

**CONTRACT FOR PUBLIC WORKS CONSTRUCTION  
LAKEVIEW GOLF COURSE IRRIGATION & CART PATH IMPROVEMENTS  
PROJECT # 11236.C**

**THIS CONTRACT FOR PUBLIC WORKS CONSTRUCTION** is made this 22<sup>nd</sup> day of March, 2022, and entered into by and between the City of Meridian, a municipal corporation organized under the laws of the State of Idaho, hereinafter referred to as "CITY", 33 East Broadway Avenue, Meridian, Idaho 83642, and Lexicon, Inc. d/b/a Heritage Links, a corporation organized under the laws of the State of Arkansas, hereinafter referred to as "CONTRACTOR", whose business address is 6707 Cypress Creek Parkway, Houston, Texas 77069 and whose Public Works Contractor License # is C-055700.

**INTRODUCTION**

Whereas, the City has a need for services involving Golf Course Construction; and

WHEREAS, the Contractor is specially trained, experienced and competent to perform and has agreed to provide such services;

NOW, THEREFORE, in consideration of the mutual promises, covenants, terms and conditions hereinafter contained, the parties agree as follows:

**TERMS AND CONDITIONS**

**1. Scope of Work:**

1.1 CONTRACTOR shall perform and furnish to the City upon execution of this Contract and receipt of the City's written notice to proceed, all services and work, and comply in all material respects, as specified in the document titled "Scope of Work" acopy of which is attached hereto as Exhibit "A" and incorporated herein by this reference, together with any amendments that may be agreed to in writing by the parties.

1.2 All documents, drawings and written work product prepared or produced by the Contractor under this Agreement, including without limitation electronic data files, are the property of the Contractor; provided, however, the City shall have the right to reproduce, publish and use all such work, or any part thereof, in any manner and for any purposes whatsoever and to authorize others to do so. If any such work is copyrightable, the Contractor may copyright the same, except that, as to any work which is copyrighted by the Contractor, the City reserves a royalty-free, non-exclusive, non-transferable, and irrevocable license to reproduce, publish and use such work, or any part thereof, and to authorize others to do so.

1.3 The Contractor shall provide services and work under this Agreement consistent with the requirements and standards established by applicable federal, state and city laws, ordinances, regulations and resolutions and that are in effect at the time of performance of this Agreement. The Contractor represents and warrants that it will perform its work in accordance with generally accepted industry standards and practices for the profession or professions that are used in performance of this Agreement and that are in effect at the time of performance of this Agreement. Except for that representation and any representations made or contained in any proposal submitted by the Contractor and any reports or opinions prepared or issued as part of the work performed by the Contractor under this Agreement, Contractor makes no other warranties, either express or implied, as part of this Agreement.

1.4 Services and work provided by the Contractor at the City's request under this Agreement will be performed in a timely manner in accordance with a Schedule of Work, which the parties hereto shall agree to. The Schedule of Work may be revised from time to time upon mutual written consent of the parties.

## **2. Consideration**

2.1 The Contractor shall be compensated on a Not-To-Exceed basis (except as provided herein) as provided in Exhibit B "Payment Schedule" attached hereto and by reference made a part hereof for the Not-To-Exceed amount of **\$4,379,150.00**.

2.2 The Contractor shall provide the City with a monthly statement and supporting invoices, as the work warrants, of fees earned and costs incurred for services provided during the billing period, which the City will pay within 30 days of receipt of a correct invoice and approval by the City. The City will not withhold any Federal or State income taxes or Social Security Tax from any payment made by City to Contractor under the terms and conditions of this Agreement. Payment of all taxes and other assessments on such sums is the sole responsibility of Contractor.

2.3 Except as expressly provided in this Agreement, Contractor shall not be entitled to receive from the City any additional consideration, compensation, salary, wages, or other type of remuneration for services rendered under this Agreement including, but not limited to, meals, lodging, transportation, drawings, renderings or mockups. Specifically, Contractor shall not be entitled by virtue of this Agreement to consideration in the form of overtime, health insurance benefits, retirement benefits, paid holidays or other paid leaves of absence of any type or kind whatsoever.

## **3. Term:**

3.1 This agreement shall become effective upon execution by both parties, and shall expire upon (a) completion of the agreed upon work, (b) or unless sooner

terminated as provided in Sections 3.2, 3.3, and Section 4 below or unless some other method or time of termination is listed in Exhibit A.

3.2 Should Contractor default in the performance of this Agreement or materially breach any of its provisions, City, at City's option, may terminate this Agreement by giving written notification to Contractor.

3.3 Should City fail to pay Contractor all or any part of the compensation set forth in Exhibit B of this Agreement on the date due, Contractor, at the Contractor's option, may suspend its performance of the work or terminate this Agreement if the failure is not remedied by the City within ten (10) days from the date payment is due.

#### **4. Termination:**

4.1 If, through any cause not caused by the CITY, CONTRACTOR, its officers, employees, or agents fail to fulfill in a timely and proper manner its obligations under this Agreement, violates any of the covenants, agreements, or stipulations of this Agreement, falsifies any record or document required to be prepared under this agreement, or engages in fraud, dishonesty, or any other act of misconduct in the performance of this contract, or if the City Council determines that termination of this Agreement is in the best interest of CITY, the CITY shall thereupon have the right to terminate this Agreement by giving written notice to CONTRACTOR of such termination and specifying the effective date thereof at least fifteen (15) days before the effective date of such termination, provided that such termination shall not be effective if CONTRACTOR cures the reason therefor within such fifteen (15) day period. CONTRACTOR may terminate this agreement at any time by giving at least sixty (60) days notice to CITY.

In the event of any termination of this Agreement, all finished or unfinished documents, data, and reports prepared by CONTRACTOR under this Agreement shall, at the option of the CITY, become its property, and CONTRACTOR shall be entitled to receive just and equitable compensation for any work satisfactorily complete hereunder plus, in the event of a termination by the CITY for any reason other than an uncured default by CONTRACTOR, the reasonable and actual costs incurred by CONTRACTOR by reason of such termination.

4.2 Notwithstanding the above, neither party shall be relieved of liability for damages sustained by the other party by virtue of any breach of this Agreement by such party. This provision shall survive the termination of this agreement and shall not relieve either party of its liability to the other party for damages.

#### **5. Independent Contractor:**

5.1 In all matters pertaining to this agreement, CONTRACTOR shall be acting as an independent contractor, and neither CONTRACTOR nor any officer, employee or agent of CONTRACTOR will be deemed an employee of CITY. Except as

expressly provided in Exhibit A, Contractor has no authority or responsibility to exercise any rights or power vested in the City and therefore has no authority to bind or incur any obligation on behalf of the City. The selection and designation of the personnel of the CITY in the performance of this agreement shall be made by the CITY.

5.2 Contractor, its agents, officers, and employees are and at all times during the term of this Agreement shall represent and conduct themselves as independent contractors and not as employees of the City.

5.3 Contractor shall determine the method, details and means of performing the work and services to be provided by Contractor under this Agreement. Contractor shall be responsible to City only for the requirements and results specified in this Agreement and, except as expressly provided in this Agreement, shall not be subjected to City's control with respect to the physical action or activities of Contractor in fulfillment of this Agreement. If in the performance of this Agreement any third persons are employed by Contractor, such persons shall be entirely and exclusively under the direction and supervision and control of the Contractor.

## **6. Sub-Contractors:**

Contractor shall require that all of its sub-contractors be licensed per State of Idaho Statute # 54-1901

## **7. Removal of Unsatisfactory Employees:**

The Contractor shall only furnish employees who are competent and skilled for work under this contract. If, in the reasonable opinion of the City, an employee of the Contractor is incompetent or disorderly, refuses to perform in accordance with the terms and conditions of the contract, threatens or uses abusive language while on City property, or is otherwise unsatisfactory, that employee shall be removed from all work under this contract.

## **8. Indemnification and Insurance:**

8.1 CONTRACTOR shall indemnify and save and hold harmless CITY and its elected officials, officers, employees, agents, and volunteers from and for any and all losses, claims, actions, judgments for damages, or injury to persons or property and losses and expenses and other costs including litigation costs and reasonable attorney's fees, to the extent arising out of, resulting from, or in connection with the negligence or willful misconduct, in the performance of this Agreement, by the CONTRACTOR, its servants, agents, officers, employees, guests, and business invitees, except to the extent caused by or arising out of the negligent or tortious conduct of CITY or its employees. CONTRACTOR shall maintain, and specifically agrees that it will maintain, throughout the term of this Agreement, liability insurance, in which the CITY shall be named an additional insured, with respect to the liabilities assumed by CONTRACTOR hereunder, in the minimum amounts as

follow: General Liability One Million Dollars (\$1,000,000) per incident or occurrence, Automobile Liability Insurance One Million Dollars (\$1,000,000) per incident or occurrence and Workers' Compensation Insurance, in the statutory limits as required by law.. The limits of insurance shall not be deemed a limitation of the covenants to indemnify and save and hold harmless CITY; and if CITY becomes liable for an amount in excess of the insurance limits herein provided with respect to a claim for which the CITY is entitled to indemnity hereunder, CONTRACTOR covenants and agrees to indemnify and save and hold harmless CITY from and for all such losses, claims, actions, or judgments for damages or injury to persons or property and other costs, including litigation costs and reasonable attorneys' fees, to the extent arising out of, resulting from , or in connection with the performance of this Agreement by the Contractor or Contractor's officers, employs, agents, representatives or subcontractors and resulting in or attributable to personal injury, death, or damage or destruction to tangible or intangible property. CONTRACTOR shall provide CITY with a Certificate of Insurance, or other proof of insurance evidencing CONTRACTOR'S compliance with the requirements of this paragraph and file such proof of insurance with the CITY at least ten (10) days prior to the date Contractor begins performance of it's obligations under this Agreement. In the event the insurance minimums are changed, CONTRACTOR shall promptly submit proof of compliance with the changed limits. Evidence of all insurance shall be submitted to the City Purchasing Agent with a copy to Meridian City Accounting, 33 East Broadway Avenue, Meridian, Idaho 83642.

8.2 Insurance is to be placed with an Idaho admitted insurer with a Best's rating of no less than A-.

8.3 Any deductibles, self-insured retention, or named insureds must be declared in writing and approved by the City. At the option of the City, either: the insurer shall reduce or eliminate such deductibles, self-insured retentions or named insureds; or the Contractor shall provide a bond, cash or letter of credit guaranteeing payment of losses and related investigations, claim administration and defense expenses.

8.4 To the extent of the indemnity in this contract, Contractor's Insurance coverage shall be primary insurance regarding the City's elected officers, officials, employees and volunteers. Any insurance or self-insurance maintained by the City or the City's elected officers, officials, employees and volunteers shall be excess of the Contractor's insurance and shall not contribute with Contractor's insurance except as to the extent of City's negligence.

8.5 The Contractor's insurance shall apply separately to each insured against whom claim is made or suit is brought, except with respect to the limits of the insurer's liability.

8.6 All insurance coverages for subcontractors shall be subject to all of the insurance and indemnity requirements stated herein.

8.7 The limits of insurance described herein shall not limit the liability of the Contractor and Contractor's agents, representatives, employees or subcontractors.

8.8 Notwithstanding any other provisions to the contrary in this Agreement, neither the City nor Contractor shall be liable under any cause of action related to the subject matter thereof, whether in agreement, warranty, tort (including negligence), strict liability, products liability, professional liability, indemnity, contribution, or any other cause of action for special, indirect, incidental, or consequential losses or damages, including loss of profits, use, opportunity, revenues, financing, bonding capacity, or business interruptions, or damages or losses for principal office expenses.

**9. Time is of the Essence:**

The parties hereto acknowledge and agree that time is of the essence with respect to each and every term, condition and provision hereof, and that the failure to timely perform any of the obligations hereunder shall constitute a breach of, and a default under, this Agreement by the party so failing to perform, subject to applicable notice and cure periods set forth herein.

**10. Bonds:**

Payment and Performance Bonds are required on all Public Works Improvement Projects per the ISPWC and the City of Meridian Supplemental Specifications & Drawings to the ISPWC, which by this reference are made a part hereof. Contractor is required to furnish faithful performance and payment bonds in the amount of 100% of the contract price issued by surety licensed to do business in the State of Idaho with a Best's rating of no less than A-. In the event that the contract is subsequently terminated for failure to perform, the contractor and/or surety will be liable and assessed for any and all costs for the re-procurement of the contract services.

**11. Warranty:**

All construction and equipment provided under this agreement shall be warranted for 2 years from the date of the City of Meridian acceptance per the ISPWC and the Meridian Supplemental Specifications & Drawings to the ISPWC and any modifications, which by this reference are made a part hereof.

All items and work found to be defective during a warranty inspection and subsequently corrected will require an additional two (2) year warranty from the date of City's acceptance of the corrected work.

THE WARRANTIES SET FORTH IN THIS SECTION 10 ARE SOLE AND EXCLUSIVE, AND IN LIEU OF ANY AND ALL OTHER WARRANTIES RELATING TO THE WORK, WHETHER STATUTORY, EXPRESS OR IMPLIED, AND

CONTRACTOR DISCLAIMS ANY SUCH OTHER WARRANTIES, INCLUDING BUT NOT LIMITED TO ANY AND ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND WARRANTIES ARISING FROM COURSE OF DEALING AND/OR USAGE OF TRADE.

During the warranty period, the City shall (i) establish and conduct a reasonable maintenance and repair program in and around the property; (ii) comply in all respects with the requirements set forth in the manufacturers' warranties on all equipment, fixtures and systems; and (iii) grant to Contractor such reasonable easements and rights of access necessary to inspect the work during the warranty period and correct or replace any defect covered by Contractor's warranty.

**12. Changes and Delays:**

The CITY may, from time to time, request changes in the Scope of Work to be performed hereunder. Such changes, including any increase or decrease in the amount of CONTRACTOR'S compensation or time for performance, which are mutually agreed upon by and between the CITY and CONTRACTOR, shall be incorporated in written amendments which shall be executed with the same formalities as this Agreement.

If the Contractor is delayed at any time in the commencement or progress of the work by, (1) a delay in or failure of the City, its other contractors or the Architect to perform their respective obligations, (2) changes in the sequencing of the work ordered by the City, or arising from decisions of the City or the acts or omissions of its other contractors that impact the time of performance of the work; (3) a suspension by the City; and (4) by labor disputes, fire, unusual delay in deliveries, pandemics, abnormal adverse weather conditions not reasonably anticipatable, unavoidable casualties, or any causes beyond the Contractor's control then the Contractor's compensation (solely with respect to items (1), (2) and (3) above) and/or time for performance shall be adjusted by Change Order by written agreement of City and Contractor . Contractor shall be entitled to receive any verifiable third-party costs associated with any increased costs (such as increased equipment rental expense) plus, with respect to items (1), (2) and (3) above, out-of-pocket costs associated with demobilization and remobilization.

**13. Taxes:**

The City of Meridian is exempt from Federal and State taxes and will execute the required exemption certificates for items purchased and used by the City. Items purchased by the City and used by a contractor are subject to Use Tax. All other taxes are the responsibility of the Contractor and are to be included in the Contractor's Bid pricing.

**14. Meridian Stormwater Specifications:**

All construction projects require either a Storm Water Pollution Prevention Plan

(SWPPP) or an erosion sediment control plan (ESCP) as specified in the City of Meridian Construction Stormwater Management Program (CSWMP) manual. The CSWMP manual containing the procedures and guidelines can be found at this address: <http://www.meridiancity.org/environmental.aspx?id=13618>.

Contractor shall retain all stormwater and erosion control documentation generated on site during construction including the SWPPP manual, field inspections and amendments. Prior to final acceptance of the job by the City the contractor shall return the field SWPPP manual and field inspection documents to the City for review. A completed Contractor Request to File Project N.O.T. with the EPA form shall be provided to the City with the documents. These documents shall be retained, reviewed and approved by the City prior to final acceptance of the project. Notwithstanding anything herein to the contrary, the City shall pay for all permits, fees, and inspections, including fees associated with the SWPPP and ESCP.

**15. ACHD:**

Contractor shall be responsible for coordinating with the City to obtain appropriate ACHD permit(s) and will reimburse the City for fees, fines, or penalties City incurs due to Contractor's violation of any ACHD policy. City shall certify to ACHD that Contractor is authorized to obtain a Temporary Highway and Right-of-Way Use Permit from ACHD on City's behalf. The parties acknowledge and agree that the scope of the agency granted by such certification is limited to, and conterminous with, the term and scope of this Agreement.

**16. Reports and Information:**

16.1 At such times and in such forms as the CITY may require, there shall be furnished to the CITY such statements, records, reports, data and information as the CITY may request pertaining to matters covered by this Agreement.

16.2 Contractor shall maintain all writings, documents and records prepared or compiled in connection with the performance of this Agreement for a minimum of four (4) years from the termination or completion of this or Agreement. This includes any handwriting, typewriting, printing, photo static, photographic and every other means of recording upon any tangible thing, any form of communication or representation including letters, words, pictures, sounds or symbols or any combination thereof.

**17. Audits and Inspections:**

At any time during normal business hours and as often as the CITY may deem reasonably necessary, with reasonable prior written notice to CONTRACTOR, there shall be made available to the CITY for examination all of CONTRACTOR'S records with respect to all matters covered by this Agreement. CONTRACTOR shall permit the CITY to audit, examine, and make excerpts or transcripts from such records, and to make audits of all contracts, invoices, materials, payrolls,



records of personnel, conditions of employment and other data relating to all matters covered by this Agreement.

**18. Publication, Reproduction and Use of Material:**

Except as provided herein, (a) no material produced in whole or in part under this Agreement shall be subject to copyright in the United States or in any other country, And (b) the CITY shall have unrestricted authority to publish, disclose and otherwise use, in whole or in part, any reports, data or other materials prepared under this Agreement.

**19. Equal Employment Opportunity:**

In performing the work herein, Contractor agrees to comply with the provisions of Title VI and VII of the Civil Rights Act, Revenue Sharing Act Title 31, U.S. Code Section 2176. Specifically, the Contractor agrees not to discriminate against any employee or applicant for employment because of race, color, religion, sex, national origin, age, political affiliation, marital status, or handicap. Contractor will take affirmative action during employment or training to ensure that employees are treated without regard to race, color, religion, sex, national origin, age, political affiliation, marital status, or handicap. In performing the Work required herein, CONTRACTOR shall not unlawfully discriminate in violation of any federal, state or local law, rule or regulation against any person on the basis of race, color, religion, sex, national origin or ancestry, age or disability.

**20. Advice of Attorney:**

Each party warrants and represents that in executing this Agreement. It has received independent legal advice from its attorney's or the opportunity to seek such advice.

**21. Attorney Fees:**

Should any litigation be commenced between the parties hereto concerning this Agreement, the prevailing party shall be entitled, in addition to any other relief as may be granted, to court costs and reasonable attorneys' fees as determined by a Court of competent jurisdiction. This provision shall be deemed to be a separate contract between the parties and shall survive any default, termination or forfeiture of this Agreement.

**22. Construction and Severability:**

If any part of this Agreement is held to be invalid or unenforceable, such holding will not affect the validity or enforceability of any other part of this Agreement so long as the remainder of the Agreement is reasonably capable of completion.

**23. Waiver of Default:**

Waiver of default by either party to this Agreement shall not be deemed to be waiver of any subsequent default. Waiver or breach of any provision of this Agreement shall not be deemed to be a waiver of any other or subsequent breach, and shall not be construed to be a modification of the terms of this Agreement unless this Agreement is modified as provided above.

**24. Entire Agreement:**

This Agreement contains the entire agreement of the parties and supersedes any and all other agreements or understandings, oral or written, whether previous to the execution hereof or contemporaneous herewith.

**25. Assignment:**

It is expressly agreed and understood by the parties hereto, that neither party shall have the right to assign, transfer, hypothecate or sell any of its rights under this Agreement except upon the prior express written consent of the other party.

**26. Payment Request:**

Payment requests shall be submitted to City of Meridian through the City's project management software. The Project Manager will compare the invoice against the Payment Schedule in the Agreement for compliance. Upon approval that the work has been done and is in compliance with the Agreement, the Project Manager will approve the pay request for processing. City of Meridian payment terms are Net 30 from the date City receives a correct invoice. Final payment will not be released until the City has received a tax release from the Tax Commission. Retainage of five percent (5%) of the current contract value will be withheld from the final pay application(s) until final completion has been met and releases from both the Idaho Tax Commission and Surety have been received by the City.

**27. Cleanup:**

Contractor shall keep the worksite clean and free from debris. At completion of work and prior to requesting final inspection, the Contractor shall remove all traces of waste materials and debris resulting from the work. Final payment will not be made if cleanup has not been performed.

**28. Order of Precedence:**

The order or precedence shall be the contract agreement, the Invitation for Bid document, then the winning bidders submitted bid document.

**29. Compliance with Laws:**

In performing the scope of work required hereunder, CONTRACTOR shall comply with all applicable laws, ordinances, and codes of Federal, State, and local governments.

**30. Applicable Law:**

This Agreement shall be governed by and construed and enforced in accordance with the laws of the State of Idaho, and the ordinances of the City of Meridian.

**31. Notices:**

Any and all notices required to be given by either of the parties hereto, unless otherwise stated in this agreement, shall be in writing and be deemed communicated when mailed in the United States mail, certified, return receipt requested, addressed as follows:

**CITY**

City of Meridian  
Procurement Manager  
33 E Broadway Ave  
Meridian, ID 83642  
208-489-0417

**CONTRACTOR**

Lexicon, Inc. d/b/a Heritage Links  
Attn: Jon O'Donnell  
6707 Cypress Creek Parkway  
Houston, Texas 77069  
Phone: 281-866-0909  
Email: jono@heritage-links.com  
Idaho Public Works License #

Either party may change their address for the purpose of this paragraph by giving written notice of such change to the other in the manner herein provided.

**32. Approval Required:**

This Agreement shall not become effective or binding until approved by the City of Meridian.

**33. Remedies**

The remedies provided for in this Agreement are the sole and exclusive remedies of the parties and are exclusive of all other remedies available at law or in equity.

**CITY OF MERIDIAN**

**LEXICON, INC. d/b/a HERITAGE LINKS**

BY: \_\_\_\_\_  
KEITH WATTS, Procurement Manager

BY: \_\_\_\_\_  
Jon O'Donnell

Dated: \_\_\_\_\_

Dated: \_\_\_\_\_

Approved by Council: \_\_\_\_\_

**Project Manager**  
Mike Barton

# EXHIBIT A

## SCOPE OF WORK

**REFER TO INVITATION TO BID PKS-2216-11236.C**

**ALL ADDENDUMS, ATTACHMENTS, AND EXHIBITS included in the Invitation to Bid Package # PKS-2216-11236.C are by this reference made a part hereof.**

### **SPECIFICATIONS / SCOPE OF WORK**

*All construction work shall be done in accordance with the current version of the Idaho Standards for Public Works Construction (ISPWC), the 2013 City of Meridian Supplemental Specifications to the ISPWC (and any Addendums).*

**See separate attached documents:**

- SPECIFICATIONS Section 02811 (25 pages) Revised & attached below:
- PLANS by Bear Design Group, LLC dated January 2022 (19 pages)

Exhibit B

**MILESTONE / PAYMENT SCHEDULE**

A. Total and complete compensation for this Agreement shall not exceed \$4,379,150.00.

<b>MILESTONE DATES/SCHEDULE</b>				
Milestone 1	Substantial Completion	270 Days from Notice to Proceed		
Milestone 2	Final Completion	300 Days from Notice to Proceed		
<b>PRICING SCHEDULE</b>				
Contract includes furnishing all labor, materials, equipment, and incidentals as required for the per IFB PKS-2216-11236.C				
<b>NOT TO EXCEED CONTRACT TOTAL    <u>\$4,379,150.00</u></b>				
<b>This is a fixed price contract with a not to exceed amount, except as provided in the Agreement. No price adjustments will be allowed for material escalation. Line item pricing below will be used for invoice verification and any additional increases or decreases in work requested by city.</b>				
<b>Contract Pricing Schedule</b>				
<b>Item No.</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Unit Price</b>
1	Mobilization	1	LS	\$125,000
2	Base Bid (Back 9 Irrigation System, Pump Station, Central Control System, Weather Station)	1	LS	\$1,960,732
3	Front 9 Irrigation System	1	LS	\$1,611,318
4	Pump Station Filters	1	LS	\$56,250
5	Gravity Irrigation Improvements	1	LS	\$23,850
6	Concrete Cart Paths	1	LS	\$602,000

**Lakeview Golf Course**  
**Irrigation Renovation Project**  
 March 10, 2022  
**Schedule of Values**

<u>Description</u>	<u>Unit Measure</u>	<u>Unit Cost</u>	
<b>Overhead Costs</b>			
Mobilization	LS	\$125,000.00	
<b>Gravity Irrigation</b>			
Gravity Irrigation Improvements	LS	\$23,850.00	
<b>Road Crossings</b>			
Bore	EA	\$75,000.00	
Cut & Patch	LF	\$75,000.00	
<b>Irrigation Pump Station</b>			
Prefabricated Pump Station	EA	\$225,000.00	
Wet Well and Pump Pad	EA	\$35,000.00	
30" HDPE DR17 Intake	LF	\$20,000.00	
Intake Screen	EA	\$4,000.00	
Power	EA	\$10,000.00	
<b>Central Control System</b>			
Rain Bird Cirrus, ICI-3000	EA	\$47,500.00	
iPad, Otterbox	EA	\$1,500.00	
Weather Station	EA	\$17,250.00	
<b>Sprinkler Assemblies</b>			
65' Full Circle VIH Rotor (Detail 7 & 8/IR300)	EA	\$635.00	
65' Part Circle VIH Rotor (Detail 7 & 8/IR300)	EA	\$650.00	
65' Part Circle VIH Rotor w/tail (Detail 7 & 8/IR300)	EA	\$650.00	
50' Part Circle VIH Rotor (Detail 7 & 8/IR300)	EA	\$650.00	
Landscape Rotor (Detail 9/IR300)	EA	\$185.00	
<b>Remote Control Valve Assembly</b>			
2" Elec. Control Valve (Detail 17/IR301)	EA	\$1,250.00	
<b>Quick Couple Valve Assembly</b>			
Quick Coupler Valve (Detail 5/IR300)	EA	\$250.00	
<b>Air Release Valve Assembly</b>			
Quick Coupler Valve (Detail 4/IR300)	EA	\$900.00	
<b>Lateral Isolation Valve Assembly</b>			
16"x2" Lateral Valve Assembly (Detail 3/IR300)	EA	\$550.00	

<u>Description</u>	<u>Unit Measure</u>	<u>Unit Cost</u>	
12"x2" Lateral Valve Assembly (Detail 3/IR300)	EA	\$525.00	
10"x2" Lateral Valve Assembly (Detail 3/IR300)	EA	\$525.00	
8"x2" Lateral Valve Assembly (Detail 3/IR300)	EA	\$500.00	
6"x2" Lateral Valve Assembly (Detail 3/IR300)	EA	\$500.00	
<b>Mainline Isolation Valve</b>			
16" Mainline Valve Assembly (Detail 2/IR300)	EA	\$10,000.00	
12" Mainline Valve Assembly (Detail 1/IR300)	EA	\$4,500.00	
10" Mainline Valve Assembly (Detail 1/IR300)	EA	\$3,250.00	
8" Mainline Valve Assembly (Detail 1/IR300)	EA	\$2,250.00	
6" Mainline Valve Assembly (Detail 1/IR300)	EA	\$1,500.00	
<b>Pipe</b>			
16" HDPE 4710 DR13.5	LF	\$80.00	
12" HDPE 4710 DR13.5	LF	\$48.00	
10" HDPE 4710 DR13.5	LF	\$36.00	
8" HDPE 4710 DR13.5	LF	\$24.00	
6" HDPE 4710 DR13.5	LF	\$16.00	
2" HDPE 4710 DR11	LF	\$4.00	
<b>Fittings</b>			
16" HDPE TEE	EA	\$565.00	
16" HDPE 90 EL	EA	\$550.00	
16" HDPE 45 EL	EA	\$550.00	
16"x12" REDUCER	EA	\$535.00	
16"x8" REDUCER	EA	\$535.00	
12" HDPE TEE	EA	\$552.50	
12" HDPE 90 EL	EA	\$515.00	
12" HDPE 45 EL	EA	\$515.00	
12"x10" REDUCER	EA	\$130.00	
12"x8" REDUCER	EA	\$112.50	
12"x6" REDUCER	EA	\$112.50	
10" HDPE TEE	EA	\$390.00	
10" HDPE 90 EL	EA	\$400.00	
10" HDPE 45 EL	EA	\$420.00	
10"x8" REDUCER	EA	\$85.00	
10"x6" REDUCER	EA	\$85.00	
8" HDPE TEE	EA	\$167.50	
8" HDPE 90 EL	EA	\$115.00	
8" HDPE 45 EL	EA	\$115.00	
8"x6" REDUCER	EA	\$55.00	
6" HDPE TEE	EA	\$50.00	
6" HDPE 90 EL	EA	\$45.00	
6" HDPE 45 EL	EA	\$45.00	
2" HDPE	LS	\$5,000.00	
<b>Electrical</b>			
12-2 Communication Wire	LF	\$0.61	
14-2 Communication Wire	LF	\$0.48	
Grounding & Arrestor Assembly	EA	\$250.00	



<u>Description</u>	<u>Unit Measure</u>	<u>Unit Cost</u>	
<b>Incidentals</b>			
Incidentals	LS	\$5,000.00	
<b>Demo</b>			
Removal of Existing Irrigation	LS	\$7,500.00	

## SECTION 02811

### GOLF COURSE IRRIGATION

#### PART I -GENERAL

##### 1.1 SUMMARY

- A. Section Includes
  - 1. Pipe and fittings, valves, sprinkler heads, accessories, and connections to water source.
  - 2. Control system.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 2 Section 02110 "Site Clearing" for site preparation.
  - 2. Division 2 Section 02211 "Rough Grading" for course improvements.

##### 1.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. Location of Sprinklers and Devices: Design location is intended for maximum irrigation efficiency. All Sprinklers will be located by Irrigation Consultant
- B. Minimum Water Coverage:
  - 1. Not less than:Turf Areas: 100 percent.
- C. All flow velocities, within the entire irrigation system, shall not exceed 5 feet per second.

##### 1.3 SUBMITTALS

- A. Product data including pressure rating, rated capacity, settings, and electrical data of selected models for the following:
  - 1. Valves, including general-duty, underground, automatic control, and quick-coupler types, isolation and valve boxes.
  - 2. Sprinklers.
  - 3. Wiring and Splice Kits.
  - 4. Irrigation system record drawings.
  - 5. Control system.
  - 6. IC Modules.
- B. Wiring diagrams for electrical controllers, valves, and devices.
- C. Maintenance data for inclusion in "Operating and Maintenance Manual" specified in Division 1 Section "Contract Closeout" for the following:
  - 1. Seasonal activities of start-up, shut-down and winterization, including blow-out operation of sprinkler system with compressed air.
  - 2. Automatic control valves.
  - 3. Sprinklers.
  - 4. Controllers.
  - 5. Irrigation system record drawings.
  - 6. Central control system.
  - 7. Remote Control.
- D. HDPE pipe, valves and fittings:
  - 1. The following information shall be submitted by pipe and fitting suppliers:
    - a. Name of the pipe manufacturer and a list of the piping and quantities to be provided by manufacturer. A Certificate of Origin is required for all pipe not manufactured in the United States.
    - b. Name(s) of fitting manufacturer(s) and lists of fittings and quantities to be provided by manufacturer. A Certificate of Origin is required for all fittings not manufactured in the United States.

- c. Pipe and fitting product data indicating conformance with this specification, applicable standards, and warranty provisions, including written documentation regarding any intended variance from this specification and applicable standards.
  - d. At the time of shipment, the supplier shall provide certified documentation of pipe and fitting conformance with this specification and applicable pipe and fitting standards specified herein.
- 2. The following information shall be submitted by Fusion Providers.
    - a. Documentation that each Fusion Technician has met requirements for joining proficiency for each type of fusion joint performed by the Fusion Technician under this specification.
    - b. Documentation of conformance with this specification and applicable standards, including written documentation regarding any intended variance from this specification and applicable standards. This will include fusion joint warranty information and recommended project specific fusion parameters.
    - c. The following MANUAL AS-RECORDED DATA is required from the Contractor and/or Fusion Provider:
  - 3. Manual Datalogging for each fusion joint performed on the project, including joints that were rejected. Submittals of the Fusion Technician's joint reports are required as requested by the Owner or Engineer. Specific requirements of the Fusion Technician's joint manual datalogging shall include:
    - a. Fusion technician's name or initials
    - b. Date and exact time at completion of fusion process
    - c. Once the technician has completed this process, they are confirming that they followed all safety and fusion procedures for the fusion machine used.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced company, foreman, superintendent and laborers with a minimum of five years experience and who have successfully installed irrigation systems similar in material, design, and extent to that indicated for Project that have resulted in construction with a record of successful in-service performance.
- B. Listing/Approval Stamp, Label, or Other Marking: On equipment, specialties, and accessories made to specified standards.
- C. Listing and Labeling: Equipment, specialties, and accessories that are listed and labeled.
  - 1. The Terms "Listed" and "Labeled": As defined in "National Electrical Code," Article 100.
  - 2. Listing and Labeling Agency Qualifications: A "Nationally Recognized Testing Laboratory" (NRTL) as defined in OSHA Regulation 1910.7.
- D. HDPE pipe, valves and fittings:
  - 1. REFERENCES:
    - a. This section contains references to the following documents. They are a part of this section to the extent referenced in this specification. Where a referenced document contains references to other standards, those documents are included as references under this section as if referenced directly. In the event of a conflict between the requirements of this section and those of the referenced documents, the requirements of this specification shall prevail.
    - b. Unless otherwise specified, references to documents shall mean the latest published edition of the referenced document in effect at the time of construction.

Reference	Title
AWWAC651	Standard for Disinfecting Water Mains
ANSI/AWWA C901	Polyethylene (PE) Pressure Pipe and Tubing, ½ In. (13 mm) Through 3 In. (76 mm) for Water Service
ANSI/AWWA C906	Polyethylene (PE) Pressure Pipe and Fittings, 4 In. (100 mm) Through 63 In. (1,600 mm), for Water Distribution and Transmission
ASTMC923	Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
AWWAM55	Manual of Water Supply Practices, PE Pipe-Design and Installation
ASTMD1603	Standard Test Method for Carbon Black in Olefin Plastics
ASTM D2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTMD2774	Standard Practice for Underground Installation of Thermoplastic Pressure Piping
ASTMD3035	Standard Specification for Polyethylene (PE) Plastic Pipe ( <b>DR-PR</b> ) Based on Controlled Outside Diameter
ASTMD3261	Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing
ASTMD3350	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
ASTMD4218	Standard Test method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
ASTMF585	Standard Practice for Insertion of Flexible Polyethylene Pipe Into Existing Sewers
ASTM F714	Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter
ASTMF1055	Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing
ASTMF1290	Standard Practice for Electrofusion Joining Polyolefin Pipe and Fittings
ASTMF1417	Standard Test Method for Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air
ASTMF1962	Standard Guide for Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings
ASTMF2164	Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure
ASTMF2206	Standard Specification for Fabricated Fittings of Butt-Fused Polyethylene (PE) Plastic Pipe, Fittings, Sheet Stock, Plate Stock, or Block Stock
ASTMF2620	Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings
ASTMF2786	<u>Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Gaseous Media Under Pressure (Pneumatic Leak Testing)</u>
NSF/ANSI 61	Drinking Water System Components-Health Effects
PPI TR-4	PPI Listing of Hydrostatic Design Basis (HDB), Strength Design Basis (SDB), Pressure Design Basis (PDB) and Minimum Required Strength Ratings for Thermoplastic Piping Materials for Pipe
PPI TR-46	<u>Guidelines for Use of Mini-Horizontal Directional Drilling for Placement of High-Density Polyethylene Pipe</u>

- E. Product Options: Irrigation system piping, specialties, and accessories are based on specific types, manufacturers, and models indicated. Components with equal performance characteristics produced by other manufacturers may be considered, provided deviations in dimensions, operation, and other characteristics do not change design concept or intended performance as judged by the Irrigation Consultant. The burden of proof of product equality is on the Contractor. Any substitutions must be approved by the Irrigation Consultant in writing prior to installation.

#### 1.4 HOPE MANUFACTURER REQUIREMENTS

- A. High density polyethylene (HDPE) pipe and fittings shall be manufactured in accordance with the following standards
1. ASTM D3035 - ½ in through 24-in pipe
  2. ASTM F714- 3-in through 54-in pipe

3. AWWA C901- 1/2 In. (13mm) through 3 In. (76 mm) pipe and tubing
4. AWWA C906 - 4 In. (100 mm) through 63 In (1,600 mm) pipe and fabricated fittings
5. ASTM D3261 - butt fusion fittings, saddles and flange adapters
6. ASTM F1055 - electrofusion couplings and saddles.
7. ASTM F2206 - fabricated fittings

#### 1.5 HDPE FUSION TECHNICIAN REQUIREMENTS

- A. Each Fusion Technician shall be separately qualified to make each type of fusion joint. Fusion joint types are butt fusion, saddle fusion, electrofusion, and socket fusion. Only AquaFUSION® qualified technicians shall make fuses during initial construction and during the contractor warranty period. Qualification to make one type of fusion joint shall not qualify a Fusion Technician to make a different type of fusion joint.
- B. Each Fusion Technician making butt fusion joints shall be qualified to make butt fusion joints in accordance with ASTM F2620. Qualification shall have occurred not more than 12 months before performing fusion joining on site in accordance with this specification. Qualification shall be a documented demonstration of proficiency by making joints in accordance with ASTM F2620 that are proved to be satisfactory by destructive testing (bend-back test) in accordance with ASTM F2620. Prior to any fused HDPE pipe being installed in the trench, the contractor shall perform a bend back test (in accordance with ASTM F 2620). These tests shall be random. The fusion technician will not know in advance which of his/her fusions will be tested. The completed test specimen shall be manually data logged (each will be marked clearly with name of technician, date, passed or failed written with a silver, metallic Sharpie marker). These completed test specimens will remain onsite for inspection of the irrigation consultant till the project is completed. Tests will be performed as follows, one test per diameter, per week, per technician.
- C. Each Fusion Technician making saddle fusion joints shall be qualified to make saddle fusion joints in accordance with ASTM F2620. Qualification shall have occurred not more than 12 months before performing on-site fusion joining in accordance with this specification. Qualification shall be a documented demonstration of proficiency by making joints in accordance with ASTM F2620 that are proved to be satisfactory by destructive testing in accordance with ASTM F2620.
- D. Each Fusion Technician making electrofusion fitting joints shall be qualified to make electrofusion fitting joints in accordance with ASTM F1290 and the electrofusion fitting manufacturer's recommended procedure. Qualification shall have occurred not more than 12 months before performing on-site fusion joining in accordance with this specification. Qualification shall be a documented demonstration of proficiency by making joints in accordance with ASTM F1290 and the electrofusion fitting manufacturer's recommended procedure that are proved to be satisfactory by destructive testing in accordance with ASTM F1290 and the electrofusion fitting manufacturer's recommended procedure.
- E. Each Fusion Technician making socket fusion joints shall be qualified to make socket fusion joints in accordance with ASTM F2620. Qualification shall have occurred not more than 12 months before performing on-site fusion joining in accordance with this specification. Qualification shall be a documented demonstration of proficiency by making joints in accordance with ASTM F2620 that are proved to be satisfactory by destructive testing in accordance with ASTM F2620.

#### 1.6 APPROVED HDPE SUPPLIERS

- A. Pipe and fitting suppliers shall be approved by the Project Consultant.
- B. The following pipe manufacturers are approved:
  - a. AquaFuse®
  - b. ISCO
- C. The following fitting manufacturers are approved:
  - a. AquaFuse®

- b. ISCO
- D. The following on-site qualification training are approved:
  - a. AquaFuse®
- E. The following mainline and isolation valves are approved:
  - a. ControlFlo™
  - b. AquaFuse®
  - c. Leemco

#### 1.7 PROJECT CONDITIONS

- A. Perform site survey, research public utility records, and call Digline verify existing utility locations.

#### 1.8 SEQUENCING AND SCHEDULING

- A. Maintain uninterrupted water service to all facilities during normal working hours. Arrange for temporary water shutoff with Owner.
- B. Maintain Uninterrupted existing irrigation system during construction. Arrange for temporary water shutoff with Owner. Provide alternate water source for irrigation if water is to be shut off for more than (2) days.
- C. Provide proposed construction schedule to Ownership prior to construction. Coordinate hole closure with Course staff minimum one week in advance. Maximum number of holes closed simultaneously shall be limited to two holes unless approved by Ownership in advance.

#### 1.9 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below. Package them with protective covering for storage and label clearly describing contents.
  1. Quick Coupler Valves, Hose Swivels and Operating Keys: Furnish (3) extra parts.
  2. VIH Rotors: Furnish (6) extra full heads and (6) extra part circle heads, each model.
  3. Remote Control Valves: Furnish (2) extra valve assemblies, for each assembly type. To exclude lateral isolation valve.
  4. Landscape Sprinklers: Furnish (2) extra full circle rotors and (2) extra adjustable heads, each model.
  5. Landscape Spray/Rotary Sprinklers: Furnish (6) extra each model spray body and nozzle.
  6. Lateral Isolation Valves: Furnish (2) extra each model lateral isolation valve.

#### 1.10 SUBSTITUTIONS

- A. Substitutions to the specified equipment will be permitted with the express written approval of the Irrigation Consultant. Substitutions will be approved only when the substituted item is equivalent or better in quality and performance than the item originally specified. The final determination for "equivalents" rests with the Irrigation Consultant. Their decision shall be final and binding.

#### 1.11 INSTALLATION WARRANTY

- A. See Agreement.

- B. As part of the warranty, the Contractor shall be responsible for deactivating and winterizing the system prior to the onset of the freezing season and for reactivating the system at the onset of the spring growing season; each event must be accomplished once during the warranty period. In the event the system is completed in a season when it will not be in use, the Contractor shall winterize the system upon completion of testing (and approval by the Irrigation Consultant) and reactivate the system in the spring. The Contractor shall submit a letter to the Irrigation Consultant certifying that the system was winterized and drained and indicate the date such action was accomplished. The Contractor shall be responsible for any damage resulting from failure to comply. Contractor shall instruct and demonstrate winterization and startup techniques for Owner.

**1.12 RAIN BIRD BRANDED WARRANTY**

- A. All Valve-In-Head rotors and swing joint shall carry a 5-year parts replacement warranty.
- B. All other Rain Bird branded components shall carry a minimum I-year parts replacement warranty.

**1.13 HDPE PIPE, FITTINGS AND VALVES**

- A. Pipe and fitting suppliers shall provide a twenty five-year HDPE system warranty covering defects in product material and workmanship. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the supplier of warranty responsibility for the full warranty term.
- B. Fusion providers shall provide a one-year warranty from the date of installation acceptance covering defects in fusion joining workmanship that shall provide for remaking defective butt fusion, saddle fusion, electrofusion, or socket fusion joints. A successful pressure test or pressure leak test prior to the expiration of the warranty period shall not relieve the installer of warranty responsibility for the full warranty term.

**1.14 ALLIED MATERIAL WARRANTY**

- A. All components not covered under the Rain Bird or HDPE pipe, fitting and valve warranty shall carry a minimum I-year parts replacement warranty.

**PART 2 MATERIALS**

**2.1 SWING JOINTS:**

- 1. Swing Joints shall have AquaFuse® thread inlet and modified stub ACME threads with elastomeric O-ring seals at each rotating joint and meets ASTM Standard F2768 (Standard Specification for Modified Stub ACME Thread Joint with Elastomeric Seal in plastic piping components). Each rotating joint shall be sealed with an elastomeric O-ring, installed pre-compressed in a sealing groove free of parting lines to prevent leakage as produced by CMF Global.
- B. Rain Bird Swing Joints:
  - 1. Rain Bird 702-IC/752-IC Series Rotors: Rain Bird SJ-12-125-43
  - 2. Landscape Rotors: Rain Bird SJ-18-100-41
  - 3. Quick Couple Valve: Rain Bird SJ-18-100-41
- C. Or approved Equal

**2.2 VIH ROTORS:**

- A. Full-circle sprinklers shall be Rain Bird A-702-IC-70-32.
- B. Part-circle sprinklers shall be Rain Bird A-752-IC-70-36, A752-IC-70-26.

2.3 LANDSCAPE ROTORS:

- A. Rain Bird 8005-SS Series, nozzle per plan.

2.4 ROTARYSPRAYHEADS:N/A

2.5 2" REMOTE CONTROL VALVES:

- A. Rain Bird 200-PESB-PRS-ICM with ICM adapter.

2.6 2" REMOTE CONTROL VALVE & FILTER:

- B. Rain Bird 200-PESB-PRS-ICM with ICM adapter.
- C. Netafim LVCZ150HP-NV filter kit.

2.7 CENTRAL CONTROL SYSTEM:

- A. The computerized central control system shall be the Rain Bird Cirrus as hereinafter specified. It shall be capable of controlling three (3) independent, 18-hole golf courses, plus one "other" area, each consisting of greens, tees, fairways, approaches, perimeters, roughs and miscellaneous areas. The central shall include the Rain Bird Cirrus Computer Assembly, a field hardware (Integrated Control) interface, an uninterruptible power supply rated at 980 Watts or higher, a power circuit surge arrester and a grounding network grid with surge arrestors, all as hereinafter specified.
- B. All Cirrus central control systems shall be "Hybrid" compatible. Cirrus Hybrid computer systems shall have the flexibility to control up to three (3) field interfaces in any combination of interface type. Each of the interfaces will require a separate serial port for each device. To enable the functionality of these items, a Cirrus system Hybrid software module and additional interfaces (MIM, MIM-LINK or MIM-LINK900, ICI or LDI as needed) shall be supplied as specified on the drawings.
- C. Cirrus software shall include the following modules; Automatic Weather™, Smart Weather™, Rain Bird Messenger™, Hybrid Software, Smart Sensors™, The Freedom System™, Map Utilities, Map Layers and Multiple Weather Stations. An additional module purchase is required for Smart Pump™.
- D. The Cirrus system shall provide for the selection of three (3) different flow measurement units - U.S. gallons per minute (GPM), cubic meters per hour (M3/H) or liters per second (LIS). It shall also provide for the selection of any one of 22 different languages for display.
- E. **Cirrus Software Capacity** -The Cirrus software shall operate in the Microsoft® Windows® 10 32 or 64-bit environment and shall be capable of controlling any one (1) or up to eight (8) of the four (4) types of Rain Bird field control systems: hard-wired satellite controllers; LINK or LINK900 radio-operated satellite controllers, decoder field devices, or IC System.
- F. The Cirrus software, when used with an IC System, shall have the capacity to control a maximum of 24,000 single ICMs and activate up to 24,000 rotors or valves using eight (8) IC Interfaces and a Hybrid software module.
- G. **Continuous "real-time" communication** - Between the central computer, interfaces and field satellite controllers, decoders or IC modules, the system shall provide continuous operation and response at all times. Continuous field "feedback" status information shall be registered in the computer software and also at the satellite interface when satellite systems are used. Cirrus shall be a program/schedule-based system providing maximum flexibility of programming and giving the operator absolute and full control of the entire system. The Cirrus system shall be capable of unlimited programs residing in the system at one time. Each program shall be further defined by a number of smaller schedules. A maximum of 50 programs and up to 50 schedules per program may be operated simultaneously. All programming shall be maintained in



the computer memory and on the hard drive, from which they shall be executed. Programming shall NOT be "downloaded" to the field satellites. It shall NOT be possible to change or reprogram from the field thus assuring the operator full control at all times.

- H. A "time window" may be defined for each individual program, confining its operation to this specific time period. Individual programs shall be capable of being designated for up to six (6) start times. Individual schedules shall be capable of being designated for up to 12 start times within the specified time window for their program. It shall be possible to designate the sequence of operation of areas and the sequence of operation of stations in these areas, within a given schedule.
- I. **Dynamic Flo-Manager®** feature shall be included with the software and automatically distribute and limit flow within the system, to eliminate hydraulic "overload" while maintaining maximum system operating efficiency, without the requirement of entering flow zone or branch piping data. The system shall also be capable of entering complete flow management database information for up to six (6) independent pump stations; up to 250 piping network branches and up to 999 flow zones for each pump station. This shall result in the highest efficiency of pump station operation, shortest watering cycle time and conservation of energy. During operation, individual flow graphs shall be automatically generated for each of the three (3) courses, with individual station activity information being presented in colorful charts. Flow graphs shall be automatically stored in the software for future access and reference.
- J. **The Cirrus Smart Weather™** optional software module, when specified, shall monitor and respond to climatic conditions as they occur by tracking evapotranspiration (ET) rates and other sensory inputs from up to five (5) on-site weather stations. Smart Weather shall also log weather conditions for future reference. Smart Weather shall provide automatic response from user- defined thresholds on up to five (5) WS-PRO2 Weather Stations. The Smart Weather responses shall be provided to the computer for programmed response and shall be capable of sending an email or text message to the user for alarm conditions with the optional Rain Bird Messenger™ module.
- K. **Pump Profiling™** - Cirrus shall provide user-definable limits for irrigation system capacity to manage system flow and decrease power consumption during peak electrical periods. If so desired, the user shall define irrigation system capacity for each hour of the day to optimize system efficiency according to electrical demand. The Cirrus software shall automatically increase or decrease system capacity according to these user-defined limits.
- L. **Programming Flexibility** - The Cirrus system shall also provide for programs to be set to adhere to manual water budgeting; at the system level, at the individual program level and/or at the individual schedule level. A watersaver feature shall provide water budgeting capabilities from zero (0) to 300% in one (1) % increments. Automatic rain shutdown shall be possible with the integration of a rain sensor.
- M. An innovative, guided initialization and "start-up" programming method in Cirrus shall result in a customized QuickStart™ program that gets the system "up" and "operating" in the shortest possible time. Built-in rotor database tables shall provide for easy specification of station sprinklers for custom irrigation scheduling. Precipitation rates for each station shall be automatically calculated with the selection of sprinkler model, pattern and spacing.
- N. A unique QuickIRR™ method of programming shall provide for a quick and easy method to automatically build programs to meet all irrigation challenges and allow programming by specific areas and designating sequence of operation of these areas. This feature is enhanced in Cirrus by providing the ability to program multiple courses. Select the course, hole, area, sequence and run time and Cirrus will calculate the most efficient irrigation sequencing.
- O. A "Dry Run" feature shall provide for simulation of a program prior to operation, enabling the user to make the necessary adjustments before actually operating it in the field. A printout of the "dry run" results shall be possible, as well as being displayed on the monitor.
- P. The Cirrus Cycle+ Soak™ feature works with Flo-Manager to achieve maximum efficiency and conservation. It helps control water application on slopes and in areas with poor drainage. Cycle + Soak shall maintain pump station demand while preventing over application in challenging areas of the course.

The Cycle + Soak feature will ensure the maximum cycle time defined by the user is never exceeded and will not change with changes in station runtime.

- Q. Graphical display of the golf course can be achieved using GPS, CAD, aerial photograph or the Scorecard function. Each hole can be defined to indicate the areas to be irrigated such as greens, tees, fairways, approaches, perimeters, roughs and miscellaneous areas. The system shall provide for multi-station programming and operation of individual stations. A station data table shall give complete database information for each individual station.
- R. **The FREEDOM System™** - The Cirrus system shall be capable of direct manual access of any station at any time. Full system remote control via handheld radio or remote telephone commands shall be possible with the integration of The FREEDOM System™ and handheld software module.
- S. **Logs and Troubleshooting** - The Cirrus system shall provide for an individual course, daily and seasonal logs for record keeping and easy compliance with regulatory requirements regarding water usage. A unique "Cost Estimator" feature shall provide projections of water and power costs for specific irrigation cycles, which can be used in establishing budget requirements.
- T. When used with an Integrated Control System, the Cirrus software shall contain detailed diagnostics software that measures a series of parameters related to system operation. These parameters shall include ICI and ICM operation. The software diagnostics shall be capable of polling individual station ICM's on each wire path and display the number of passed and failed ICMs on each wire path. The diagnostics shall also be capable of measuring the total mA draw on each wire path. Individual ICM's can be interrogated to confirm communication with the central control software as well as measure the voltage at each ICM for troubleshooting purposes. The diagnostics shall be capable of communicating with each ICM by "fast connect" or through the "long address" setting based on the diagnostic function.
- U. **Hardware---Computer** - Furnish and install at the central location a Rain Bird Cirrus computer assembly consisting of the following minimum specifications:
1. DELUM Optiplex<sup>1</sup>M 7040 Mini Tower
  2. Intel® Core™ i5-6500 Processor
  3. 8GB, DDR4 RAM
  4. 1TB Solid State Drive
  5. US English (QWERY) Wireless Keyboard and Mouse
  6. 8X DVD+/-RW Optical Disk Drive
  7. Intel® Integrated Graphics
  8. 24" Widescreen HD LED-Lit Flat-Panel Monitor
  9. 16 GB USB Flash Drive
  10. 6 Serial (RS232/COM) Ports
  11. 1 Parallel Port
  12. 10 External USB 2.0 Ports (6 USB 3.0, 4 USB 2.0)
- V. Preinstalled software shall consist of:
1. Rain Bird Cirrus software program
  2. Microsoft Windows® 10 Professional 64-bit
- W. **Voltage Stabilizer (120VAC)-At** the central location, furnish and install a combination voltage stabilizer and uninterruptible power source. Unit shall have a minimum rated output of 1440VA and 980 Watts. It shall be suitable for 50/60 Hz operation with input power of 120VAC. The unit shall operate in the AC mode from 82VAC input up to 144VAC input, regulating the output voltage within proper limits. Transfer to battery mode shall occur at any input voltage less than 75VAC or greater than 154VAC. In battery mode, output shall be a pure Sine wave form. Stepped or approximated Sine wave forms shall not be acceptable. Output voltage regulation shall be less than 5% at full load. Frequency regulation shall be +/- 3 Hz on battery. Surge energy rating shall be a minimum of 459 Joules. Battery back-up shall have a minimum time of approximately 14 minutes minimum at half-load capacity. The unit shall have Quick Status Indicators and an LCD menu-driven display screen showing power status, control settings, configuration, test and diagnostics, and logs. USB and Smart-Slot computer interface ports shall enable communication with the central control computer. The tower housing shall have a minimum of eight (8) "battery and surge" NEMA 5-15R electrical outlets. The voltage stabilizer shall be the APC Smart-UPS 1500 or higher.

## 2.8 ISOLATION VALVES:

- A. Ductile Iron Mainline Valves: Ductile Iron Resilient Seated Gate Valves 250 PSI Polyethylene Pipe End Sizes 4" - 12":
1. Valves shall conform to the latest revision of AWWA Standard C509/C515 covering resilient wedge (RS) gate valves for water supply service.
  2. AWWA C509/C515 valves shall have an iron body, bonnet, and O-ring plate. The wedge shall be fully encapsulated with rubber.
  3. The sealing rubber shall be permanently bonded to the wedge casting per ASTM D429.
  4. Valves shall be supplied with O-ring seals at all pressure retaining joints. No flat gaskets shall be allowed.
  5. The valve shall be non-rising stem (NRS), opened by turning left or right, and provided with either a 2" square operating nut or a hand wheel. The operating nut and hand wheel shall be marked with the word "Open" and an arrow to indicate the direction to open.
  6. Stems shall be cast copper alloy or stainless steel with an integral collar in full compliance with AWWA. All stems shall operate with copper alloy stem nuts independent of the wedge.
  7. All stems shall have two O-rings located above the thrust collar and one O-ring below. The upper stem O-rings shall be replaceable with valve fully opened and subjected to full pressure. The stems on 2"-12" or 63mm-315mm sizes shall also have a low torque thrust bearing located both above and below the stem collar to reduce friction during operation.
  8. Waterway shall be smooth, unobstructed, and free of all pockets, cavities, and depressions in the seat area.
  9. The body, bonnet, and O-ring plate shall be coated, both on the interior and the exterior, with fusion-bonded epoxy. Epoxy shall be applied in accordance with AWWA C550 and be NSF 61 certified.
  10. Each valve shall have the maker's name, the pressure rating, and the year in which it was manufactured cast into the body. Prior to shipment from the factory, each valve shall be hydrostatically pressure tested to the requirements of AWWA C509/C515.
  11. AquaFuse® ControlFlo™ Valves shall have all component parts cast and assembled in the USA and shall be manufactured by the Clow Valve Company.
- B. Poly Lateral Isolation Valves:
1. AquaFuse ControlFlow 360 Ball Valve AFBV0200Y-MFNO-360.
  2. All valves shall be ball valve type constructed from High Density Polyethylene PE 4710 Full Port and manufactured in accordance with AWWA C901, AWWA C906, ASTM D2513, ASME B16.40, CFR 49 Part 192 and CSA B137.4.
  3. Manufacturing facility must be ISO 9001 certified.
  4. All valves must be serialized for complete material and process traceability.
  5. Valve should maintain a bubble tight seal throughout the entire pressure and temperature range and provide blow-out proof stem and Seal design.
  6. All valves must be PE4710 material both body and ends.
  7. Operation must be 360 degree open to close.
  8. Valves shall be temperature rated -20°F - 140°F Valve body must provide resistance to mechanical and thermal loads as supplied by AquaFuse® ControlFlo™.

## 2.9 VALVE OPERATING KEYS:

- A. Rain Bird 55-K-1.
- B. The contractor shall provide three keys of each type required to operate all types of manual gate valves used.

## 2.10 VALVEBOXES:

- a. Automatic Electric Valves:
1. Rain Bird VB-JMB-H. Extensions as required.

2. Carson 1324 Spec Grade Valve Box with Green "T" Lid and Bolt. Extensions as required.
3. Or approved Equal.

B. Lateral Isolation Valves:

1. Rain Bird VB-10RND-L. Extensions as required.
2. Carson 910 Spec Grade Valve Box with Green "T" Lid. Extensions as required.
3. Or approved Equal.

C. Mainline Isolation Valves:

1. Rain Bird VB-10RND-L. Extensions as required.
2. Carson 910 Spec Grade Valve Box with Tan "T" Lid. Extensions as required.
3. Or Approved Equal.

D. Air Relief Valve:

1. Christy B24 Concrete Valve Box with B24D Lid and B24x12 extensions as required.
2. Or approved Equal.

E. Splices:

1. Rain Bird VB-10RND-BLK. 10" CL 200 PVC Riser
2. Carson 910 Spec Grade Valve Box with Black "T" Lid. 10" CL 200 PVC Riser.
3. Or approved Equal.

2.11 FLUSH VALVE AND AIR-RELIEF VALVE:

- A. Crispin ICIOA AirNac Combo Valve assembly as detailed.

2.12 WIRE CONNECTORS:

- a. All high voltage splice kits shall be Direct Bury Multi-Mold Resin 85 Series as manufactured by 3-M.
- b. Wire 24-volt splice kits shall be Direct Bury Splice Kits (DBY) as manufactured by 3-M.
- c. All 24 volt and 120-volt wire splices are to be placed in Carson 910 valve boxes with black lid.

2.13 WIRING:

- A. 120 and 220 volt and wiring shall be type UF, direct burial copper wire sized as shown on the irrigation plan. 120 and 220 volt wiring shall be three conductor Tray cable and shall consist of one black power wire, one white common wire, and one green ground wire which is to be one wire size smaller than the power wire which the ground is servicing. Grounding shall be provided per manufacturer's recommendation.
- B. 24V Power wire shall be red 14-2 PE UF/UL direct bury as manufactured by Regency or approved equal.

2.14 WEATHER STATION:

- d. Rain Bird WS-PRO2-WLS as manufactured by Campbell Scientific with solar/battery power and radio communication. Weather station shall be equipped with Solar Radiation Sensor, Air Temperature and Relative Humidity Probe Tipping Bucket Rain Gage, and either the Wind Set or Sonic Wind Sensor.

3.1 PIPE AND FITTINGS

- F. PE4710 100% Fused System:

1. PE4710 100% Fused System Component material (compound) for all fittings (general and service), valves (mainline and lateral), and pipe shall be high density bimodal High-Performance polyethylene copolymer designed for extrusion of potable water, reclaimed water, industrial, and mining pipe."PE4710 Fused System Component material (compound) shall have a PENT value at 2.4 MPa and 80 °C of >10,000 hours per ASTM F 1473 and It is listed by the Plastics Pipe Institute (PPI TR-4, as both PE 4710 and PE 100) and is certified to ANSVNSF Standard 14, ANSI/NSF Standard 61, CSA B137.1 and CSA B137.4 and have Oxidative Resistance Classification of CC3".
  2. All Fused PE4710 material (compound) shall conform to material requirements specified in pipe standard: ASTM D3035 or ASTM F714 or AWWA C901 or AWWA C906, fitting standard: AWWA C906 or ASTM D3261 or ASTM F2206 or ASTM F1055 as applicable for the pipe or fitting. PE4710 material (compound) shall meet the requirements of ASTM D3350 and shall meet or exceed Cell Classification 445574C and 445576C and is Certified NSF Standard 14 and/or Standard 61 for Potable Water Pipe and Fittings and have an Oxidative Resistance Classification of CC3.
  3. PE4710 material (compound) shall have a hydrostatic design basis (HDB) rating at 140°F (60°C) of not less than 1000 psi that shall be listed in PPI TR-4 in the name of the pipe manufacturer.
  4. PE4710 pipe and fitting material (compound) in PE4710 pipe and fittings shall contain color and ultraviolet (UV) stabilizer meeting the requirements of Code C or E per ASTM D3350. Code C material shall contain 2 to 3 percent carbon black to provide indefinite protection against UV degradation when material from the pipe is tested in accordance with ASTM D1603 or ASTM D4218. Code E material used for coextruded OD color stripes or a coextruded ID color layer shall contain sufficient UV stabilizer to protect the pipe against UV degradation for at least 24 months of unprotected outdoor exposure. Coextruded color PE compound material shall be PE4710 pipe material compound, varying only by color and UV stabilizer.
  5. Clean rework materials derived from pipe production by the same manufacturer are acceptable as part of a blend with new material for the production of new pipe provided that the rework material is the same PE4710 material designation as the new material (compound) to which it is added. Finished products containing rework material shall meet the requirements this specification.
- G. PE4710 pipe and butt fusion fittings shall have plain ends for butt fusion.
- H. PE4710 pipe:
1. Nominal straight lengths of 3 inch and larger pipe shall be 40 ft. or 50 ft.
  2. Nominal coil lengths of 4-inch and smaller pipe shall be 500 ft. Longer or shorter coils such as 800 ft for 4-inch pipe, 1000 ft for 3-inch pipe, or 2000 ft for 2 inch or smaller pipe shall be acceptable. Pipe shall be black. Coextruded lavender or purple stripes or a coextruded lavender or purple layer shall be an acceptable option.
  3. Pipe shall be permanently marked using heated indent printing in accordance with ASTM D3035 or ASTM F714 as applicable for the pipe size including:
    - a. Nominal size and sizing system, e.g., IPS or DIOD
    - b. DR or SDR
    - c. Standard Designation, ASTM D3035 or ASTM F714 material designation, and pressure rating or pressure class for water at 73°F.
      - a) Marking the Standard Designation on the pipe shall serve as the manufacturer's certification that the pipe has been manufactured, sampled and tested and has been found to comply with the requirements of the standard.
      - b) The ASTM D3035 or ASTM F714 pipe pressure rating for water at 73°F shall be "PE4710 PRI 61" where 161 = pressure rating in psi
  4. Extrusion production-record code
  5. Manufacturer's Trademark or trade name "AquaFuse".
- I. PE4710 fittings:
1. PE4710 butt fusion, saddle fusion, electrofusion and fabricated fittings shall be manufactured from PE4710 material (compound) in accordance with this specification.

All fittings molded and fabricated shall be manufactured in the U.S.A. and must be NSF-61 Approved and manufactured at a Factory Mutual (FM) approved facility that has been inspected and approved by FMRC, and are audited frequently to ensure compliance and promote continuing improvement.

2. PE4710 fittings shall comply with ASTM D3261 for molded butt fusion and saddle fusion fittings, flange adapters and MJ adapters, or shall comply with ASTM F2206 or AWWA C906 for fabricated butt fusion fittings, or shall comply with ASTM F1055 for electrofusion fittings.
3. PE4710 fittings shall comply with the marking requirements of ASTM D3261 for molded butt and saddle fusion fittings, flange adapters and MJ adapters or shall comply with the marking requirements of ASTM F2206 or AWWA C906 for fabricated butt fusion fittings, or shall comply with the marking requirements of ASTM F1055 for electrofusion fittings.
4. PE4710 fittings shall have pressure class ratings not less than the pressure class rating of the pipe to which they are joined.

### 3.2 FUSION JOINTS

- A. Unless otherwise specified, PE4710 pipe and fittings shall be assembled in the field with butt fusion, saddle fusion or electrofusion joints. **Electrofusion couplings can only be installed if pipe is prepared with a professional rotary scraper.** ASTM F2620 and the pipe manufacturer's recommended procedure shall be observed for butt fusion and saddle fusion joints. ASTM F1290 and the electrofusion fitting manufacturer's recommended joining procedure shall be observed for electrofusion joints.
- B. Field butt fusion, saddle fusion and electrofusion joints shall be made by Fusion Technicians that are qualified in accordance with this specification to make the specific fusion joint type.
- C. Field fusion joints shall be recorded and documented in accordance with this specification.

### 3.3 MECHANICAL CONNECTIONS AND FITTINGS FOR PRESSURE APPLICATIONS

- A. Connections shall be defined in conjunction with the linking of project piping, as well as the tie-ins to other piping systems.

#### B. MECHANICAL AND COMPRESSION FITTINGS

1. Acceptable mechanical and compression fittings for use with PE4710 pipe and fittings shall be mechanical fittings that are qualified by the mechanical fitting manufacturer for use with HDPE pipe and fittings.
2. Mechanical and compression fittings for use with HDPE pipe shall provide restraint against longitudinal separation that is inherent to the design of the joint. Mechanical joints that do not provide restraint against pull-out or push-off are prohibited. An insert stiffener must be used to ensure long term restraint and water tight seal. Compression Fittings are to be used for REPAIRS ONLY.
3. Mechanical connections to non-HDPE devices and appurtenances shall be by bolted flange adapter or MJ adapter. Flange adapter and MJ adapter connections shall be assembled, installed and tightened in accordance with flange adapter or MJ adapter manufacturer's instructions. Flange bolt tightening shall be in accordance with PPI TN-38.

#### B. GASKETED, PUSH-ON FITTINGS

1. Gasket push-on fittings shall be fitted with insert stiffener and an external mechanical restraint that span across the joint and are assembled in accordance with restraint manufacturer's instructions.
  - a. Thrust blocking does not provide acceptable restraint and is prohibited.
  - b. Where plain-end PE4710 pipe is assembled with push-on fittings, the PE4710 pipe end shall be fitted with electrofusion restraints so that external mechanical restraint may be secured to the PE4710 pipe.
2. Where PE4710 pipe is connected to gasket mechanical joint fittings or appurtenances, the connection shall be made by butt fusing a PE4710 MJ Adapter to the PE4710 pipe and connecting the PE4710 MJ Adapter to the mechanical joint fitting or appurtenance.

### C. SLEEVE-TYPE COUPLINGS

1. Sleeve-type mechanical couplings shall be manufactured for use with HDPE pipe, and shall be restrained and shall be fitted with insert stiffener as indicated on the drawings and in these specifications. Unrestrained sleeve-type couplings are prohibited.

### D. EXPANSION AND FLEXIBLE COUPLINGS

1. Expansion-type mechanical couplings are prohibited.

### E. CONNECTION HARDWARE AND COATING

1. Bolts shall be carbon steel grade 5 or 8 with a minimum 105,000 PSI tensile strength conforming to SAE J429. Bolts shall be standard ANSI B1.1, Class 2A coarse threads. Nuts shall conform to ASTM A563 and be standard ANSI B1.1, Class 2A coarse threads. All bolt heads and nuts shall be hexagonal. Identification on the head of the bolt shall be three slash marks.
2. Bolts and nuts shall be finished with the TRIPAC 2000 coating system to significantly reduce the effects of corrosion. A multi-step process shall be utilized to chemically clean, abrasive blast and prime with zinc/nickel phosphate primer prior to application of the Xylan fluoropolymer. Wear resistance (K-Factor) shall be in the range of 6 to 8 (excellent) and minimal effects should be seen after a 2000-hour Salt Spray test conforming to ASTM B-117.

## 4.1 CONSTRUCTION:

### 4.01 DELIVERY AND OFF-LOADING

- A. All piping shall be bundled or packaged for transportation by commercial carrier to the site.
- B. Before off-loading, pipe shall be inspected for damage. Any pipe damaged in shipment shall be assessed and either accepted or rejected as directed by the Owner or Engineer, and the pipe supplier shall be notified of rejected pipe within 7 days of delivery at the site. Rejected pipe shall be quarantined for disposition. Each pipe shipment shall be checked for quantity and proper pipe size, color and type.
- C. Pipe shall be off-loaded and handled in accordance with the pipe manufacturer's instructions and AWWA M55.
- D. The Contractor shall be responsible for correct procedures in loading, unloading, stacking, transporting, and handling all materials to be used in the system. The Contractor shall avoid rough handling which could affect the useful life of equipment. Pipe shall be handled in accordance with the manufacturer's recommendations on loading, unloading, and storage.

### 4.02 HANDLING AND STORAGE

- A. Pipe lengths should be placed and stored on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.
- B. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way. Use of hooks, chains, wire rope or any other handling device which creates the opportunity to damage the surface of the pipe is strictly prohibited.
- C. Covering or shading of PE4710 pipe and fittings against exposure to ultraviolet light from sunlight is not required.
- D. Materials shall be stored to insure the preservation of their quality. Materials can be stored on the site providing the storage area is approved by the Owner, see Site Summary Plan.

Disposal of rubbish and waste material shall be continuous. Upon completion of the system, the contractor shall remove all temporary structures, rubbish, and waste material remaining from the installation.

4.03 EXCAVATION AND BACKFILL:

- A. The Contractor shall do all necessary trenching and backfilling required for the proper installation of the system. Only mainlines will be installed with trenches. All pipe 2-1/2" and smaller shall be installed using the "pulling method".
- B. The Contractor shall use backfilling equipment and techniques that will tamp the backfill in such a manner that no settling will result.
- C. Trench bottoms and backfill material will be free from rock or stones over 1/2 inch in diameter, clodded dirt, or other unsuitable substances to prevent damage to pipe during backfill operation. The trench bottom is to be smooth and where rock or other debris is encountered, over excavation of 6 inches is required and suitable material will be used to form an adequate pipe bed.
- D. Backfilling of trenches containing plastic pipe shall be done when the pipe is cool to avoid excessive contraction in cold weather. All pipe embedment material should be selected and placed carefully, avoiding stones (over 1/2" in size), frozen lumps, and debris. Sharp stones and crushed rock larger than 3/4 inch which could cause significant scratching or abrasion of the pipe, should be excluded from the embedment material.
- E. Contractor shall perform all boring, cutting, removal, and/or repair of pavement, where pipes must be installed across existing roads, paths, walkways or other pavement. Such work shall be coordinated with the owner and/or governmental agencies to minimize time of close for any road, walkway, etc. Where cart path crossings are required, contractor shall cut and remove pavement and provide a temporary gravel repair until Contractor is able to pave prior to finalization of project.
- F. Lateral pipe is to be installed with a vibratory plow, the Contractor should use due care to ensure the pipe is not damaged by scraping or stretching during installation, and a bullet with a diameter at least 1" greater than the pipe being installed shall be used.
- G. Trenches shall be made wide enough to allow a minimum of 6 inches between parallel pipes. Trenches for pipes shall be made of sufficient depths to provide the minimum cover from finished grade as follows:
  - 1. 30" minimum cover over main lines (pipe 3" and larger).
  - 2. 24" minimum cover over lateral lines (pipe 2-1/2" and smaller).
  - 3. 36" minimum cover over 24-volt electric wires.
- H. Where 120-Volt power wire and 24-volt power wire share the same mainline trench, they are to be laid on opposite sides of the mainline and at different elevations allowing for a minimum separation of 18" with the 120-volt power near the bottom of the pipe and the 24-volt control wire near the top of the pipe.
- I. Where the 120-volt power wire is not in the mainline trench, it is to be installed in a trench with a minimum of 36 inches of cover.
- J. Maintain all warning signs, shoring, barricades, flares, and red lanterns as required by any local ordinances.
- K. Backfill shall be placed in layers of twelve inches (12") or less and tamped in place. The contractor shall guarantee that all trenches and other disturbed areas will be free from settling of more than one-half inch (1/2"). Should more settling than this occur, the Contractor shall regrade



and reseed the trench. This no-settlement guarantee shall be in effect for one year following the final acceptance.

- L. If rock is encountered in sufficient amounts that it cannot be removed by trencher or backhoe, the Contractor shall notify the Owner and they shall negotiate the additional cost incurred in the handling of such areas of excavation.
- M. If existing utilities or other components are damaged during construction, they are to be repaired by the contractor at no additional cost to the owner.
- N. All equipment on the golf course shall be equipped with a non-aggressive turf type tread. No tracks allowed.

#### 4.04 MAINLINE INSTALLATION:

- A. Mainline installation is to be in accordance with manufacture's recommendations. Mainline is to be installed in one complete operation with all associated components (fittings, mainline valves, lateral valves, etc.) The mainline is to be tested under normal operating pressure for at least 24 hours prior to making lateral connections. Mainlines are to be flushed and all air removed prior to connecting laterals.
- B. Routing of mainline shall be in accordance with the plans wherever possible. The Contractor may make necessary adjustments to avoid obstacles provided the adjustments do not conflict with the intent of the plans and specifications. All such changes or adjustments are subject to the approval of the Owner.
- C. Joining of O-ring pipe shall be completed with a lubricant approved by the pipe manufacturer. Pipe Manufacturer's recommendations shall be used to join pipe lengths. Gasketed fittings shall be installed by cutting the pipe square, removing burrs and using a rasp or beveling tool to taper the cut ends of pipe. Lubricant shall be also used to install fittings per manufacturer's recommendations.
- D. HDPE pipe shall be fused as per manufactures specifications and per section 4.05.
- D. All mainline trenches are to be closed at the end of each day.
- E. Where mainlines are to cross shallow drainage pipes, irrigation contractor shall adjust mainline depth to route pipe over or under drainage pipe as required.

#### 4.05 FUSION PROCESS

##### A. GENERAL

1. Butt and saddle fusion of PE4710 pipe and fittings shall be in accordance with ASTM F2620 and the manufacturer's recommended joining procedure.
2. Electrofusion of PE4710 pipe and fittings shall be performed in accordance with ASTM F1290 and the electrofusion fitting manufacturer's recommended procedure.
3. PE4710 pipe and fittings shall be fused by qualified fusion technicians, as documented by the fusion provider. Training records for qualified fusion technicians shall be available to Owner or Engineer upon request.
4. As each fusion joint is constructed the contractor is required to perform MANUAL DATALOGGING on all fusions. This is written next to all fusions with a metallic ink marker (such as Sharpie or equivalent) that will include fusion technician's name or initials, date and exact time at completion of fusion process. Once the technician has completed this process, they are confirming that they followed all safety and fusion procedures for the fusion machine used.

5. Butt fusion machines shall incorporate the following properties, including the following elements:
  - a. HEAT PLATE - Heat plates and the non-stick coatings on heating surfaces shall be in good condition without heating surface gouges or scratches. The non-stick coating shall be intact, clean and free of any contamination. Heater controls and temperature indicators shall function properly, and electrical cords and connections shall be in good condition. The heat plate shall maintain a uniform and consistent temperature on all areas of the heating surfaces on both sides of the heat plate.
  - b. CARRIAGE - Carriage shall travel smoothly with no binding at less than 50 psi for hydraulic fusion machines. Clamps shall be in good condition with proper inserts for the pipe size being fused.
  - c. GENERAL MACHINE- Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.
6. Other equipment specifically required for fusion processes shall include the following:
  - a. Pipe rollers shall be used to support pipe to either side of the butt fusion machine and provide for vertical and lateral pipe alignment straight through the butt fusion machine.
  - b. A protective enclosure that provides for full machine motion of the clamps, heat plate, fusion assembly and carriage shall be provided for fusion in inclement and/or windy weather. Pipe ends shall be covered or blocked where open pipe ends could allow prevailing winds to blow through the pipe.
  - c. Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.

#### B. JOINT RECORDING

1. MANUAL DATALOGGING on all fusions. This is written next to all fusions with a metallic ink marker (such as Sharpie or equivalent) that will include fusion technician's name or initials, date and exact time at completion of fusion process. Once the technician has completed this process, they are confirming that they followed all safety and fusion procedures for the fusion machine used.

#### 4.06 INSTALLATION

- A. The PE4710 pipe and fittings shall be installed such that PE4710 pipe curvature is not less than the minimum bending radius recommended by the pipe manufacturer.
- B. Direct burial installation of PE4710 pressure pipe shall be in accordance with ASTM D2774 and the pipe manufacturer's recommendations.
- C. Direct burial installation of PE4710 non-pressure pipe shall be in accordance with ASTM D2321 and the pipe manufacturer's recommendations.
- D. Installation of PE4710 pipe by horizontal directional drilling shall be in accordance with ASTM F1962 or PPI TR-46 and the pipe manufacturer's recommendations.
- E. Installation of PE4710 pipe by slip lining or insertion within a casing or host pipe shall be in accordance with ASTM F585 and the pipe manufacturer's recommendations.
- F. Tracer Wire -All PE4710 piping shall be installed with a continuous, insulated PE, UF, TW, THW, THWN, or HMWPE insulated copper, 10 gauge or thicker wire for pipeline location purposes by means of an electronic line tracer.
  1. The wires shall be installed along the entire length of the pipe.
  2. Sections of wire shall be spliced together using approved splice caps and waterproof seals. Twisting the wires together is not acceptable.

#### 4.07 MAKING CONNECTIONS TO NON-PE4710 PIPING SYSTEMS

- A. Approximate locations for non-PE4710 piping systems are shown on the drawings or detailed in the specifications. Prior to making connections into existing piping systems, the Contractor shall:
  1. Verify the actual field location, size, piping material and service of non-PE4710 piping systems.

2. Obtain all required non-PE4710 piping manufacturer(s) approved fittings (i.e., saddles, sleeve type couplings, flanges, tees, etc., as shown).
  3. Have installed all temporary pumps and/or pipes in accordance with established connection plans.
  4. Have on hand pipe stoppers, blind flanges or other devices to seal a valve or appurtenance that fails to seal properly. When applied to pressure rated valves or appurtenances, all such devices shall be pressure rated equal to or greater than the pressure rating of the valve or appurtenance to which they are attached.
- B. Where PE4710 pipe connects in-line to unrestrained gasket push-on piping, the end of the PE4710 pipe shall be anchored in-line within 10 ft of the connection to restrict longitudinal movement of the PE4710 pipe.
1. The PE4710 pipe shall be fitted with a PE4710 wall anchor or electrofusion flex restraint.
  2. The PE4710 wall anchor or electrofusion flex restraints shall be encased in reinforced concrete that is sufficient to withstand Poisson effect longitudinal loads in accordance with AWWA MS5 In-Line Anchoring.
- C. Unless otherwise approved by the Engineer, new piping systems shall be completely assembled and successfully tested prior to making connections to non-PE4710 piping systems.

#### 4.08 PIPE SYSTEM CONNECTIONS

- A. Pipe connections shall be installed per applicable standards and regulations, as well as per the connection manufacturer's recommendations and as indicated on the drawings. Pipe connections to structures shall be installed per applicable standards and regulations, as well as per the connection manufacturer's recommendations.

#### 4.09 TRACER WIRE TESTING

- A. Upon completion of installation by direct burial, slip lining, directional boring or pipe bursting, the Contractor shall demonstrate that the tracer wire is continuous and unbroken through the entire run of the pipe.
1. Demonstration shall include full signal conductivity (including splices) when energizing for the entire run in the presence of the Owner or Engineer.
  2. If the wire is broken, the Contractor shall repair or replace it. Pipeline installation will not be accepted until the tracer wire passes a continuity test.

#### 4.10 TAPPING FOR POTABLE AND NON-POTABLE WATER APPLICATIONS

- A. Tapping shall be performed using standard saddle fusion fittings, electrofusion saddle fittings, or mechanical tapping saddles or sleeves designed for use on HDPE piping. Tapping by threading directly into the PE4710 pipe wall is prohibited.
- B. Branching connections requiring a larger diameter shall be made with saddle fusion branch saddle fittings or mechanical branch connection fittings as specified and indicated on the drawings.
- C. Equipment used for tapping shall be made specifically for tapping HDPE pipe:
1. Tapping bits shall be carbide tipped and designed for clean burr-free drilling, specifically made for HDPE pipe. 'Hole saws' made for cutting wood, steel, ductile iron, or other materials are strictly prohibited.
  2. Manually operated or power operated drilling machines may be used.
- D. Taps may be performed while the pipeline is filled with water and under pressure ('wet' tap), or when the pipeline is not filled with water and not under pressure ('dry' tap).

#### 4.11 TESTING

- A. Testing shall comply with all local building codes, statutes, standards, local jurisdiction, and laws.
- B. Segments of the pipe may be tested separately in accordance with standard testing procedure, as approved by the Owner and Engineer.
- C. HYDROSTATIC LEAKAGE TESTING FOR PRESSURE PIPING

1. Hydrostatic leakage testing shall comply with ASTM F2164. Joint leakage and any defective materials and/or workmanship shall be repaired or replaced by the Contractor during the warranty period stated in the Agreement at no additional cost to the Owner.
2. Pneumatic (compressed air) leakage testing of PE4710 pressure piping is prohibited.

D. LEAKAGE TESTING FOR NON-PRESSURE PIPING

1. Non-pressure piping such as sewers shall be tested for excessive leakage in accordance with ASTM F1417.
2. Joint leakage and any defective materials and/or workmanship shall be repaired or replaced by the Contractor during the warranty period stated in the Agreement at no additional cost to the Owner.

4.12 CHECK LIST FOR CONTRACTORS

- A. All system components must be 100% fused with a Zero "O" allowable leakage rate for a minimum of 25 years and with a **PENT value at 2.4 MPa and 80 °C of >10,000 hours per ASTM F1473** from the Pump Station connection to the Swing Joint assembly and no other alternatives shall be accepted.

The fused components consist of the following:

1. Fused lateral connection to swing joint- Rated at > 335 PSI Operating Pressure
2. Fused gear operated lateral isolation valves - NSF/ANSI Standard 61 certified.
3. Fused mainline valves - AWWA CS 50 and NSF/ANSI Standard 61 certified.
4. Molded fittings thru 12" - FM Approved, AWWA, NSF/ANSI Standard 61 certified.
5. Fabricated fittings 14" and larger - FM Approved, AWWA, NSF/ANSI Standard 61 certified.
6. Pipe - FM Approved, AWWA, NSF/ANSI Standard 14 and 61 certified.

B. SUBMITTALS

1. The following information shall be submitted by the contractor or system supplier:
  - a. A Certificate of Analysis issued by the manufacturers Quality Assurance that confirms that the products in the "Check List For Contractors" section meets all requirements including a **PENT value at 2.4 MPa and 80 °C of >10,000 hours per ASTM F 1473**.
  - b. A Certificate of Origin is required for all products not manufactured in the United States.

4.13 ELECTRICAL WORK:

- A. The Contractor is responsible for all electrical work pertaining to the irrigation system unless otherwise noted on the plan.
- B. All electrical shall be installed per local and national codes.
- C. All high voltage power shall be installed by a licensed electrician.

4.14 UTILITIES

- A. The Contractor shall be required to locate all utilities within the limits of construction, including private and public utilities prior to construction. Notwithstanding the foregoing, Owner shall provide and pay for construction water, point of connection and all electricity including all connections that are required for the work.
- B. Owner shall be responsible to Digline to verify utility locates and make Contractor aware of other possible utilities not located. Contractor shall not be responsible for any utilities which are not marked or which are improperly marked.
- C. Any and all damage caused by Contractor to located utilities, tile lines, and existing water lines will be repaired by the Contractor at the Contractors expense. Any and all damage to non-located utilities, tile lines, and existing water lines will be repaired by the Contractor and paid for by the

Owner subject to agreement of a negotiated price.

4.15 **QUICK COUPLE VALVES:**

- A. Quick couple valves are to be installed with prefabricated swing joint assemblies as shown in the details. One quick coupler valve shall be provided for each tee complex and one quick coupler valve shall be provided for each green and tee complex and located per plan.

4.16 **LATERAL LINES:**

- A. Pipe and fittings shall be thoroughly cleaned of dirt, dust and moisture immediately before the fusion process.
- B. Lateral pipes and fittings shall be installed in accordance with the manufactures recommendations.
- C. The pulling technique shall be used and a bullet with a diameter 1" greater than the pipe will be required.
- D. All lateral lines shall be flushed thoroughly prior to installing sprinklers and electric valves. Flushing shall be completed by plumbing a minimum five-foot length of 1.25" pipe threaded to the swing joint outlet and directed to discharge water downhill of trench or excavated hole. No water allowed within excavated area prior to plumbing the sprinkler head.

4.17 **SPRINKLERHEADS:**

- A. All sprinkler heads are to be installed on swing joints as shown on the detail sheet.
- B. Sprinklers are to be installed with the top of the sprinkler body at finish grade and level to maintain equal water distribution in 360 degrees rotation.
- C. Sprinklers shall be installed at least 12" away from curbs, sidewalks or buildings. The contractor shall be responsible for damage from landscape maintenance operations to sprinklers which are installed incorrectly.

4.18 **CONTROL EQUIPMENT INSTALLATION**

- A. Installation of all control equipment wired, and radio is to be complete in accordance with manufacturers recommendations. Refer to details and manufacturer installation manuals for detailed installation instructions.
- B. Central controller shall be located at the superintendent's office.
- C. Contractor shall provide Irrigation Consultant with daily records of all decoder addresses on VIH rotors and electric solenoid-controlled valves on the "as-staked" plan provided to Contractor by Irrigation Consultant.
- D. Contractor shall install all radio communication equipment as necessary to provide communication throughout the property.

4.19 **FIELD GROUNDING:**

- A. All central control and field control units shall be ground per manufacturers recommendations. Grounding shall be tested by Contractor to ensure the minimum resistance is achieved at each controller unit. Report detailing resistance test shall be provided to Irrigation Consultant prior to final payment application.

4.20 CLEANING PREMISES:

See Agreement.

4.21 COURSE PLAYABILITY:

- A. The Contractor may coordinate with the Golf Pro and Superintendent to close two golf holes throughout construction.

4.22 CARE OF SOD AND TURF:

- A. For all phases of the installation requiring trenching or excavating, sod shall be cut, removed and replaced alive within all areas of the golf course. Turf elevated due to pulling laterals and 24-volt wiring shall be rolled to establish a level surface after all connections have been completed. All areas disturbed by construction or equipment shall be graded to conform to their specified or original condition and be sodded as approved by the Owner. No more than 1000 feet of trench will be permitted to be unrestored at any one time.
- B. It shall be the Contractors responsibility to care for sod/seed until established. Scheduling of irrigation shall be coordinated with Superintendent.
- C. Any turf loss due to lack of irrigation as a result of not maintaining the existing irrigation system is the responsibility of the contractor. All turflost shall be cut, removed and resod with a sod mix approved by the Superintendent. Turfloss shall be identified by the Golf Course Superintendent.

4.23 VEGETATION:

- A. No trees or shrubs shall be cut, pruned or removed without authorization of the Owner in writing. Any trees removal that is required and approved shall be cut and removed by golf course personnel.

4.24 REMOVAL OF EXISTING IRRIGATION EQUIPMENT:

- A. Existing irrigation equipment shall be removed by Contractor. Contractor shall coordinate construction schedule with golf course superintendent for removal of existing irrigation equipment.
- B. All irrigation valves, rotors and field satellites, valve boxes or other components visible on the surface shall be removed and returned to Owner.
- C. All voids in finish grade from removal of irrigation shall be filled with topsoil from mainline excavation, graded flush with surrounding grade and sodded.

4.25 ADDITIONAL HEADS & DECODERS FOR SHOP INVENTORY:

- A. See Section 1.7.

4.26 EXISTING IRRIGATION SYSTEM:

- A. The existing irrigation system shall be kept fully operational during the construction of the new irrigation system during the irrigation season. If the existing system is damaged by Contractor during the irrigation season, the contractor shall repair the existing system to provide irrigation to the golf course as water is needed to maintain vegetation. If the existing system is damaged by Contractor outside the irrigation season, damaged location shall be adequately marked for possible future repair by the contractor prior to the following irrigation season if required to maintain existing vegetation. Thecontractor shall coordinate construction of the new irrigation system so that the existing system can be removed as the new system is installed.

- B. Work shall proceed from the new pump station and proceed out to the extremities of the property. The existing system is to be kept operational during construction and if required, the new system can be temporarily connected to the existing system to provide irrigation during the construction period.

4.27 ROAD CROSSINGS:

- A. All road crossings shall be bored. No cut and patch shall be allowed.

4.28 CART PATH CROSSING AND REPAIR:

- A. Cart path crossings are to be made by cutting cart path and pulling the pipe under the path with a vibratory plow. Provide a temporary gravel repair which will be suitable for a future pavement base. Contractor will provide all permanent repairs to street and cart path crossings. Repair shall match exiting conditions.
- B. Mainline crossings shall be made by making a 3-foot cut and removing existing pavement. Provide a temporary gravel repair which will be suitable for a future pavement base. Contractor will provide all permanent repairs to cart path and street crossings. Repair shall match exiting conditions.
- C. Where possible, cart path crossings shall be made by boring pipe under the path.

4.29 GPS SURVEYING OF STAKED SPRINKLERS:

- a. Location of all sprinklers will be marked with GPS by Baer Design Group, LLC in upto six site visits. Additional staking requested the Contractor will be at the Contractors expense at a rate of \$140/hr plus all travel expense.
- b. Contractor shall install sprinkler heads within 6 inches of GPS's location. Contractor is responsible to provide offset markers during excavation for head set to ensure rotor is installed in desired location.
- c. The Contractor will provide one person to assist in the head staking and the same person shall be used to stake the entire golf course.
- d. The Contractor is to provide whisksers for marking head locations. Whisker colors shall be pink for full circle sprinkler heads and blue for part circle sprinkler heads. The irrigation consultant is to be notified at least 10 working days prior to each staking phase.
- E. Contractor shall provide Whisksers for staking of sprinklers
  1. Whisksers shall be Stake All Whisksers by Black Burn Marking Flags and Marking Products. <https://blackburnflag.com/markings/stake-whisksers/stake-all-whisksers/>
  2. Full circle rotors shall be marked with blue whisksers.
  3. Pare circle rotors shall be marked with pink whisksers.
- F. The irrigation consultant is to be notified at least 10 working days prior to each staking phase.

4.30 RIPRAP: N/A

4.31 OTHER INSTRUCTIONS:

- A. Manufacturer's recommendations and instructions will be followed on the installation of all equipment constituting the irrigation system.
- B. Valve boxes are to be installed so that the top of the box is in the same plane as the ground surface

directly surrounding the box.

- C. The Contractor shall securely cover all openings into the pipe system at the end of the day.
- D. The Contractor shall conduct their operations in a manner to comply with all provisions of the Soil Erosion and Sedimentation Control Act, as well as preventing the entry of fuels, oils, chemicals, or sewage or other harmful substances into any bodies of water or aquifers.
- E. Any existing equipment removed and not used in the irrigation system shall remain the property of the Owner. Removed equipment shall be cleaned and delivered to the Owner prior to completion of the contract.

5.1 FINALIZATION:

5.2 TESTING:

- A. The Owner's authorized representative shall be responsible for inspection of the Contractor's work while such work is in progress. The Contractor will be notified of any work which does not meet the installation instructions and will be required to correct such work.
- B. Upon completion of construction, the contractor will test the entire system under the normal working conditions. Upon visual inspection of the ground, should any leak be found, it shall be promptly repaired. All components will be checked for proper operation. Any malfunctioning equipment or leak shall be repaired and retested until it is in satisfactory working condition.
- C. Upon completion of construction, the Contractor will test all grounding and provide a written report to the Owner on the installed performance for each wire leg, central control, weather station, pump station and other grounding system.

5.3 ADJUSTING THE SYSTEM:

- A. Upon completion of the system the Contractor shall adjust the sprinkler heads to provide optimum performance, and all controllers, and other equipment will be set so that the overall operation of the system is at its most efficient.
- B. The irrigation consultant will assist the Contractor in programming the central controller.
- C. The Contractor shall flush all lines and evacuate all air from the system.
- D. The Contractor shall adjust the pressure of all heads to provide performance which is specified on the irrigation plan. Minor adjustment during the guarantee period will be made by the Owner.

5.4 NOTIFICATION AND COMPLETION OF REQUIREMENTS:

- A. When the Contractor is satisfied that they have completed the requirements of the contract documents, and has tested the system, the contractor shall submit a written statement which indicates the installation is complete. At a prearranged time, within ten (10) days following receipt of such statement from Contractor, the system will be inspected by the Owner and Irrigation Consultant and any items found which do not constitute completion of the irrigation system will be noted. The Contractor will be notified of corrections in writing. Failure to provide such written notification within such ten (10) day period shall be deemed acceptance of such completed work.

5.5 OWNER'S ACCEPTANCE:

- A. Final acceptance of the work may be obtained from the Owner upon the satisfactory completion of all work. The Owner may accept the system prior to completing corrections deemed necessary



during the final inspection. Any appropriate deductions for such conditions will be made to the final payment.

**5.6 RECORD DRAWINGS:**

- A. The contractor shall furnish the Owner with a reproducible "Record" drawing with each payment request showing all sprinkler heads, valves, station addresses, flush valves, and pipelines to a reasonable scale and provide a minimum of two dimensions taken from fixed, obvious objects to each automatic and manual control valve, and quick coupling valve.
- B. Contractor shall provide Owner with an Operations and Maintenance Manual. Instruction sheets and parts lists covering all operating equipment installed on the project will be bound into a 3-ring binder and furnished to the Owner in two copies.

**5.7 OPERATIONAL INSTRUCTIONS:**

- A. After completion, testing and acceptance of the system the Contractor will instruct the Owner's personnel in the operation and maintenance of the system.

**5.8 WARRANTY: See Agreement.**

**5.9 GUARANTEE: See Agreement.**

- A. . See Agreement.
- B. In the Fall following final acceptance of the installation the Contractor shall "winterize" the system as part of the guarantee.
- C. In the Spring following final acceptance of the installation the Contractor shall turn the system on and make any necessary repairs as part of the guarantee.
- D. Any damage to the equipment not covered by the guarantee will be repaired by the Contractor and charged to the Owner at the Contractor's regular service rates. It will be the responsibility of the Contractor to get the signed work order before making any non-warranty repairs.
- E. Emergency repairs may be made by the Owner without relieving the contractor of his guarantee obligation. Emergency repairs shall only be made by Owner in the event of an emergency threatening life or property and which Contractor is unable to commence within twenty-four (24) hours following written notice from Owner.

**5.10 OWNER'S RESPONSIBILITY DURING CONSTRUCTION:**

- A. Owner shall pay for all permits required on the project.

**5.11 OWNER'S RESPONSIBILITY POST CONSTRUCTION:**

- A. It will be the Owner's responsibility to maintain the system in good working order during the guarantee period, performing necessary minor maintenance, keeping the grass from obstructing the sprinkler heads, and preventing damage during landscape maintenance operations. The foregoing shall be in addition to the Owner's obligations set forth in Section 10 of the Agreement.