lines in cistern/wet well pump system under pressure for leaks. Repair leaks and re-test.

6. Furnish necessary equipment to perform tests.

7. Review all Maintenance and Operating Manuals section-by-section with the Owner's Representative and turn them over.

3.9 ACCEPTANCE AND OPERATION BY OWNER

A. Upon completion of the work and acceptance by the Town of Longmeadow, the Contractor shall be responsible for the training of the Owner's Representative(s) in the operation of the cistern/wet well pump system (provide minimum 7 days' written notice in advance of test). Furnish, in addition to the Operating and Maintenance Manuals, copies of available specification sheets and catalog sheets to the Owner's personnel responsible for the operation of the cistern/wet well pump system. Guarantee parts and labor under this specification for a minimum period of one (1) year from date of acceptance.

B. Conditions for acceptability of work for start of maintenance by City of Longmeadow issued by Owner's Representative shall include but not be limited to:

1. Irrigation cistern/wet well pump system complete and in place.

2. Well pump and associated equipment complete and in place.

3. Punch list items complete and approved by Owner's Representative.

4. Operating and Maintenance Manuals approved.

3.10 CLEAN UP

A. Upon completion of installation, remove leftover materials and equipment from the site in a safe and legal manner.

B. Remove debris resulting from the cistern/wet well pump system work.

END OF SECTION 32 84 10

(END – ADDENDUM NO.1)