ABSTRACT

SL.NO	ANNEXTURE DETAILS	AMOUNT	REMARKS
I	INSTALLATION AND COMMISSIONING INCLUDING EARTHWOTH EXCAVATION AND REFILLING WORKS AND HDPE PIPING WORK		GST EXTRA AS APPLICABLE
II	ANNEXTURE-II IRRIGATION AUTOMATION WORK		GST EXTRA AS APPLICABLE
III	ANNEXTURE-III A,B BUNDSCHOOL AND BAARI SCHOOL AUTOMATION WORK		GST EXTRA AS APPLICABLE
IV	ANNEXTURE-IV SWIMMING POOL WATER FOR SAND TRACKS SEPARATE PUMPING UNIT AND CONTROL		GST EXTRA AS APPLICABLE
V	ANNEXTURE -V WEATHER STATION		GST EXTRA AS APPLICABLE
VI	ANNEXTURE -VI "C"BUND SCHOOL IRRIGATION SYSTEM		GST EXTRA AS APPLICABLE
VII	ANNEXTURE -VII PUMP REPLACEMENT		GST EXTRA AS APPLICABLE
	GRAND TOTAL RS		

INSTALLATION OFFER					
	Bangalore Turf Club Ltd Automated Irrigation Works				
1	**WORK DISCRIPTION**	**Units**	**Qty**	**Rate**	**Amount**
1	Earth work excavation and refilling 300x450mm All lateral lines	Rm	12250.00		
2	Earth work excavation and refilling 450x600mm All Mainline	Rm	2600.00		
3	Commissioning , Supervision,Transportation Charge.	LS	1		
5	HDPE Installation and EF Welding / Compression fittings/ Testing and commissioning work etc				
	MAINLINE	RM	2600		
	LATERAL LINE	RM	12250.00		
	GRAND TOTAL INR				

S.No.	ITEMS	APPROVED BRANDS & MODELS	OTHERS
		Rain Bird	
1	PUMPS & PANELS		Grundfos
2	FILTERS		Amiad (Isreal)
3	HDPE PIPES & FITTING	10ksc PE100	VARUNFLOW/ EQUAVILENT ISI
4	MAINLINE SLUICE VALVES		PIMTAS MAKE
	CI WITH SS SPINDLE		PIMTAS MAKE
5	MAINLINE P.E.SADDLES		SAB (Italy) or George fissher
6	LATERAL LINE PVC BALL VALVES		PIMTAS MAKE
7	VALVE BOXES	Rain Bird -USA	RAINBIRD
8	SPRINKLERS	8005/5005/Rvan	Rainbird
9	SWING JOINTS	Rain Bird -USA	Rainbird/Lasco / Dura (USA)
10	SOLENOID VALVES	200 PGA	Rainbird
11	RQRC VALVES ,	5 RC	Rainbird
12	RQRC KEY's	K 55-1	Rainbird
13	SWIVEL ELLS	HS-2	Rainbird
14	DECODERS	FD101	RAINBIRD
15	CENTRAL CONTROL	RAINBIRD IQ	Rainbird
16	CONTROL CABLE	RAINBIRD MAXI	Paige Electric (USA)
17	COMMUNICATION CABLE	RAINBIRD PAIGE	Paige Electric (USA)
18	WIRE CONNECTORS AND SPLICES	RAINBIRD 3M	3 M (USA)

"C" - BUND SCHOOL IRRIGATION WORK (Reference to ANNEXTURE VI)

Sl No	Description	Qty	Unit	Rate	Amount
1	Main line Ip Pipe saddle 140X2" with Necessary Fittings for Point of connection from the existing Mainline	2	Nos		
2	Lateral lines Combination of 90,63mm, 10 KSc HDPE Pipe with Necessary Fittings Including earthwork.	600	Mts		
3	HDPE Pipe saddles for sprinklers connection ,9063,40,mm	32	Nos		
4	HDPE Compression Fittings MTA for POC from the Mainline	1	Unit		
5	PVC Fittings	1	unit		
6	8005 SS B BSP 18mts pop up sprinkler	32	Nos		
7	FD 101 Decoder	4	Nos		
8	2"PESB-BSP Solinoid valve	4	Nos		
9	1"D x 18"L Swing Joint	32	Nos		
10	Isolation Valves 2" 16PN ISI standard ball valve	4	Nos		
11	Allied Fittings and accessories for valves	1	Unit		
12	Valve Box 10" circular	4	Nos		
13	1" QCV BRASS POINTS with key arrangements	4	Nos		
14	7" valve box for qcv points	4	nos		
15	1" Air vent	1	Nos		
16	Installation and service charges	1	Unit		
	T O T A L				

BANGALORE TURF CLUB LTD

RAINBIRD CENTRAL CONTROL IRRIGATION SPECIFICATION

DESIGN OF IRRIGATION SYSTEM
BANGALORE TURF CLUB LTD.
Bangalore

IRRIGATION

PART 1. SYSTEM DESIGN, EQUIPMENT SPECIFICATIONS & INSTALLATION

1.01 SPRINKLERS AND SWING JOINTS

1.01.01 General

All sprinklers should have been tested by an independent test authority such as recommended above and all sprinklers should have a Distribution Uniformity Coefficient in the range of 80 to 85%.

Main Track Left and Right side :

In general, each section shall have a minimum of eight (8) Type Rain bird full or part circle **sprinklers** placed to ensure uniform coverage of the Racing surface and the Track.

Sprinklers shall be operated on entire sections simultaneously with four solenoid valve under special irrigation programs.

Inner & outer sand track :
Inner &outer sand track shall have Type 5005ss 12mts popup & 5mts rotary nozzles sprinklers placed to ensure sand surface and batters are adequately watered. Control of sand track rotary nozzle sprinklers shall be controlled either individually or in pairs depending upon the number of valve.

Control of these sprinklers shall generally be in block of 50nos rotary nozzle sprinklers each depending on location and purpose Half circle PATTERN.

Landscaped Surrounds
(I) Within the BTC limits there are Quick Coupling Valves (QCV's) placed every 60 meters for areas not covered by automatic pop up irrigation. These valves can be used with hoses as supplementary irrigation for non-irrigating areas, drip or micro irrigation or whatever is deemed suitable for the establishment and maintenance of these areas.

1.01.02-A Sprinkler Types

1. Type A – Full/Half circle Sprinkler SS
   The sprinkler shall have the following performance: -

Radius	18.0-20.0 m
Discharge	1.1 liters/sec
Operating Pressure	450kPa

2. Type B – Part/full circle Rotary nozzle R van Sprinkler
   The sprinkler shall have the following performance: -

Radius	5.0-6.0 m
Discharge	0.30 liters/sec
Operating Pressure	150kPa

Rainbird Sprinkler Specification

TRACK - Rotors - The full or part - circle sprinkler shall be a water – lubricated gears drive rotor capable of covering a 18-20 (Mts) radius at a base pressure of …4.5 (Kg/cm2) and a discharge rate of 1.1 (Lps) for Full circle sprinkler and 18-20.0 (Mts) radius at a base pressure of …4.5 (Kg/cm2) and a discharge rate of 1.1 (Lps) for Part circle sprinkler. The rotor shall be installed with a number 36 nozzles that shall be in Blue colour for case of identification.

The part - circle sprinkler shall have adjustable arc coverage of 30^{0} to $345^{0.}$ Arc adjustment can be performed with or without the rotor in operation and shall require only a flat – blade screwdriver. The part - circle rotor shall rotate through an 180^{0} arc in one and one – half minutes or less. Rotation through 360^{0} shall be two and one – half minutes or less for the full - circle sprinkler.

The sprinkler shall be fully serviceable from the top without requiring special tools and digging. The pop – up height shall be 3.25" (8.3 cm). The retract spring shall be of stainless steel and of sufficient force for positive pop – down.The nozzle housing cover of the rotor shall indicate the model, identify the installed nozzle and have an arrow to indicate the position of the nozzle, and shall provide a positive seal against the debris when the rotor is not in operation. The housing shall be installed with one of six color-coded nozzles. The nozzle shall be tested per ASAE 5398.1 and be verified to deliver scheduling coefficient of 1.2 or less and a Christiansen coefficient of uniformity of 90% or greater at the specified spacing.

The rotor body shall be molded of engineering grade plastic and shall have a double

wall construction female 1” BSP/ACME bottom inlet.

ADDIATIONAL DETAILS

SPRINKLER SPECIFICATIONS -

The full- and part-circle sprinklers shall be a gear-driven rotary type. The sprinkler shall be of a pop-up design with an overall height of 10" (254mm), a body diameter of 3 ½" (90mm), a cap diameter of 6" (152mm) and a pop-up stroke of 2 ¾" (70mm). The sprinkler shall have a 1" (25mm) BSP female-threaded inlet.

Part Circle: Water distribution shall be via two nozzles mounted in a 2¼" (57mm) diameter plastic nozzle turret. The three nozzles shall be oriented in the same direction and elevate 2" (50mm) above the body when in operation. The sprinkler nozzles shall be of a thread-in type and color-coded for easy identification of radius and flow performance capabilities.

Full Circle : Water distribution shall be via two nozzles mounted in a 2¼” (57mm) diameter plastic nozzle turret. The dual nozzles shall be oriented in opposite directions and elevate 2" (50mm) above the body when in operation. The sprinkler nozzles shall be of a press-in-type and color-coded for easy identification of radius and flow performance capabilities.

The part-circle sprinklers shall be adjustable from the top with the left terminus of the arc as fixed. The sprinkler shall be adjustable during operation and when the unit is not in operation. An arrow on the top of the cap will indicate the nozzle orientation, aiding non-operational arc adjustment and allowing operators to remain distant from the water throw. The arc adjuster shall be protected from debris contamination by a stainless-steel screw and plastic cover.

Rotation shall be accomplished by a sealed, oil-filled planetary gear drive. The assembly shall be isolated from the water supply and driven by a variable stator. The drive assembly shall be constructed of plastic and stainless-steel components. The variable stator shall provide a consistent speed of rotation throughout the entire nozzle range and shall not require adjustment or replacement if nozzle changes are required.
The body and cap of the sprinkler shall be injection-molded from ABS, a corrosion-proof, impact-resistant, UV-resistant, heavy-duty plastic material. The sprinkler shall have two plastic filter screens: a coarse screen in the body inlet, sized to prevent entry of larger foreign material from entering the body, and a finer screen threaded into the riser, sized to prevent foreign material from clogging the nozzle. The sprinkler body inlet shall accept a 1" (25mm) BSP/ACME male-threaded fitting.

All internal components shall be serviceable from the top of the sprinkler without

disturbing the body installation. The riser assembly and the internal valve assembly shall each be retained by a single snap ring.

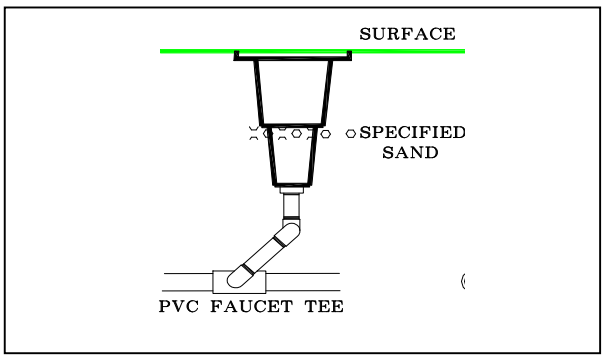
1.01.02-B Swing Joint

The swing joint shall be molded from rigid PVC, Type 1, cell classification 12454-B, con-forming to ASTM D1784, with a pressure rating of 315 psi (21,7 Bars), @ 73°F (22,8°C) when tested in accordance with ASTM D3139, including 60 minutes @ 790 psi, and short term exposure of 1000 psi without leakage. All NPT threads, sockets and spigots shall be Schedule 80 per ASTM D2464 and D2467.

All components shall be factory pre-assembled, in 1" inlet/outlet Size, and in lengths of 12" All rotating joints are modified stub ACME threads, **with two elastomers O-rings for positive sealing and thread protection.**

All swing joint assemblies shall be available with any combination of NPT, BSP, and ACME inlets/outlets. An enlarging outlet (no additional adapter required) for swing joints with 1" diameters shall be available to allow them to be used with many larger rotors.
All swing joints are with **swept elbow designed** utilizing computational fluid dynamics software, resulting in superior flow characteristics, minimum flow loss and high efficiency.

DETAIL 'A'
SPRINKLER & RISER DETAILS



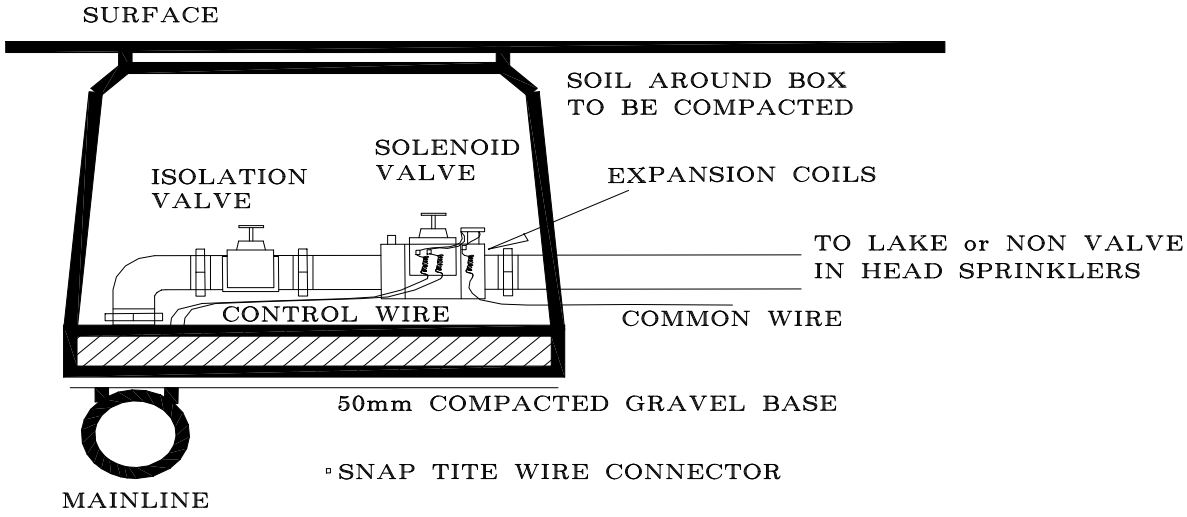
1.02AUTOMATIC CONTROL VALVE

Model Specifications
Electric Remote Control Plastic Valve Rainbird BESP BSP

The remote control valve shall be a normally closed 24 VAC 50 Hz cycle solenoid actuated globe pattern design capable of having a flow rate of **3.1 to 12.5 Liters per seconds (Lps)** with a pressure loss range not to exceed **0.25 to 1.25 Kg/cm2.** The valve pressure rating shall not be less than 150 psi.
The valve body and bonnet shall be constructed of heavy glass-filled, UV-resistant nylon; the diaphragm shall be of nylon-reinforced nitrile rubber. The bonnet shall be secured to the body by stainless steel flanged nuts. All other internal parts shall be made of bronze, brass and stainless steel to ensure corrosion resistance.
The valve shall have both internal and external manual open/close control (internal and external bleed) for manually opening and closing the valve without electrically energizing the solenoid. The valve shall have internal manual bleed to prevent flooding of the valve box. The valve shall house a fully encapsulated, one-piece solenoid.
The solenoid shall have a captured plunger with a removable retainer for easy servicing
and a leverage handle for easy turning. This 24 VAC 50 Hz solenoid shall open with 19.6 VAC minimum at 200 psi. At 24 VAC average inrush current, it shall not exceed 0 .41amps. Average holding current shall not exceed 0.23 amps.
The valve shall have a self-cleaning, scrubber type, stainless steel screen designed for use in
dirty water applications and be particularly effective under algae conditions.
The valve shall have a brass flow control stem for regulating or shutting off the flow of water.
The valve must open or close in less than one minute at 150 psi and less than 30
seconds at 20 psi.

The valve construction shall allow all internal parts to be removed from the top of the valve
Without disturbing the valve body installation in the piping system.

DETAIL 'B'
SOLENOID VALVE DETAILS



1.03 QUICK COUPLING VALVES

Model specification
One-Piece Quick Coupling Valve RAINBIRD MAKE

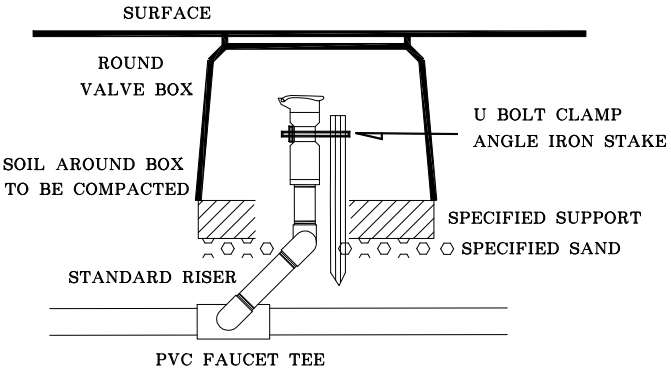
The quick coupling valve shall be a **one-piece type** capable of having a **discharge rate of 1.90 to 4.40 Liters per seconds (lps)** with a pressure loss range not to exceed **0.14 to 0.97 Kg/cm2.**

The valve body shall be constructed of heavy cast brass. The cover shall be made of durable, thermoplastic rubber and shall be self-closing.

The valve shall be opened and closed by a brass key of the same manufacturer having a
1" (MNPT) and 1" (FNPT) outlet. The valve throat shall have a keyway with detent positions for regulating water flow. Each key should be equipped with 1″ X 1″ Hose swivel Elbow.

DETAIL 'C'

QUICK COUPLING VALVE DETAIL



1.04 CONTROL SYSTEM-RAINBIRD DECODER

1.04.01 General

Control of the system shall be achieved thru the central control unit which is connected by the Field decoder Controller by the two wire hard path system.

The field Controllers shall be strategically located around the track/course.

The Irrigation Company shall provide a control Maxi cable routing plan, showing size, number and alignment of communication cable location.

1.04.02 Specification LXD – Field Decoder interface

The controllers, where indicated and shown on the drawings, shall be microprocessor-based, solid-state controller. The controller shall be capable of having 16, 24, 32, 40, 48, stations, and operating as a stand-alone controller operated under central control. The base controller shall be a 16-station, stand-alone controller. It shall have the capability of adding up to four (4) eight-station Output Station Modules (OSM or OSM-S), giving the availability of 16, 24, 32, 40 and 48 stations. These OSMs can be easily added in the field. It shall have the capability of adding a central control Interface Board, which will allow operation under central control for either the standard two-wire communication path or using the wireless Link radio for central-to-satellite communication. For any central control operation to occur, the Interface Board must be installed.

The controllers, where designated as any model, shall be housed in a sturdy, heavy duty, temperature and chemical resistant, double-walled ascorene high-impact

resistant enclosure.
The enclosure shall be complete with mounting template and hardware for bolting to a poured concrete base. The top cover shall have a key operated lock. The plastic enclosure shall have a front and a back removable panel for convenient access to both compartments of the pedestal for installation. The front of the stainless steel enclosure shall have a removable panel for easy access to the entire pedestal for installation.

All Controller models shall be UL & C-UL listed, CE approved and C-Tick compliant.

The controller units shall be capable of operating under the following power requirements at 50 Hz frequency 220 VAC Nominal [205-232 VAC] . The transformer shall be capable of stepping down 220 VAC input power to 26.5 VAC output power for the operation of solenoid remote control valves sprinklers. The transformer shall be rated at 5.25 AMP capacity for operating a maximum of ten (10) standard solenoids at one time at 50 Hz.

The transformer connector shall have two "pigtails" preinstalled into the power connector to facilitate wiring to primary power. For 220/240 VAC operation, these same positions correspond to the two hot terminals. The mounting bracket in all models shall be capable accommodating conduit diameters of up to one inch.

Each unit shall have a circuit breaker that can be reset, rated at 4 AMPS. All controllers must be grounded to 10 OHM or less. The unit shall use relays and metal oxide visitor (MOV) surge arrestors to electrically isolate the circuitry from field noise, while providing a physical gap to protect against surge damage from coming in on the field wiring. The panel which houses the Main Logic Board shall have a detachable harness that connects to the Power Interconnect Board in the pedestal base, allowing for quick removal of the panel assembly. The controller shall use socketed EPROM chips on the printed circuit boards to allow easy upgrade of the controller software.

the pedestal base and allow for easy field upgrades to increase total capacity up to 48 stations. Plastic pedestal models shall have two 24 station terminal boards available to facilitate field wire installation. Each board in turn shall have its own preinstalled 18-gauge wire harness, with the other ends of the harnesses prewired in groups of eight into connectors for quick and simple connection to the OSMs. The field wires shall attach to the OSMs with quick disconnect connectors, facilitating installation and reducing the need to disconnect and reconnect field wires.
The panel assembly of the controller shall have a sealed and sloped keypad and display to keep moisture and contaminants away from the critical electronic components of the unit. A clear, 32-character (two [2] lines of 16 characters each) alphanumeric crystal display shall be used to show the operational information and diagnostic data of the controller in an easy to read manner. Indicating LEDs shall give a visual indication of the active schedules and the central control status. The

control panel shall have 20 large, raised buttons with clear, descriptive icons and English labeling to facilitate local programming.

The controller shall have eight (8) user-selected languages: English, French, German, Italian, Japanese, Portuguese, Spanish and Dutch. A language display shall act as a prompt.

The controller units shall have six (6) automatic schedules possible and two (2) multimanual programs available. Each of the independent schedules shall have the capability of up to twelve (12) start times per day and overlapped starts shall automatically "stack." Water budgeting for each independent schedule shall be able to be selected from 0 to 200%, in 10% increments to allow automatic changes to all station operating times of stations within the schedule, without separately reprogramming each station. Each individual station shall allow for the setting of operation times from one (1) minute minimum time to one hundred twenty (120) minutes maximum time, in one (1) minute increments.

The CONTROL mode shall provide for four (4) controller control modes: 1) "OFF," for "Rain Shut-Down," 2) "MANUAL," for manual starts only to operate, 3) "LOCAL," to operate the satellite as a stand-alone controller only, and 4) "MAXI" (central control), to allow for the response of the LDI unit to the central computer program (this light will only be active if the central control Interface Board is installed). Under central control, the LDI shall ignore any of its own individual programming unless a loss of control commands from the central is detected. Under LOCAL operation, the controller must be programmed for its desired operation, at the controller itself. In the MANUAL mode, the LDI shall be capable of manual operation only, with no LOCAL or Maxi (central control) scheduling capable of operating. Under the "Rain Shut-Down" condition, clock irrigation activity will not start.
The controller shall be capable of multistation operation, simultaneously operating up to six (6) automatic schedules with a limit of ten (10) at 50Hz. Multistation programming shall be accomplished by having the capability to assign any station to one of six (6) different schedules. It shall have the capability to operate one station from each of these six (6) schedules simultaneously. All stations within a given schedule shall line up and operate in sequence one after the other. Any given station may be assigned to more than one schedule. It shall be capable of operating ONE (1) multimanual program.

There will be no limit or restriction as to the number of individual scheduled cycles a given satellite station may be scheduled in at any time. The built-in, back-up program and nonvolatile memory shall maintain schedules and time of day during a power outage for up to 10 years.

TWO-WIRE COMMUNICATION: If so specified, a two-wire communication path shall be used to communicate between central control equipment and the Decoders,

provided that the central control two-wire Interface Board is installed in the unit. This two-wire path shall also be used to communicate back to the central equipment. This feedback signal shall be used by the central to verify and log all decoder activity.

The central control interface type, along with firmware version numbers installed for both the controller Main Logic Board and the central control Interface shall be able to be queried via the controller's keypad and panel display.

All Decoder low-voltage station output wiring shall be type UF single conductor annealed soft copper wire with a 0.06" thick PVC insulation jacket. Wires are of the sizes indicated on the drawings and of the colors indicated or directed. All splices and all underground connections, for both two-wire communication and the station output wiring, shall be made using either 3M, DBY or DBR (direct burial) splice kits or 3500 Scotch - Lok connector packs. All underground wire joints and connections shall be in standard size rectangular valve boxes, except at solenoids and OSM connections.

The model, location and number of controllers shall be as shown on the drawings or as instructed and shall be as manufactured and furnished by

1.04.03 Specification (Central Control)
Two-Wire, Central Control System RAINBIRD IQ 3.2 VERSION

The computerized central control system shall be as here in after specified. It shall be capable of controlling up to 18 individual golf holes though initially only 6 holes have been designed, consisting of greens, tees, fairways, approaches, perimeters, roughs and miscellaneous areas.

System, as hereinafter specified. In addition, the central equipment shall include an interface unit, an uninterruptible power source, a power circuit surge arrestor and a grounding network with surge arrestors, all as hereinafter specified.

Software shall operate in the Windows™ environment and shall be capable of controlling (1) "hard-wired" decoder field units; and or any one of the other two different types of field unit systems; (1) "radio" operated satellite field units or (2) "hardwired" decoder field units.

Total number of stations, for each Decoder, shall be shown on the drawings.
Continuous "on-line" communication, between central computer/interface unit and the field decoder units, shall provide "true" central control. Continuous field unit "feedback" status information shall be registered at the computer and also at the LDI interface unit. Central Control 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 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." All programming shall be maintained in the computer memory and on the hard drive, from which they shall be executed.

Programming shall NOT be "down loaded" to the field units. It shall NOT be possible to change or reprogram the system from the field, thus assuring the operator full control at all times. A "time window" may be defined for each individual program, confining its operation to this specific time period. Each individual program can have up to 6 starts or each schedule shall be capable of being designated for up to 12 start times.
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.

An innovative, guided initialization and "start-up" programming method in C.C. shall result in a customized "Quick Start ™" program, enabling the process of getting 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.

A graphic display of each hole defined, shall 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 satellite stations. A station data table shall give complete database information for each individual station. A unique "QuickIRR™" method of programming shall provide for a quick and easy method to automatically build programs.

The CC system shall provide for the selection of three (3) different flow measurement units—U.S. gallons per minute, metric of cubic meters per hour or liters per second. It shall also provide for the selection of any one of eight (8) different languages for display. A built-in "Flo-Manager®" feature shall automatically distribute and limit flow within the system, to eliminate hydraulic "overload" while maintaining maximum system operating efficiency.

During actual operation of the system, a course graphic overview shall provide visual indication of all areas being irrigated. A system Flo-Bar and flow analysis chart shall provide complete system flow
information, including flow with NO "feedback", flow with "feedback", "paused" flow and total flow demand as well as the total system capacity. The system shall allow the use of pump station monitoring software capable of providing real time data exchange with optional Smart Pump ™ feature.

A "Watersaver" feature shall provide water budgeting capabilities from 0% to 300% in 1% increments at the system level, at the program level or at the schedule level.

Automatic rain shutdown shall be possible with the integration of a rain sensor. A "dry run" feature shall provide for testing of a program and making necessary adjustments before actual operation. A printout of the "dry run" results shall be possible, as well as being displayed on the monitor.

Hardware—Computer-Furnish and install at the central location "P" Series computer system, consisting of the following minimum specifications:

1.4 GHz Pentium 4 Processor
256 MB RAM
20 GB hard drive
1.44 MB floppy disk drive
Microsoft PS2 Intellimouse
56K Modem
DVD/CD-ROM–R/W
32 MB Video Card
Sound Card
Speakers
Quiet Key 104 Keyboard
4-Com 4 Port Digi board
19" Color Monitor
Preinstalled software shall consist of:
The program
Map Import Software
Pc Anywhere Communication software
Microsoft®
Windows XP
Software

WEATHER STATION :

Rain bird LT PRO-2 weather station capable to communicate to central control

Central Controller (DETAILS)
RAINBIRD IQ CENTRAL CONTROL SYSTEM:
The central controller shall utilize a personal-computer-based, Windows95 platform, user-friendly irrigation management and control program.

The central controller shall utilize site graphics with 32/64-bit software, including site graphics at the station level. The central controller shall support the creation of a customized site map. The central controller shall provide system status at the station level and make system changes.

The central controller shall have the ability to communicate with and control with up to 48 stations .

The central controller shall permit true random access of all stations in the system and allow programs to be constructed with any combination of stations regardless of wiring sequences or satellite designation.

The central controller shall have built-in, help screens with "hot keys" to hyperlink to on-line troubleshooting assistance.

The central controller shall employ advanced hydraulic/electrical systems management, allowing the user the 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 and run times based on the program priority and hydraulic limits set for each source and pipe, and for the electrical limit set for each field controller (LXD&DECODERS).

The central controller shall have the ability to manually start programs for an entire group or for an individual STATION. Manual programs may be started in normal or syringe/test mode. The central controller shall have the ability to start a multi-manual cycle in a satellite, running up to 6 stations simultaneously with a run time of up to 59 minutes.

The central controller shall have the ability to independently suspend (hold) the automatic operation of an individual station, program, group or the entire system. The hold duration shall be programmable for the current irrigation day up to seven 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 12 switches. 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).

The central controller shall allow a user-defined response to a LDI or weather station-based alarm. The alarm response shall have up to 99 responses for local and globalized control.

The central controller shall provide system status indications and allow the user to remotely view the operational status and program memory.

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, group and satellite information, flow and program, 4) satellites report stations that did not run due to undetected 24 V a.c.

The central controller shall have the ability to graph water usage by the irrigation system.

The central control system software shall be Year-2018 compliant.

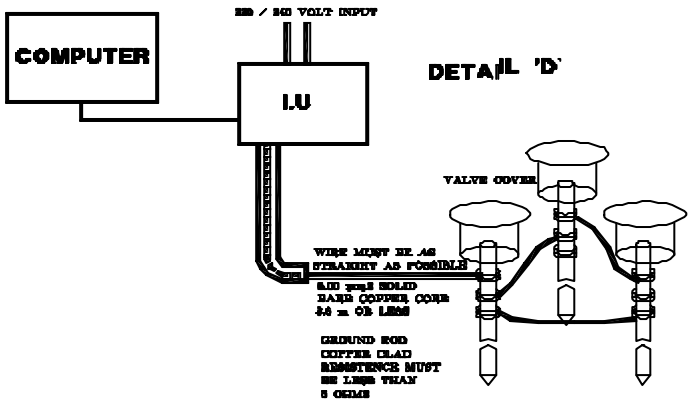
The system shall require a personal computer, which has been certified by the manufacturer for use with the central control system.

Grounding System.

At the central control location, as close to the Interface units as possible install a grounding system.

Install a standard 12" x 18" x 12" rectangular valve box around the top of any connection in the grounding system to a surge arrestor, and the grounding lug of a piece of equipment. This shall provide future access to inspect and/or maintain it properly.

A #10 gauge or larger bare copper ground wire shall be run from the grounding lug and attached to the grounding system going out to the field controller units. A 10 OHMS or less resistance shall be maintained at the grounding system.



CENTRAL COMPUTER & INTERFACE UNIT
WITH GROUNDING GRID

1.04
1.05 VALVE BOXES

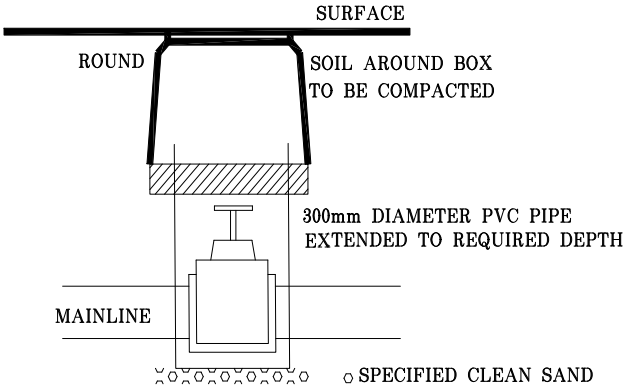
General
The valve boxes to be constructed of glass reinforced polypropylene or ABS with bolt down or lockable lid.All isolation valves for lateral pipes and quick coupling valve pipe work shall be housed in round valve boxes. All isolation valves for mainlines, automatic control valves with isolation valves, air valves and pressure regulation valves shall be housed in rectangular valve boxes.

Type
(i) Rectangular boxes for control valves with isolation valves and air valves and shall be 1419B.
(ii) Rectangular boxes for Grounding rods shall be RAINBIRD Model 7" Round or equal.
(iii) Round boxes shall be RAINBIRD Model 910-12B or equal.

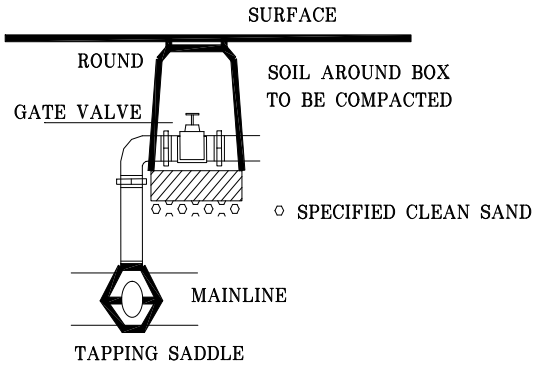
Installation
Valve boxes are to be installed with lids flush with finished grade. Each box must have either bricks or timber blocks placed under to support box and prevent the box from resting on pipe work. **This support work must ensure that backfill material or surrounding soil does not enter the valve box.**
Furthermore, a 50mm bed of sand or fine gravel shall be packed in the base of the box

DETAIL 'F'

MAINLINE ISOLATION VALVE



MANUAL CONTROL VALVE



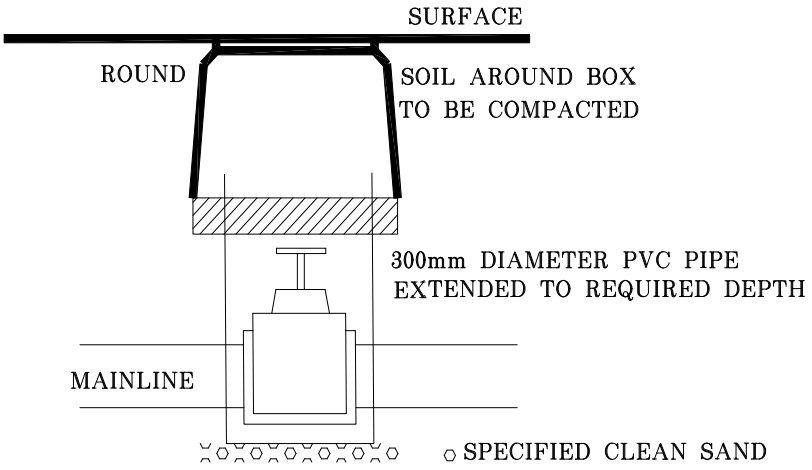
1.06 ISOLATION VALVES

Installation

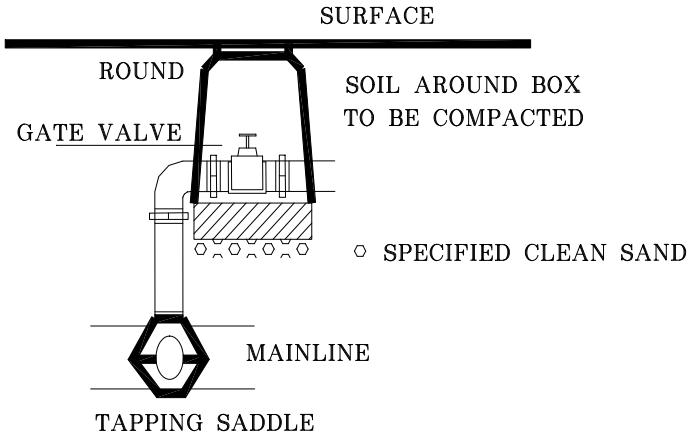
All isolation valves on the mainline must be installed as per Detail 'F' with spindles or levers having adequate room to be operated and install top of valve no less than 100mm from top of valve box.

All mainline valves must be thrust blocked and strapped as per Appendix A. Straps shall be galvanized steel rod.

DETAIL 'F'
MAINLINE ISOLATION VALVE



MANUAL CONTROL VALVE



1.07 VALVES

General

A total of 10 x 50mm double acting air valves shall be installed at local high points around the mainline pipe work. Final location shall be made on site by the irrigation Company (refer to the Layout Plans).

Type

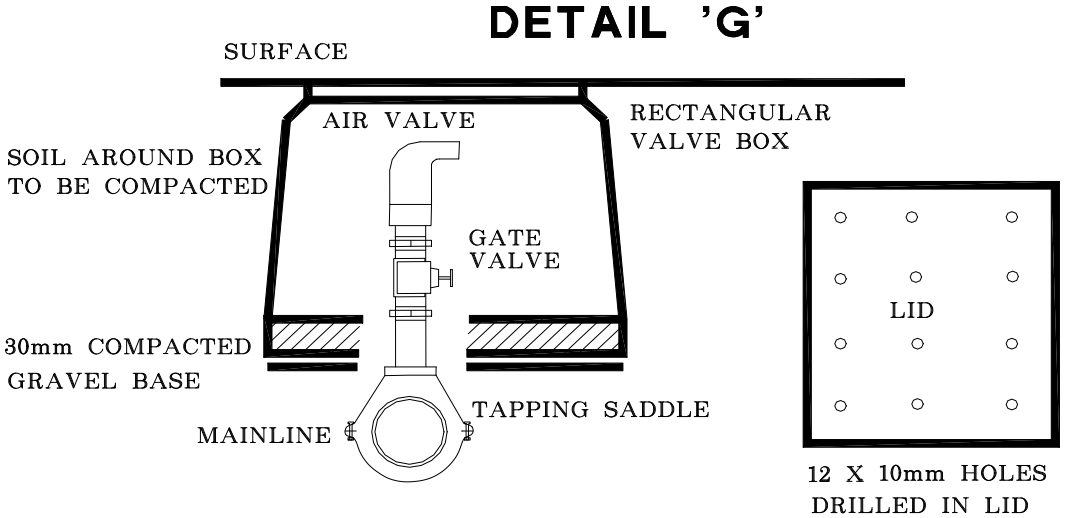
Air valves shall be **(50mm) double acting including ball valve.**

Installation

Air valves may be installed above ground where they are not obtrusive. In prime viewing areas, place valve underground in a rectangular valve box as per Detail 'G'. A minimum of 12 x 10mm. holes should be drilled into the valve box lid to allow air to vent from the box.

1.08 SCOUR VALVES

General



Scour Valves shall be placed at suitable low points in the system to enable emptying of the system into Lakes or Canals should servicing be required. The valves shall be sized 80mm diameter.

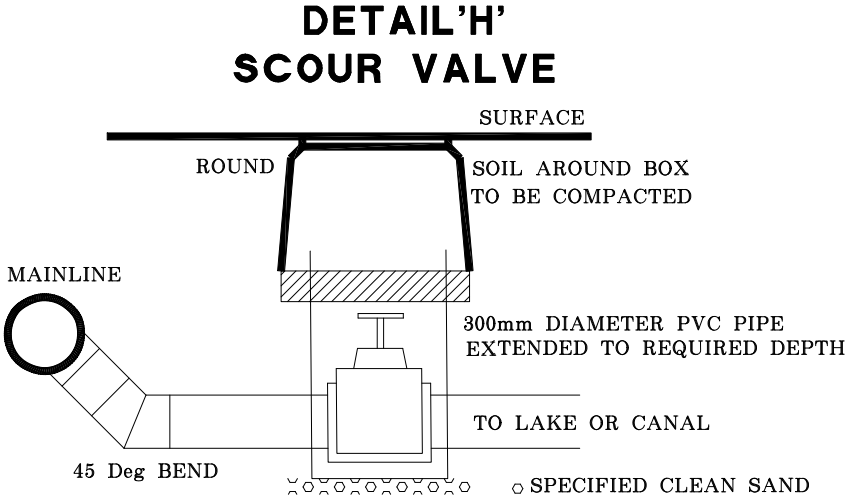
All scour valves shall be the same type as the mainline isolation valves and shall be located as per the Irrigation layout drawing:
Final location to be confirmed by the company

Type

Valves shall be cast iron epoxy coated, sluice, suitable sized. Valves shall be selected to have pressure losses not exceeding the equivalent of 10m of pipe.

Installation

All scour valves off the mainline must be installed as per Detail 'H' with spindles or levers having adequate room to be operated. All valves must be thrust blocked and strapped as per Appendix A. Straps shall be galvanized steel rod.



1.09 ELECTRICAL POWER CABLING- 220 /240 Volt

General

Indian Standard 4 mm2 three core copper conductor aluminum annealed armored cable.

1.10 ELECTRICAL CONTROLL CABELING--24 Volt

General

All 24 volt cabling shall be Rain bird single or multi-stranded conductors polyethylene insulated. A single active cable must be run for each control valve as well as for any controller stations not used at this point in time.

All laterals shall have at least two spare cables run to the farthest control valve
Controllers to be protected using main surge protectors as per manufacturer's recommendations.
Cable joins to be in accordance with manufacturer's recommendations.

The Irrigation Contractor is responsible to ensure that all cable arrangements are in accordance with the manufacturer's recommendations.

All Active cables shall be:	1.5 sq mm
Common cables:	
Where individual common cables are run:	2.5 sq mm

(All cables to be confirmed with equipment manufacturer)

1.11 ELECTRICAL CUMMUNICATION CABLING – 24 VOLT-RAINBIRD

Type
All 24-volt cable shall be either rain bird Polyethylene insulated single solid copper conductor or polyethylene insulated and PVC sheathed cable.

Installation
Controller to solenoid valve wiring shall be direct buried alongside pipe work and coiled at each solenoid valve. All changes of direction shall incorporate an expansion coil. Refer Detail 'J'. Adequate slack must be allowed along the trench lines to prevent stressing the cables during the backfilling process.

1.12 ELECTRICAL CABLING – COMMUNICATION

General
The communication cable shall be run from the Central Control Interface Unit to each of the Field Decoders.
The communication cable must be separated from all other cables by a minimum of 200mm if laid in the same trench and must be supplied and installed as per the manufacturers recommendations

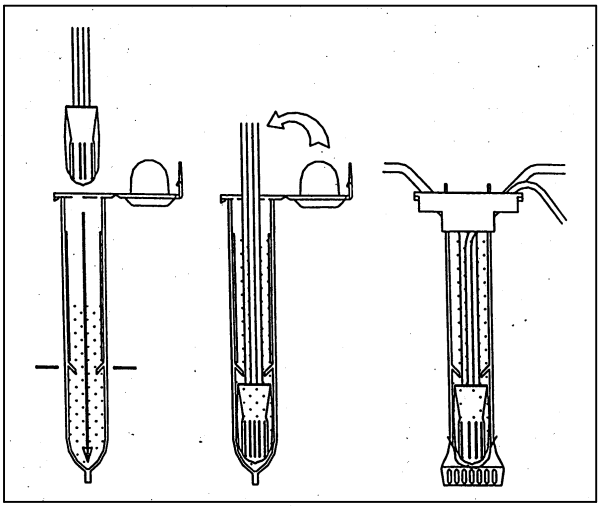
The Irrigation Contractor shall provide a decoder controller cable routing plan, showing size, number and alignment of communication cable location.

Type
The communication cable shall be 2.5-mm^2 two-core copper conductor direct burial.

CABLE JOINTS

General
24-volt cable joins must always be inside valve boxes .All communication cable joints are to be made at field satellite locations.

Type
(i) Communication Cable as per manufacturer's recommendation
(ii) 24-volt cable joints shall be DBY or DBM type in accordance with manufacturer's specifications.



DETAIL 'I'
TYPICAL WIRE CONNECTION DETAIL

1.14 PIPE & FITTINGS

General

All pipe work shall be HIGHDENSITYPOLYETILENE (HDPE) equivalent to IS 4895. All mainline pipe work shall be run in roughs where possible to keep major pipe work off heavy play areas. Pipe work on bridge crossings shall be either steel or electrofusion welded polyethylene.

All pipe shall be of 12 kg/cm2 pressure rating.

Type

(i) Mainline pipe work shall be hdpe as IS 4895 and shall be rated for pressures of 10 kg/cm2 (minimum).
(ii) Lateral pipe work shall be HDPE as IS 4895 and shall be rated for pressures of 10 kg/cm2 (minimum).
(iii) Fittings for mainline pipe shall be as per IS 7834. All main & lateral fittings shall be Electrofusion weld/Compression fittings.(up to 90mm dia)

Installation

Unless otherwise specified or shown on the drawings, the construction of sprinkler lines and installation of control cables shall include excavation and backfill, the furnishing, installing and testing of pipe work and restoration of existing utilities and all other works in accordance with the plans and specifications.

Unless otherwise indicated on the drawings or required, all pipe work shall be installed with a minimum cover of 450mm over mainlines and 300mm over lateral lines based on finished sub grades. Generally, piping under concrete or asphalt shall be installed by jacking, boring or hydraulic driving. Where any cutting or breaking of pathways, concrete and/or asphalt, approval shall be obtained from those having proper jurisdiction.

Where piping is shown under paved areas, but running parallel and adjacent to plant or turf areas, the intent of the drawing is to install the piping in the planted or turf areas.

Minimum cover under roadways or paving shall be500mm and pipe shall be bedded and covered with sand to a minimum of 100mm above the pipe. The remainder shall be backfilled with Type B Grade crushed rock compacted to 95% A.A.S.H.O. and all road or path surfaces must be restored to its original condition.
Where conduits are required under roads, they shall be installed as described in the above paragraph.

Plastic pipe shall be installed in a manner so as to provide for expansion and contraction as recommended by the manufacturer and in accordance with the IS or

Indian Standard.

Solvent Welding:
Solvent cement types

Fast - For small diameter and cool conditions.
Medium - For general-purpose and ambient temperatures below 30 degrees C.
Slow - For large diameter (200mm upwards) and hot conditions.

Procedure:
1. Ensure spigot end is cut square.
2. Mark spigot with pencil where socket mouth will end.
3. Clean and degrease both inside of socket and outside of spigot with priming fluid.
4. Using a clean dry brush apply an even coat of solvent cement, first to the socket, then to the spigot. Care should be taken to prevent ponding of solvent cement at back of socket.
5. The spigot should be quickly pushed into the socket squarely and held for a few seconds.
6. Wipe off excess solvent cement.

All mainline pipe work shall have an indicator tape placed 200 mm below the surface level.

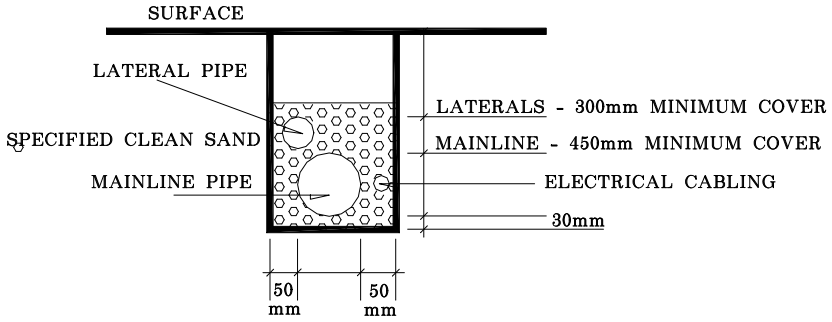
1.15 EXCAVATION & BACKFILL

General
In general, the contractor must excavate to a sufficient depth to ensure a minimum of 450mm cover over mainlines and a minimum of 300mm cover over lateral pipework.

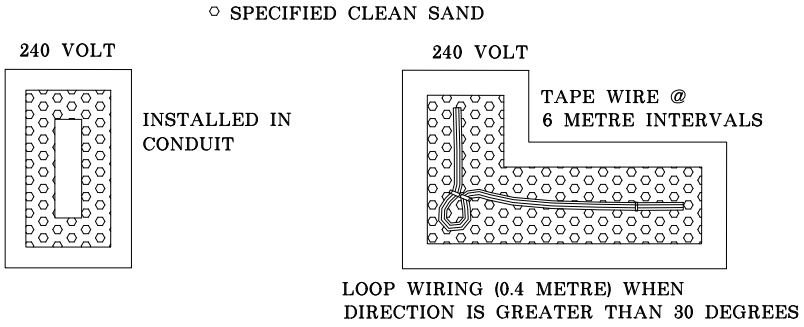
Installation
Backfill material shall be compacted to the same density as adjacent soil and any subsequent sink age will not be accepted.

All trenches that are opened during any particular working day shall be closed and backfilled on the same day. No open trenches or partially backfilled trenches shall be left overnight.

DETAIL 'J'
GENERAL PIPE DETAILS



ELECTRICAL CABLING DETAILS



1.16 PUMP STATION

General **VFD PUMPING STATION USING GRUNDFOS PUMPS**

EXISTING PUMP STATION

Mechanical

Discharge Piping

All piping shall be constructed from Class C Galvanized iron pipe or equivalent pipe or heavier as required to maintain a 3 to 1 pressure safety factor (including 1/16" corrosion allowance). All piping shall be hydrostacally tested to 150% of maximum shutoff pressure.

Paint

Structural steel and piping shall be commercially sand blasted and evenly coated with 2 ½ to 3 mils epoxy primer. A 1 ½ to 2 mil finish coat of polyurethane shall then be applied. The control panel shall be dip cleaned, acid etched and neutralized, iron phosphate coated and painted with a finish coat of 1/12 to 2 mils of polyurethane.

Bolts

All bolts used in the assembly of the pumping shall be GR5 cadmium plated to retard corrosion.

Pump Check Valve

Pump check valves shall be bolted directly to the pump discharge heads and sized per the technical data sheet. They shall of the silent operating type that begin to close as forward velocity diminishes and be fully closed at Zero velocity preventing flow reversal. Valve bodies shall be cast from grade 35 cast-iron or better and shall be free from blowholes, sand holes and other impurities. The valve design shall incorporate a center guided, spring loaded pop up, guided at opposite ends and having a short linear stroke that generates a flow area equal to the pipe diameter. Valves shall be sized to permit full pump capacity to discharge through them without exceeding a pressure drop of 2.5 PSI.

Pump Isolation Valves: Discharge

Pump isolation valves shall be of the butterfly type with grooved ends to provide for expansion and vibration dampening and a lever operator. They shall be sized as shown in the technical data sheet. Valve body and cover shall be made of cast iron valve shall be rated to 300 PSI.

Air Release Valve

A properly sized air release valve shall be installed on top of the stuffing box mounting plate of each discharged head. Valve shall function to release separated air (generated by the starting of the pumps) to atmosphere. Discharge of air release valve shall be vented back to the wet well. Valve shall have cast iron body cover with stainless steel internal trim, and a button to prevent malfunctions due to corrosion.

Pressure Relief Valve
A pilot operated modulating relief valve shall be included and sized per the technical data sheet. The valve shall be set 7 to 10 PSI above operating pressure and shall relieve when inlet pressure exceeds spring setting on pilot. Valve shall be quick opening and slow closing to minimize surging. Discharge of relief valve shall be piped back to wet well. Valve body shall be cast iron with inlet and outlet flanges and shall be rated for 200 PSI. A water strainer shall be installed on the inlet of the relief valve. Specifications for this isolation valve shall be the same as for the station isolation valve later in the specification.

Pressure gauge
A pressure gauge shall be mounted on the discharge header with an isolation ball valve. All gauges shall be silicon filled to reduce wear due to vibration. Accuracy shall be within 2% gauge diameter shall be 3 ½" minimum. Range shall be at least 30% higher than the highest pressure attainable from the pumps at shutoff head conditions. Stainless steel back & bronze internal.

Station Isolation Valve
Station isolation valve shall be installed on the discharge of the pump station to completely isolate the pumping system from the irrigation system. Valve shall be of the lug style butterfly type. Valve shall have one piece body cast from cast iron.

FILTRATION

150m3 filtomat (amaid) autobackflush 100micron filter unit made in Isrel.

Electrical (under client scope)

Scope
To provide complete instrumentation and controls to automatically start, stop the pump along with provision of full safety features needed to protect the equipment and irrigation piping system.

Control Enclosure
Controls shall be housed in an enclosure with integral latches. The control enclosure shall be constructed of 18-gauge steel and the back plate assembly shall be constructed of 18-gauge steel. The enclosure shall be painted as specified in the pain specification listed under relevant section.

All indicating lights, reset buttons, speed potentiometer, selector switches and the operator interface device shall be mounted on enclosure door. All internal components shall be mounted and secured to the removable back plate assembly.

All electrical equipment shall be protected by a secondary surge arrestor to suppress voltage surges on incoming power. Unit shall have maximum clamping voltage of 1500 volts.

Main Disconnect

A non-fusible main disconnect shall be provided to completely isolate all control and motor starting equipment from incoming power. Main disconnect shall have a through the door operator, and shall be sized as shown in the technical data sheet.

Control Power

Power for the controls shall be provided by a control power transformer, which shall provide 220 volt, THREE-phase power for the pumping system control operation. Control power transformer shall not be used for any other external load. The control power transformer shall be protected on the primary side by control limiting fuses of adequate size and voltage rating. All control components shall be protected by time delay circuit breakers of adequate size.

Motor Starting Equipment

Unless modified, all motor starters for the pumping station shall be mounted on a single back panel in a single enclosure as specified in relevant section. Motor starters shall be rated for a minimum of 1,250,000 operations.

Codes

All equipment and wiring shall be mounted within the enclosure and labeled for proper identification. All adjustments and maintenance shall be able to be done from the front of the control enclosure. A complete wiring circuit and legend with all terminals, components, and wiring identification shall be provided. Main disconnect shall be interlocked with door.

----------END----------

Schedule of work progress -BTC Central control Irrigation System

W.E.F: AUGUST '10-2019	Weeks from Start 10.08.2019 END 10.10.2019									
Weeks from Start	1	2	3	4	5	6	7	8	9	10
Work Description										
Mobilisation of Materials										
Arrival of Pipes										
Setting out and marking										
Commencement of Earthworks										
Mainline works begin										
Lateral line works begin										
Mainline works complete										
Lateral line works complete										
Installation of RAINBIRD material										
Pumpstation commissioning										
Flushing of system										
Fixing sprinklers										
Commissioning of system										
Training and handover										

ANNEXURE - II

TENDER DOCUMENT- 2, FOR IRRIGATION&EF FITTINGS AND AUTOMATION COMPONENT - COMMERCIAL

I. Automated Irrigation System at BTC - MAINTRACK/INNER& OUTER SAND TRACK,"C"BUNDSCHOOL

	DISCRIPTION	Make/model	Units	Qty	Rate	Amount
1	**SPRINKLERS & ACCESSORIES**					
a	Supply of **Pop up spray RD 1804 Series Spray bodies, ,with hand adjustable rotary nozzle having mutilple stream MPR spray and Co-moulded triple - blade wiper seal** is molded into the cap and features an encased plastic 'cage' to provide unmatched resitence to grit, nozzle capable of **covering 0.9-7.3m at 1.0 - 6.9 Bars, pressure**, and the enviroment with patented **PRS pressure regulator built into the stem and flow optimizer technology, flow shield technolgy , SAM** and **Debry pocket for mud collection**, Two-piece ratchet mechanism, Features is Precision controlled flush at pop-down clears debris from unit, Construction of time-proven UV_resitant plastic. **Including Swing joint assembly Supply of 1/2" Pop up Connecting Swing joint Assembly. The tubing shall be made of polyetylene having wall thickness of 2.3mm ,a working pressure of 5.5 kg/cm2 at 43oC and a surge pressure of 16.6 kg/cm2. The fittings shall be made of UV resistant thermo plastic.SA Series**	**RAINBIRD -R VAN24**	**Nos**	**500**		
B	Supply of Pop up sprinkler full/part circle having radius of throw 15m - 23m & flow of 0.09 - 0.61 ltr./sec.at an operative pressure of 2.5 - 4.5 kg/cm.sq. , The sprinkler is gear driven rotary type with **RC technology having 1" bottom inlet, with memory arc , non strippable and brass reinforced nozzle turret** .The sprinkler shall have multi-function, pressure-activated wiper seal for low pressure opreation a The sprinkler shall have internal Seal - A - Matic device which prevents low head drainage (upto 3.1m) & hence puddling & erosion. The body of sprinkler is of non - corrodible, heavy duty, ABS plastic.**8005** series **SS SAM Rain Curtain™ Nozzel Technology,Color-coded Nozzles Including 1"swing joints assembly Supply of 1" Pop up Connecting Swing joint Assembly. The tubing shall be made of UPVC ,a working pressure of 5.5 kg/cm2 at 43oC and a surge pressure of 16.6 kg/cm2. The fittings shall be made of UV resistant thermo plastic. TSJ series**	**RAINBIRD /8005 SS EQUIVA**	**Nos**	**250**		
c	Supply of Supply of Pop up sprinkler full/part circle having radius of throw 10 to 15 m & flow of 0.23 - 0.35 ltr./sec.at an operative pressure of 2.5 - 4.5 bar. The sprinkler is gear driven rotary type with slip clutch mechanism and heavy duty retract spring. memory arc , non strippable Drive Mechanism and brass reinforced nozzle turret ,left right both side arc adjustment,Memory arc technology,part and fullcircle in same sprinkler . Arc Adjust thru Top Cover w/ Std. Screwdriver.The sprinkler shall have multi-function, pressure-activated wiper seal for low pressure opreation a The sprinkler shall have internal Seal - A - Matic device which prevents low head drainage (upto 3.1m) & hence puddling & erosion. The body of sprinkler is of non - corrodible, heavy duty, ABS plastic.8005 SAM Rain Curtain™ Nozzel Technology,Color-coded Nozzles **3/4" Pop up Connecting Swing joint Assembly WITH 12mts 5005 model popup.** The tubing shall be made of polyetylene having wall thickness of 2.3mm ,a working pressure of 5.5 kg/cm2 at 43^{o}C and a surge pressure of 16.6 kg/cm2. The fittings shall be made of UV resistant thermo plastic.**SA**	**RAINBIRD /SA 5004 PLUS/PRS SAM**	**Nos**	**350**		
D	COMPESSION FITTINGS/PVC/HDPE /EF/FITTINGS AS PER THE TENDER DOCUMENT-1 AND SITE CONDITION	SAB/FUSIONTECH/GF/ rainson	LS	**LS**		
E	Supply of **HDPE service saddle** of varying size	**SAB/PIMTAS/Rainson**	Nos	**1370**		
	SUB TOTAL					
2	**VALVES & ACCESSORIES**					
a	Supply of PVC Ball Valve,security pivot to maintain lever in space,double water tight joint,direct injection stem non mechanical ,with a base which permits maximum penetration into the valve of size 63mm.	**SAB/PIMTAS**	Nos	**71**		
b	Supply of a double acting Air release valve 1.5" made of high strength aluminium / plastic with fibre glass reinforced . The Air release valve shall be capable of both releasing and admitting air from and into the line. The working pressure shall be 5 bar.	**RAINBIRD/BERMAD/ ARAMAS**	Nos	**40**		
c	Supply of 12" Rectangular Valve Box with **greenlid and corrugated structure** with unique shovel access slot and bolt hole knockout	**RAINBIRD / VBSTD**	Nos	**71**		

d	Supply of 10" Round Valve Box with **greenlid and corrugated structure** with unique shovel access slot and bolt hole knockout	**RAINBIRD / VB10RND**	Nos	**50**		
e	Supply of 6"Round box with greenlid and corrugated structure with unique shovel access slot and bolt hole knockout	**RAINBIRD / VB6RND**	Nos	**40**		
f	Supply of Quick coupling valve made up of solid brass with locking cover corrosion resistant and stainless steel spring **3RC**	**RAINBIRD MAKE 3RC**	Nos	**40**		
g	MAINLINE ISOLATION VLV FOR MAINTENANCE WORK 140MM&160MM AS PER THE DWG PN16 BAR	**PIMTAS / IMPORTED**	NOS	**7**		
h	Supply of Key threads into top of QCV to provide water access **33DK**	**RAINBIRD MAKE**	Nos	**10**		
	SUB TOTAL					
3	**AUTOMATION COMPONENT**					
	DECODER Equipment					
a	Supply of 14 Awg **cable** with **high molecular weight polyethelene and applications upto 600volts, temperature upto -55 to+ 60 deg centigrade ,soft drawn bare copper meeting ASTM B3, tensile strenth 1400PSI** for two way communication between solenoid valvel and decoders complete With sleeve conduit.	**Rainbird/paige**	Mtr	**762**		
b	Supply of Direct burial14 Awg x 2 **Maxi cable with PVC insulated UL stndard 493 with impregnated polyethene jacket and soft annealed tin coated copper confirming to ASTM B-33** for two way communication between decoder controller and decoders complete with sleeve conduit pipe	**Rainbird/paige**	Mtr	**3000**		
c	Supply of **decoder control system outdoor rated, UV resistant,wall mount case, to support sensor decoder,turf decoders and line surgeprotectors (LSP) with options of program BACK UP AND RESTORE , cycle +soak,Raindelay,ET managers ,weather station, controlling upto 5 master valve(5water source)with diagnostic feature in wire shorttest ,voltage test at stations,ping test and with option to upgradable to IQ central control** including , standard accessories complete	**Rainbird - ESP LXD**	No	**2**		
d	Supply , Fixing & Commissioning of **ESP LXD Decoder Control SM75 Station expansion Module**	**RAINBIRD - SM75**	NO	**10**		
e	Supply o**f Field Decodertor support 1,2,4 or 6 stations ,fully water proof encapsulation,power draw 0.5mA at idle and 18mA at active ,working range 0 deg to 50degree centigrade** as per specifications and with different station capacities as given below Field Decoder 1 station FD101	**Rainbird - FD101**	Nos	**80**		
f	Supply of 2" Solenoid globe Valves with **fabric reinforced diaphram and rugged PVC construction ,compatible with decoder system ,and slow closing to prevent water hammer,pressure rating upto 10.4bar and maximum flow of 150GPM ,max water temp. upto 42degree centigrade, with 24AC solenoid,current rating 0.41A @60Hz,coil resistance 30ohm with provision to attach PRS-Dial**	**Rainbird - PESB BSP/PEB**	Nos	**80**		
g	**Supply of PRS-DIAL to Maintain constant outlet pressure between 1.04 to6.9bar**	**RAINBIRD - PRSD**	Nos	15		
h	Supply of **direct bury -on wire connector with strain relief, UL486 D certified with waterproof silicon sealant ,fits wire from 22ga to6 ga** as per specifications complete	**Rainbird - DBTWC**	Nos	**200**		
I	Supply of **Line Surge Protection device as required with copper grounding rod, clamps, charcoal** and all requisite accessories complete **LSP**	**Rainbird - LSP1**	Nos	**15**		
	SUB TOTAL					

4	**centralcontrol**					
a	Supply of **flow sensor** with six blade impeller programablefrom computer with accuracy + or - 1%,flow rate 0.5-30feet per sec with 100psi max pressure ,temp upto 60degree centigrade with PT3002 pulse transmitter as per specifications complete	**RAINBIRD**	Nos	**2**		
b	Supply of complete feedback **Sensor decoder** ,encapsulated in moisture and UV resistant case to monitor flow,moisture,rainas per specifications complete	**RAINBIRD SD**	Nos	**2**		
c	**Supply of IQ NCC network Communication Cartrige(IQ Cloud Operation) shall be enabled to access controller through mobile and tab for full operation of irrigation system and Cloud shall have Global weather feature and pin enabled access for user and dry run to budget available water**	**RAINBIRD/IQ NCC**	No	**2**		
d	**Supply of IQ software with Evapotranspiration feature package,advance flow sensing options,RS 232 network catridge,connection module, and cable,communicate between weather station and computer to analys eavapotranspiration, temp., humidity,wind velocity,rainfall and control irrigation schedule on daily basis as per specifications complete including DESTOP (Computer) UPS, Power conditioner, printer and all grounding equipments etc.**	**RAINBIRD IQV2**	Nos	**1**		
	TOTAL RS					
					ANNEXTURE-III	
	A,B BUNDSCHOOL, BARI SCHOOL AUTOMATION WORK					
1	**AUTOMATION COMPONENT**					
	DECODER Equipment					
a	Supply of 14 Awg **cable** with **high molecular weight polyethelene and applications upto 600volts, temperature upto -55 to+ 60 deg centigrade ,soft drawn bare copper meeting ASTM B3, tensile strenth 1400PSI** for two way communication between solenoid valvel and decoders complete	**Rainbird/paige**	Mtr	**762**		
b	Supply of Direct burial14 Awg x 2 **Maxi cable with PVC insulated UL stndard 493 with impregnated polyethene jacket and soft annealed tin coated copper confirming to ASTM B-33** for two way communication between decoder controller and decoders complete	**Rainbird/paige**	Mtr	**750**		
c	Supply of **decoder control system outdoor rated, UV resistant,wall mount case, to support sensor decoder,turf decoders and line surgeprotectors (LSP) with options of program BACK UP AND RESTORE , cycle +soak,Raindelay,ET managers ,weather station, controlling upto 5 master valve(5water source)with diagnostic feature in wire shorttest ,voltage test at stations,ping test and with option to upgradable to IQ central control** including , standard accessories complete	**Rainbird - ESP LXD**	No	**1**		
d	Supply o**f Field Decodertor support 1,2,4 or 6 stations ,fully water proof encapsulation,power draw 0.5mA at idle and 18mA at active ,working range 0 deg to 50degree centigrade** as per specifications and with different station capacities as given below Field Decoder 1 station FD101	**Rainbird - FD101**	Nos	**13**		
e	Supply of 2" Solenoid globe Valves with **fabric reinforced diaphram and rugged PVC construction ,compatible with decoder system ,and slow closing to prevent water hammer,pressure rating upto 10.4bar and maximum flow of 150GPM ,max water temp. upto 42degree centigrade, with 24AC solenoid,current rating 0.41A @60Hz,coil resistance 30ohm with provision to attach PRS-Dial**	**Rainbird - PESB-BSP/PEB**	Nos	**13**		
f	**Supply of PRS-DIAL to Maintain constant outlet pressure between 1.04 to6.9bar**	**RAINBIRD - PRSD**	Nos	**5**		
g	Supply of **direct bury -on wire connector with strain relief, UL486 D certified with waterproof silicon sealant ,fits wire from 22ga to6 ga** as per specifications complete	**Rainbird - DBTWC**	Nos	**50**		
h	Supply of **Line Surge Protection device as required with copper grounding rod, clamps, charcoal** and all requisite accessories complete **LSP**	**Rainbird - LSP1**	Nos	**5**		
	SUB TOTAL					
					ANNEXTURE-IV	
	SWIMMING POOL WATER FOR INNER /OUTER SAND TRACK APPLICATION					

1	**PUMPING UNIT WITH VFD ARRANGEMENT - 15LPS @ 85MTS HEAD**					
a	Supply of Hydro-Pneumatic Pumping System with Variable Frequency Drive Mechanism of suitable capacity with Suction & Delivery Manifold, Wafer Seal Butterfly Valve as Isolation Valves, Non Return Valves, Pump Control Panel, Pressure Vessel, mounted on a Baseframe with proper supports. (1+1)	**Grundfos/AQUATEX**	No.	1		
b	Suction ,Delivery & Header Pipe	**TAT B CLASS**	Lot	1		
c	Control Valve in mainline for bypass and flow diversion of approved quality	**LEADER / AQUASTAR / ISI MAKE**	No.	15		
	SUB TOTAL					
					ANNEXTURE-V	
	RAINBIRD WEATHER STATION					
1	**WS PRO-2 WEATHER STATION**					
a	Supply of WS PRO WEATHER STATION The WS-PRO2 Weather Station collects and stores weather data from field locations. This information is retrieved by the Central Controller daily, allowing SiteControl, IQ v3.0, and Maxicom² ® to adjust station run time and/or schedule day cycle frequency according to each day's ET (evapotranspiration) and rainfall. WS-PRO2 Weather Stations are highly accurate, durable, and reliable. They are built using the highest quality sensors available and will provide years of reliable data, even in the toughest environments. An on-board data-logger continually polls the sensors which measure air temperature, relative humidity, wind speed and direction, rainfall, and solar radiation. **INCLUDING PROPER GROUNDING METHODS AS PER MANUFACTURER RECOMMANDATIONS**	**RAINBIRD/CAMPEL**	No.	1		
b	BELTON CABLE	**RAINBIRD/CAMPEL**	mts	750		
c	HUAL MODEM	**RAINBIRD/CAMPEL**	No.	1		
	SUB TOTAL					
					ANNEXTURE-VI	
	NEW IRRIGATION SYSTEM TO "C"BUNDSCHOOL AND SAND BATH					
1	**NEW IRRIGATION SYSTEM TO "C"BUND SCHOOL**					
a	Supply of Automated Irrigation system to "C"Bundschool Including piping work and earthwork excavation and refilling with complete automation work etc,,...	**Rainbird**	No.	1		
	SUB TOTAL					
					ANNEXTURE-VII	
	ANNEXTURE -VI REPLACEMENT OF OLD 30HP MOTORS INTO NEW PUMPS					
1	**NEW IRRIGATION 30HP PUMPS REPLACEMENT**					
a	Supply of CR90-4 NEW Pumps for Automated Irrigation system with complete automation work etc,,...	**aquatex/ Grundfos**	No.	2		
	SUB TOTAL					
	PRE QUALIFICATION , TERMS AND CONDITIONS					
1	**Applicant should have an experience in design, project implemenetation and maintainanace of Central Control Automated Irrigation Sytem to any race course In India**					
2	**Applicant should complete the Central Control Automated Irrigation System implementation and operational mainaiance at least one race course in India from last five years**					
3	**Special Condition: (a) Project period 10th August 2019 to 30th Septomber 2019**					
	(b) Design, project implementation and commisioning has to complete within 60 days					
4	**Free annual operational maintainance contract for ONE year aftrer commissioning**					