Commercial Site Assessment™ Tier II

Prepared for: Morgan Square

20686 Keystone Ave Lakeville, MN 55044

2021 Season



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Irrigated Area



Commercial Site Assessment[™]

Date of Tier I CSA:	September 29, 2021
Certified Technician:	Jake Mathre CLIA, CIC, CIT
Date of Tier II CSA:	June 30, 2021
Certified Technician:	Jake Mathre CLIA, CIC, CIT
Irrigated Acres:	2.98
Irrigated ft^2 :	129,895 ft ²



Morgan Square Audit Observations

Morgan Square has 2 controllers with a total of 27 zones.

Controller and Sensor:

The two controllers each have a functioning rain sensor. Both controllers are Rainbird ESP controllers. These controllers are not smart controllers (weather based) that are capable of remote monitorization, which results in inefficient watering. The controller programming is correct with most zones running for 30 mins every other day.

Solution:

• Retrofit the controllers with Hunter Hydrawise Smart controllers and hot spots.

Zone by Zone:

While walking the property, we found:

- 146 of the 495 Rotors are leaking and need to be replaced
- 8 Spray heads were leaking and need to be replaced
- 14 heads need to be raised or straightened for proper coverage

Solution:

- Replace 146 rotors
- Replace 8 broken spray heads
- Raise/Straighten 14 rotors

There were some rotors in zones that had the wrong nozzle size installed for their area of coverage. Nozzles of rotors should change depending on area of coverage. If all nozzles are the same and the heads turn at a fixed rate, then areas covered by a 90° head will get more water and those covered by a 360° head will get too little.

Solution:

• Retrofit the remaining 349 rotors with new heads and correct nozzle sizes

There were a few areas with minor design issues that need to be addressed. These areas either need heads added and/or moved for proper spacing and coverage. Many of the coverage gaps are along the driveways and grass islands.



Solutions:

- Moving 11 heads
- Add 3 heads

Many of the zones along driveways had mixed application devices (sprays with rotors). Traditional spray heads apply water at three to four times the rate rotors apply water. On these zones, the 39 nozzles should be replaced with rotating nozzles to match the precipitation rates.

Solution:

• Retrofit 39 spray nozzles with rotating nozzles



Water Rates:

WATER RATES		I	rrigation	n Metered	System	
Converted Units:	X 1 unit = 100	00 gallo	ons			
Units Measured As:	X 1000 gallon	is	CCF			
Meter Reading Interva	I: Monthly	X Qua	arterly	Other	·	

Price per unit (per 1,000 gals)	\$5.64
Threshold per quarter	Irrigation Metered System
Sewer Rate per unit (if unmetered):	Does not apply

Historical Water Usage:

Year	Annual Water Usage (gallons)	Annual Water Cost*
2016	1,067,000	\$6,440.88
2017	1,632,000	\$10,050.48
2018	1,393,000	\$8,702.52
2019	1,258,000	\$7,941.64
2020	1,501,000	\$9,311.64
5 Year Average	1,370,200	\$8,573.93

** Average Taken from months with recorded water. Zero usage removed from average. Assuming if system ran, what would the average be?

Plant Water Requirement (ET Data & Average Effective Rainfall):

Plant Material:	645,49	95 gallons	Cost: \$3,64	11/year
Eff 04 - water no	eed	Eff 04 —	645,495 - 4	7 1104
water u	ise	EJJ %0 -	1,370,200 - 4	7.11%

Minimum EPA efficiency standard = 75%

Water Usage Goals:

Eff = 75%: 860,660 gallons used at an annual cost of **\$5,418**

Eff = 85%: 759,406 gallons used at an annual cost of **\$4,847**

Eff = 95%: 679,468 gallons used at an annual cost of **\$4,396**



Water Budgeting

	2016	2017	2018	2019	2020	average	Water Budget
Jan-May	0	0	0	0	0	0	0.00
June - Aug	1067	1091	1168	869	1171	1073.2	705.07
Sept - Dec	0	541	225	389	330	297	155.59
Total	1067	1632	1393	1258	1501	1370.20	860.66





Water Source and Backflow Prevention:

			WATER	SOURCE									
	Location Address	20566 En	d of Stree	t									
	Water Source	City											
	Backflow Device												
#1	Brand		Wilkins		Model								
Ce	Туре		RPZ		Size	2"							
nr	Visual Inspection	Leaks?	No	Notes		Looks Good							
SC	Date of Last Backf	ow Test	7/30/2018			Unknown							
		Meter / Deduct Meter											
at(Brand		Neptune		Model								
3	Туре		Analog		Size	2"							
	Serial Number				1514172485	6							
	Reading		3,6	574,486		Leak Detector Spinning?	No						
	Visual Inspection	Leaks?	No	Notes									



			WATER	SOURCE									
	Location Address	20864											
	Water Source	City	City										
	Backflow Device												
‡ 2	Brand		Wilkins		Model								
ce #	Туре		RPZ		Size	2"							
Sourc	Visual Inspection	Leaks?	No	Notes		Looks Good							
	Date of Last Backfl	ow Test	7/30/2018			Unknown							
	Meter / Deduct Meter												
ate	Brand		Neptune		Model								
\mathbf{i}	Туре	Digit	al /	Analog	Size	2"							
	Serial Number				1564679828								
	Reading		99	98,451		Leak Detector No Spinning?							
	Visual Inspection	Leaks?	No	Notes									



Controller Data:

IRRIGATION CONTROLLER											
	Location:						20566				
	Brand:			Rainbird		Мо	Model:		P-LX	Zone Count	16
			Program	Program	Program	Program		Sensors:		Rain	Weather
		#	Ā	В	c	D	Auxiliary	Installed?		Yes	
		1	9:30 PM					Bypassed	?	No	
	Start	2						Tested?		Yes	
	Times	3						Functiona	l?	Yes	
		4									
		5						Notes			
		6									
								R	emote Acce	ess Installed	1?
	Wate	r Days	Odd					Cell Card		Active?	
++		•						WiFi		Active?	
++	0							Hand Held	 	Active?	
ק	Onm Deading	Zone	Zone	Zone	Zone	Zone	Zone	Zone	R = Rotor	S = Spray	D = Drip
	Reading	1		Runtime	Runtime	Runtime	Runtime	туре			= Bubbler
0		2	30						Installed?	Tested?	Voltage
Ē		3	30						motaneu.	Testeu.	Voltage
Jt I		4	30						yes	yes	
5		5	30						Cont	roller Worl	king?
ы		6	30						Powered	LCD Panel and	
		7	30						Up?	Buttons	Working?
		8	30								
<u>.</u>		9	30						yes	y	25
L L		10	22						Sea	asonal Adjı	ust
D D		11	25						Global A	diust %	none
<u>اب</u>		12	25								
L		13	25						М	onthly Adju	ıst
—		14	30								
		15	30						Month	Set As	Recommend
		17	30						Januarv		
		18							February		
		19							March		
		20							April		
		21							May		
		22							June		
		23							July		
		24							August		
		25							Sept		
		26							October		
		27							November	•	
		28							December		



Location: 20684 Brand: Rainbird Model: ESP Count 11 Image: Start Image: Start Program Program Program Program Program Sensors: Rain Weather Start Image: Start Image: Start Image: Start Image: Start Sensors: Rain Weather Image: Start Image: Start Image: Start Image: Start Sensors: Rain Weather Image: Start Image: Start Image: Start Image: Start Sensors: Rain Weather Image: Start Image: Start Image: Start Image: Start Sensors: Notes Image: Start Image: Start Image: Start Notes Notes Image: Start Image: Start Image: Start Image: Start Image: Start Image: Start Notes Image: Start Ima						IRRIGATIO	ON CONTRO	OLLER				
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Start Times 1 11:00 PM Bypassed? No 2 - - Tested? Yes - 4 - - - Functional? Yes - 4 - - - Notes - - - 5 - - - - Notes - - Water Days Even - - - - - - 0hm Zone Zone Zone Zone Zone Zone Zone Zone Rentime Runtime Runtime Runtime Runtime Tested? Volt Back-up Battery 1 30 -		-		Α	В	C	D	Auxiliary	Installed?		Yes	
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Times 3		Start	2						Tested?		Yes	
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			23							July		
24 August			24							August		
25 Sept			25							Sept		
26 October			26							October		
2/ November			27							November		



Zone by Zone Findings:

				(Controlle	r 1 - ZON	E DATA				
ZONE	1	2	3	4	5	6	7	8	9	10	Totals
TOTAL # of Rotors		15	15	15	20	20	20		15	34	154
4" Rotor Broken		10	6	11	9	4	3			11	50
TOTAL # of Sprays	6						12			3	21
4" Spray Broken							2				2
Swap Mixed Head							12			3	15
Add Heads										2	2
Move Heads							2			2	4
Raise / Straighten						3			2	2	7
		r	-	(Controlle	er 1 - ZON	IE DATA	- t		-	
ZONE	11	12	13	14	15	16	17	18	19	20	Total
TOTAL # of Rotors	19	2	30	11	21	13					96
4" Rotor Broken			5		11	5					21
TOTAL # of Sprays	2	2	2	2	1						9
Swap Mixed Head	2	2	2	2	1						9
Add Heads											
Eliminate Heads						2					2
Move Heads			1								1
Raise / Straighten	3										3



<u>Controller 2</u>

					Contr	oller 2 - Z		ГА				
ZONE	1	2	3	4	5	6	7	8	9	10	11	Totals
TOTAL # of Rotors	13	31	21		22	13	20	20	34	34	37	245
4" Rotor Broken		7	2		5	2	7	7	17	11	13	71
TOTAL # of Sprays	1	3	1	17	2						8	32
4" Spray Broken				6							8	14
Swap Mixed Head	1	3	1		2							7
Add Heads					1							1
Move Heads						6						6
Raise / Straighten							4					4



Critical Repairs and Adjustments

Repairs	Price (each)		Price (each) Count		Total	
Installed Rotor	\$	65.00	146		\$	9,490.00
Installed 4" Spray w/ Nozzle	\$	65.00	8		\$	520.00
Raise/Straighten Head	\$	15.00	14		\$	210.00

Design Issues

Repairs	Price (each)		Count			Total	
Heads Needing to be Moved	\$	150.00	11		\$	1,650.00	
Heads Needing to be Added	\$	150.00	3		\$	450.00	
Match Precipitation Rates	\$	20.00	39		\$	780.00	

Recommended Efficiency Upgrades

Repairs	Price (each)		Count	Total	
Smart Controller Upgrade	\$	1,500.00	2	\$ 3,000.00	
High Efficiency Spray Nozzle Upgrade	\$	65.00	62	\$ 4,030.00	
Upgrade ALL Rotors w/ Proper Nozzle Size	\$	65.00	349	\$ 22,685.00	



In summary, completing the recommended critical repairs and upgrades will result in substantially more efficient water usage and healthier plant material.

Next Steps:

Fix critical repair issues
Match Precipitation Rates with Rotating Nozzles
Move and Add Heads for Proper Coverage
Retrofit controllers with Smart controller technology
Upgrade existing Spray Nozzles with High-Efficient Nozzles
Annually maintain and monitor property