HYLAND POINTE Homeowner Association

Apple Valley, MN

Stage II

Landscape Irrigation Assessment

Report & Recommendations

OCTOBER 10, 2022

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Water in Motion®

CLEAN WATER LAND & LEGACY AMENDMENT

Vermillion River watershed reflecting life

Apple Valley

METROPOLITAN COUNCIL

GENERAL

Date of Site Assessment: September 1st, 2022 Approx. Irrigated acres/Ft^2: 2.7/116,700
Approximate 2022 approximate value of this system in good condition: $80,000 to $95,000

We were hosted throughout the assessment by an involved board member who has taken a personal interest in the HOA irrigation system operation.

IRRIGATION SYSTEM GENERAL OBSERVATIONS

The irrigation system was installed approximately 1998 by Aqua Engineering of Eden Prairie, MN. The construction includes an outdoor municipal water supply and booster pump in a metal enclosure, an outdoor located controller and twelve stations of irrigation designed to serve the turf areas.

Irrigation scheduling was observed to be basic, lacking best practice techniques to help achieve efficient irrigation water application. The system is reported to have received minimum service and by various vendors over time. Service has been limited to spring system start-up, break-fix repairs, and autumn shutdown. We observed areas where efforts were made to overcome design or installation flaws, but we also observed many areas where sprinklers were leaking or obstructed by landscape growth. We also noted that station #2 has two areas wired together at the controller causing too much water demand at once in this area, resulting in poor sprinkler performance.

GENERAL RECOMMENDATIONS:

A. Budget for regular proactive system maintenance.
B. Replace broken and leaking sprinklers and relocate sprinklers blocked by landscape growth
C. Assemble a list of suitable replacement components for vendors to install to maintain system integrity. Include pressure-regulated sprinkler bodies to reduce overwatering and check valve sprinklers for low points to reduce waste from low point drainage.
D. Require matched application rate nozzles on sprinklers to reduce overwatering.
E. Separate the two zone controls tied-together on station #2 and schedule separately
F. Enact scheduling practices that employ water-efficient delivery of irrigation water

GENERAL RECOMMENDATION ESTIMATED COST RANGES:

ITEM	COST RANGE	ESTIMATED PAYBACK
A	$2,000-$2,500 annually, plus parts	
B	$5,000	3 seasons
C	Zero cost to create the requirement. Recommended sprinklers cost about 20% more than basic sprinklers	
D	Approximately 5 minutes of Tech time per sprinkler to properly nozzle	1 season
E	$1,000 to upgrade to a larger capacity controller	
F	$150	2 seasons

CONTROLLER AND SENSORS

The irrigation controller is a Hunter® brand Pro-HC 12. The controller is SMART-ready and can be upgraded to enable US EPA WaterSense® labelled operation. There was a basic rain sensor present but not in service.

CONTROLLER AND SENSOR RECOMMENDATIONS:

A. Employ a vendor knowledgeable with SMART controllers and best-practice scheduling methods
B. Upgrade the controller to enable remote control and EPA WaterSense functionality including weather-based scheduling
C. Replace the failed basic rain sensor with a device that offers programmable delays after rain events
D. Employ water-efficient scheduling methods such as “cycle-and-soak" application
E. Consider adding flow sensing to enable action and reporting of malfunctions

CONTROLLER AND SENSOR IMPROVEMENT ESTIMATED COST RANGES:

ITEM	COST RANGE	PAYBACK
A	$0	1 season
B	$1,600 including 1 year of cell service	3 seasons
C	$250	1-2 seasons
D	$0	1 season
E	$650	4 seasons

WATER SUPPLY AND BACKFLOW PREVENTION

The municipal water supply is sized adequately to serve the property. The system includes a booster pump that increases water pressure for adequate sprinkler performance. The reduced pressure zone backflow prevention assembly is tagged indicating testing compliance with Minnesota plumbing code.

WATER SUPPLY AND BACKFLOW RECOMMENDATIONS:

A. Add support posts and brace brackets under the plumbing equipment to relieve stress on fittings
B. Replace plastic (PVC) pipe with metallic pipe until below grade

WATER SUPPLY IMPROVEMENT ESTIMATED COST RANGES:

ITEM	COST RANGE	PAYBACK
A	$150	none
B	$400	none

IRRIGATION STATIONS/ZONES

A “station” or “zone” is a group of sprinklers that operate together.

The irrigation system was operated station-by-station with photos taken and basic observations noted. Please refer to the *Station By Station* section of this report.

The system design can be considered a below average departure from best practice-based design including large areas grouped together at a time without consideration for slope, sun, area. A common and significant result of grouping large areas together is the tendency to overwater some areas to get enough water onto other areas, a.k.a., “watering to the dry spot.”

IRRIGATION STATION/ZONE RECOMMEDATIONS:

A. Work with an experienced, cooperative irrigation service professional to implement measures to overcome watering to the dry spot
    - Consider applicants who employ industry certified professionals and/or EPA WaterSense Partners
B. Implement a plan to replace rotor-sprinklers randomly nozzled with matched application rate nozzles to improve distribution uniformity and water efficiency*
C. Move sprinklers to overcome changes in landscape or hardscape
D. Add sprinklers in areas of inadequate coverage
E. Add check valve sprinklers at low points to reduce drainage water waste
F. Use pressure regulated sprinkler bodies on replacement sprinklers

** A nozzle is the orifice that emits water from a sprinkler. Nozzles come in assorted sizes resulting in different amounts of water applied to the landscape. Best design and maintenance practices include matching application rates to the area being covered by a sprinkler – smaller nozzles on ¼ circle sprinklers, larger nozzles on sprinklers with greater coverage. “Distribution uniformity” is the evenness that sprinklers deliver water onto the landscape.*

IRRIGATION STATION IMPROVEMENT ESTIMATED COST RANGES:

ITEM	COST RANGE	PAYBACK
A	$0	1 season
B	$3,000	3-4 seasons
C	$500	2-3 seasons
D	$500	
E	$250	4-5 seasons
F	Approximately 20% more cost than basic sprinkler bodies	

EXAMPLES OF REPLACEMENT PRODUCTS FOR FUTURE MAINTENANCE

ORIGINAL ITEM	REPLACE WITH	OPTIONAL
Rain Bird PGA low voltage control valve	same	
Toro brand 570z spray body	EPA WS-labeled sprinkler body like Toro 570z-PRS-COM	
Toro 570 fixed spray nozzles	Toro Precision® spray nozzles (more water-efficient)	
Hunter brand PgP rotor	Hunter I20-PRB or Rain Bird 5004-PCSR pressure-regulating	
Hunter PgJ small rotor	same	MP rotator w/WS labeled sprinkler body
Hunter MP Rotator nozzle on a sprinkler body	same	EPA WS-labeled sprinkler body like Toro 570z-PRS-COM

EXAMPLES OF HOW TO ADD MATCHED APPLICATION RATE NOZZLES TO ROTOR-STYLE SPRINKLERS

Where rotor sprinklers water same/similar areas	Where rotor sprinklers simultaneously water fronts/sides/backs	OPTIONAL
Small nozzles on 1/4 to 1/3 arc, medium nozzles on 1/2 to 2/3, large nozzles on 3/4 to full circle	Small nozzles in shady areas, larger nozzles in sunny areas	Convert rotors to MSMT nozzles on WS-labeled sprinkler bodies

SAMPLE IRRIGATION MAINTENANCE REQUEST FOR PROPOSAL GUIDANCE CAN BE FOUND AT:

https://www.vermillionriverwatershed.org/wp-content/uploads/2020/03/HOA-Irrigation-System-Services-RFP-Template-Final-3_6_2020.docx

WATER INFORMATION

Apple Valley, MN 2022 monthly outdoor water price per unit (1,000 gallons) is $3.08

WATER USE HISTORY:

YEAR	ANNUAL USAGE (GALS)	APPROX. ANNUAL COST
2021	543,000	$ 1,591
2020	460,000	$ 1,283
2019	611,000	$ 1,619
2018	772,000	$ 1,945
2017	847,000	$ 2,033
AVERAGE (5 YRS)	*643,000*	*$ 1,992**

** Water usage reports provided by the City of Apple Valley, MN. The 5yr average of $1,992 uses the 2022 $3.08 water rate*

Recent year water use reductions may have been the result of scheduling changes that our host made to reduce water consumption.

ESTIMATED WATER NEED (BASED ON ET DATA & EFFECTIVE RAINFALL)

TURF (full sun to mostly sunny): 635,000 gallons Cost: $ 1,955

APPLICATION EFFIENCY RANGES AND SYSTEM OBSERVATIONS

An exceptionally well-designed and maintained sprinkler irrigation system may achieve up to 70% efficiency. Estimating the efficiency of this system depicts annual water use as follows:

“A Level” effectiveness and water use based on 70% efficiency = 921,816-gals Water Cost: $ 2,839

“B Level” effectiveness and water use based on 60% efficiency = 1,075,542-gals Water Cost: $ 3,312

“C Level” effectiveness and water use based on 50% efficiency = 1,290,542-gals Water Cost: $ 3,975

Efficient irrigation system designs include consideration for plant type(s), soil, slope, sun, water requirement, water supply, watering timeframes and sprinkler performance -known as distribution uniformity (how evenly a sprinkler applies water). Rainfall is considered 100% uniform and is a reference when factoring sprinkler performance.

Based only on a calculation of irrigation system efficiency (avg. water use/water need) at Hyland Pointe, the efficiency of the system appears to approach 100%. However, observations from this assessment indicate the system is not effectively applying water resulting in "C level" effectiveness at 50% or lower.

The calculation indicating a nearly 100% efficient system reflects the result of manual adjustments to the irrigation system schedules solely to reduce water use. If manual schedule adjustments to reduce water use were not performed, the system is estimated to use approximatively twice the amount of water than it currently is (1.29M gallons).

It should be the desire of Hyland Pointe HOA to operate the irrigation system in a manner to achieve "A level" effectiveness that includes both efficient water application and best practice-based scheduling.

Watering with a system that has had leaks repaired, employs water-saving components, uses nozzles that are sized for their respective application areas, a SMART irrigation controller with working rain sensor and automatic, SMART-based scheduling practices will help to achieve greater effectiveness and efficiency.

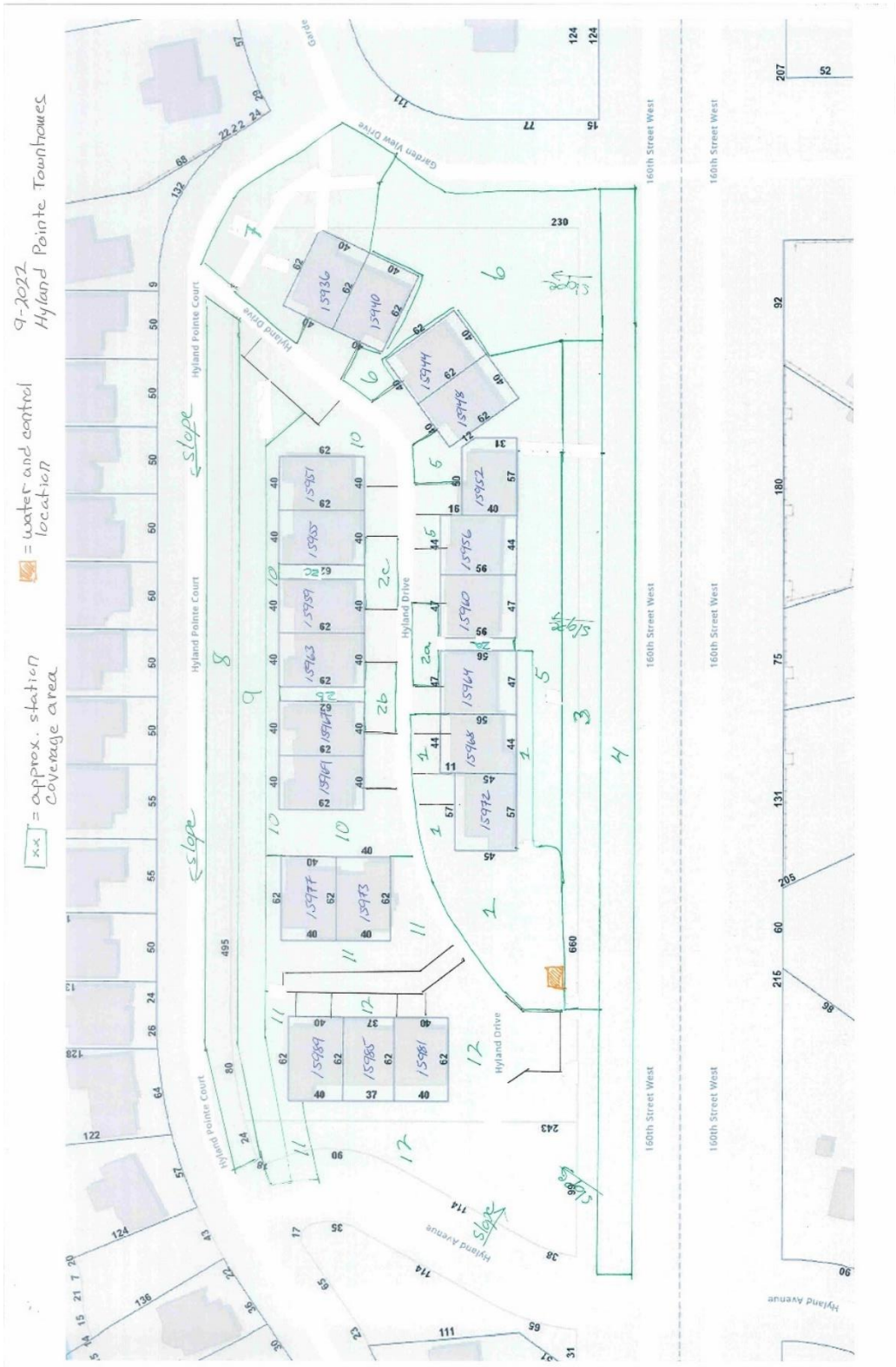
Because of such changes, the resulting health of the landscape will improve over time.

STATION FINDINGS SUMMARY

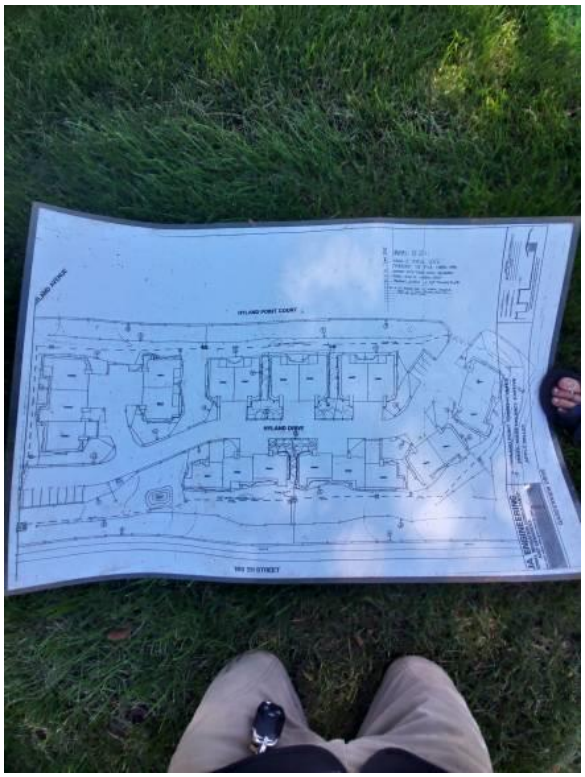
STATION	1	2	3	4	5	6	7	8	9	10	11	12	TTL
Number of Sprinklers	28	30	13	15	11	15	12	20	20	25	28	18	235
Broken or Leaking	5			10				18			15	10	58
Blocked or Move									15				15
Pitched or Too Low	6		5	8									19
Add or Change Sprinklers	X	X					X			X	X		
Balance Nozzles	28	30	13	15	11	15	12	20	20	25	28	18	235
Low Sprinkler Drainage		X						X	X	X			
Other		X											

End of Section

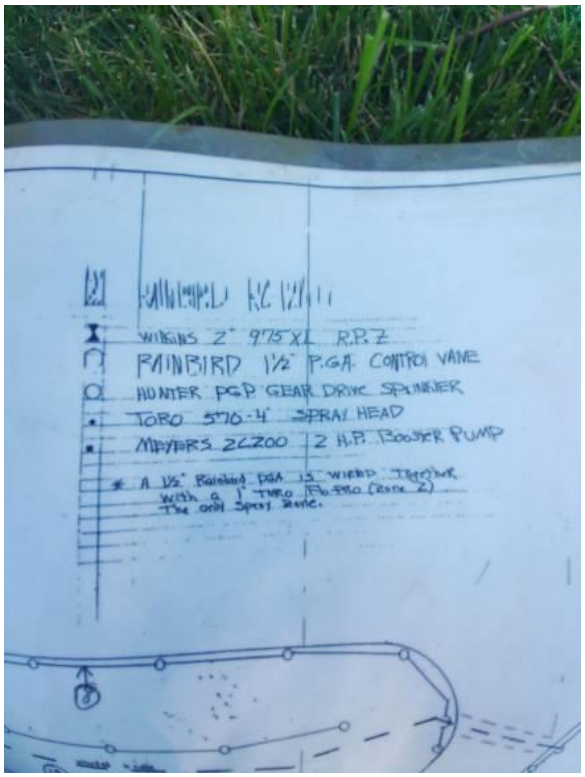
STATION MAP


9-2022
Hyland Pointe Townhomes
= water and control location
= approx. station coverage area
Hyland Pointe Court
Hyland Drive
Garden View Drive
160th Street West
Hyland Avenue
Slope

STATION BY STATION OBSERVATIONS



1.5" PVC main pipeline, Myers hard start booster pump. 12 stations. 1998 installation.



Aqua Engineering of Eden Prairie, MN installed the system
Original products included:

- Rain Bird brand control valves
- Rain Bird controller
- Hunter PgP large area, rotor-style sprinklers
- Toro 570z small area spray sprinkler bodies
- Toro 570 fixed spray nozzles
- The booster pump was included at the time of installation.

4" municipal water supply into 1.5" meter and Wilkins 975backflow prevention assembly tested 6/9/22.

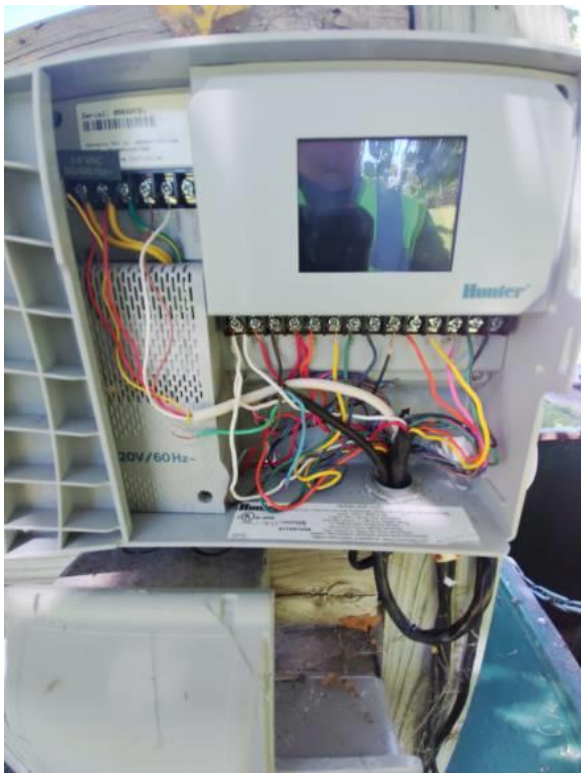
The 2hp Myers hard start booster pump is connected to the water supply with 2" metal pipe.

2” PVC pipe is attached after the pump to below grade.

Supply will benefit from all metal pipe to below grade.

Add supports to relieve stress on plumbing fittings.

Hunter Pro -HC SMART-ready controller. Irritrol basic wireless rain sensor, not connected.



12 station controller.

Station 2 has two wires indicating two stations are wired together.

Basic scheduling: Schedule beginas at 1AM on Mon and Fri only.

25 mins runtime applied to each station.

Host indicates she reduced schedule frequency to reduce water costs.

Sta 1 - rotors near water supply and in front of 15972 & 15968.

Pitched, leaking seals result in water waste and reduced effectiveness.

No matched appl rate, sprinkler to sprinkler.

Poor layout in front of 15968. See next image.

Sta 1 - front of 15968 - leaking seals poor sprinkler selection, poor placement.

Suggest replacing large area sprinklers with small area sprinklers and reconfigure layout for improved coverage and effectiveness.

Sta 2 - mixed sprinkler types results in overwatering areas.

Two stations are tied together at the controller. South = Fronts & between of 15964, 15960. See next image.

Sta 2 north side. Fronts & sides of 15967, 15963, 15959, 15955.

Mixed sprinkler types results in overwatering.

The side yards are especially overwatered. See next image.

Two separate stations of sprinklers are combined at the controller resulting in too much water demand and poor sprinkler performance. Many low quality spray-type nozzles.

Several sprinklers need maintenance including an apparent root pinch in front of 15955.

Sta 2 - Example of runoff along a side yard from over watering in less than 5 mins.

Sta 3 - 13 Hunter PgP rotor-style sprinklers on a hillside along 160th.

Possible root pinch at the maple tree cuts-off water to sprinklers resulting in poor effectiveness and water waste.

Sta 4 – Hunter PgP rotor-style sprinklers along 160th walk path from entry to entry. Some pitched sprinklers, some leaking seals.

Sta 5 –11 PgP sprinklers backs of south homes -see map.

No matched appl rate nozzles resulting in overwatered areas.

Sta 1 backs of homes. Dry area shown will benefit from larger nozzles to compensate for all-day sun.

Another example of the need to install matched application rate nozzles.

Sta 6 - 12-15 PgP sprinklers. Also operates the front of 15940 & 15944.

This station of sprinklers covers too large and diverse of an area resulting in overwatered back and side yards.

Suggest smaller nozzles in back and side yards to improve effectiveness of watering.

Sta 7 - rotors front & side of 15936. Wrong style of sprinklers in front.

Replace long-throw sprinklers with sprinklers appropriate to the size of area covered and add a sprinkler at drive corner.

Sta 8 - 18-20 PgP & Rain Bird 5004 sprinklers mixed along Hyland Point Ct. Most PgP sprinklers have leaking seals & lots of runoff after a few minutes of operation.

Some PGPs not rotating. Mixed nozzle sizes.

Middle 5-6 sprinklers at hill bottom will benefit from check valve installation to reduce waste from low point drainage.

Sta 9 - 18-20 PgP sprinklers along a center hillside along Hyland Point Ct. Many are blocked due to tree growth over time.

Sta 10 - 20-25 PgP sprinklers, top of hill along Hyland Point and front of 15951.

Suggest nozzle balance the entire station.

Change the large area rotor sprinklers in the front yard to smaller style sprinklers. Add a sprinkler at the drive corner.

Sta 10 – sprinklers in front & side of 15969 Suggest nozzle balance the entire station. Change the large area rotor sprinklers in the front yard to smaller style sprinklers. Add a sprinkler at the drive corner.

Also add check valve sprinklers at bottom of the hillside of 15969 to reduce waste from low point drainage.

Sta 11 - 28 sprinkers sprinklers covering a large area including front, sides and back of 15973 & 15977. Also, the front and north side of 15989.

Many PgP sprinklers with leaking seals. Suggest nozzle balance and smaller sprinklers in the front yards. Add sprinklers at drive corners for improved coverage.

Sta 12 –18 sprinklers front, side & back of 15981 and between 15981 & 15985

Suggest extensive nozzle balance and replace the PgP sprinklers that have leaking seals.

GLOSSARY

Arc – The area a part-circle sprinkler irrigates, expressed in degrees of a circle. For example, a 90-degree arc provides quarter-circle coverage, while a 180-degree arc provides half-circle coverage.

Backflow Preventer – A mechanical assembly installed to protect the potable water supply from potentially contaminated irrigation water.

Best Management Practices – An irrigation BMP is a voluntary irrigation practice that is both economical and practical and is designed to reduce water consumption and protect water quality while maintaining plant health at the desired level.

Certified Landscape Irrigation Auditor – The Certified Landscape Irrigation Auditor is involved in the analysis of landscape irrigation water use. Auditors collect site data, make maintenance recommendations and perform water audits. Through their analytical work at the site, these irrigation professionals develop monthly irrigation base schedules.

Controller – An automatic timing device that sends an electric signal for automatic valves to open or close according to a set irrigation schedule.

Cycle-and-Soak – Allows the user to divide a station's run time into more usable, shorter duration cycles. Cycle-and-soak is particularly applicable for slopes and tight soil (such as clay) and helps prevent excessive runoff. The cycle time is entered into the controller as a fraction of the station's watering time, and the soak time as the minimum soak required before the watering of the next portion. The total number of cycles is determined by taking the total programmed station run time and dividing it by the cycle time.

Distribution Uniformity – (Also referred as "Performance") Measure of the uniformity of irrigation water over an area.

EPA WaterSense Partner – WaterSense is a voluntary, public-private partnership program sponsored by the U.S. Environmental Protection Agency. WaterSense works to protect the future of national water supplies by promoting water-efficient products, practices and professionals. EPA WaterSense Partners are committed to bringing water-efficient products and practices to the market.

Fixed Arc Nozzles – Rotor style sprinkler where the arc stays static and is non-adjustable.

Hydrozone – Grouping of plants with similar water requirements so that they can be irrigated with a common zone.

Maintenance – The work of keeping something in operating condition.

Matched Application Rates – Refers to sprinklers that apply water at the same rate per hour no matter the arc of coverage or part of a circle they cover.

Microclimate – The unique environmental conditions in a particular area of the landscape. Factors include amount of sunlight or shade, soil type, slope and wind.

MSMT – A "multi-stream, multi-trajectory" sprinkler that uses individual, rotating streams of water to distribute irrigation water.

Municipal Water – Domestic or drinking water. It can be used as a source of irrigation water, but once water enters an irrigation system (and passes through the backflow device) it is no longer considered potable.

Nozzle – The final opening through which water passes from the sprinkler or emitter. Nozzle shape, size, and placement has a direct effect on the distance, watering pattern, and distribution efficiency.
Pitched Sprinkler Head – A sprinkler that is slanted or tilted.

Point of Connection – Location where irrigation system is connected to a (potable) water supply.
Rain Sensor – A device that automatically interrupts irrigation events during periods of sufficient moisture.

Rotor Sprinkler – A type of sprinkler where a primary stream of water is distributed back and forth across the area being watered.

Runoff – Portion of precipitation, snow melt or irrigation, that flows over the soil, eventually making its way to surface water supplies.

Spray Sprinkler – A sprinkler that does not rotate.

Sprinkler to Sprinkler Coverage – Single sprinklers generally do not provide even distribution of water

throughout their range of throw. When overlapping coverage is provided, the weak areas from one
sprinkler are supplemented by the strong areas from another sprinkler. Overlapping coverage also
reduces time necessary to complete an irrigation cycle from the perspective of total water required.

Station/Zone/Circuit – Section of an irrigation system served by a single point of control. Also known as a Hydrozone, optimally comprised of similar sprinkler types and plant material types and applying water onto a consistent topography or microclimate.

Topography – The arrangement of the natural and artificial physical features of an area.
Valve Box – A protective container installed around an underground valve to allow operation or maintenance access to underground pipeline valves.

Variable Arc Nozzles – Rotor style sprinkler where the arc can be adjusted to more accurately apply irrigation to nonconvention landscape areas.

WiM – Water in Motion, Inc.