Finance
Purchasing Division
929 N Front St., 10th Floor
Post Office Box 1810
Wilmington, NC 28402-1810

910 341-7830
910 341-7842 fax
wilmingtonnc.gov
Dial 711 TTY/Voice

ADDENDUM NUMBER 1

Municipal Golf Course Installation of New Irrigation Project

GC-TPG-0624

May 13, 2024

To all holders of Bid Documents, please be advised to the following:

Item 4 of the Addendum revises the Project Manual issued for bidding, as noted below, and shall become part of the contract documents.

1. The road bisecting the golf course is a City Road and those directional bores must be permitted via the City
2. The existing system must be kept alive until all of the greens irrigation is completed
3. The Contractor is responsible for removing all sprinklers
4. The Project Manual has been revised to include a line item for the Water Cooler Supply and the installation of 18 Stealth Kits for the approach sprinkler at each green
5. All Bids must arrive in paper form and sealed via hand delivery or overnight delivery service by 3 pm June 11, 2024, to:

Daryle L. Parker, CLGPO
Purchasing Manager
City of Wilmington, Purchasing Division
929 N. Front Street 10th Floor/ P.O. Box 1810
Wilmington, NC 28401-1810

Acknowledge receipt of this Addendum in the space provided in the Proposal. Failure to do so may disqualify the Bidder.

All other terms and conditions remain unchanged.

Daryle L. Parker, Purchasing Manager
Purchasing Division
END OF ADDENDUM ONE

PREPARED FOR

WILMINGTON
GOLF COURSE
Wilmington, North Carolina

2024 GOLF COURSE
IRRIGATION SYSTEM PROJECT
(Project Manual No. 240119-PM1-REV1)
(Dwg # WGC-230828-IRR1)

Matthew Smith
Golf Course Supt

PREPARED BY
THE PIGNATO GROUP
GOLF IRRIGATION CONSULTANTS
ASHEVILLE, NORTH CAROLINA
TELEPHONE 561.313.4219

Contents

WILMINGTON GOLF COURSE
Wilmington, North Carolina

GOLF COURSE IRRIGATION CONTRACTOR QUALIFICATIONS

1. The qualified irrigation contractor will have performed and been active in the installation of irrigation systems on Golf Courses for a minimum of 5 years.

2. The qualified contractor will have completed the installation of a minimum of 6 (six) complete Golf Course HDPE Irrigation Systems during the past 5 (five) years. A complete golf course irrigation system is understood to be comprised of a minimum of 500 valve in head sprinklers, 14 golf irrigation field controllers, 50,000 lf of lateral piping, 15,000 lf of mainline piping.

3. Of those installations, 4 (four) must have been a complete Two Wire System installations on golf courses with either the Rain Bird, Toro, or Hunter Golf 2 Wire Valve in Head product.

4. The qualified contractor's appointed Project Superintendent will have completed the installation of a minimum of 3 (three) Golf Course Irrigation Systems as the Lead Superintendent in the last 5 years.

5. The Qualified Contractor shall be able to Staff on a daily basis a minimum of 8 (eight) full time employees exclusive of "day labor". Day Labor is defined as unskilled labor resourced from a labor supply company and also as individuals who are not employees of the qualified contractors company on a permanent basis.

6. The qualified contractor will be able to perform business with all selected vendors on a credit worthy basis if necessary.

7. The qualified contractor will meet all contracting and business licensing requirements as required by the City of Wilmington and the State of North Carolina.

WILMINGTON GOLF COURSE
Wilmington, North Carolina

Scope of Work

1. The Contractor will be responsible for purchasing all required irrigation whole goods and associated devices to include but not be limited to sprinklers, swing joints , electric valves, controlllers, Central and software, and all “allied” material, which is understood to be, but not limited to, pipe, wire, fittings, splice kits, machinery required for installation, concrete, all devices/equipment for connection, welding, fusing, or joining pipe.

2. The Irrigation Contractor shall plan to connect an existing pump station (1500 gpm at 120 psi) at the station isolation valve with an 12” DR 13.5 HDPE Z Pipe to be fabricated by the Irrigation Contractor (see details). Note: An HDPE SPACER will be required at that point of connection to allow for isolation valve closure

3. The Club will be contracting the installation of the irrigation system directly with a Golf Irrigation Contractor who have their own Irrigation Division, or using one of the approved listed Irrigation Subcontractors listed below. Irrigation Division is understood to be individuals who have been a direct employee of the GC, and is not a subcontractor. This person shall have been employed by the GC for the past year and is solely responsible for irrigation system installations only. No other sub contracts for Irrigation will be considered at this time.

4. All required permitting for the installation of the irrigation system is the responsibility of the Irrigation Contractor

5. All mainline pipe shall be open trenched and all lateral pipe shall be installed via a vibratory plow.

6. Where the sod allows (this is where it is removable and re-plantable) all Mainline ditches will have the sod lifted and placed back to the GC Supts satisfaction.

7. All Trunk Supply ditches to the middle of each golf hole will have the sod removed and replaced to the GC Supts satisfaction.

8. The Contractor shall be responsible for the off-site removal of the debris, excess fill, and material scrap.

DIVISION I – THE PIGNATO GROUP GENERAL BID INSTRUCTIONS
INVITATION TO BID

WILMINGTON GOLF COURSE
2024 Golf Course Irrigation Project
Wilmington, North Carolina
Golf Irrigation Contractor

Based on your company's ability to demonstrate that it meets all Contractor Qualifications as set forth herein, and pending review by the Evaluation Committee that said company does in fact meet these standards and qualifications, your company is invited to submit a Bid Proposal on the referenced project and Scope of Work herein enclosed in the Irrigation System Project Manual.

PROJECT DESCRIPTION

Installation of the Irrigation System at **WILMINGTON GOLF COURSE,** Wilmington, North Carolina, as described in Drawing Number WGC-230828-IRR1, pages 1 through 11 and Project Manual Number 240119-PM1**.** All bids must arrive, via email, at the locations listed below on the assigned date and time. All Bid Proposals that are received after the assigned date and time of the Bid Opening will not be accepted. Bid Proposals will only be accepted from those companies on the Invited Bid List. The opening of the Bid Proposals received from the invited list of Bidders shall be done privately. Please submit your Bid Proposal to:

Matthew Smith
Golf Course Supt
Wilmington GC
matthew.smith@
wilmingtonnc.gov

Daryl Parker
Purchasing Director
City of Wilmington
Daryle.Parker@
wilmingtonnc.gov

Mike Pignato
The Pignato Group
mike@
thepignatogroup.com

All bidders are to submit all Proposals on the Bid Forms that are attached. Bid Forms may be duplicated as necessary. The **Owner** reserves the right to select or reject any single or all Bid Proposals. The **Owner** reserves the right to re-advertise the project for bid and to accept the Bid Proposal that is in the best interest of the Project and the **Owner**. The **Owner** reserves the right to waive formalities and/or informalities. The **Owner** reserves the right to negotiate the final price and contract with the **Golf General/Irrigation Contractor** of choice. The **Owner** reserves the right to make additions/deletions to the scope of work or to all materials.

SIGNED _____ DATE _____

WILMINGTON GOLF COURSE THE PIGNATO GROUP

BASE PROPOSAL

Matthew Smith
Golf Course Superintendent
Wilmington Golf Course
Wilmington, North Carolina

Dear Mr. Smith,

I have reviewed and examined the Project Manual, the Irrigation System Design, the Material Specifications, and all Addendums, and fully understand the scope of work, conditions, and requirements for this project. The following Addendums were received, understood and incorporated into the base bid of this proposal.

ADDENDUM NUMBER	ISSUE DATE
_____	_____
_____	_____

It is understood that the conditions and offers set forth in this proposal shall remain in effect for a period of sixty (60) days, and acceptance of this Proposal by the **Owner** binds both parties to its contents during the term that it takes to satisfactorily complete the installation of the irrigation system at **WILMINGTON GOLF COURSE,** Wilmington, North Carolina.

It is understood that the Unit Pricing section of this bid proposal must be completely filled out and accompany the Base Proposal. It is understood that failure to do so, can result in a disqualification of the submitted proposal.

I/ We, representing, or as Agent for _____
Company

_____
Address

_____
City, State, Zip Code

and hereby known as **Golf General/Irrigation Contractor**, agrees to furnish all equipment, labor, and material as stated in the Project Manual, detailed on the Irrigation design, and required in the Project Manual for the installation of the Irrigation System at **WILMINGTON GOLF COURSE,** Wilmington, North Carolina.

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For this required scope of work the Contract Price is:

GOLF COURSE IRRIGATION SYSTEM

IRRIGATION MATERIALS TOTAL	***$ _____***
IRRIGATION LABOR TOTAL	***$ _____***
DIRECTIONAL BORING TOTAL	***$ _____***
WATER COOLER PIPE / POWER INSTALLATION	***$ _____***
PUMP STATION CONNECTION	***$5000.00***
YARDAGE MARKER ALLOWANCE	***$2000.00***

TOTAL IRRIGATION PROJECT ***$ _____***
(Including all permits, taxes, fees)

CONTRACTOR MATERIAL QUANTITY LIST

The following is a Unit Pricing Proposal for the supplying of the materials for the Irrigation System at **WILMINGTON GOLF COURSE,** Wilmington, North Carolina.
It is understood that the number of units quoted include all material and equipment (except where noted). It is understood that all items for which there is no specific breakdown, are to be considered as necessary and integral parts to other items, of which when combined, form a complete and understood component. The following quantities will be used as the quantity guideline for determining the qualification and accuracy of the Base Proposal. **NOTE: These quantities are not to be used as part of your contract with the Club. They are for reference and comparison ONLY. The bidding Contractor(s) should perform their own quantity take-off.**

MATERIAL QUANTITY LIST

SPRINKLERS / VALVES – 2 WIRE SYSTEM

DESCRIPTION	
1 ½" INF Full Circle Sprinkler, 2 Wire, 50 gpm, 80'spacing	337
1 ½" INF Part Circle Sprinkler, 2 Wire, 50 gpm, 80'spacing	454
INF STEALTH ASSEMBLY	18
1" Part Circle Sprinkler, 2 Wire, 37 gpm, 70'spacing	0
1 1/2" Two Wire Actuated Plastic Pressure Reducing Valve	3
¾" Part Circle Rotor, 5 gpm, 35' spacing	17
1" Quick Coupler	21
3/4" Swing Joint	17
1" Swing Joints	21
1 1/2" Swing Joints with Saddle	791
Grounding Assemblies	56

CENTRAL / SOFTWARE

Central to Field Interface via Radio, to Sprinkler via Wire ----IPAD to Central From Field
with all software, premium computer,
radio base station, , Radio Antenna,
site surveys, 5 Year Manufacturer Support Subscription 1

IPAD for remote operation 2

Field Interface Unit 1

Campbell Scientific Weather Station 1
w/ radio modem comm / Solar Power

PIPING

2" CL 200 PVC BOE PIPE	800 lf
3" CL 200 PVC BOE PIPE	100 lf
2" DR 13.5 4710 HDPE Pipe(Water Cooler) BLUE STRIPE	5,000 lf
2" DR 13.5 4710 HDPE Pipe	70,000 lf
3" DR 13.5 4710 HDPE Pipe	4,800 lf
4" DR 13.5 4710 HDPE Pipe	4,000 lf
6" DR 13.5 4710 HDPE Pipe	9,200 lf
8" DR 13.5 4710 HDPE Pipe	4,500 lf
10" DR 13.5 4710 HDPE Pipe	0 lf
12" DR 13.5 4710 HDPE Pipe	200 lf
16" DR 13.5 4710 HDPE Pipe	0 lf

ISOLATION VALVES (HDPE Type w Integrated HDPE Extensions)

3” Drain Valve(1 at each lake off lateral)	6
3”	23
4”	5
6”	22
8”	7
10”	0
12”	0
1” Air Release Valves	6

WIRE

#12 2-Trunk Wire Red (Double jacketed)	3,500 LF
#12 2- Trunk Wire Blue (Double jacketed)	5,000 LF
#12 2-Trunk Wire Green (Double jacketed)	4,500 LF
#12 2- Trunk Wire Purple(Double jacketed)	4,700 LF
#14 2-Lateral Wire Green (Double jacketed)	90,000 LF
8’ X 5/8” Copper Ground Rod	60
#6 Bare Copper Wire	2,000 lf
2- #2 awg with a #2 ground (Water Cooler)	2,500 LF
2- #4 awg with a #4 ground (Water Cooler)	1,500 LF
3M Scotch Splice Kits	1,600

VALVE BOXES

6” Valve Box w/ Lid QC	21
10” Valve Box w/ Lid Mainline, Grns, Fwys Iso valves, Lake Drains	63
12” Rectangular GRAY Valve Box w/Lid 2 wire splices	21
24” Rectangular Valve Box w/ Lid Elec Valves, Air Rel Valves	9

ALL FITTINGS **BY CONTRACTORS**

It is understood that all items for which there is no specific breakdown, are to be considered as necessary and integral parts to other items, of which when combined, form a complete and understood component.

THE IRRIGATION MANUFACTURER, DISTRIBUTOR, AND CONTRACTOR MUST EXAMINE THE IRRIGATION DESIGN AND PROJECT SPECIFICATIONS AND BASE THE BID PROPOSAL ON THEIR OWN CALCULATIONS

CONTRACTOR UNIT PRICING PROPOSAL

The following is a Unit Pricing Proposal for the Irrigation System at **WILMINGTON GOLF COURSE,** Wilmington, North Carolina. It is understood that the pricing quoted include all material, labor, and equipment for the complete installation and functional operation of that specific component (except where noted). It is understood that all items for which there is no specific breakdown, are to be considered as necessary and integral parts to other items, of which when combined, form a complete and understood component.

The following unit pricing will be used as the quantity guideline for determining the qualification and accuracy of the Base Proposal, and will be used as the guideline for determining the cost basis of a Change Order offered by the Irrigation Contractor, or the Owner for any additions or deletions to the original irrigation system design and the original Base Proposal.

MATERIAL
UNIT PRICE LIST

DESCRIPTION	UNIT PRICE	ROCK PRICE
I. PIPE		
4" DR 13.5 HDPE Pipe	$_____/FT	$_____/FT
6" DR 13.5 HDPE Pipe	$_____/FT	$_____/FT
8" DR 13.5 HDPE Pipe	$_____/FT	$_____/FT
II. SPRINKLER HEADS		
1 ½" FC Sprinkler	$_____(Allied/Labor)	
1 ½" PC Sprinkler	$_____(Allied/Labor)	
1 " PC Sprinkler	$_____(Allied/Labor)	
1" QC	$_____(Allied/Labor)	

III. ISOLATION VALVES

2" (Lake Drain Valves)	$_____/EA(labor/material)
3"	$_____/EA(labor/material)
4"	$_____/EA(labor/material)
6"	$_____/EA(labor/material)
8"	$_____/EA(labor/material)
1" Air Release Valves	$_____/EA(labor/material)

IV. GROUNDING

2 Wire Grounding Device	$_____-EA (labor/material)
Copper Plates	$_____-EA (labor/material)
GEM Wells	$_____-EA (labor/material)
Ground Rods	$_____-EA (labor/material)

It is understood that all items for which there is no specific breakdown, are to be considered as necessary and integral parts to other items, of which when combined, form a complete and understood component.

THE IRRIGATION MANUFACTURER, DISTRIBUTOR, AND CONTRACTOR MUST EXAMINE THE IRRIGATION DESIGN AND PROJECT SPECIFICATIONS AND BASE THE BID PROPOSAL ON THEIR OWN CALCULATIONS

COMPANY PROFILE

To be submitted in duplicate and to accompany bids submitted to construct the "GOLF COURSE IRRIGATION SYSTEM" , **WILMINGTON GOLF COURSE, Wilmington, North Carolina**

Name of Bidder

1. Business Address
2. Telephone/ Fax Number
3. E-mail
4. When Organized / Where Incorporated ?
5. Financial Statement Attached Y/N
6. Credit Available for this Contract $_____
7. Contracts now in hand, Gross Amount $_____
8. How many years have you been engaged in the contracting business under the present firm name?
9. Licenses held by Company, Owner, or Agent
10. Plan of Organization (Proprietorship, Partnership, Corporation)
11. Have you ever refused to sign a contract at your original bid?
12. Have you ever been declared in default on a contract?
13. Remarks regarding #12 or #13 attached (Y/N)

CONTRACTOR RESUME

I. Company Name & Address

II. Telephone/Facsimile Numbers

III. List Previous 5 Projects Completed. Please Include The Following:
- Name and Address of the Project
- Name and Telephone Number of Golf Course contact
- Name and Telephone Number of Golf Course Builder
- Date Installed
- Type of Control System and # of Heads
- Any special notes

Bidder Resume: PROJECT #1

Bidder Resume: PROJECT #2

Bidder Resume: PROJECT #3

Bidder Resume: PROJECT #4

Bidder Resume: PROJECT #5

_____ _____

Signed Date

WORKFORCE PROFILE

(1) Name of this Job's Supervisor, and any key Foreman

(2) Last three similar projects that this Supervisor has administrated representing your company

(3) Anticipated crew size and the number of men in each job scope, i.e., pipe fitters, electrical/controllers, laborers.

DIVISION II – GENERAL PROJECT REQUIREMENTS

SCOPE OF WORK

The scope of work at **WILMINGTON GOLF COURSE, Wilmington, North Carolina** shall be to supply all material, labor, and equipment necessary to complete the installation of the Irrigation System per the plans and specifications provided by The Pignato Group, Inc. The requirements and specifications for the installation of this system shall be as documented and stated in these attached specifications, and any reasonable work required, however not included in the accepted scope of work, shall be considered necessary and should be provided in order to satisfactorily completion of this scope of work. The bidding contractors shall take note of the following items and incorporate them into their proposals being offered to **WILMINGTON GOLF COURSE ,Wilmington, North Carolina:**

1. The Contractor will be responsible for purchasing all required irrigation whole goods and associated devices to include but not be limited to sprinklers, swing joints , electric valves, controlllers, Central and software, and all "allied" material, which is understood to be, but not limited to, pipe, wire, fittings, splice kits, machinery required for installation, concrete, all devices/equipment for connection, welding, fusing, or joining pipe.

2. The Irrigation Contractor shall plan to connect an existing pump station (1500 gpm at 120 psi) at the station isolation valve with an 12" DR 13.5 HDPE Z Pipe to be fabricated by the Irrigation Contractor (see details). Note: An HDPE SPACER will be required at that point of connection to allow for isolation valve closure

3. The Club will be contracting the installation of the irrigation system directly with a Golf Irrigation Contractor who have their own Irrigation Division, or using one of the approved listed Irrigation Subcontractors listed below. Irrigation Division is understood to be individuals who have been a direct employee of the GC, and is not a subcontractor. This person shall have been employed by the GC for the past year and is solely responsible for irrigation system installations only. No other sub contracts for Irrigation will be considered at this time.

4. All required permitting for the installation of the irrigation system is the responsibility of the Irrigation Contractor

5. All mainline pipe shall be open trenched and all lateral pipe shall be installed via a vibratory plow.

6. Where the sod allows (this is where it is removable and re-plantable) all Mainline ditches will have the sod lifted and placed back to the GC Supts satisfaction.

7. All Trunk Supply ditches to the middle of each golf hole will have the sod removed and replaced to the GC Supts satisfaction.

8. The Contractor shall be responsible for the off-site removal of the debris, excess fill, and material scrap.

DEFINITION OF PARTIES

- **Owner: City of Wilmington, North Carolina**
- **Owner's Representative: Matthew Smith**
- **Owner's Site Representative:**
- **Golf Course Architect**: NA
- **Site Contractor:** TBD.
- **Irrigation Contractor**: The Company selected and contracted with by the **Owner**, to follow the Scope of Work as outlined in the Project Manual.
- **Subcontractor**: The individual, or Company that engages in any work and is employed and contracted by the **Irrigation Contractor** to engage in such work, and is not directly contracted and employed by the **Owner**.
- **Irrigation Consultant**: The Pignato Group.

DRAWING AND SITE VERIFICATION

The Irrigation Design is scaled and schematic in nature. All equipment detailed on the design is being shown in location that is approximate. Should site conditions require alternate placement, the **Irrigation Contractor** shall do so with the intent of best possible location to insure the quality and performance of the final installed system. The **Owner**, his **Representative**, or the **Irrigation Consultant**, shall have final approval before work is to continue on the alternate change that has been proposed by the **Irrigation Contractor** to the **Owner**.

Prior to commencing work the **Irrigation Contractor** shall check and verify all quantities and measurements, and should any discrepancies occur the **Owner** shall be notified in writing. Failure to do so will result in the addition and/or relocating of the equipment by the **Irrigation Contractor** at his own expense.

The **Irrigation Contractor** will be responsible for being familiar with site conditions, and will verify the location of all utilities and facilities above and below ground prior to commencing work.

AUTHORIZED REPRESENTATIVES

The **Owner** shall designate and appoint with his authority, one (1) person to represent, and act in the **Owner's** behalf. This person known as the **Owner's Representative**, or the **Owner** herein, shall work with the **Irrigation Contractor** in the best interest of the project, and it's final satisfactory completion.

The **Irrigation Contractor** shall designate as his representative, a **Job Superintendent** that will dutifully adhere to all project requirements. The **Superintendent** shall represent the **Irrigation Contractor** in his absence, and any decisions or actions made by the **Superintendent** that misrepresents these specifications, or diminishes the intended quality of the Irrigation System shall be the responsibility of the **Irrigation Contractor.**

PERMITS, FEES, AND INSPECTIONS

The **Irrigation Contractor** should obtain and pay for all permits and licenses required by local governing authority. (City of Wilmington, State of North Carolina).

All local, state, and federal laws, regulations, and codes governing or related to any portion of these specifications, shall become incorporated into these specifications, and be followed as intended, by the **Irrigation Contractor.**

Any inspections by local, state, or federal authority that are to be made, shall be made with the **Owner**, and/or the **Irrigation Consultant**, and the **Irrigation Contractor** and/or his **Superintendent** present. Any fines, penalties, or permit reapplication fees shall be the responsibility of the **Irrigation Contractor**.

WARRANTY

The **Irrigation Contractor** will furnish a written warranty against all workmanship, defects, and materials for ALL COMPONENTS EXCEPT HDPE PIPE/FITTING ASSEMBLY for a period of one (1) year from the date of final acceptance of this project. All pipe and fitting assembly whether HDPE or PVC system is installed shall carry a 5 year workmanship warranty to include replacement parts, equipment, and labor.

The **Irrigation Contractor** shall furnish at his expense all labor and material to make any repairs under warranty.

PROTECTION OF PROPERTY AND FACILITIES

The **Irrigation Contractor** shall exercise due diligence in maintaining and protecting all existing utilities, structures, equipment, and facilities. Any damage done by the **Irrigation Contractor**, shall be repaired and the payment of such shall be the responsibility of the **Irrigation Contractor**. This is to include but not be limited to cart paths, bridges, existing utilities, and existing golf course features.

All utility location shall be the responsibility of the **Irrigation Contractor. At no time shall the Irrigation Contractor rely on the utility location services of anyone other than a professional location service.** All other existing equipment that is to be determined at risk of damage and undesirable of such shall be identified and located by the **Owner** and avoided by the **Irrigation Contractor.** Any damage to this equipment by the **Irrigation Contractor** shall be repaired in a timely manner at his own expense. If this equipment is not located by the **Owner** and damaged, then the **Owner** shall be responsible for the repair in a timely manner.

Portions of the golf course that are to be designated as natural habitats, reserves, wetlands, etc. are to be protected by the **Irrigation Contractor**, and any damage caused by the **Irrigation Contractor**, shall be his responsibility, and any fines, penalties, and the repairs of this damage shall also be his responsibility.

AS-BUILT RECORDS/GPS

The **Irrigation Contractor** shall document in a field book format and stake (w/3/4" PVC) the FINAL location of all irrigation equipment, valves, valve boxes, splices, mainlines, lateral lines, satellites, and wiring. He shall also provide a set of station assignments for each satellite, detailing head location, station number, and station responsibility (green, tee, rough, fairway, approach). The **Irrigation Consultant** will GPS each irrigation sprinkler location during staking visits and issue to the Contractor As Staked dwgs. The Irrigation Contractor shall stake, color code, and label the following:

MAINLINE: One Stake every 200' and at each change of direction
ISOLATION VALVES : One Stake with denoting size and function (main, fwy, green, tee)
ELECTRIC VALVES: 1 Stake denoting size
AIR RELEASE/DRAIN/QC : 1 Stake denoting type
WIRE SPLICE : 1 Stake denoting Wire Path / Wire Size
SPRINKLER: 1 Stake denoting PC or FC

These stakes shall be placed during installation and be kept in place until the Golf Hole is GPS'd and completely signed off and approved as Final. After completion all stakes shall be removed by the Contractor and discarded.

Along with this information and the daily field notes, it will all be sent to the Irrigation Consultant. The Irrigation Consultant to produce the Final As Builts and Irrigation Central Program.

The accumulation and documentation of this data should be done on a daily basis, and submitted Bi-Weekly to the **Owner** and the **Irrigation Consultant**, along with the Request for Payment. **FINAL AS-BUILTS FOR THAT MONTH'S WORK WILL ACCOMPANY MONTHLY PAY REQUEST FOR ALL HOLES COMPLETED AND INVOICED.** Should the **Owner**, or the **Irrigation Consultant** conclude that the As-Built is not being properly documented in format, or in timeliness then the **Owner** reserves the right to stop future work by the **Irrigation Contractor**, until such documents are up to date and in his possession. The time that it takes to complete this shall not be added to the completion time that the **Irrigation Contractor** has agreed to.

Before FINAL payment, or FINAL acceptance of the system by the **Owner**, the **Irrigation Contractor** shall have provided all As Built information as needed. Final production of the As Built shall be the responsibility of the **Irrigation Consultant**.

SCHEDULE OF WORK

The **Irrigation Contractor**, understanding the work described herein, shall commence work no later than fourteen (14) days from the date of notification by the **Owner**. All work and FINAL acceptance of the system should take place within the schedule of construction as assigned by **WILMINGTON GOLF COURSE**. The accumulation of these days shall not include Sundays, holidays, or days lost because of bad weather, and any damage that may have resulted from such.

Work shall take place **Monday-Saturday, between 7:00 A.M. and 6:00 P.M.** No Holiday work is permitted. Sunday work will only commence with written approval from the **Owner**.

APPROVAL SCHEDULE

The **Irrigation Contractor** and the **Owner,** understanding the work described herein, will notify the **Irrigation Consultant** at the phased completion of 3 holes. At that point when the **Contractor** has installed all components, as specified, and on a particular golf hole, has backfilled, tamped, and is prepared for a partial release of that hole he shall notify the **Irrigation Consultant** for a Rough Final. The term "Rough Final" will be understood to mean that all components as designed and specified have been installed, all ditches have been tamped, and filled to grade, and that all mechanical work is complete on the hole. It does not release the **Irrigation Contractor** from the responsibility of workmanship or product warranty issues that may arise after completion. A Rough Final when approved shall relinquish the **Irrigation Contractor** of responsibility for any issues relating to the clean up and backfill of that group of golf holes. All specifications related to ditch settling, workmanship, and mechanical warranties will still remain in effect. However, the erosion of ditch lines, the deterioration of ditch lines, and the displacement of installed irrigation equipment as a result of tractors and mowing equipment shall become the responsibility of the **Owner**.

A Final Release for a group of golf holes will be at the request of the **Irrigation Contractor**. At that point, all equipment is installed as specified, all equipment is functioning as intended by the manufacturer, all grounds (ohms resistance) have been checked, and it is understood by the **Owner** and the **Irrigation Contractor** that all work is 100% complete. The term "Final Release" shall be understood to mean that all work performed meets the standards set by all manufacturers, all specifications described herein, and the

approval of the **Irrigation Consultant** and the **Owner's Representative.** At that point, all maintenance on that portion of the project shall now become the responsibility of the **Owner**. It will not release the **Contractor** from any warranty, or workmanship issues that may arise.

SUBCONTRACTORS

The use of subcontract labor, or service is permitted. The **Irrigation Contractor** shall supply the **Owner** with a written list of all subcontractors that are to be used on this project. Any variations from this list shall be requested to the **Owner** and the **Irrigation Consultant** in writing. The **Owner** reserves the right to cancel any subcontract agreements. The Irrigation Contractor shall pay for all subcontracts, except where noted, and the **Owner** shall reimburse the **Irrigation Contractor** once the work has been approved and request for payment made. All Lien Releases relevant to any subcontractor purchases shall be submitted with each payment request. These Lien Releases are to apply to all materials and equipment that were purchased and received up to and included in the previous payment request.

All subcontractors will follow all site regulations, specifications stated herein, and any local, state, federal, laws, codes, or regulations as they apply. The **Irrigation Contractor** shall be responsible for any damage to the site or it's facilities, made by his subcontractor, and the repair and payment for such shall also be the responsibility of the **Irrigation Contractor**. The subletting of any portion of work shall not release the **Irrigation Contractor** from his obligations and responsibilities regarding that portion of work, and the **Irrigation Contractor** is to be considered to have performed and completed said portion of work. All insurance requirements stated herein shall apply to the subcontractor.

INSURANCE AND LIABILITY

The **Irrigation Contractor** shall take out and furnish satisfactory proof by certificate or otherwise as may be required that he has taken out public liability and property damage insurance with an insurance carrier that is satisfactory to the **Owner.** The insurance shall be in such form as to satisfy the **Owner** and protect the **Irrigation Contractor** against a loss from liability imposed by law from damages on account of bodily injury, including death resulting from, suffered or alleged to have been suffered by any person or persons, other than employees, resulting directly or indirectly from the performance or execution of this contract or any subcontract thereunder, and also to protect said contractor against loss from liability imposed by law for damage to any property, caused directly, or indirectly by the performance or execution of this contract or any subcontracts thereunder, which insurance shall also cover accidents arising out of the use and operations of automobiles, equipment, machinery, and trucks.

The Irrigation Contractor shall maintain a public liability and property damage insurance in full force and effect during the entire period of performance under this contract. The amounts of coverage of insurance shall not be less than the following:

Public Liability	$1,000,000 for one person injured in one accident. $1,000,000 for more than one person injured in one accident.
Property Damage	$1,000,000 for each occurrence.
Automobile Liability	$500,000 for one person injured. $1,000,000 for one accident

Workman's Compensation Insurance shall be maintained by the **Irrigation Contractor**, at his expense, during the time period it takes to complete the irrigation system. The Irrigation Contractor shall provide a certificate verifying coverage to the Owner. Said requirements shall apply to all subcontractors employed by the **Irrigation Contractor**.

ACCIDENTS

In the event of an accident, the **Irrigation Contractor** shall provide on the site all equipment and first aid service to anyone who is injured in connection with his scope of work. The **Irrigation Contractor** shall immediately notify all accidents to the **Owner**, and to the necessary government agency. An accurate record and report must be submitted in writing within 24 hours, to the **Owner.**

The **Irrigation Contractor** is responsible for instructing all personnel as to all safety regulations that are applicable to the work and to insure that all persons are adhering to these regulations at all times.

DELAYS

If it is in the opinion of the **Owner,** that the **Irrigation Contractor** is unskilled, misrepresented himself, has inadequate equipment, or for any reason that the **Owner** feels the **Irrigation Contractor** is not constructing the irrigation system in a diligent effort towards completion then the **Owner** has the right and shall notify the **Irrigation Contractor** in writing to remove from the project all such causes. If the **Owner** feels that the **Irrigation Contractor** has not complied satisfactorily with his request, then the **Owner** has the right to terminate the contract at the **Irrigation Contractor's** expense.

If it is in the mutual opinion and understanding that the delays are occurring with no connection or responsibility to that of the **Irrigation Contractor**, but as a result of other influences then the time period for which the **Owner** and the **Irrigation Contractor** had agreed upon as the project installation time window, shall be adjusted by the **Owner** to extend the time needed to complete the project.

All days lost to weather shall be documented with a "Weather Delay" form and signed by both the Owner's Representative and the Contractor. Copies shall be sent via fax to the Irrigation Consultant for record. Issuance of the Weather Delay form will be at the sole discretion of the Owner.

SCHEDULE OF PAYMENT

Prior to the beginning of construction, the **Owner** and the **Irrigation Contractor** shall define and agree upon a schedule of payments for the installation of the irrigation system. The **Owner** and the **Irrigation Contractor** will agree upon the work to be completed for each billing period and the amount that each billing will be prior to its' submittal for payment to the **Owner**. Any extras that are to be billed will be billed as they occur and will be billed at the rate upon which has been set in the unit pricing section of the Bid Proposal. Only those extras that are approved by the **Owner,** via a signed Work Authorization Form, shall be considered upon receipt of the payment request. **Owner** shall have signed Work Authorization Form in his possession prior to "extra" work commencing.

If the payment request is to include subcontract reimbursement, then a copy of the subcontractor invoice is to accompany the request for payment along with the **Irrigation Contractor's** written approval that the work has been completed correctly. All Lien Releases relevant to any purchases made by the **Irrigation Contractor** or any **Subcontractor** shall be submitted with each payment request. These Lien Releases are to apply to all materials and equipment that were purchased and received up to and included in the previous payment request.

With each payment the **Owner** shall withhold 10 % Retainage, and will be held until Final Payment; when at that time, it shall paid in full. Retainage shall not be withheld on Irrigation Materials.

Prior to final acceptance and payment, the system shall be pressure tested at a static pressure of 120 psi for 12 hours with the Line Maintenance Pumps starting no more than one time per hour. Upon completion of

the irrigation project, the **Owner** shall make FINAL payment to the **Irrigation Contractor** within thirty (30) days of final acceptance by the **Owner**, the **Irrigation Consultant**, and the **Irrigation Contractor**. Any remaining work that is considered by the **Owner** to be part of the agreement with the **Irrigation Contractor** is grounds for the **Owner** to hold FINAL payment until such work is completed to the satisfaction of the **Owner**, or the **Irrigation Consultant**.

SITE VISITS

By contract, the **Irrigation Consultant** is required to make visits every 10-14 days, or as needed during the Irrigation Phase of construction. These visits shall be at the request of the **Owner.** The purpose of these site visits is to include Field Work (head location, valve location, etc.) central programming, as-built information gathering, and site inspections. Should additional visits be required and that are a result from delays caused by the **Irrigation Contractor**, then the **Irrigation Contractor** shall be responsible for payment to the **Irrigation Consultant** for his services and travel expenses.

TRENCHING

All trenches shall be of sufficient depth and width in order to properly install the pipe and fittings as designed. All mainline piping shall have a minimum of 24" of cover to finished construction grade. All lateral piping shall have a minimum of 18" of cover to finished construction grade. All trenching shall be done in accordance with manufacturer's recommended installation instructions. Parallel pipes shall not be allowed in the same trench unless otherwise noted or approved by Irrigation Consultant.

All routing shall be done in accordance with the irrigation design as provided by the **Irrigation Consultant**. The **Owner**, and the **Irrigation Consultant** reserve the right to change the routing in the event that obstacles are encountered.

Because of the potential that rock may be encountered while trenching, the **Irrigation Contractor** shall establish a unit price per linear foot for Rock Excavation as outlined in the Unit Pricing Section of the Project Manual. He will insure that the bedding on which the pipe shall be placed, will be free of all unsuitable materials. Unsuitable materials shall be defined as all rock or debris larger than 2" in diameter. Should these conditions exist in the base of the trench, the **Irrigation Contractor** shall supply clean bedding material for backfilling. These materials shall be located and stockpiled at each hole by the **Irrigation Contractor.**

The **Irrigation Contractor** shall be responsible for all unsuitable materials that cannot be used as fill in open trenches. These materials are to be disposed of on-site in an area that has been assigned by the **Owner**, or his representative. The relocation of these materials shall be the responsibility of the **Irrigation Contractor**.

The **Irrigation Contractor** is responsible for obtaining the clean material for backfilling the trenches. The **Owner** shall be responsible for payment of the clean backfill material per the established unit pricing offered by the **Irrigation Contractor**. The **Irrigation Contractor** shall be responsible for the cleanup of the stockpiled and unusable bedding material.

The Irrigation Contractor shall tamp all trenches with a vibratory wheel. For a period of one year the **Irrigation Contractor** shall be responsible for any settling that occurs.

Directional boring, pavement cutting, concrete cutting or any other trench preparation shall be the responsibility of the **Irrigation Contractor**. All patching to cart paths, roadways, curbs, etc. shall be the responsibility of the **Irrigation Contractor**.

At any time when solid rock, slate, lime rock, coral or material is encountered that cannot be trenched through, or removed with a small backhoe, or standard mechanical trenching machine with a standard spade toothed blade, the **Irrigation Consultant**, and the **Owner** shall determine if a routing change is possible. If a re-routing is not possible then the Contractor shall secure the appropriate equipment to insure pipe installation to proper depths. This shall be deemed an extra under the Rock Clause Unit Pricing and shall be documented in footage by both the Irrigation Contractor and the Owners Representative. The **Owner** shall be responsible for all blasting that would be required to install pipe. The **Irrigation Contractor** shall include a separate Rock Clause based on the size of the pipe and in a per linear foot format.

The **Irrigation Contractor** shall be fully aware of the construction site. The **Irrigation Contractor** shall provide the proper trenching equipment for the required trench sizes and depths. All equipment shall be in good condition and able to perform the job satisfactorily, to the **Owner's** and **Irrigation Consultant's** discretion.

TRENCHLINE RESTORATION

During the backfilling of all trenches, the **Contractor** shall make efforts to insure that no debris or rock be used in the filling of the first 10" of backfill. After tamping, the remainder of the ditch shall be free of any rock or debris larger than a tennis ball. While excavating and trenching in dirt conditions, the Irrigation contractor shall after installation tamp each ditch in 8" lifts and leave at final grade in the condition as it was first found. While trenching in turfgrass, and after tamping, and re-establishing the trench to grade, all spoils shall be removed from trenchlines created by the installation of the new irrigation system within 24 hours of the hole completion. All mainline pipe shall be open trenched and all lateral pipe shall be installed via a vibratory plow. Where the sod allows all Mainline ditches will have the sod lifted and placed back to the GC Supts satisfaction. All Trunk Supply ditches to the middle of each golf hole will have the sod removed and replaced to the GC Supts satisfaction.

Once a trenchline has been issued a Final it shall become the maintenance responsibility of the Owner. All trench lines will be grassed and grown in by the Golf Course Superintendent. All specifications related to ditch settling, workmanship, and mechanical warranties will still remain in effect.

HEADS PLACED IN AREAS TO BE SODDED SHALL BE INSTALLED TO FINAL GRADE WITH THE OUTER EDGE OF THE HEAD AT THE SAME GRADE AS THE TOP OF THE SOD.

DIVISION III – IRRIGATION MATERIAL SPECIFICATIONS

MATERIAL CONDITION

The materials to be used shall be as designated in the FINAL project specifications and as shown on the FINAL project drawings. All materials to be used shall be new and equal to the specifications set forth herein. No material used on this project shall be imported, as a leftover from a previous project. All materials shall be shipped and received for the sole purpose of installation on THIS project.

MATERIAL STORAGE

All materials shall be stored in a manner that will best maintain its' original condition. Store all plastic and PVC material out of the sunlight. Discolored pipe or fittings shall be rejected from installation. All damaged, dented, or scratched materials shall be rejected from installation. The **Owner** shall provide an area designated for the use of the **Irrigation Contractor** as his staging and storage area. By providing this area, this in no way waives the **Irrigation Contractor** from his responsibility to protect and maintain the materials. All losses to materials due to damage, deterioration, theft or neglect shall be the responsibility of the **Irrigation Contractor**. Any repairs, or service that occurs as a result of improperly cared for materials being installed, shall be the responsibility of the **Irrigation Contractor**.

MATERIAL SPECIFICATION CHANGES

The **Irrigation Contractor** shall follow the specifications for materials that are outlined in the Project Manual. However, should the **Irrigation Contractor** wish to substitute an equivalent material, a request for substitution must be made to the **Irrigation Consultant** and to the **Owner**, in writing. Copies of material specification sheets, or product performance sheets must accompany this written request.

VERIFICATION OF QUANTITIES

The **Irrigation Consultant** has provided a design that is scaled and schematic in nature. The **Irrigation Contractor** shall be responsible for calculating and verifying all quantities shown on both the Final Design and the Final Materials Quantity Sheet. The **Irrigation Contractor** is not to rely on any quantities from the **Irrigation Consultant**, **Golf Course Builder, General Contractor, Project Owner**, or **Local Distributor**, as the **Irrigation Contractor** is responsible for installing all components and material to make the irrigation system operational as intended by the **Irrigation Consultant** and the Manufacturer.

RECEIVING OF MATERIAL

The **Irrigation Contractor** will be held responsible for the receipt of all irrigation equipment that is to be used in the installation of the irrigation system. A representative from the **Irrigation Contractor** shall be designated to receive and verify all material and quantities. Should any discrepancy occur, it must be noted and brought to the attention of the **Owner** as soon as possible. The Irrigation Consultant shall inspect materials, and should the Owner or the Irrigation Consultant deem any material unacceptable, then the **Contractor** shall immediately replace those materials at his expense. The materials shall be removed within 72 hours of notification. Once material has been received and signed for by a representative of the **Irrigation Contractor**, it shall become the responsibility of the **Irrigation Contractor**, until installed and approved by the **Owner**, or the **Irrigation Consultant**.

MATERIAL DISPOSAL

The **Irrigation Contractor** shall dispose of all material waste and scrap in an area that is to be assigned and provided by the **Owner**. The term material shall not be limited to what is known as Irrigation Materials, but shall also include dirt, rock, tree stumps and roots, grass, and any other debris or by-product that results from the installation of any part of the irrigation system. The Irrigation Contractor shall provide the transport of this to the disposal site.

HDPE PIPE/FITTING SPECIFICATIONS

1.0 PIPE (DR 13.5)

1.1 Pipe and tubing shall be manufactured from a PE4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The PE 4710 resin material will meet the specifications of ASTM D 3350-09 with a minimum cell classification of PE 445474C. Pipe shall be manufactured to the dimensions and requirements of ASTM F714 or ASTM D3035. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. All HDPE pipe shall be in straight lengths or coils. Manufacturer should be ISO 9001:2008 certified or have a similar quality assurance and control program.

1.2

Table-1
HDPE Physical Properties per ASTM D 3350-09

For Cell Class (445474C) Associated Property	**Specification**	**Allowable Values**	**Typical Values**
(4) Density (g/cm³)	ASTM D 1505	>0.955	>0.960
(4) Melt Index (g/min)	ASTM D 1238	<0.150	<0.150
(5) Flexural Modulus (psi)	ASTM D 790	110,000 to <160,000	125,000
(4) Tensile Strength at Yield (psi)	ASTM D 638	3500 to <4000	3650
(7) Slow Crack Growth Resistance Pent (hours)	ASTM F 1473	500	>2500
(4) Hydrostatic Design Basis at 73.4˚F (psi)(1)	ASTM D 2837	1600/1000	1600/1000
(C) Black Color UV stabilizer	ASTM D 3350	Min 2%	Avg. 2.25%

Table Notes:
For operating temperatures over 80˚F contact an authorized factory representative to obtain a derated working pressure rating.
The approved HDPE system, AquaFuse, ISCO or equal

2.0 The Pipe shall be ISCO, AquaFuse as supplied for CMF Global (hot line) or equal.
Pipe, Tubing and Fitting Compliance Requirements

2.1 The supplier must be capable of supplying both the pipe and fittings.

2.2 The supplier must have the capability to train the contractor's employees in butt fusion, electrofusion, socket fusion, sidewall saddle fusion and compatible fusion of HDPE pipe and fittings.

2.3 The supplier must be capable of providing a **"Fusion Technical Hot Line" 740-953-0589** to assist in fusion and fusion equipment questions.

2.4 The supplier must be capable of providing a trained representative on site upon the request of the contractor, owner or consultant to address any problems that are encountered during the installation.

2.5 The supplier must furnish a written **25 year limited Warranty** for HDPE pipe fittings and valves Golf, Turf and Commercial Irrigation applications as provided by ISCO, CMF Global.

2.6 Recommended supplier: ISCO, CMF Global. Or equal.

3.0 FITTINGS (DR 11 Fittings)

3.1 Socket Fusion Fittings - Fittings shall be PE 4710 with a minimum cell classification of PE 445474C (depending on supplier this may also be PE445575C). Butt Fusion molded Fittings shall have a manufacturing standard of ASTM D3261. Molded & fabricated fittings shall have the same minimum pressure rating as the pipe unless otherwise specified on the plans. Fabricated fittings are to be manufactured to meet the FM (Factory Mutual) performance standards. Fabricated fittings are to be manufactured using a Data Logger. Reference to the Data Logger quality control records should be referenced from an indented stamp in each fusion bead of each fitting. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records.

3.2 Flanged and Mechanical Joint Adapters - Flanged and Mechanical Joint Adapters shall be PE 4710 resin with a minimum cell classification of PE 445474C. Flange adapters and Mechanical Joint Adapters shall have the same pressure rating as the pipe unless otherwise specified on the plans.

3.2.1 Main Line Isolation Valves shall be Waterous/ AVK LUG TYPE Isolation Valves.

3.2.2 All gate valves will have stainless steel stem with HDPE stubs.

3.2.3 All 3", and 4" pipe for sprinkler connections can be made using Bolt on Stainless Saddles OR Side Wall Welded/Fused Saddles with 1½ acme thread outlet, drilling the hole prior to installing the saddle. The pressure rating shall be equal to or greater than 100 PSI PE 4710 or approved equal.

4.0 EXECUTION

4.1 Pipe and Fittings: Size as indicated on the plans. Install as shown in accordance with manufacturer's recommendations

4.2 HAULING, UNLOADING and DISTRIBUTING PIPE: During loading, transportation and unloading, every precaution shall be taken to prevent injury to the pipe. No pipe shall be dropped from cars or trucks, or allowed to roll down slides without proper retaining ropes. During transportation pipe shall rest on suitable pads, strips, skids or blocks securely wedged or tied in place. Any pipe damaged shall be replaced. (add PPI TR Note)

5.0 FUSION

5.1 Sections of polyethylene pipe should be joined into continuous lengths on the jobsite above ground, when ever possible. The joining method shall be the butt fusion and or socket fusion method and shall be performed in strict accordance with the pipe supplier's recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe supplier, including, but not limited to, temperature requirements of 425 +/- 15 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 +/- 15 psi for hydraulic . The fusion equipment used shall be manufactured by McElroy Manufacturing, or equal. The butt fusion joining will produce a joint weld strength equal to or greater than the tensile strength of the pipe itself.

5.2 Electrofusion or socket fusion (500˚F +/-25 may be used where the butt fusion method cannot be used. Electrofusion couplings and fittings shall be PE 4710 with a minimum cell classification of PE 445474C. Electro-fusion couplings or fittings shall have a manufacturing

standard of ASTM F1055. Couplings and fittings shall have the same pressure rating as the pipe unless otherwise specified on the plans.

5.3 Mechanical connection to other types of pipe shall be made by one of the following methods:

5.3.1 Flange, using HDPE flange adapter with ductile iron back up ring, and zinc-plated bolt pack.

5.3.2 Mechanical joint, using HDPE Mechanical Joint (MJ) adapter kit.

5.3.3 Bell MJ adapter with kit (4"- 12)

5.4 INSPECTION: Inspect the pipe for defects before installation and fusion. Pipe shall not exhibit scratches or gouges greater than Defective, damaged or unsound pipe will be rejected.

5.5 TESTING if pressure testing is required testing shall be done hydrostatically. For detailed testing information contact

6.0 Quality Control Testing (On Site Bend Back Test)

6.1 Prior to HDPE pipe being installed in the trench, at the beginning of the job, the contractor shall cut out the first butt fusion of each pipe size. The contractor shall prepare the sample for the test in accordance with the "Bend Back Testing" procedure in accordance with ASTM F 2620.

6.2 The samples shall be tested in the presence of the owner's representative and / or the irrigation consultant, all in accordance with testing procedures outlined. All samples shall be labeled and saved. Testing must be done at 73 degrees F plus or minus 5 degrees. The test temperature and sample size are critical to testing. The purpose of the test is to determine if the weld meets specified standards. A pass means no failures during the bend back test. This means a good weld. A break means a bad weld. Any failure shall require additional testing.

7.0 Contractor Qualifications

7.1 The contractor shall have successfully installed high density polyethylene pipe in golf/turf or commercial irrigation projects. References will be required. These reference(s) must provide a satisfactory response or the experience will not be accepted.

7.2 **Prior to the commencement of this project the Contractor will be required to have a qualified fusion technician from ISCO , CMF Global, or equal, for a period of three to five days (at the expense of the contractor). Regardless of the Contractors most recent certification on another project by ISCO, CMF Global or any other training facility, for THIS project the training will be required and on site. The required time for HDPE pipe (fusion and mechanical) training shall be collectively agreed to by the owner, ISCO, CMF Global and the specifier. Training shall provided by a qualified technician and shall include the following**:

7.3 Training administered shall be ISCO, AquaFUSION by CMF Global, or equal

7.3.1 Butt fusion

7.3.2 Socket fusion

7.3.3 Electrofusion

7.3.4 Attachment of mechanical saddles

7.3.5 If electro and/or sidewall fusion is required, this training must also be completed while the technician is on site.

7.3.6 Sidewall saddle fusion (if required for project)

7.3.7 Compatible fusion

7.4 Contractor Equipment Qualifications

7.4.1 If the contractor owns butt fusion equipment, the equipment must be serviced prior to use for this project. The machine must be environmentally friendly and in good working order. The hydraulic system must be leak free. All fusion equipment with pressure gauges shall be properly calibrated and the heating tool is to be in proper working condition prior to use.

7.4.2 Rented butt fusion machines must be rented from a company that has a fusion machine service center or centers certified by the butt fusion machine manufacturer. The fusion equipment supplied shall have certification that pressure gauges are

properly calibrated and the heating tool is to be in proper working condition prior to use.

8.0 25 Year Limited Warranty for Golf/Turf and Commercial Irrigation Applications

8.1 Product Warranty

8.1.1 LIMITED WARRANTY: Seller warrants that, for a period of twenty five years from the date of shipment for a Golf /Turf or Commercial irrigation application, it will replace any section of HDPE pipe, fittings and valves product that is defective in materials or workmanship, provided that Buyer, upon discovery of a defect, promptly notifies Seller of the defect and, as instructed by Seller at such time, either returns the product to Seller for inspection or allows Seller to inspect at the place of installation. If Seller determines the product to be defective, Seller will provide new product of the same specification and same quantity as the defective product and Seller will bear the expense of freight to deliver the replacement product to the jobsite for domestic projects, and to the closest USA port for foreign projects. Seller does not warrant the installation of product. Any defects introduced after the shipment of product by Seller, whether due to handling, installation or other cause, are not covered by this warranty. This warranty does not cover labor or other costs of installing products. Buyer's sole remedy for defective product shall be to receive replacement product as provided in this Limited Warranty.

8.1.2 OTHER THAN THE ABOVE LIMITED WARRANTY, SELLER MAKES NO WARRANTY AND EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.SELLER'S LIABILITY ARISING OUT OF OR RELATED TO THIS CONTRACT OR ANY PRODUCT OR SERVICE SUPPLIED BY SELLER (WHETHER SUCH LIABILITY IS ALLEGED AS A BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, INDEMNIFICATION, PRODUCT LIABILITY OR OTHERWISE) SHALL IN NO EVENT EXCEED THE ORIGINAL PURCHASE PRICE OF THE DEFECTIVE PRODUCT PLUS APPLICABLE FREIGHT COSTS ACTUALLY PAID BY BUYER. SELLER WILL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL, INDIRECT OR PUNITIVE DAMAGES, LOSS OF PROFITS, LOSS OF BUSINESS OPPORTUNITY OR OTHER LOSS EVEN IF SELLER KNEW OR SHOULD HAVE KNOWN OF THE POSSIBILITY OF SUCH DAMAGES OR LOSSES.

8.1.3

8.2 CONTRACTOR'S WARRANTY

8.2.1 LIMITED WARRANTY: Contractor warrants that, for a period of (5) five years from the date of installation, it will re-fuse or repair a fusion connection that is defective in workmanship, provided that Buyer, upon discovery of a defect, promptly notifies Contractor of the defect and, allows the Contractor to inspect at the place of installation. If it is determined the fused connection to be defective, Contractor will re-fuse or repair the connection at the jobsite. Contractor does not warrant the product itself, only the fused connection. This warranty does not cover labor or other costs, only the fused connection. Buyer's sole remedy for defective connection shall be to receive replacement fusion of the pipe or fitting as provided in this Limited Warranty

8.2.2 OTHER THAN THE ABOVE LIMITED WARRANTY, CONTRACTOR MAKES NO WARRANTY AND EXPRESSLY DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT

LIMITED TO, THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

CONTRACTOR'S LIABILITY ARISING OUT OF OR RELATED TO THIS CONTRACT OR ANY PRODUCT OR SERVICE SUPPLIED BY CONTRACTOR (WHETHER SUCH LIABILITY IS ALLEGED AS A BREACH OF CONTRACT, BREACH OF WARRANTY, MISREPRESENTATION, NEGLIGENCE, INDEMNIFICATION, PRODUCT LIABILITY OR OTHERWISE) SHALL IN NO EVENT EXCEED THE ORIGINAL PURCHASE PRICE OF THE DEFECTIVE CONNECTION PLUS APPLICABLE FREIGHT COSTS ACTUALLY PAID BY BUYER. CONTRACTOR WILL NOT BE LIABLE FOR ANY CONSEQUENTIAL, INCIDENTAL, SPECIAL, INDIRECT OR PUNITIVE DAMAGES, LOSS OF PROFITS, LOSS OF BUSINESS OPPORTUNITY OR OTHER LOSS EVEN IF CONTRACTOR KNEW OR SHOULD HAVE KNOWN OF THE POSSIBILITY OF SUCH DAMAGES OR

SWING JOINTS

MATERIAL

All sprinkler heads, quick coupling valves, and air release valves shall be installed on swing joints of required size. The swing joint shall be Pre-Assembled, with O-Rings Seals in each joint. The swing joint shall be manufactured/supplied by Toro or an approved equal. The swing joint shall meet or exceed all requirements set forth in ASTM D 3139.

Acme threads are permissible.

INSTALLATION

All threads shall be wrapped with Teflon tape (no pipe dope is to be used). The swing joint upon installation shall rest so that the angle between the lateral pipe and the arm of the swing joint is between 30 and 45 degrees. It may be necessary to use riser extensions to increase height rather than vertically placing and setting the swing joint.

SPRINKLER HEADS

MATERIAL

The sprinkler heads shall be 2 Wire System actuated, pressure regulating, Valve in head, with 1 ½" inlets. The sprinkler heads shall be full circle and adjustable part circle, and shall be utilized where the arc type permits and where diagrammed on the Irrigation Design. The sprinklers shall have a top serviceable removable cap that allows for all operational components, to include but not be limited to on/off signal decoder, pilot valve assembly, solenoid, and all wire splices are to be located within the cavity of the sprinkler body and sealed with the lid.

The sprinkler heads performance shall be as noted below (full circles a minimum of 87' radius, adjustable part circles a minimum of 87' radius, minimum of 47 GPM on all heads.)

1 1/2" FC/PC VIH Sprinklers, 1" PC Rotors

INSTALLATION

The Irrigation Contractor, Irrigation Consultant, and the Owner's representative shall do the spacing and layout of the sprinkler heads. Each hole when staked shall require final approval from the **Irrigation Consultant**, and the **Owner's** representative before trenching and installation can begin. In areas where regrassing will not take place, the Irrigation Contractor shall install all heads to final grade. At the time of installation, the **Irrigation Contractor** shall install all sprinkler heads to final grade. If final grassing grade is not yet established at the time of installation, then the Contractor shall install the sprinkler 6" high and come back at the time final grassing grade is established and lower the sprinkler to its final placement.

Placement of the heads will be to the satisfaction of the **Owner's Representative.** If a head is questioned, it shall be judged for straightness and elevation by laying a three foot piece of 2" X 4" sideways across the top of the head. The head should not elevate the 2" X 4" nor should it be any lower than ½" from the 2" X 4".

All field wires shall be coiled with an extra 2' of wire and shall be clipped to side of the swing joint at the bottom of the joint.

All sprinkler heads shall be installed in accordance with the manufacturers recommended installation procedures.

CENTRAL CONTROL SYSTEM

Central to Remote Field Decoder Controller VIA Radio, Remote Controller to Field via 2 Wire, Field to Central, Via Hand Held Radio or IPAD

The central controller shall utilize a personal-computer-based, Microsoft Windows 11 or latest platform, user-friendly irrigation management and control program. The central controller shall utilize a client/server architecture. Computer shall include 2 video outputs and allow map graphic to be floated onto secondary monitor.

The central controller shall utilize site graphics with 64-bit software, including site graphics at the station level. The software shall be presented in a "flat" display, where all of the information needed is available to the user for a given operation, without having to open and close additional windows.

The central controller shall have programs based on a hierarchy organized the same as the golf course. Course(s), Areas (greens, tees, fairways, etc.) followed by holes (1 through 48), followed by the individual sprinklers. The central controller shall have the ability to view the system at any of the four levels (course, area, hole, sprinkler) by Dynamic Drill down (simply clicking on a plus/minus box) to give the user intuitive control. A graphic red "Water Drop" will identify areas and holes that have stations turned off. A graphic green "Water Drop" will identify areas, holes and stations set to run automatically. A graphic blue "Water Drop" will identify areas not scheduled to water.
The central controller shall allow the user to schedule areas to irrigate by either entering runtimes in minutes, or by entering amount of water to apply. If the amount is utilized, the corresponding minutes will automatically be calculated and displayed. If minutes are utilized, the corresponding amount of application shall be calculated and displayed. Runtimes shall be calculated and executed to the minute.
The central controller shall have a "Course Report" to allow the user to determine the status of each sprinkler station on the golf course. The Course Report shall auto generate after each night's watering to allow confirmation of all sprinkler runtimes at a glance. The Course Report will display all Automatic, Manual, and Group Multi-Manual Irrigation as well as stations that are currently running. Stations that

have not operated as scheduled shall be identified with a graphic red “Water Drop”. The Course Report / Alert Panel shall display feedback from the Gateway(s) to indicate station status. The Course Report will utilize the Area, Hole, Station layout with Dynamic Drill down to quickly navigate to exceptions.

The central controller shall support the creation of a customized site map displaying multiple layers. The central controller shall allow the user to quickly create a map from any digital image (jpeg, bmp or tif format). The control system will allow the user to edit the locations of sprinklers, Turf Guard Sensors, and switches on the map. The central controller shall provide system status at the station level and display changes in status. The central controller shall be capable of creating user-defined work orders. If a scaled CAD map is utilized, the central controller will display area and distance measurements.

The central controller shall be capable of graphically displaying projected flow on the map at the station level and displaying station activation utilizing a color-coding system that shows how stations will activate during the next 24 hours. The central controller shall be capable of creating irrigation programs through the map and making station level percentage adjustments. When programming or manually running stations, the map shall be capable of automatically zooming into the stations, holes, and areas selected.

The central controller shall automatically calculate sunrise and sunset based on longitude, latitude and date, and provide this information for starting or stopping a program in relation to sunrise or sunset.The central controller shall permit true random access of all stations in the system and allow Instant Programs to be constructed with any combination of stations regardless of wiring sequences or satellite designation.The central controller shall have the ability to manually adjust (percentage increase/decrease) by course, area, hole, station, and/or the entire system. System adjustment factors may be input via actual percentage or operational ET. The central controller shall have the ability to connect to a weather station. The weather station will measure and store temperature, relative humidity, dew point, wind speed and direction, and solar radiation for use in the calculation of evapo-transpiration. The central shall have the ability to automatically calculate and adjust watering times based on evapo-transpiration. The central controller shall also have the ability to reduce the automatically calculated runtime by the rainfall measured over the preceding 24 hours. Further, the central controller shall have the ability to adjust calculated runtimes after they have been scheduled utilizing a Rain Re-Flow alarm response.

The central controller shall include the Soil Sensor software. Individual sensor data can be assigned to specific sprinklers to allow the user to view current soil moisture on the Watering Plan, allowing the user to choose to skip watering if moisture levels are above user-defined thresholds, or to activate stations if moisture levels are below defined thresholds.

The central controller shall employ advanced hydraulic/electrical systems management, allowing the user to specify hydraulic system design (sources and pipes representing mainlines, branches and flow groups) and the hydraulic limits of each entity. The central controller shall manage system flow by automatically generating the appropriate station start times based on the program priority and hydraulic limits set for each source and pipe, and for the simultaneous station limit set for each wire path. The central controller shall incorporate the ability to use Precipitation Management Groups to specific which stations are allowed to operate simultaneously when hydraulic capacity is available.

The central controller shall display projected flow by source, course, area, program and hole using colors to differentiate. The graph will calculate and display the maximum instantaneous flow as well as the total volume. Maximum flow and volume will be displayed in user-selected units. When pump integration is configured, the actual flow reported by the pump station can be displayed simultaneously with the projected flow for up to the last 7 days.The central controller shall have the ability to manually start programs for an entire area or for an individual hole/area. Manual programs may be started in normal program time or a manually selected time. The central controller shall have the ability to start a multi-manual cycle on a wire path, running up to 100 stations simultaneously with a run time of up to 99 minutes.

The central controller shall have the ability to independently suspend (hold) the automatic operation of an individual station, a course or the entire system. The station hold duration shall be programmable for the current irrigation day up to 30 days, or may be permanent.The central controller shall have the ability to control non-irrigation devices through switch outputs. Each switch (up to 50) will have an independent seven-day calendar schedule and start times for up to 24 starts. Switch outputs may run from one minute to 23 hours and 59 minutes (programmable in one-minute increments), with individual start times for each station (switch output). Switches may also be scheduled to run with any program and include the ability to offset the start time prior to or after the start of the program.

The central controller shall provide reports detailing the following information: 1) projected schedule activity, 2) contents of the database constructed while programming the central controller, 3) overview of scheduled irrigation activity including start time, end time and area information, flow and program, 4) report stations that did not acknowledge a message to run, 5) stations that are assigned to more than one program.

The central controller shall be capable of integrating with up to 10 pump stations manufactured by, MCI, or Watertronics. The central controller shall be capable of displaying key pump station data including flow and pressure. The central controller shall be capable of responding to "alarm" conditions based on data received from the MCI or Watertronics pump stations. When alarms are activated, the irrigation system will respond in one of the following ways: log only no response, pause irrigation, resume irrigation, turn a switch on/off, cancel a program or station, initiate a rain hold or cancel, start a program or initiate a Re-Flow response. The central controller will be able to limit flow during specified times with the configuration of a pump profile with or without pump station integration. These features allow savings in markets where the utility companies have adopted tiered electricity rates for peak use periods.

The system shall require a personal computer which has been certified by the manufacturer for use with the central control system. The system shall come with a one-year dedicated support program provided by the manufacturer which includes extended warranties, 24-hour component replacement, toll-free help-line support and remote diagnostics by a licensed irrigator.

The system shall include GSP for secure remote access to allow the user to operate the Lynx system from any computer connected to the internet. This will also allow GSP to do remote diagnostics and support of the central controller. The system shall include one year of GSP, a service that will allow GSP to remotely monitor the computer 24/7/365 and will alert the user to internal computer hardware and software issues.

REMOTE 2 WIRE CONTROL SYSTEM

The irrigation satellites shall be installed and mounted on a concrete slab no less than 6" in thickness. A 4" sweep (field wires), and a 2" sweep (power wires) shall be incorporated into the construction of each Remote Controller (RC) pad. All slabs will be brush finished, with smooth trim, and rounded edge.

The satellite cabinets shall be constructed of Plastic, with locking doors. All control devices shall be enclosed and installed as per manufacturer's recommended installation procedures.

Each satellite shall have a power disconnect, with receptacle installed. This disconnect shall meet all local electrical codes.

The power supply will be 120 VAC, and 24 VAC power for the field wire. Each RC location, shall be connected with # 6 bare copper wire, via a CadWeld to a minimum of three 5/8" ground rods in a grid triangle distanced 16'apart, and surrounding the satellite group. A resistance to Ohms of 10 or less is required at each location before it can be approved and signed off. Should additional grounding rods be

required, it shall be considered an extra, and the **Owner** shall be responsible for payment as outlined in the unit pricing section of the Bid form.

Each RC shall have installed surge protection for the 120 VAC power wires, 40 VAC field wires. This surge protection shall include any fuses, chokes, gap relays, MOV's or resistors that are typically part of timing mechanism, transformer construction, or satellite construction.

ALL RCs SHALL BE SIZED TO ACCOMMODATE THE REQUIRED NUMBER OF STATIONS PRESENT IN EACH HYDROZONE.

ISOLATION VALVES

MAINLINE, LATERAL, TEES & GREENS ISOLATION VALVES

All Isolation Valves shall follow the following specifications with the exception that the bid for the HDPE SYSTEM shall include Lug Type Epoxy Coated Metal valves with integrated HDPE stubs on each side of the valve no less than 18" in length OR transition from HDPE to the valve via a mechanical joint assembly.

All isolation valves shall be sized as specified on the irrigation design, and no variation shall be allowed unless approved by the **Irrigation Consultant**. All isolation valves on the project shall be of the same manufacturer.

All greens isolation valves shall be installed within fifty (50) feet from the green's edge. If this is not possible, then the Owner shall select the valve location.

All mainline pipe supplying green's loops are 4", and all green's loops are 3" in diameter.

The **Irrigation Contractor** will provide to the **Owner**, four (4) valve-adjusting wrenches, each shall be 5' in length.

VALVE BOXES

Valve boxes shall be placed over all isolation valves, quick coupling valves, drain valves, air release valves, electrical wire splices, communication cable splices, and ground rod locations. Valve boxes shall be of high strength plastic, and valve lids shall be **green** (unless otherwise required by local code) for irrigation components. Electrical splices shall be installed in rectangular valve boxes **gray or black** in color. All Mainline/Lateral irrigation valve boxes shall be 24" Rectangular Boxes, all Lateral electric valve boxes shall be 24" rectangular, and quick couplers and ground rod valve boxes 6" in diameter, and electrical splices 24"rectangular. Valve box extensions must be used where necessary. Valve boxes are to be manufactured by Brooks or Carson.

QUICK COUPLERS

All quick coupling valves shall be constructed of brass and they shall be 1 " in size. All quick coupling valves will be supplied via the green loop. Each quick coupling valve will be enclosed in a 6" valve box, with a green lid.

All quick coupling valves shall be connected to the Lasco Snap-Lok swing joint with a brass male stabilizer elbow (G14S-212). Quick Coupling valves shall be located at the back right head of each green.

AIR RELEASE VALVES/DRAIN VALVES

AIR RELEASE VALVES

The irrigation system shall have a minimum of six (6) 1" Air Release Valves. The locations shall be determined during construction depending on site conditions. Bermad, Model 4405, or an approved equal shall manufacture the air releases valves. Each A.R. Valve shall have a gate valve to allow service.

DRAIN VALVES

The irrigation system shall have a 2" Lug Type Valve at each lake on the golf course. These drain valves shall be attached to the nearest fairway lateral via and housed in a valve box 10-15' from the lake's edge.

WIRE

2-WIRE COMMUNICATION WIRE

Trunk Wire shall refer to the wire path that parallels the mainline and Lateral Wire shall refer to the wire that leaves the Trunk Wire and runs with the sprinkler lateral pipe to each sprinkler. All wire shall be Polyvinyl Chloride (PVC) thermoplastic-coated underground feeder (UF) wire and rated to 600 volts. All 120 VAC wire shall be installed as per all Local and National Electric Codes. All wire shall be tested by Underwriter's Laboratories, and bear all UL labels. The **Irrigation Contractor** shall follow all color schemes and sizes as shown on the irrigation design and in the Project Manual.

The 2-WIRE TRUNK Soft drawn bare copper meeting the requirements of ASTM specification B-3 or B-8. Insulation shall be low density high molecular weight polyethylene and a thickness of 0.045". The two conductors (black and yellow) shall be twisted with a minimum lay of 4". All wire is to be manufactured by Regency. An optional Mylar tape may be used over the conductors. A rip cord shall be placed directly below the outer jacket. Overall jacket shall be high density polyethylene with a thickness of 0.035". Colors shall be as defined in the Qty Section of the PM and on the drawings. The jacket shall be sufficiently round, and loose, to facilitate its removal when being stripped. Colors are as displayed in the drawings.

The 2 WIRE LATERAL WIRE Soft drawn bare copper meeting the requirements of ASTM specification B-3 or B-8. Insulation shall be low density high molecular weight polyethylene and a thickness of 0.045". The two conductors (black and yellow) shall be twisted with a minimum lay of 4". All wire is to be manufactured by Regency. An optional Mylar tape may be used over the conductors. A rip cord shall be placed directly below the outer jacket. Overall jacket shall be high density polyethylene with a thickness of 0.035". Colors shall be as defined in the Qty Section of the PM and on the drawings. The jacket shall be sufficiently round, and loose, to facilitate its removal when being stripped.

Wire colors for the Lateral Wires shall be as follows:

All Trunk wires shall be as defined in the dwgs. All Fairway and Greens shall be GREEN/BLACK.

All wires shall be installed in lengths so that splicing can be avoided. However, both the Irrigation Consultant and the Owner understand that in some cases this will not be possible. When a splice is necessary, all 2 Wire splices should be at the closest sprinkler with 3M DBY/DBR , or an approved equal.

All bare copper wire splices in the field shall be joined via a split bolt to ground rod at that point where the spool empties. All wire splices are to be buried in a valve box. (See Valve Box section). All wire splices will be made as per manufacturer's instruction.

TWO WIRE SPLICE

All Two Wire Trunk Splices and 3 Way Lateral Wire Spices shall be made with a Polaris splice kit. It shall be comprised of a hard molded rubber coated, aluminum bus bar with accessible allen screws for tightening and testing. Each wire shall be housed in a watertight sleeve and be trimmed to wire diameter. These devices are to be waterproof to 6'.

GROUND WIRE

The irrigation satellites shall be connected to the ground rods with a #6 BARE copper wire. This same wire will travel the length of all power wire runs. The wire shall be attached to the rods with a CadWeld. All splices shall be made with a ground rod and CADWELD. The ground wires from a group of two or more satellites may be unioned together, and connected to the ground rods via a single #6 bare copper wire.