

**Monday, September 16, 2019**

**SITE IMPROVEMENTS - GOLF IRRIGATION CEDAR RIDGE GOLF COURSE**

**PART 1 - GENERAL**

**1.1 SCOPE**

- A. This is a general information section
- B. The CENTRAL CONTROL is Existing and Radio Controlled
- C. There are 19 Existing Controllers which will require a module upgrade to 64 Station (Provided by City) and each controller will be relocated by Contractor. They will require new concrete pads.
- D. The irrigation installation will be to install and make operational the sprinkler heads on 10 golf holes and range. Install a 10" transfer line from maintenance to pump lake. Tie-in new mainline to existing mainline near 18 green and 11 tee.

**1.2 EXPERIENCE**

- A. This project requires certification of certain disciplines by all those performing the following:
- B. HDPE fusion, Splicing and grounding.
- C. The contractor will also be required to show that they have completed the following:
- D. (3) 18-hole irrigation replacement installations in the last (3) years.
- E. (2) Irrigation full replacements using HDPE pipe main lines and laterals.
- F. System where laterals were installed with the pulling or trenchless method.
- G. Documentation shall be included with bid.

**1.3 COUNT - TAKE-OFF**

- A. The Contractor shall be responsible for the final material take-off and provide to the City for City to purchase. The City will reserve the right to order 80% of take-off before start of project and cross reference inventory for the remainder of material.
- B. A general material list is included in the specification for information only. It is not for use in the final counts for bidding purpose.

- C. Furnish all: The contractor shall furnish all labor, housing, and equipment to install the City provide, Toro, pipe, wire valves & fittings as designated on the plans or the intentions of the plans and deliver to the owner a fully operational irrigation system.

#### **1.4 MOBILIZATION**

- 1.5 It is anticipated that the successful contractor may begin to mobilize, prepare the area, and in some selected areas begin construction in the month of November 2019. Be aware that weather could cause delays and may cause a return in the spring of 2020 to complete the installation.

#### **1.6 PERMITS AND FEES**

- A. Work covered by this specification, also includes all Bonds, licenses, permits, federal, state, local taxes, and all other costs, both foreseeable and unforeseeable at time of construction. All to be paid for by Cedar City.

#### **1.7 TRAINED CERTIFIED TECHNICIANS**

- A. Contractor shall use certified technicians for making electrical connections, splices, HDPE fusion welding, metal welding, etc. Contractor shall provide proof (certificates) to Owner, that training and certification is current (within 6 months).
- B. A HDPE training certificate is required by all personnel engaged in the fusion of the HDPE pipe from an approved pipe manufacturer. The certification shall be performed on site by the successful pipe and fitting supplier.
- C. A SPLICING AND GROUNDING TRAINING CERTIFICATE is required by each person engaged in the splicing of the control wires, installing the grounding or any wire system requiring splicing. Tags must be used at each splice indicating the In-Out and direction of wire path from power supply to clock.
- D. Cedar City & Cedar Ridge Staff will require that three personnel shall be included-to be part of the Training for HDPE Fusion and Wire Splice Classes and Certification at Contractor's expense. If additional class time or field training is required. Contractor shall be responsible for all costs for class and field training of 3 City maintenance staff.

#### **1.8 DEVIATIONS**

- A. No deviation from these specifications, accompanying drawings, or agreement is authorized, or shall be made without prior written authorization by Owner or his duly appointed representative (Owners Authorized Representative).

- 1.9 A contingency section is provided for unseen additions which may occur during the installation. The contingency count of items to be included in the bid is contained in the Symbol Identification section of specification package.
- 1.10 This is an existing site. The contractor will visit the site and determine the method of trenching, pulling and define the methods of installation and adjust the cost related in his bid.
- 1.11 There are locations on the project where existing utilities are of concern. Location of ALL utilities shall be staked (blue stake) under the direction (responsibility) of the Contractor.
- 1.12 The installation of Large irrigation heads will be full circle or part circle / full combination, model as specified in the symbol identification. Heads shall be gear driven and each head shall have an individual valve. Heads will operate by automatic signal or manual key. Each head will be pressure regulated as specified. Access to all components shall be top accessible.
- 1.13 The general spacing is (64') triangular on fairways and greens. Not more than (1) head will operate on a Station position unless staked by GPS Golf and all or any double head stations will be doubled at the Clock. Each head shall have a signal wire return to the clock regardless. No doubling in the field under any circumstance.
- 1.14 There are existing spray and rotor systems at the parking lot entrance. The contractor shall reconnect 4 valves at the electric valve box and leave 1 Extra wire at each box location for future use.
- 1.15 A Wilkins NR3XL, pressure regulator shall be installed before each valve or group of valves. The regulator and section valves shall be enclosed in an access box. The regulator pressure setting (60 PSI) will be defined in the installation details.
- 1.16 The water window is designed for 8 hours under normal weather conditions.
- 1.17 FIELD SERVICES Shall be Completed by GPS Golf As-Built Design and will be part of the Contractors bid.**
- A. Staking
  - B. As staked
  - C. Mapping
  - D. GPS As-Built
  - E. Programming
- 1.18 PUMP STATION**
- A. The pump station shall be provided and installed by the City.
  - B. The pump station shall be manufactured by Watertronics.
  - C. The Contractor shall connect to the Z-Pipe from Pump Station outward.

- 1.19 Drain valves shall be installed at low points on the main line where the discharge will be delivered per plan. The gate valve shall be 2" installed on the horizontal after a 45-degree downward discharge. The valve shall be enclosed in an appropriate valve box.
- 1.20 All main line gate valves shall be resilient wedge type as manufactured by LEEMCO for pipe size 8" thru 12". Or ***Equal Contractor*** to submit cut sheet with Bid.
- 1.21 All valves require a 32" cover to allow for the operating nut to be below grade and enclosed in an access box. All valves shall be flanged.
- 1.22 Lateral connections to the main line shall be a sidewall fusion.
- 1.23 The lateral valve shall be attached to the main line by a ***2" Aqua Fuse 360*** valve ball valve and shall be installed to isolate the lateral line from the main. HDPE end pieces are furnished with each valve for the inlet and outlet allowing direct connection fusion. These items are connected by the socket fusion method.
- 1.24 The service tee to the lateral pipe shall be with a fusible service saddle (nipple).
- 1.25 Fittings for the 2" lateral pipe shall be butt fused molded fittings, tee's, elbows. End cap shall be or ***Aqua Fuse AFAEL***- for 2" pipe.
- 1.26 Average burial of the lateral pipe is 18".
- 1.27 ELECTRICAL
- A. The contractor is responsible for the complete electrical connections.
- B. All wire shall be installed with the color as specified on the plan. Substitutions will not be allowed. White as Common, Red as Signal & Blue or Yellow as Extra Wire
- C. Grounding at each grounding Controller must be 10 ohms or less.
- D. Grounding shall be with a PAIGE (2) plate / Rod / GEM / material grounding system.
- E. ***All splices***, grounding connections shall be enclosed in an access box.
- F. The irrigation equipment supplier must test and approve grounding before operating the control system.
- 1.28 Frost delays are determined by Superintendent and only when Superintendent lifts the frost delay shall Contractor be allowed to work within the Golf Course
- 1.29 WARRANTY
- A. THE CONTRACTOR SHALL WARRANTY THE ENTIRE SYSTEM from Completion date (approximately) June 1, 2020 thru season 2021 October 2021. (16 Month estimated)
- B. Warranties from manufacturers extending their warranties past the date above will remain as defined.

- C. Warranty shall cover materials, workmanship and labor.
- D. Warranty shall include filling and or repairing depressions or replacing plantings due to settlement of the irrigation system or other irrigation system elements.
- E. The irrigation shall have been adjusted to provide proper, adequate coverage of the irrigated areas.
- F. Manufacturer may offer additional warranties based on the APPROVED products and services accepted for this project. The Irrigation Contractor shall provide the owner with this information prior to the selection (purchase) of the approved products.
- G. Warranties of supplied materials shall remain as stated in these specifications or as published by manufactures documents. Example: Main line gate valves (10 years).

**END OF PART 1 – GENERAL**

## **PART 2 - PRODUCTS**

### **2.1 GENERAL REQUIREMENTS**

- A. The irrigation system has been conceptually designed based on the graphic representation of the golf course layout. There will be situations in the field that will require deletion or addition of irrigation heads. In the case of approved deletion and addition, there will be a deduction or addition on the contract price according to the unit price as stated in the bid proposal.
- B. The work covered in this section defines the responsibilities of the CONTRACTOR with respect to the general installation requirements of a complete underground golf course irrigation system. The system as so defined in the Plans, Specifications and Instructions and Contract Documents.
- C. The CONTRACTOR will notify the DESIGNER and OWNER in writing of any inconsistencies in the Plans, Specifications, Instructions and Contract Documents prior to any construction or installation covered under this contract.
- D. At any time during the installation phase, the CONTRACTOR is invited to suggest in writing to the OWNER and DESIGNER any field changes or modifications that he feels will improve the overall efficiency or installation economics of the system. Any changes made but not approved in writing by the DESIGNER or OWNER'S representative cannot be considered a billable additional service from the CONTRACTOR.
- E. Sprinkler lines, heads, valves, controllers, etc., shown on the drawings are essentially diagrammatic. The exact location for the installation of components of the system shall be adjusted and established on site by the DESIGNER or his representative.
- F. The CONTRACTOR shall keep on this job a full time, competent superintendent and any necessary assistants all of who must be approved by the Owner's Representative. The Superintendent shall represent the CONTRACTOR in his absence and all directions given to him shall be as binding as if given by the CONTRACTOR.
- G. The name of the Contractors Superintendent and all support personnel shall be submitted with qualifications of each, prior to the award of the contract.
- H. The CONTRACTOR shall not replace his superintendent, as identified to the Owner without written approval of the Owner of his Representative, unless terminated for cause.

- I. The CONTRACTOR shall furnish an approved WIREMAN. The wireman shall be skilled in the type of work which he is to perform. The Wireman may not be replaced without approval by the DESIGNER and OWNERS REPRESENTATIVE. The name of a Wireman shall be submitted with qualifications, prior to the award of the contract. The wireman (foreman) and any person engaged in splicing, grounding or any installation procedure must show proof that they have been certified by the Training and Certification program provided by Turf Equipment / Regency Wire or qualified approved equal splicing and grounding trainer.
- J. Any changes, additions, deletions, etc. will not invalidate the original contract and will be mutually agreed upon, as to price change only, between the OWNER and CONTRACTOR prior to the construction or installation of said change.
- K. Throughout the installation phase the CONTRACTOR shall be responsible to coordinate and cooperate with other CONTRACTORS who may be on the site to insure no unnecessary delays or destruction of completed work and proper scheduling for the timely completion of the project. Prior to the start of the installation the CONTRACTOR must submit his intended progress report in writing, as to the procedures from the very beginning of the installation.

## **2.2 TECHNICAL INSTALLATION REQUIREMENTS**

- A. The work covered under this section outlines and defines all specific and required material that will be necessary for the complete installation of the designed and specified underground automatic irrigation system, including pumping station or stations when required.
- B. The water supply shall be taken from the location (Pump Station) as indicated on the Irrigation Routing plan.
- C. The system utilizes a TORO OSMAC Lynx.
- D. The Central Control Computer Antennas and miscellaneous material existing on site are deemed to be in working order and are the responsibility of OWNER.
- E. The CONTRACTOR will personally verify all quantity totals and materials listed and notify the DESIGNER and OWNER of any inconsistencies or changes he feels should be made prior to his execution of this contract.
- F. It is mutually agreed between the OWNER and CONTRACTOR that when the materials arrive on site the CONTRACTOR and Owner inventor and acceptance jointly.

- G. In addition to the actual materials listed, the CONTRACTOR shall be responsible to include and provide any extras necessary for contingencies, due on his part, during the installation phase.

### **2.3 REQUEST FOR APPROVED EQUAL**

- A. Equipment differing from that stated on the specified and approved material list may be proposed by the CONTRACTOR. For consideration of proposed equal equipment, the CONTRACTOR shall submit to the DESIGNER thru the Owner not less than 10 days prior to the bid opening a list of material under consideration.
- B. The CONTRACTOR shall submit (2) copies of a material list, complete with manufacturer's name and product numbers. (2) comparable installations in operation, including customer address and location of installation. Any engineering drawings that would alter the system design of the proposed changes.
- C. Notification of the submitted data for consideration of "as equal" to the equipment specified herein, will be by the DESIGNER by addendum three days prior to the bid opening.

### **2.4 ROUTING – STAKING REQUIREMENTS**

- A. As set forth in the Bid Documents, the CONTRACTOR shall have thoroughly examined and familiarized himself with the site and all conditions pertaining to the implementation of this contract.
- B. It shall be the responsibility of the CONTRACTOR to have BLUE-STAKES to locate and mark any known underground utilities, wiring, structures, property lines and other boundaries prior to any routing and excavation by the CONTRACTOR. Any damage to underground utilities not located by CONTRACTOR shall be the responsibility of the CONTRACTOR.
- C. The routing and staking shall be in general accord with the irrigation routing plan.
- D. Prior to any trenching, construction or installation of the irrigation system components, GPS Golf As-Built will stake out the area to insure the best location of runs of pipe, sprinkler heads, valves, controller slabs, etc. The DESIGNER or his appointed representative shall approve all staking prior to trenching. An As-staked plan shall be provided within 24 hours of the staking process.
- E. Pipe lines around greens are shown diagrammatically on the IRRIGATION PLAN. The CONTRACTOR shall determine on-site the best routing and placement of heads to insure the proper and designed coverage. Pipe lines and heads are to be a minimum of two (2) feet from the putting surface and no line is to run through the bed of any sand trap or under the green's surface.



- F. The CONTRACTOR shall have the right to adjust the routing of the main pipe lines to avoid obstacles. In no case shall any adjustment of this nature invalidate the original contract or affect the price of the contract.
- G. Any adjustments recommended by the CONTRACTOR that necessitates more pipe or material than originally planned shall be approved by the OWNER or DESIGNER, or his representative, prior to the actual installation of the adjusted area.
- H. Any adjustments, changes, additions or deletions that have been approved by the OWNER and that affect the price of the original contract will be governed by the provisions set forth in the Contract Documents.
- I. The CONTRACTOR shall work closely with GPS Golf As-Built and provide labor for staking, flags, nails, whiskers, paint and maintain the staking positions for the duration of the project.
- J. The CONTRACTOR, with approval from the DESIGNER, or his appointed representative, or the OWNER, or the OWNER'S representative, may alter the routing of pipelines to avoid rocks, stumps and other obstacles, provided the rerouting does not alter the quantity of material or the intent of the plans. In the event the CONTRACTOR re-routes the pipeline, all mainline gate valves, shall be installed outside of fairways. Before ditching, CONTRACTOR must have approval of the golf course superintendent and project manager before installation.

## **2.5 DRAWINGS OF RECORD**

- A. From the latest set of plans the CONTRACTOR received (original or as-staked), the CONTRACTOR shall keep a set for marking all changes reflected by the actual installation of equipment, routing of pipes, electrical and communication wiring. This plan shall be kept in good condition and marked clearly with a fine point red pen, including all changes from the latest plans provided to CONTRACTOR. This plan shall be kept up-to-date and the completion of the areas completed shall determine payment to the Contractor. Requests for payment must be accompanied by photocopy of the as laid plan for the areas requesting payment for. Before Final Acceptance, this plan shall be delivered to the DESIGNER for approval.
- B. It is understood and agreed between OWNER, DESIGNER and CONTRACTOR that during the installation process possible changes, modifications, additions or deletions may be required to improve the system. All changes, modifications, etc., must first be approved by the OWNER prior to the actual changes, modifications and/or installation. All changes must be recorded on the plan of record. The plan of record shall be completed by means of GPS survey.
- C. As-built Plan Record Drawings: The DESIGNER will furnish to Owner per the Contractors service of GPS Golf As-Built a G.P.S. surveyed as-built plans at a scale of 1" = 100' on reproducible bond paper of the following:
  - 1. Golf features including, the tee's, greens, bunkers and lakes.

2. Mechanical Plan, showing precise location of heads, valves, electrical splice, air relief valves. GPS shots must be from as-built equipment, not as staked plan.
  3. Electrical Plan, showing the routing of the communication cable, and station numbers. This plan will require accurate field notes to be supplied by the CONTRACTOR.
  4. Control Plan, showing the control number as it relates to the programming of each head. This plan will require accurate field notes to be supplied by the CONTRACTOR.
- D. The GPS provider will be responsible for collecting G.P.S. point data as it relates to the golf features and ABOVE ground irrigation system.

## **2.6 AS-BUILT FIELD DOCUMENTATION**

- A. The CONTRACTOR will be responsible for all field notes, drawings and measurements.
- B. The CONTRACTOR will be responsible for the correction location, size and routing of:
  1. All mainline pipe and lateral piping.
  2. All communication wiring.

## **2.7 PAYMENT**

- A. Weekly inventory along with monthly payment schedule based on City or AIA payment schedule
- B. The contractor will be responsible for submitting with a monthly payment schedule, a clean, clear and legible plan, notes and drawings of the work completed to date. These notes will provide accurate data as it relates to electrical, communication and piping locations.
- C. OWNER and/or DESIGNER will reserve the right to WITHHOLD ENTIRE PAYMENT until an accurate, clean, clear legible field as-built is SUBMITTED AND APPROVED by DESIGNER.

## **2.8 G.P.S. As-Built Plan Documentation:**

- A. The contractor will be responsible for numbering all sprinkler heads as they relate to the station programming, on a mechanical plan provided to him by the DESIGNER upon completion of the irrigation system. In the event field notes, plans, measurements, etc. as deemed incorrect at any time, it will be the responsibility of the contractor to make all corrections on a mechanical plan provided to him by the DESIGNER upon Completion of the irrigation system.

## **2.9 RETENTIONS**

- A. Dollar values WILL BE MAINTAINED BY OWNER until DESIGNER has approved and accepted all field as-built notes, plans and drawings which are submitted by contractor. This includes final walk-thru- punch list of field corrections to be completed by CONTRACTOR.

## **2.10 DELIVERABLES**

- A. GPS Golf As-built Design will provide to the OWNER
  - 1. A square footage of: Tees, Greens, Bunkers, Lakes; for the use of programming, watering and fertilization requirements as it pertains to the daily maintenance of the golf course. This plan will be provided at a scale of 1"=100' and in a spread sheet format.
- B. A reproducible copy of the plan of record must be provided to the OWNER, and programming consultant.

## **2.11 PROGRAMMING**

- A. Programming shall be accomplished from the as built records and information provided by the contractor, See section (2.4.4). When complete the information shall be installed into the central control system. It will be the responsibility of the operator to review and continue to make changes as he deems necessary. The program is intended for the initial operation and entrance of all defining information and the most efficient operation at the time of the initial start-up.

## **2.12 MAPPING**

- A. The finished As-Staked plan shall be certified and prepared for loading into the central control system as defined by the Toro Lynx system. The mapping shall be installed by the DESIGNER after the OWNER, Superintendent, Contractor, and DESIGNER certify that the data is correct.

## **2.13 EXISTING SYSTEM**

- A. During the irrigation season, the existing system must be repaired and in operation by 4:30 pm each night.
- B. The existing system when out of service will be left in place. The removal and relocation of controllers will require the termination of the electrical and communication. Seal the ends as required, place in an access box which will be removed at completion, controllers will be relocated. The electrical and communication will be disconnected at any source at the end of the installation or in the specific areas. Heads and valves will be removed later by the Owner. Unless Owner selects the Add / Alternate from bid to have Contractor remove.

## **2.14 SPRINKLER HEADS / QUICK COUPLERS**

- A. All large golf heads shall be gear driven type. All large golf heads shall be valve-in-head. All components must be top accessible and removable. Manufacturer shall have used the valve-in-head technology and proven successful for a period of no less than 5 years.
- B. The large golf heads shall be connected to the lateral line by installing TORO triple top swing joint on an AQUA FUSE, fusible service saddle.
- C. Spacing for all heads is diagrammatically indicated on plan. Exact location of heads shall be determined on site by DESIGNER or his representative. See Routing & Staking section of these General Specifications.
- D. The CONTRACTOR shall mark all installed sprinkler heads and boxes with “irrigation flags”, whiskers and large nails driven into the ground at the exact location as marked by the staking provider.
- E. The CONTRACTOR shall set all golf heads to grade at installation and be flush (to grade) with the replaced turf after trenching, pulling, and compacting.
- F. All quick couplers valves, as specified on the plan, shall be attached to the irrigation system piping with swing joints at the location and grades as indicated on the plan. These heads shall be set to grade by the CONTRACTOR.

## **2.15 TRENCHING, PIPE PULLING AND BACKFILLING REQUIREMENTS**

- A. All trenching, installation of pipes, valves, sprinkler heads, construction of thrust blocks, etc., will be in accordance with manufacturers recommended installation requirements or where soil conditions dictate otherwise. The CONTRACTOR shall consider all excavation standard or unclassified and will include all material encountered except for material that cannot be excavated by normal chain trenching excavation means or normal backhoe excavation means. Any exceptions will be brought to the attention of the DESIGNER, or his representative, and the OWNER, and a price adjustment shall be agreed upon before excavation of these areas proceeds.
- B. The CONTRACTOR shall be responsible for the disposal of any unsuitable excavated material. All unsuitable excavated material shall be disposed of on-site by CONTRACTOR by burial or spread out. OWNER shall determine location and method of on-site disposal.”
- C. When excavated material is determined by OWNER and DESIGNER to be unsuitable for backfill, it shall be the OWNERS responsibility to obtain and insure the prompt delivery of the

additional backfill material to the site to not delay the trenching and backfilling process. It will be the OWNER'S responsibility to furnish suitable backfill material and delivering to the site.

- D. Mechanical trench diggers shall provide trenches with straight sides and shall be no wider at any point than is necessary to lay and bed the pipe properly.
- E. Trenching that will be required to go through existing roadways, cart paths, sidewalks, etc., will be the CONTRACTOR'S responsibility as well as the replacement and repair of same, including the paving of same. Where a permit is required, it is the responsibility of the contractor.
- F. Excavation and backfill of all trenches, including the equipment and labor necessary for the completion of work, shall be considered as included in the Contract price for installation of the irrigation system. Upon encountering unmovable material, Contractor shall notify the Owner or Owner's representative, and a per foot price for the required excavation shall be determined and agreed upon prior to additional trenching in this area of the project. Failure to notify the Owner or Owner's representative will constitute acceptance by the Contractor of the original price for such work, and no additional payment beyond the Contract will be due from the Owner.
- G. All trenching for main line piping shall be with a wheel or ladder type trencher preferred or the appropriate size rubber track excavator.
- H. Mechanical trench diggers shall provide trenches with straight sides and shall allow for a 4" clearance on each side of pipe.
- I. The finishing layer of backfill on all trench lines shall be slightly crowned above finished fairway grade. The CONTRACTOR shall be responsible to bring back to finished grade any undue settlement in the trench lines, pavement, and sprinkler head etc., for a period of one (1) year at no additional cost to the OWNER. Minor settling after the system has been installed will be the responsibility of the OWNER.
- J. Throughout the installation phase, the CONTRACTOR shall refill any trenches that have settled due to incomplete compaction.
- K. With HDPE pipe system thrust blocks are at the discretion of the contractor.
- L. Backfill of trenches shall be accompanied in no less than three (3) layers of material and compacted by means of a vibrating wheel compactor or equal. Flooding will not be allowed.
- M. Compaction shall provide a minimum of 90% compaction. Each layer shall be compacted prior to the next layer of backfill. Backfill material shall be free of rocks, large clumps of dirt, or abrasive materials.

- N. Should the CONTRACTOR encounter any unsuitable obstacles or material, such as logs, limbs, stump, debris pile, etc. that has been buried by another CONTRACTOR in a prior construction phase, the OWNER and DESIGNER will be immediately notified.
- O. The CONTRACTOR will insure that all installed pipe is backfilled and tamped properly after each working day. No trenches with installed pipe will remain open overnight unless fenced and secured.

## **2.16 SOD REMOVAL AND REPLACEMENT**

- A. This installation requires the removal of sod prior to trenching, head placement and grounding plate locations as well as other installation locations.
- B. Sod must be removed by a sod cutting machine.
- C. All areas requiring re-sod must be replaced within 48 hours after removal. Any loss of sod will be the CONTRACTOR responsibility to locate and replace like sod. CONTRACTOR shall water sod until rooted-in. Any sod replacement shall be the responsibility of the CONTRACTOR.
- D. The existing irrigation system shall remain intact for all unfinished areas and operational by 4:30 pm each day. The superintendent may notify the CONTRACTOR in advance if this requirement may be suspended for certain defined periods.
- E. Sod shall be replaced with a crown. After a rooting period, the crown shall be rolled with a steel drum vibrating roller. Any settling must be repaired. The sod must be flat, and heads leveled with the grade before the completion of this project is certified.
- F. This project may extend into the cold months of the year and could also require spring completion.
- G. Be aware that weather could cause delays and may cause a return in the spring to complete the installation. Sod and re-seeding must be discussed with the owner and the process considered and approved by the contractor and owner.

## **2.17 HDPE PIPING AND INSTALLATION REQUIREMENTS**

- A. All main line pipe shall be HDPE compound 4710. Main line pipe shall be HDPE DR 13.5 (161 PSI rated).

- B. Mainline trench depth shall provide a minimum of 30" cover over 6" thru 10" pipe and 36" plus cover over pipe 12", 14" and 16" pipe.
- C. The trench bottom shall be free of rocks, clods and other sharp objects.
- D. In all conditions the main line pipe depth shall allow for the proper installation of lateral valves leaving 18" cover over the lateral line as well as the proper depth to allow for an access box over all gate valve operating nuts.
- E. All lateral line pipe shall be HDPE compound 4710. Lateral line pipe shall be (2") HDPE-DR-11.0, (202 PSI rated). Rolled only.
- F. All fittings and bends shall be by the socket fusion method. Ends shall be Aqua Fuse AFAEL15-000 End of Line.
- G. Service tee to the lateral pipe shall be with an AQUA FUSE, fusible service saddle connecting to an AQUA FUSE / TORO triple top swing joint assembly.
- H. Outlet from the main line is horizontal.
- I. An AQUA FUSE Acme elbow is required prior to the swing joint installation.
- J. Lateral pipe shall be pulled. The pulling device shall be a minimum of 75 hp. A 'line tamer' and proper trailer must be provided. The pulling blade must have a spreader and a minimum 3.5" bullet. The blade shall have a chute for the laying of the control wire while pulling pipe.
- K. All road crossing pipe shall be DR 13.5 (size as shown on the plan) unless otherwise noted or dictated by local code.
- L. Electrical conduits shall be installed with the main line crossing pipe and have a separation for easy access.
- M. When crossing stream, the bank and integrity of the stream bed must be returned to its original condition.
- N. All Electrical at road crossings shall be in conduit sized to accept. Electrical conduits shall be installed with the main line crossings pipe and have separation for easy access.
- O. The pump station discharge Z pipes shall be furnished by the City and pump station supplier and shall be manufactured with fabricated HDPE, DR 11.0 minimum. The ends shall be flanged.

- P. All HDPE pipe shall be installed in accordance with the manufacturer's installation guide and recommendations.

## **2.18 HDPE FUSION TRAINING**

- A. The Contractor receive training from the pipe supplier and or hire a Certified trainer.
- B. Each person engaged in the fusing of the pipe shall have a certificate of completion that they have completed the training course.
- C. If a pipe supplier has not committed to be available for certification, training and machine rentals they will not be approved as a supplier of the materials.
- D. Training may be on-site or other designated locations as deemed necessary for the proper instruction required.

## **2.19 HDPE FITTINGS**

- A. Fittings, in general, for all installations shall be considered incidental to the contract price and shall be the CONTRACTOR'S responsibility to provide all the required fittings to complete the contract.
- B. All joints, bends and tees size 2" thru 12" shall be molded for butt fusion and rated DR 11.0.
- C. All fittings 14" and larger must be certified / insured / fabricated by a factory mutual FM company.
- D. All fabricated fittings must be manufactured at a Factory Mutual (FM) approved facility that has been inspected and approved by the DESIGNER.
- E. Product must be covered by a products liability insurance policy with an aggregate of \$2,000,000 covering damages arising from product failures caused by manufacturing / design defects.
- F. A certificate of insurance in the name of the golf course must be provided at the end of the project.
- G. All connections to valves or other metallic items shall be with Flanged type fittings.
- H. All lateral line fittings shall be HDPE for socket fusion.



- I. 2" HDPE shall be fabricated from the outlet to a 90-degree socket fusion bend at approximately 18" below grade to accept the HDPE 360 Aqua Fuse valve.
- J. When tapping/hole sawing into HDPE pipe for lateral valves or sprinklers; utilize ONLY a MIYANAGA Poly-Clic Composite Core Bit Hole Saw. (this specialized hole keeps most of the fillings on exterior).
- K. Prior to installing hardware utilize a Shop-Vac electric or 18-Volt battery powered vacuum with a fabricated 1"x1' flex hose on the end of the intake hose and vacuum out any debris that may have fallen into the pipe.
- L. Additional tapping/hole sawing methods and equipment may be requested for approval by the DESIGNER and owner.
- M. All fittings and valves requiring thrust blocks shall be the responsibility of the Contractor.

## **2.20 VALVES**

- A. Lateral Isolation valves shall be installed on the main line to isolate the lateral system from the main line.
- B. Irrigation heads may not be installed on the main line.
- C. The valves shall be Aqua Fuse 360 type for connection to 2" HDPE. These valves are furnished with HDPE stub pieces on the inlet and outlet for butt or socket fusion.
- D. Valves shall be installed in a valve box.
- E. All gate valves shall be ductile iron, AWWA, LEEMCO LMV-XXFF series, flanged with resilient wedge.
- F. All valves shall be fusion bonded epoxy coated. Valves shall have a 2" square operating nut.
- G. Each valve shall be enclosed in a valve box as per detail.
- H. Thrust blocks are not required when the flange / fusion method is used.
- I. Valves must have a minimum 10-year warranty.
- J. All flange bolts shall be grade 8 zinc coated bolts for sizes 10" thru 12" flanges and grade 5 zinc coated bolts for 4" thru 8".

- K. If it becomes necessary to use mechanical or push on type valves with joint restraint, a pipe stiffener must be inserted into the HDPE pipe prior to connection as per the manufacturer's installation manual.
- L. Each valve placed underground shall be placed in a valve box. The box cover shall be marked "WATER". All valve boxes shall be Carson 10" round box #910 with green lid installation over a 6" PVC sleeve.
- M. For the operation of underground valves with 2" nut mounted stems, the CONTRACTOR shall furnish two (2) valve keys for each size of valve nut in the system. The cost of such key shall be merged in the total bid price. Valve wrenches shall be minimum 4' in length and furnished with sockets to fit 2" square nuts. All wrenches shall have tee handles and be constructed of steel pipe with welded connection.
- N. The location and type of all valves are shown on the layout routing plan. The implementation of the plan should be followed as closely as possible. However, the CONTRACTOR, with prior approval from the OWNER, shall make on-site adjustment in routing and location of valves for better implementation of the plan.

## **2.21 FLUSHING**

- A. Sprinklers shall never be installed prior to complete flushing of both lines main and lateral lines, utilizing caps.
- B. Flushing of lateral lines through the base of the sprinkler / removable screen is **not** acceptable as debris becomes trapped in the base of sprinklers not being flushed.
- C. Ideally, initial flushing should occur at a low flow and low pressure, from a high to low elevation/gravity assisted, preventing debris from becoming entrapped or forced in hardware pockets.
- D. If the water source / pump station sits in a low spot, then water truck or alternate source i.e. fire hydrant should be considered.
- E. Zones should be flushed at a minimum 3 times, with brief time in between to let possible trapped debris settle out, then alternate caps removed and repeated until every swing joint has been flushed a minimum of 3 times, with increased volume each time.

## **2.22 PRESSURE TESTING**

- A. The Contractor will be required to provide documentation that they have completed a pressure test on the piping system.
- B. The test must be completed on two (2) different days.
- C. The system shall be brought up to operating pressure and the system isolation valve the closed for a period of 2 hours.
- D. The pressure loss may not exceed 4 PSI.
- E. Acceptance of the system will be approved when these parameters are achieved.
- F. This test is for the main line. All lateral valves should be off for this test. With the lateral valves open, a larger pressure drop will be realized. If the pressure continues to decrease in a rapid fashion, an investigation must be performed to find the cause. The system should hold tight within a few pounds. The operator may approve the test when a comfort level has been achieved by the owner or his representative.

**2.23 ELECTRICAL INSTALLATION**

- A. The contractor shall be responsible for installing the electrical system according to the National and Local Electrical codes. Permits may be required.

**2.24 ELECTRICAL SPLICING TRAINNING / CERTIFICATE**

- 2.25 Each person engaged in the splicing of wire and communication cable must have on his person a certificate of completion of the PAIGE or Equal splicing training program.

- 2.26 Grounding shall be in accordance to the Manufacturers installation guide and using a PAIGE, (2) late/GEM system, an 8' copper clad rod when needed. Grounding will be in ground that will be irrigated weekly.

- 2.27 The OWNER shall furnish the electrical services necessary for supplying required electrical voltage to the pump station. The electrical services to consist of all necessary transmission lines, transformers, poles, main power disconnects and wiring of same. The power requirements to the pump station shall be 3-phase, 460-Volt 60 hertz. When 220-Volt single phase power is to be supplied from the pump station location. The pump station supplier shall provide that service as stated in the Pump Station General Specifications. Any changes in voltage which require additional or different voltage central switches and/or motors will be at the OWNER'S expense.

**2.28 ELECTRICAL WIRE / CABLE**

- A. Tray Cable for Power shall be installed with bedding material when existing soils consist of rock or debris. Bedding material shall be supplied and stored by OWNER.
- B. Signal Wire shall be #14 color Red, Ground or Common shall be #12 White. Each Quick Coupler shall be installed with an Extra #14 color Blue and a Ground or Common shall be #12.

The CONTRACTOR shall install an (2) Extra Wire Color Blue from controller down each end of mainline in opposite direction (2) at the Tee and (2) at the Green complex.

- C. All cable (control lines) shall be assembled, connected and installed in accordance with the Paige connection and grounding devices recommended instructions.
- D. All cable shall be installed in the trench lines and shall not be yanked, stretched or excessively pulled during installation. Wire shall be laid on a firm, even bed which shall support the entire length.
- E. Where a single cable is installed in a trench it should be on the same side of the pipe throughout the system. Where (2) cables are installed they shall be installed on opposite sides of the main line. Separation of the cable is required.
- F. Where road crossings occur, separate conduits shall be required.

## **2.29 SET & ADJUST SYSTEM**

2.30 Upon completion of the installation of the total system, the CONTRACTOR will set and adjust all component parts of the system to ensure that the overall operation of the system in functioning at peak efficiency.

2.31 This includes the programming and adjustments of all, controllers, sprinkler heads, pressure regulators, valves, etc.

2.32 All the above work should be in conjunction with the superintendent of the golf course or his appointed irrigation personnel.

2.33 When all work under this contract has been completed, including adjustments, additions or deletions, the CONTRACTOR will notify the OWNER and for their inspection and approval.

2.34 Final acceptance by the OWNER does not relieve the CONTRACTOR of his responsibility of WARRANTY.

## **2.35 CLEAN UP**

- 2.36 The CONTRACTOR shall be responsible throughout the construction and installation phase to maintain a clean job site.
- 2.37 Waste materials, crates, rubbish, cartons and all trash shall be removed or disposed of in all work areas at the end of each working day.
- 2.38 Materials storage site, fuel tanks or trucks and all construction equipment shall be centralized and in an orderly manner at the end of each working day.
- 2.39 Upon completion and before acceptance of the job by the OWNER, the site shall be cleaned to the satisfaction of the OWNER.

**2.40 INSTALLATION SERVICES**

- A. The staking, programming, mapping, GPS, etc. shall be completed by GPS Golf As-Built Design. It is important to maintain complete continuity in the completion of all required services and the recording as required. The services for GPS Golf Irrigation as specified shall be paid by the Contractor.

**2.41 CERTIFICATION**

- A. The contractor should make every effort to receive training and certification for every person engaged in HDPE fusion and electrical splicing and grounding as early as possible. The requirements are part of the specification section and the symbol identification section of the specification book. Certification proof must be submitted prior to beginning the construction of the irrigation system to the DESIGNER / Owners Representative.

**2.42 MISCELLANEOUS**

- A. The contractor shall be responsible for all cost such as but not limited to: freight, taxes, fees, permits and other charges as may be required to deliver the materials and equipment to the site and any returns which may occur. The contractor shall be responsible for the material list and be responsible for ordering, receiving, storing, securing and insurance for all materials and equipment. Unless the City chooses to provide all material. (TBD)

**2.43 SPECIFIED AND APPROVED MATERIALS**

- A. Irrigation Control System: Exiting Toro Lynx

B.	Controller:	Relocate	Toro Osmac
C.	Irrigation Heads:		Toro Infinity, Top-access
D.	Quick Coupler:		Toro
E.	Section Valve Regulator:		Wilkins NR3XL
F.	Main Line Gate Valves 8" thru 12":		Leemco (All Flanged)
G.	Main Line Drain Valves:		Aqua Fuse, Fusible HDPE 360 Turn
H.	Main Line Fittings 2" thru 12"		HDPE, DR11.0, Molded for Butt Fusion
I.	Main Line Fabricated Fittings 14" +		HDPE FM Approved Facility, Certified & Insured
J.	Main Line Tap for Laterals:		Aqua Fuse Sidewall Fusion
K.	Main Line Pipe:		HDPE DR13.5 for Butt Fusion (Compound 4710)
L.	Lateral Line Pipe:		HDPE DR11.0 Coiled (Compound 4710)
M.	Road Crossing Pipe:		HDPE – Same as Main Line
N.	Lateral Line Service Tee:		Aqua Fuse Fusible HDPE Service Saddle with Acme Elbow
O.	Lateral Line Isolation Valve:		Aqua Fuse Fusible HDPE 360 Turn
P.	Valve Boxes:		Carson Brooks / United States Plastic
Q.	Swing Joints:		Toro: Triple top Acme, for use on HDPE*
R.	Air Relief Valves:		Valmatic
S.	Pump Station:		Watertronics City provide and set
T.	Nutrient Injector:		Watertronics supplied on skid
U.	Communication Cable:		#14 / #12 PE wire
V.	Marking Tags & Pen:		Paige 270WMT / 270WMP
W.	Grounding:		2 Plate Ground Grid, Paige, with GEM Rod

- X. Power Cable: Tray Cable
- Y. Pump Monitor System: Radio Complete Watertronic
- Z. \* Mfg. Warranty note: Manufacturer may offer additional warranties based on the APPROVED products and services accepted for this project. The Irrigation Contractor shall provide the owner with this information prior to the selection (purchase) of the approved products.

**END OF PART 2 -- PRODUCTS**