

Commercial
Site
Assessment™
Tier II

Prepared for:

Morgan
Square

20686 Keystone Ave
Lakeville, MN 55044

2021 Season



763.434.5414
twincities@conservairrigation.com
conservairrigation.com

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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 Hydrowise 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.

Morgan Square



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:

Meter Reading Interval: Monthly Quarterly Other _____

Units Measured As: 1000 gallons CCF

Converted Units: 1 unit = 1000 gallons

WATER RATES	Irrigation Metered System
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: **645,495 gallons** Cost: **\$3,641/year**

$$Eff \% = \frac{\text{water need}}{\text{water use}} \qquad Eff \% = \frac{645,495}{1,370,200} = 47.11\%$$

Minimum EPA efficiency standard = **75%**

Water Usage Goals:

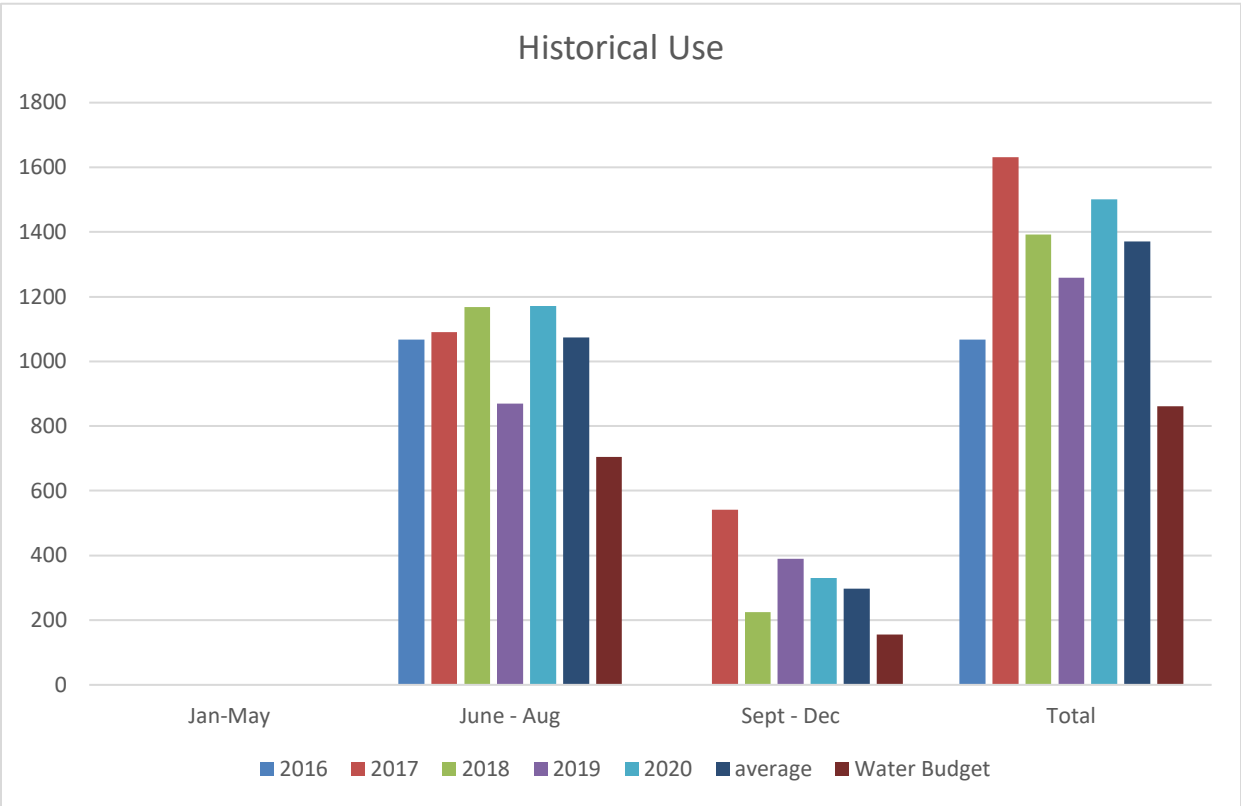
Eff = 75% : 860,660 gallons used at an annual cost of **\$5,418**

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						
Water Source #1	Location Address	20566 End of Street				
	Water Source	City				
	Backflow Device					
	Brand	Wilkins		Model		
	Type	RPZ		Size	2"	
	Visual Inspection	Leaks?	No	Notes	Looks Good	
	Date of Last Backflow Test	7/30/2018			Unknown	
	Meter / Deduct Meter					
	Brand	Neptune		Model		
	Type	Analog		Size	2"	
	Serial Number	15141724856				
	Reading	3,674,486			Leak Detector Spinning?	No
	Visual Inspection	Leaks?	No	Notes		

WATER SOURCE						
Water Source #2	Location Address	20864				
	Water Source	City				
	Backflow Device					
	Brand	Wilkins		Model		
	Type	RPZ		Size	2"	
	Visual Inspection	Leaks?	No	Notes	Looks Good	
	Date of Last Backflow Test	7/30/2018			Unknown	
	Meter / Deduct Meter					
	Brand	Neptune		Model		
	Type	Digital / Analog		Size	2"	
	Serial Number	1564679828				
	Reading	998,451			Leak Detector Spinning?	No
	Visual Inspection	Leaks?	No	Notes		

Controller Data:

IRRIGATION CONTROLLER										
Location:		20566								
Brand:		Rainbird			Model:		ESP-LX		Zone Count	16
Start Times	#	Program A	Program B	Program C	Program D	Auxiliary	Sensors:		Rain	Weather
	1	9:30 PM					Installed?		Yes	
	2						Bypassed?		No	
	3						Tested?		Yes	
	4						Functional?		Yes	
	5						Notes			
	6									
Water Days		Odd					Remote Access Installed?			
							Cell Card		Active?	
							WiFi		Active?	
							Hand Held		Active?	
Ohm Reading	Zone	Zone Runtime	Zone Runtime	Zone Runtime	Zone Runtime	Zone Runtime	Zone Type	R = Rotor S = Spray D = Drip MP = MP Rotator B = Bubblers		
	1	15						9 Volt Back-up Battery		
	2	30						Installed?	Tested?	Voltage
	3	30						yes	yes	
	4	30						Controller Working?		
	5	30						Powered Up?	LCD Panel and Buttons Working?	
	6	30						yes	yes	
	7	30						Seasonal Adjust		
	8	30						Global Adjust %		none
	9	30						Monthly Adjust		
	10	22						Month	Currently Set As	Recommend
	11	25						January		
	12	25						February		
	13	25						March		
	14	30						April		
	15	30						May		
	16	30						June		
	17							July		
	18							August		
	19							Sept		
	20							October		
	21							November		
	22							December		
	23									
	24									
	25									
	26									
	27									
	28									

Irrigation Controller #1

IRRIGATION CONTROLLER										
Location:		20684								
Brand:		Rainbird			Model:		ESP		Zone Count	11
Start Times	#	Program A	Program B	Program C	Program D	Auxiliary	Sensors:		Rain	Weather
	1	11:00 PM					Installed?		Yes	
	2						Bypassed?		No	
	3						Tested?		Yes	
	4						Functional?		Yes	
	5						Notes			
	6									
Water Days		Even					Remote Access Installed?			
Ohm Reading		Zone	Zone Runtime	Zone Runtime	Zone Runtime	Zone Runtime	Zone Type	R = Rotor S = Spray D = Drip MP = MP Rotator B = Bubblers		
		1	30					9 Volt Back-up Battery		
		2	28					Installed?	Tested?	Voltage
		3	30					yes	yes	
		4	28					Controller Working?		
		5	28					Powered Up?	LCD Panel and Buttons Working?	
		6	28					yes	yes	
		7	28					Seasonal Adjust		
		8	28					Global Adjust %		none
		9	28					Monthly Adjust		
		10	28					Month	Currently Set As	Recommend
		11						January		
		12						February		
		13						March		
		14						April		
		15						May		
		16						June		
		17						July		
		18						August		
		19						Sept		
		20						October		
		21						November		
		22						December		
		23								
		24								
		25								
		26								
		27								
		28								

Irrigation Controller #2

Zone by Zone Findings:

Controller 1 - ZONE 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
Controller 1 - ZONE DATA											
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

Controller 2

Controller 2 - ZONE DATA												
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)	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