

APPROVED MATERIALS LIST

**LANDSCAPE MAINTENANCE, DRAINAGE FACILITIES, AND
MAINTENANCE ASSESSMENT DISTRICTS (LMAD/DFAD/MAD)**

CITY OF VICTORVILLE
PUBLIC WORKS DEPARTMENT

**APPROVED MATERIALS LIST FOR LANDSCAPE MAINTENANCE, DRAINAGE FACILITIES,
AND MAINTENANCE ASSESSMENT DISTRICTS (LMAD/DFAD/MAD)**

Note: Only materials on this list may be used in the construction of LMAD/DFAD/MAD. Material substitutions must be authorized in advance by a City Planning Division Representative.

	MATERIALS		DESCRIPTION	BRAND/PART#
1.	Backflow Preventer, Reduced Pressure Principle	a.	¾" through 2" diameter, with wye strainer and ball shut-off	FEBCO 825Y-BV-S or equal
		b.	2 ½" through 10" diameter, without wye strainer, with resilient seat, NRS gate valves	FEBCO 825Y-RW or equal
		c.	2 ½" through 10", with wye strainer, 150# flange connections with blow-out port	WILKINS 975 or equal
2.	Backflow Enclosures	a.	Aluminum alloy, vented with locking mechanism	"STRONG BOX" SERIES SBBC-AL or equal
		b.	Aluminum Alloy, vented, insulated for cold weather protection with locking mechanism	"STRONG BOX" SERIES SBBC-AL1 or equal
		c.	R-30 insulation blanket is required on backflows 2" or smaller.	Best choice is USA or equivalent
3.	Gate Valves	a.	2" and smaller – threaded bronze body, NRS, star or cross handle	NICO T-113K for 150 WOG or HAMMOND IB645 or equal
		b.	2 ½" and larger – threaded ductile iron body, NRS; 2" square top stem, resilient seat wedge, epoxy coated inside and out	WATEROUS 500 SERIES or equal
		c.	2 ½" and larger – mechanical/flange joint body, NRS; 2" square top stem, resilient seat wedge, epoxy coated inside and out	WATEROUS 500 SERIES with appropriate gaskets or equal
4.	Ball Valves	a.	Brass body, threaded with handle	HAMMOND 8204 or NIBCO 580 or equal
5.	Angle Valves	a.	2" and smaller (without union) – bronze body cross handle, threaded ends	HAMMOND IB643 or NIBCO T-311 or equal
6.	Quick Coupling Valves	a.	Two piece body with locking rubber lid, 1" inlet	RAINBIRD 44NP or equal
		b.	¾"x1" single slot couplet key	RAINBIRD 44K or equal
		c.	1"x ¾" swivel ell	RAINBIRD SH-1 or equal
		d.	1"x1" swivel ell	RAINBIRD SH-2 or equal
7.	Remote Control Valves	a.	Plastic body, globe pattern, threaded ends, flow control stem with cross handle, electric solenoid	RAINBIRD PEB-PRS-D or equal
8.	Pressure Regulator	a.	Bronze body, threaded ends, adjustable stem with locking feature and internal filter screen, 50 to 200 psi range, 300 psi inlet, 25 psi to 75 psi range	1" through 3" – WILKINS 600 SERIES or equal 1" through 3" – WILKINS 500 SERIES or equal
9.	Central Control System (Rain Bird Maxi-Com)	a.	Master Valve – 3" diameter or larger	BERMAD or equal 710P
		b.	Master Valve – 2" diameter or smaller	RAINBIRD GB SERIES brass valve or equal

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		c.	Flow Sensor – 4" diameter or smaller	RAINBIRD LFS SERIES brass or equal installed with an unspliced shielded cable in 1 ¼" conduit. Paige electric cable # P-7162-D or equal
		d.	Larger than 4" diameter	SATTLE with insert type sensor
		e.	Cluster Control Unit (CCU) 28-RMK	Outside – RAINBIRD CCU 28 – RMK Inside- RAINBIRD CCU 28W - RMK
10.	Sprinklers	a.	4" pop-up with scal-a-matic check valve in head, pressure-regulating stem as required, ½" inlet	RAINBIRD 1804-SAM or equal
		b.	12" pop-up with scal-a-matic check valve in head, pressure-regulating stem as required, ½" inlet	RAINBIRD 1812-SAM or equal
		c.	Plastic nozzles should be specified on the plans, if they are to be used, to fit Rain Bird 1800 and 600 series, fixed arc spray nozzles	RAINBIRD 1800-B MPR SERIES or equal
		d.	Fixed arc, to fit Rain Bird 1800 and 600 series	RAINBIRD B-SS SERIES or equal
		e.	Variable arc nozzle 0-330 degree, spray type, plastic body, to fit Rain Bird 1800 and 600 series	RAINBIRD X-VAN or equal ("x" denotes the spacing)
		f.	Impacts – Stainless steel, full or part circle, plastic nozzles with distance control.	RAINBIRD 5000 – SAM, RAINBIRD FALCON 6504 or equal
11.	Bubblers	a.	All full circle, pressure compensating, ½" inlet, plastic body, nonadjustable	RAINBIRD 1401 SERIES
12.	Boxes	a.	Green plastic boxes for all valves and wires with two #8 stainless steel metal fasteners, 1" length round head and spanner drive	
		b.	Supply 2 spanner screwdrivers per ten valve boxes.	BROOKS or equal
13.	Valve Markers	a.	3" diameter domed had valve survey markers, solid brass with 2" shank, stamped with ¼" lettering with each valve type and it's number (for areas that are 15' or greater)	BEN MEADOWS CO. 101328 or equal
14.	Booster Pump Assembly	a.	Simplex water pressure booster system as designed and fabricated by Barrett Engineered Pumps and provided by Imperial Technical Services (714) 792-2920. The system shall be a completely prefabricated system with pump, piping, electrical and structural elements. The entire booster pump assembly shall be UL listed and approved.	
		b.	Pump shall be:	1) (GA Series) Single stage end suction close coupled centrifugal, cast iron bronze fitted construction, equipped with mechanical shaft seal, back pullout design. Impeller shall be threaded directly to the end of the shaft. Pump shaft shall be stainless steel with no sleeve. Pump shall be directly coupled to a C-face electric motor.

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				2) (C### Series) single stage end suction close coupled centrifugal, cast iron bronze fitted construction, equipped with mechanical shaft seal, back pullout design. Impeller shall be keyed and locked to the shaft with a hex head impeller nut and washer. Pump shaft shall be high strength S.A.E. 1045 carbon steel protected in the stuffing box area by a replaceable bronze shaft sleeve. Pump shall be directly coupled to a C-face electric motor.
				3) (CR Series) Vertical Multi-Stage Centrifugal. Pump construction shall be cast iron stainless fitted with cast iron casing, stainless steel impellers and bowls. Pump shall be equipped with tungsten carbide mechanical seal. Pump shall be directly coupled to a C-face electric motor.
		c.	Electric motor shall be of the squirrel cage induction type suitable for full voltage starting. Motor shall be ODP to aid in cooling. Electric motor shall be rated for continuous service. The motor shall have horsepower ratings such that the motor will carry the maximum possible load to be developed under the designed pumping conditions and not overload the motor beyond the nameplate rating of the motor. Motor shall have a 1.15 service factor. The motor shall conform to the latest NEMA Standards for motor design and construction.	
		d.	Pump Control Panel shall have a NEMA 4X plain front non-metallic enclosure with padlock latches. This includes power and control re-settable thermal circuit breakers, heavy duty magnetic starter with adjustable overload protection, hand-off-auto switch to select mode of operation, and heavy duty numbered terminal strips for power and control wiring lead terminations.	
		e.	Metal oxide varistor protected pump start relay(s) incorporated in panel to start pump with signal from each irrigation controller.	
		f.	All system piping shall be type "L" copper. All fittings shall be copper or brass, with unions or flanges to allow for system disassembly or major component removal. System shall incorporate an integral full size bypass line with isolation valve to allow for pump removal and repair without disrupting water supply to system.	

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		g.	Isolation valves shall be all brass quarter turn ball valves with hard chrome ball on lines 2" and less. Isolation valves shall be lug style butterfly valves with Buna-N elastomeric seats, ductile iron nickel coated disc, and stainless steel stem with handle and 10 position galvanized memory plate on lines 2' ½" and greater.	
		h.	Gauges shall be 2 ½" diameter face, glycerin filled with stainless casing and brass internals.	
		i.	Flow activated paddle style magnetically coupled flow switch, sensitive to flows as low as 1 fps, mounted on piping and interconnected to time delay relay to shut down pump on no-flow conditions, time delay relay adjustable from 0 to 5 minutes.	
		j.	Pump system shall be mounted on a structural aluminum skid with mounting flanges on front and back to allow for mounting of skid to concrete pad. Skid equipped with pipe support on suction and discharge piping. All nuts and bolts and washers to be heavy zinc coated steel on skid and piping. Skid shall include mounting hardware for integral aluminum enclosure.	
		k.	The system enclosure shall be vandal and weather resistant, marine grade aluminum alloy 5052-H32 construction with rectangular punch-outs for viewing and heat dissipation. The enclosure shall be low profile hinged top design with padlock provision. The cover shall be secured to the concrete pad with stainless steel hardware.	
		l.	Pump Assembly shall include the following option(s):	1) (VFD) Where specified by the System Design Parameters, a Variable Frequency Drive system to convert incoming 1 phase power to 3 phase power for the motor.
				2) VFD system to receive feedback signal from system mounted stainless steel pressure transducer, and in conjunction with internal software driven PID control loop maintain customer adjustable constant system discharge pressure by varying the speed of the pump in response to varying system load.

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		m.	The services of a victory representative or trained service professional shall be made available on the job site to check installation and perform the startup and instruct the operating personnel. A start up report containing voltage and amperage readings, suction and discharge pressure readings, estimated flow conditions, and general operating characteristics shall be submitted to the owner.	
		n.	Four sets of operating and maintenance manuals shall be provided to the owner after startup and shall include parts manuals for major components, performance curve for pump, general sequence of operations, and electrical schematic for control panel.	
15.	Product	a.	Conduit	All Communication cable interconnect conduit and conduit fittings shall be 1 1/2" Schedule 40 PVC pipe, unless otherwise noted.
		b.	Conductors	1) Communication Path – Link Radio communication for the irrigation interconnect as required from the Cluster Control Unit(s) (CCU) to the satellite unit(s) shall be 2 watt, 450 MHz Data radio/modem unit(s) with RS-232 cable from CCU and satellite unit to radio/modem unit (9 pin only), RG-58 antenna cable, antenna (as specified).
				2) The flow sensor wire shall be a two conductor of ICEA class B, 16 AWG 7 strand, conforming to ASTM B-3 and B-8, aluminum shield with drain wire, and shall have a jacket of .50 sunlight and moisture resistant PVC as manufactured by Paige Electric, Inc. (product #P7162D).
				3) Flow sensor wire may be extended to a maximum distance of 2,000 feet from the location of the assembly to which it is connected. Wire shall be installed in a 1" PVC Schedule 40 pipe.
				4) All conductors shall be the same type and shall be of the sizes shown on the drawings as required for proper operation of the systems.

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		c.	Wire Splices	1) Conductors shall be installed with no underground splices, unless absolutely necessary and unavoidable. Any and all underground splices that are required to be made, must be approved by the Architect, and shall be placed in a suitable type valve box for easy access.
				2) Wire splices on the two conductor cable communication wires shall be made with 3M DBY splice kit.
16.	Controller	a.	Automatic Controller(s) and Related Equipment	1) Controller(s) shall be as indicated on the drawings, and will be manufactured by Rain Bird Sprinkler Manufacturing Corp. Controller shall be installed per manufacturer's specifications, as shown on the drawings, and as specified herein. All controllers shall be Rain Bird Model #ESP-SAT-XX.
				2) The irrigation system controller shall be of a hybrid type that combines electromechanical and microprocessor based circuitry capable of fully automatic, semi-automatic, and manual operation. The controller will be housed in a weather proof, lockable 16 gauge seamless steel cabinet suitable for wall mounting or free standing pedestal mounting.
				3) The controller shall operate on a 117 VAC 10% at 60 Hz and be capable of actuating up to two 24 VAC, 7 VA, solenoids per station plus a master valve or pump start relay. The controller shall operate two (up to nine) stations plus the master valve simultaneously. Controller output and input shall be protected against severe electrical surge.
				4) The controller shall have four separate irrigation programs (A, B, C & D) which may have different start times, watering days and station timing. Each program shall be capable of up to 8 start times per day.

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				<p>5) The controller shall have 12, 16, 24, 28, 32, 36 or 40 stations, each capable of an operating time of 0 to 2 hours in one minute increments. Stations assigned to the Drip program shall be capable of an operating time of 0 to 59 minutes in 1 minute increments and 1 to 12 hours in 10 minute increments. The controller shall be capable of automatic sequential stacking to avoid overlapping operation, except for the Drip program, which will operate concurrently with the other programs.</p>
				<p>6) The controller shall provide a separate water budget feature for each of the A, B, and C programs. Water budget shall allow simultaneous adjustment for all stations on a program from zero% of set running time to 200% of set running time. Adjustments shall be in 10% increments.</p>
				<p>7) The controller shall have a 365-day calendar with day-of-the-month OFF feature. Programs will run on an ODD/EVEN day cycle, day-of-the-week ON/OFF cycle or in cycles from 1 to 99 days. In addition, the controller shall have a programmable rain shut down from 1 to 99 days.</p>
				<p>8) The controller shall have a master valve/pump start circuit for use with a master valve to pressurize the system when the irrigation cycle starts, or to activate a remote pump start relay to run the pump during the irrigation cycle. The master valve/pump start circuit shall be ON/OFF programmable by station.</p>
				<p>9) The controller shall be capable of being operated manually at any time. A manual single station, a group of stations or a program can be selected to run for a programmed time or a new time setting without affecting the normal program.</p>
				<p>10) The controller shall be capable of operating a variable test program without affecting the controller's normal program station times. The variable test program shall be from 1 to 9 minutes. This feature shall be functional even during rain shutdown.</p>

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				<p>11) The controller shall have Cycle + Soak water management feature that is capable of operating each station for a maximum cycle time and a minimum soak time to reduce water run-off and puddling. The maximum cycle time shall not be extended by water budgeting.</p>
				<p>12) The controller shall have internal non-volatile memory capable of program memory retention for a minimum of 10 years without power. The controller shall include a NiCad 9 VDC rechargeable battery and recharging circuit which will maintain and run the time of day operation during power outages of up to 48 hours. Recharging circuit shall also be used for counting down the program-in-progress during a power outage and allow programming of the controller when disconnected from the main power supply.</p>
				<p>13) There shall be status indicator lights for each station plus the master valve circuit. Each station plus the master valve will be protected by a diagnostic circuit breaker which will allow that station to be bypassed during the program. These lights will indicate station operation and circuit integrity.</p>
				<p>14) An indicator for sensor status will be on the front panel along with a switch to suspend sensor operation. This indicator and override will work with a sensor wired to the controller's sensor terminals.</p>
				<p>15) During operation the unit shall provide a monitoring readout indicating station in operation and time remaining. The satellite shall have a 12 hour AM/PM or 24 hour clock.</p>

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				<p>16) Under all normal operation, all station timing of the satellite unit shall be done by the central control computer through the CCU and not according to the times programmed at the satellite. The programming on the satellite unit itself shall only be functional in case of emergency, should the communication link between the satellite and the CCU is lost. It shall be strictly for a stand-by operation of the satellite in case of emergency. The change over to the stand-by program and/or back to the central control status shall take place automatically and not require a trip to the field to set each satellite unit to the back-up mode or the central mode.</p>
				<p>17) The controller, when operated by the CCU shall be capable of random access or operations of the individual stations and is not required to be operated in numerical sequence. Any of the stations may be repeated anywhere within the scheduled cycle of operation as often as desired and for a different amount of time on each repeat, if so desired. It shall also be possible to place any individual station in as many different scheduled cycles as may be desired. There shall be no limit or restrictions as to the number of individual scheduled cycles a given station may be scheduled in at any one time.</p>
				<p>18) In local field control and operation, the controller shall be capable of being manually operated on any one of the stations for single-station operation, any portion of a cycle or a complete cycle manually started, as desired. This shall be possible without moving the central control – independent station control satellite switches from the central control position. When the central control-independent station controller satellite switch is in the independent station controller satellite position, the satellite unit will ignore all central control communications and programming and respond only to its own programming as to start days, start times, and individual station timing, operating the stations as programmed and performing all functions as normal stand-alone controller.</p>

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				19) The controller shall have two internal jumpers to allow the operator the opportunity to choose from either a factory default or no default and from an electronic style backup verses mechanical style backup.
				20) Each controller unit shall be capable of being programmed in the field (at the time of installation) to respond to one of 28 different signals (or channels) from the CCU. The unit shall be capable of being reprogrammed to a different signal (channel) at any time. Satellites of 32 or 40 stations shall use 2 different signals (or channels).
17.	Cluster Control Unit Assembly	a.	The number and location of the cluster control unit(s) shall be shown on the drawing and shall be as manufactured by Rain Bird Sprinkler Manufacturing Corporation.	1) CCU shall be no less than twenty eight channels (CCU-28).
		b.	Each cluster control unit shall have a separate two-wire path to the satellite controllers under its control. This wire link shall be of the wire type, installed and herein specified. Through Link Radio communication, the CCU shall have a separate radio path to the satellite controllers under its control. The radio link shall be of the type, installed and herein specified.	
		c.	The cluster control unit shall connect directly to the telephone company lines via standard connector Model RJ11C, in full compliance with part 68, FCC docket 19528 or local telephone company standards.	
		d.	The cluster control unit assembly shall be pre-assembled by Imperial Technical Services (ITS) in a "Strong Box" stainless steel weatherproof, vandal resistant, lockable enclosure with flush mounted handle as manufactured by V.I.T. products, Inc., per article 2.7. The complete assembly shall be listed with Underwriters Laboratories, Inc., with a 3R rating.	
		e.	The cluster control unit assembly (product # ISA series) shall consist of a stainless steel enclosure with a removable backboard, key operated on/off switch, ground fault circuit interrupter duplex receptacle and ground rod, wire and clamp. This assembly shall also include a 117 volt line primary protection (product #SP).	

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		f.	The cluster control unit assembly group shall include a rain gauge roof or pole mounted assembly (Link Radio product # LSRG or LSRGP) as shown on the drawings to be properly located to avoid interference from trees and buildings and connected to the nearest cluster control unit. This assembly shall consist of a rain gauge pulse decoder and mounting bracket.	
		g.	The cluster control unit assembly shall be covered by a five-year limited warranty. Warranty service shall be performed in the field on the site where the equipment is located.	
		h.	All components shall be properly wired to the appropriate terminal strip.	
18.	Satellite controller and/or Cluster Control Unit(s) (CCU) Enclosure(s)	a.	The enclosure shall be of a vandal and weather resistant nature manufactured entirely of 304 grade stainless steel. The main housing shall be louvered upper and lower body to allow for cross-flow ventilation. A stainless steel backboard shall be provided for the purpose of mounting electronic and various other types of equipment. The backboard shall be mounted on four stainless steel bolts that will allow for removal of the backboard. The required enclosure types shall be one of the following: 16" top entry, 18" X 52" electrical meter/controller, or 18" double-wide front entry.	
		b.	The inside door area shall provide adequate storage for plans, operating instructions and scheduling information.	
		c.	The enclosure door shall have a continuous stainless steel piano hinge, carriage bolted on one side and a three point locking mechanism on the other side. The handle controlling the locking mechanism shall be located at the base of the door and be concealed within the surface of the door. A stainless steel cam style lock shall be mounted in the door and a provision for a padlock shall be included within the locking mechanism.	
		d.	The enclosure shall be manufactured with a continuous drainage channel which mates with a teardrop shaped, hollow center, water-tight, thermoplastic door seal. The above described product shall be a NEMA 3R Rain-proof enclosure as listed by the Underwriter Laboratories, Inc.	
		e.	Controller enclosures shall be "Strong Box" manufactured by V.I.T. Products, Inc.	

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		f.	Controller number(s) and remote control access number(s) shall be neatly stenciled onto outside of enclosure door in 2" high letters using paint designed for direct application onto stainless steel.	
19.	Satellite Controller/Enclosure Assembly	a.	The number and location of the satellites shall be as shown on the drawings.	
		b.	All satellite assemblies shall be linked to a CCU via link radio.	
		c.	The satellite assembly shall be pre-assembled by ITS in a "Strong Box" stainless steel weatherproof vandal resistant lockable enclosure with flush mounted handle as manufactured by V.I.T. Products, Inc., per article #18. The complete assembly shall be listed by Underwriters Laboratories, Inc., with a 3R rating.	
		d.	The satellite assembly (product # IRA series) shall consist of a stainless steel enclosure, stainless steel removable backboard, terminal interface board with radio remote receptacle, key operated on/off switch, a ground fault circuit interrupter duplex receptacle. Ground rod, wire and clamp shall be provided with two or multi-conductors paths only.	
		e.	The satellite assembly shall include a 117 volt line primary protection assembly (product #SP).	
		f.	The satellite assembly shall have a master valve relay assembly (product #MVR) when more than one satellite is connected to the same master valve. This assembly shall consist of a 24 volt relay and socket.	
		g.	The satellite assembly shall have a Flow Sensing Assembly and shall consist of a pulse transmitter and a tee mounted sensor only (product #LFS series).	
		h.	The satellite assembly shall be covered by a five-year warranty. Warranty service shall be performed in the field on the site where equipment is located.	
20.	Radio Remote Control Equipment	a.	Remote control components shall be as manufactured by Remote Control Technologies, WA. As provided by ITS.	
		b.	Remote control receiver cards shall be a RCA permanent controller mount unit(s).	1) TRC shall be compatible with all electromechanical slid state and hybrid controllers.
				2) Output 24 VAC to pump start or master valve.
				3) Activate up to 7 valves plus pump start or master valve at once.

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				4) Programmable operating time of two (2) minutes to two (2) hours.
				5) 20 minute default shut-off time.
				6) Power is 24 VAC from controller.
		c.	Remote control transmitter (RCX) kit(s) shall include a hand-held remote control transmitter with belt clip, battery charger/transformer 115 to 15 VDC, 11 volt NiCad battery and flexible antenna with BNC connection to unit. Transmitter shall have an effective range of one mile.	
21.	Data Collection	a.	Each controller shall also include data collection (#DAT Series).	
		b.	The data collection shall be represented by the number of stations on the specified controller (12-40 stations).	1) The satellite assembly shall include #DATXX for the purpose of MAXICOM data collection for a XX station ESP satellite controller. This data collection is for the purpose of inputting collected field data such as station locations and types, flow data and precipitation rates (per manufacturers catalog), into a MAXICOM central computer and software for creating irrigation schedules.