

IRRIGATION AT HENRY PARK SOFTBALL FIELD

VERNON, CT

IRRIGATION

NOVEMBER, 2014

SECTION 328400 – SOFTBALL FIELD IRRIGATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Piping.
2. Automatic control valves.
3. Miscellaneous piping specialties.
4. Sprinklers.
5. Quick couplers.
6. Controllers.
7. Boxes for automatic control valves.
8. Wiring and connections.

- B. The Contractor shall supply the materials necessary for a complete automatic irrigations system. All materials shall be new and unused as specified.

1.2 DEFINITIONS

- A. Circuit Piping: Downstream from control valves to sprinklers, specialties, and drain valves. Piping is under pressure during flow.
- B. Drain Piping: Downstream from circuit-piping drain valves. Piping is not under pressure.
- C. Main Piping: Downstream from point of connection to water distribution piping to, and including, control valves. Piping is under water-distribution-system pressure.
- D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control, signaling power-limited circuits.

1.3 PERFORMANCE REQUIREMENTS

- A. Irrigation zone control shall be **automatic operation with controller and automatic control valves**.
- B. Location of Sprinklers and Specialties: Design location is approximate. Make minor adjustments necessary to avoid plantings and obstructions such as signs and light standards. Maintain 100 percent irrigation coverage of areas indicated.
- C. Delegated Design: Design 100 percent coverage irrigation system, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

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1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and furnished specialties and accessories.
- B. Delegated-Design Submittal: For irrigation systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Coordination Drawings: Irrigation systems, drawn to scale, on which components are shown and coordinated with each other, using input from Installers of the items involved. Also include adjustments necessary to avoid plantings and obstructions such as signs and light standards.
- D. Qualification Data: For qualified Installer.
- E. Field quality-control reports stating field conditions match plans.
- F. Operation and Maintenance Data: Include operation and maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers that include a **Certified Irrigation Contractor (CIC), qualified by The Irrigation Association**. Proof of certification shall be submitted with the bid proposal.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Sprinklers, electric control valves, quick coupler valves and control system equipment shall be from a single manufacturer as specified.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver piping with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe-end damage and to prevent entrance of dirt, debris, and moisture.
- B. Store plastic piping protected from direct sunlight. Support to prevent sagging and bending.

1.7 PROJECT CONDITIONS

- A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:
 - 1. Notify **Owner** no fewer than **two** days in advance of proposed interruption of water service.
 - 2. Do not proceed with interruption of water service without Owner's written permission.

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1.8 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Sprinklers: 2 extra of each.
 - 2. Automatic Control Valves: 1 extra of each
 - 3. Keys to controller cabinet: 2

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

- A. Comply with requirements in the piping schedule for applications of pipe, tube, and fitting materials, and for joining methods for specific services, service locations, and pipe sizes.
- B. Soft Copper Tube: ASTM B 88, Type L (ASTM B 88M, Type B), water tube, annealed temper.
 - 1. Copper Pressure Fittings: ASME B16.18, cast-copper-alloy or ASME B16.22, wrought-copper solder-joint fittings. Furnish wrought-copper fittings if indicated.
 - 2. Bronze Flanges: ASME B16.24, Class 150, with solder-joint end.
 - 3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces and solder-joint or threaded ends.
- C. PVC Pipe: ASTM D 1785, PVC 1120 compound, SDR 21, Class 200.
 - 1. PVC Socket Fittings: ASTM D 2466, Schedule 40.
 - 2. PVC Threaded Fittings: ASTM D 2464, Schedule 80.

2.2 PIPING JOINING MATERIALS

- A. Metal, Pipe-Flange Bolts and Nuts: ASME B18.2.1, carbon steel unless otherwise indicated.
- B. Brazing Filler Metals: AWS A5.8/A5.8M, BCuP Series, copper-phosphorus alloys for general-duty brazing unless otherwise indicated.
- C. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.
- D. Solvent Cements for Joining PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.3 AUTOMATIC CONTROL VALVES

- A. PVC Ball Valves:

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1. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
 - a. Dura Plastics.
2. Description: Molded-plastic body, normally closed, diaphragm type with manual-flow adjustment, and operated by 24-V ac solenoid.

2.4 MISCELLANEOUS PIPING SPECIALTIES

- A. Pressure Gages: ASME B40.1. Include 4-1/2-inch- (115-mm-) diameter dial, dial range of two times system operating pressure, and bottom outlet.
- B. Pressure reducer, if required.

2.5 SPRINKLERS

- A. General Requirements: Designed for uniform coverage over entire spray area indicated at available water pressure.
- B. Large Rotary Sprinklers:

1. Basis-of-Design Product: Subject to compliance with requirements, provide or comparable product by one of the following:
 - a. Hunter Industries, Irrigation Division – I-25.
2. Description:
 - a. Body Material: ABS.
 - b. Nozzle: Plastic
 - c. Retraction Spring: Stainless steel.
 - d. Internal Parts: Corrosion resistant.
3. Capacities and Characteristics:
 - a. Flow: 3.8 to 31.5 GPM
 - b. Pop-up Height: 4" aboveground to nozzle.
 - c. Radius: 37' to 71'
 - d. Inlet: 1" NPT

C. QUICK COUPLERS

1. The quick coupler valve shall be one piece type using a single slot keyway. The valve body and coupler key shall be made of cast red brass and stainless steel construction.

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2. The valve shall have a corrosion resistant stainless steel spring and self-flushing brass plunger. There shall be a chevron-shaped wiper seal to reduce leakage around the key when inserted. It shall also incorporate a drain hole in the body to minimize debris collection.
3. The quick coupler valve shall accept a Hunter model HK-44 quick coupler key with a 1" valve and 1" key inlet.
4. The quick coupler valve shall be model number HQ-44 as manufactured by Hunter Industries.

2.6 CONTROLLERS

- A. Basis-of-Design Product: Subject to compliance with requirements, or comparable product by one of the following:
 1. Hunter Industries – ICC-600-PL.
- B. Description:
 1. Controller Stations for Automatic Control Valves. Include switch for manual or automatic operation of each station.
 2. Exterior Control Enclosures: NEMA 250, Type 4, weatherproof, with locking cover and two matching keys; include provision for grounding.
 - a. Body Material Metal cabinet.
 - b. Mounting: Surface type for wall.
 3. Control Transformer: 24-V secondary, with primary fuse.
 4. Timing Device: Adjustable, 24-hour, 14-day clock, with automatic operations to skip operation any day in timer period, to operate every other day, or to operate two or more times daily.
 - a. Manual or Semiautomatic Operation: Allows this mode without disturbing preset automatic operation.
 - b. Nickel-Cadmium Battery and Trickle Charger: Automatically powers timing device during power outages.
 - c. Surge Protection: Metal-oxide-varistor type on each station and primary power.
 5. Rain sensor, wired to interrupt the cycle during a rain fall.
 6. Wiring: UL 493, #18 gauge UF multi strand control wire and #12 AWG common wire, with solid-copper conductors; insulated cable; suitable for direct burial.
 - a. Splicing Materials: Manufacturer's packaged kit consisting of insulating, spring-type connector or crimped joint and epoxy resin moisture seal; suitable for direct burial.

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2.7 BOXES FOR AUTOMATIC CONTROL VALVES

- A. Plastic Boxes:
 - 1. Manufacturers:
 - a. Carson Industries.
 - 2. Description: Box and cover, with open bottom and openings for piping; designed for installing flush with grade.
 - a. Size: As required for valves and service.
 - b. Shape: Rectangular.
 - c. Sidewall Material: PE.
 - d. Cover Material: PE.
 - 1) Lettering: "VALVE BOX - IRRIGATION.

2.8 ZONE VALVES

- A. The electric control valve shall be a pressure-regulating model of plastic construction. The valve shall have a 150 PSI maximum pressure rating and be available in a globe configuration with 1", 1-1/2" and 2" female threads.
 - 1. The valve shall have the following flow range:

1":	5-40 GPM
1-1/2":	20-130 GPM
2":	30-180 GPM
- B. The operating pressure of the pressure-regulating valve shall be an inlet pressure of 15-150 PSI and an outlet pressure of 5-100 PSI. The burst pressure safety rating shall be 500 PSI.
- C. The diaphragm shall be a tough, double-beaded, fabric-reinforced rubber with a stainless-steel support ring for minimum wear.
- D. The valve shall incorporate an electrical solenoid for activation of the integrated control valve. The solenoid operator shall be suitable for 24 VAC, 50/60 Hz service with inrush of 0.30 A @ 50/60 Hz, and holding of 0.20 A @ 50/60 Hz. Separate models shall be available with low-wattage/high-surge performance, capable of performing in non-potable water applications, and with a DC-latching solenoid, for use in 2-wire decoder systems.

2.9 BOOSTER PUMP

- A. Manufacturer: Subject to compliance with requirements.
 - 1. Goulds, Model – GT20 Irrigator.

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2. Description: Backflow shall be a reduced pressure type.
 - a. 2 horsepower, 230 volt, single phase
 - b. End suction centrifugal
 - c. The pump relay is existing in the shed.

PART 3 - EXECUTION

3.1 EARTHWORK

- A. Install warning tape directly above pressure piping, 12 inches below finished grades.

3.2 PREPARATION

- A. Set stakes to identify locations of proposed irrigation system. Obtain Landscape Architect's approval before excavation.

3.3 INSTALLATION

- A. Location and Arrangement: Drawings indicate location and arrangement of piping systems. Install piping as indicated unless deviations are approved on Coordination Drawings.
- B. Contractor shall do all excavating, backfilling and compaction required for the proper installation of the work according to standard acceptable industry practices.
- C. Pipe routing shall be in accordance with the plan, however, the Owner shall have the right to change the route and/or depth of the pipe where rock or other obstacles may interfere with the intended path.
- D. The Contractor, with approval of the Owner, also may adjust the location of any pipeline and/or depth to avoid large rock or other obstacles, provided that the adjustment does not affect the performance of the system. In no event shall such changes affect the cost of the work except where those changes greatly alter the quantity of materials and/or labor.
- E. All trenches shall have the sod removed by the Contractor, excavated and properly backfilled with sod replaced. The Contractor shall be responsible for reusing the sod, but if not reusable, the area shall be sodded or seeded at the Owner's request. New sod and/or seed shall be supplied by the Contractor. The minimum trench width shall provide for a minimum space of 4" on each side of the piping. Trench widths shall be held close to these minimums to avoid excess earth loads on piping.
- F. Mainline piping shall have a minimum cover of 18". Trenches shall be backfilled with rock-free soil completely surrounding the pipe. Any trenches that are in extremely rock-filled soil, or if ledge is present, shall require the trench to be back-filled with a minimum of 4" of sand surrounding the pipe. The Owner shall supply all sand required for backfilling.

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- G. Lateral piping shall have a minimum cover of 16". The use of a vibratory plow for pipe installation shall only be allowed as long as minimum cover is maintained and there is no evidence of damage to the pipe.
- H. If soil conditions do not permit the Contractor to install piping at specified depths, the Contractor and Owner shall agree to alternate methods of installing the piping. Shallower depths, different piping material, backfill type, etc. may be explored to overcome installation obstacles.
- I. The Contractor must provide effective protection at all times to prevent sand, rubbish, or any other debris from entering the piping. When work is stopped at night, or at any other time, the ends of the piping must be closed and properly secured. Sidewalks, cart paths and driveways shall be clear of project debris and equipment at all times and barricades and/or tape shall be installed around any trenches left open.
- J. The Contractor shall provide any necessary pumps for removing water from trenches and other parts of the work to prevent trenches and/or slopes from caving in.
- K. When backfilling, all backfill material shall be free from rock, large stone or other unsuitable substances to prevent damage to piping and wiring. Backfilling of trenches containing plastic pipe shall be done when the pipe is cool to avoid excessive contraction in cold weather. All backfill material will be compacted in 6" layers as it is brought up to finish grade so as to insure that no settling results. Excess trench material shall be removed to a readily accessible on-site location as designated by the Owner, at the Contractor's expense.
- L. The Contractor shall be responsible for repairing all depressions or damage cause by their equipment as determined by the Owner.
- M. Pipe shall be installed strictly in accordance with recommendations of the manufacturer, including leveling of trench bottoms, bedding of pipe, and securely thrusting any fittings to change direction of gasketed piping.
- N. Install piping at minimum uniform slope of 0.5 percent down toward drain valves.
- O. Install piping free of sags and bends.
- P. Install groups of pipes parallel to each other, spaced to permit valve servicing.
- Q. Install fittings for changes in direction and branch connections.
- R. Install expansion loops in control-valve boxes for plastic piping.
- S. Lay piping on solid subbase, uniformly sloped without humps or depressions.
- T. Install PVC piping in dry weather when temperature is above 40 deg F (5 deg C). Allow joints to cure at least 24 hours at temperatures above 40 deg F (5 deg C) before testing.
- U. Install transition fittings for plastic-to-metal pipe connections according to the following:
 - 1. Underground Piping
 - a. NPS 1-1/2 (DN 40) and Smaller: Plastic-to-metal transition fittings.

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b. NPS 2 (DN 50) and Larger: AWWA transition couplings.

2. Aboveground Piping:

a. NPS 2 (DN 50) and Smaller: Plastic-to-metal transition fittings.

b. NPS 2 (DN 50) and Larger: Use dielectric flange kits with one plastic flange.

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

B. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

D. Copper-Tubing Brazed Joints: Construct joints according to CDA's "Copper Tube Handbook," using copper-phosphorus brazing filler metal.

E. Copper-Tubing Soldered Joints: Apply ASTM B 813 water-flushable flux to tube end unless otherwise indicated. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy (0.20 percent maximum lead content) complying with ASTM B 32.

F. PVC Piping Solvent-Cemented Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

2. PVC Pressure Piping: Join schedule number, ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.

3. PVC Nonpressure Piping: Join according to ASTM D 2855.

3.5 VALVE INSTALLATION

A. Install in underground piping in boxes for automatic control valves. Install DBY splice kits at each automatic control valve. Fittings and nipples as required.

3.6 SPRINKLER INSTALLATION

A. Install sprinklers after hydrostatic test is completed.

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- B. Install sprinklers at manufacturer's recommended heights. Install on flexible swing joints.
- C. Locate part-circle sprinklers to maintain a minimum distance of 4 inches (100 mm) from fences and 2 inches (50 mm) from other boundaries unless otherwise indicated.

3.7 AUTOMATIC IRRIGATION-CONTROL SYSTEM INSTALLATION

- A. Equipment Mounting: Install exterior controller on building wall.
 - 1. Place and secure to building wall and install controller components in accordance with manufacturer's specifications.
- B. Install control cable in same trench as irrigation. Provide conductors of size not smaller than recommended by controller manufacturer. Install cable in separate sleeve under paved areas. Use expansions loops, by wrapping around a 1" dowel 12" long, every 500'.

3.8 CONNECTIONS

- A. Drawings indicate general arrangement of piping, fittings, and specialties.
- B. Connect wiring between controllers and automatic control valves.

3.9 IDENTIFICATION

- A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplates and signs on each automatic controller.
 - 1. Text: In addition to identifying unit, distinguish between multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations.
- B. Warning Tapes: Arrange for installation of continuous, underground, detectable warning tapes over underground piping during backfilling of trenches.

3.10 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.
 - 1. Tests and Inspections:
 - a. Leak Test: After installation, charge system and test for leaks. Repair leaks and re-test until no leaks exist.
 - b. Operational Test: After electrical circuitry has been energized, operate controllers and automatic control valves to confirm proper system operation.
 - c. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

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- B. Any irrigation product will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

3.11 STARTUP SERVICE

- A. Startup service shall be the responsibility of the irrigation installer.
 - 1. Complete installation and startup checks according to manufacturer's written instructions.
 - 2. Verify that controllers are installed and connected according to the Contract Documents.
 - 3. Verify that electrical wiring installation complies with manufacturer's submittal.

3.12 ADJUSTING

- A. Adjust settings of controllers.
- B. Adjust automatic control valves to provide flow rate at rated operating pressure required for each sprinkler circuit.
- C. Adjust sprinklers and devices, except those intended to be mounted aboveground, so they will be flush with finish grade.

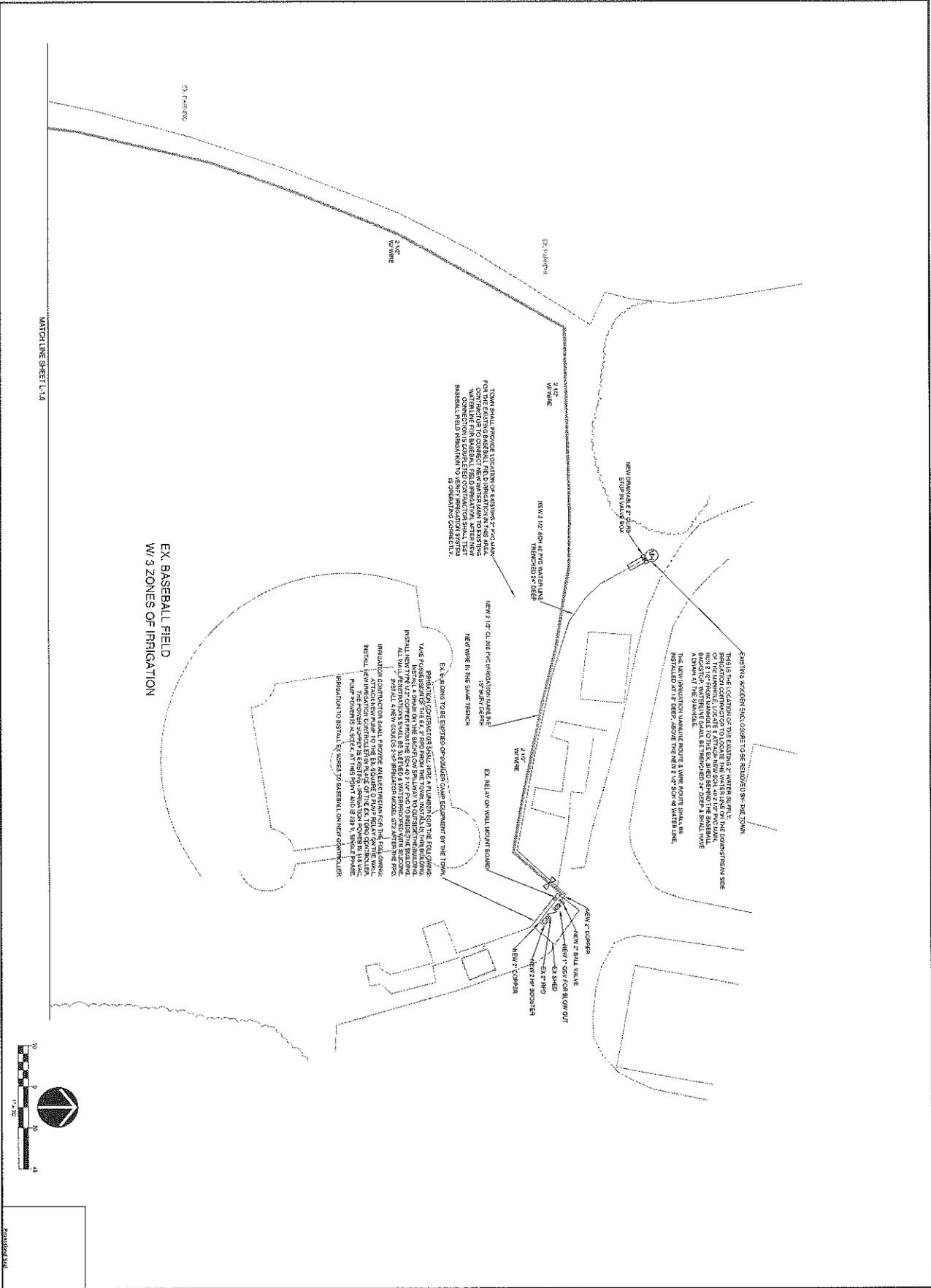
3.13 CLEANING

- A. Flush dirt and debris from piping before installing sprinklers and other devices.

3.14 DEMONSTRATION

- A. Train the Owner's maintenance personnel to adjust, operate, and maintain this system.

END OF SECTION 328400



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