

Commercial Site Assessment™ Tier II

Prepared for:

**Crosscroft
HOA**


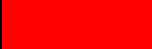



3540 Crosslough Trail
Rosemount, MN 550

2021 Season



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Proud Partner of 

Water Sources	
#1	
#2	
#3	
#4	
#5	



Commercial Site Assessment™

Date of Tier I CSA: August 5th, 2021
 Certified Technician: Garret Peterson, CLIA, CIT

Date of Tier II CSA: August 5th, 2021
 Certified Technician: Garret Peterson, CLIA, CIT

Irrigated Acres: 15.63
 Irrigated ft^2 : 680,900

Crosscroft HOA Audit Observations

Crosscroft has 5 water sources and 5 controllers with 114 zones total.

- **System #1:** Hunter I-Core, 22 active zones, Hunter Solar Sync & Rain Click™ (installed incorrectly and error code)
 - *Program A:* Start 11pm, odd days, zones 1-11
 - *Program B:* Start 10pm, even days, zones 12-19
 - *Program C (drip):* Start 6pm, Sundays, zones 20-22
- **System #2:** Hunter HCC (smart controller with no internet), 41 active zones, Hunter Rain Click™ (active)
 - *Program A:* Start 8pm, odd days, zones 1,3,5,7,9,11,13,15,17,19,21,24,26,28,30,32,34,36,38
 - *Program B:* Start 8pm, even days, zones 2,6,8,10,12,14,16,18,20,22,23,25,27,29,31,33,35,37,39
 - *Program C (drip):* 6pm, Sundays, zones 42, 45, 46
- **System #3:** Hunter I-Core, 23 active zones, Hunter Solar Sync (active)
 - *Program A:* Start 10pm, odd days, zones 1-10
 - *Program B:* Start 10pm, even days, zones 11-21
 - *Program C:* Start 8pm, Sundays, zones 22-23
- **System #4:** Hunter I-Core, 26 zones, Hunter Solar Sync (active but receiver is dangling)
 - *Program A:* Start 8pm, even days, zones 1-10, & 26
 - *Program B:* Start 8pm, odd days, zones 12-21, & 27
 - *Program C:* Start 5pm, Sundays, zones 11, & 23-25
- **System #5:** Rainbird ESP-Me, 21 active zones, Wired Rain Sensor (bypassed as sensor gets hit by irrigation)
 - *Program A:* Start 10pm, odd days, zones 1-11
 - *Program B:* Start 10pm, even days, zones 12-16, 18, & 20
 - *Program C:* Start 6pm, Sundays, zones 17, 19, & 21

Issue #1: Controllers 1, 3, 4, and 5 are basic “set and forget” controllers and controller 2 is a smart controller without the components needed to utilize the smart technology.

Solution #1: Upgrade those non-smart controllers to smart controllers with a hotspot for weather data. Smart controllers manage water use based on weather data and plant need (evapotranspiration). Reducing overall use and saving water. For the existing smart controller, only add a hotspot for the smart capabilities to be enabled.

Issue #2: There are 456 (of 1,538 total) rotor heads that are either broken or leaking and wasting water.

Solution#2: Replace 456 rotor heads

Issue #3: There are 4 (of 234 total) spray heads that are either broken or leaking.

Solution #3: Replace 4 spray heads

Issue #4: There are 12 broken or clogged spray nozzles

Solution #4: Replace the 12 spray nozzles

Issue #5: There are 13 poly irrigation lines or fittings are leaking water.

Solution #5: Repair 13 leaking poly lines and/or fittings

Issue #6: There are 91 heads need to be re-leveled. They may be crooked, which causes dry spots and possibly wash outs. They also could be too low or high, resulting in the head hitting grass/ground around the head and not applying water as needed or too high and at risk of being hit by a mower or someone tripping over it.

Solution #6: Relevel heads to proper position for coverage and safety.

Issue #7: There are areas with dry spots, a result of poor distribution of water (distribution uniformity). If there are significant variations in water application to a given area, the zone that covers that area gets run longer to make the dry spot(s) go away. This results in over watering (waste) of many more areas of that zone.

Solution #7: Add 92 heads and move 22 heads for better distribution uniformity.

Issue #8: There are three heads that are not needed, whether it is due to landscape changes, redundancies, or abandoned areas.

Solution #8: Cap three heads to prevent the waste of water

Issue #9: Some rotors are not nozzled correctly for the area of coverage. The larger the area a rotor covers the larger the nozzle needs to be and vice versa. Example: heads in corners (90° turn) should have a 1.5 gallons per minute (gpm) nozzle, 180° turn heads should have 3.0 gpm nozzle, and 360° turn heads should have a 6.0 gpm nozzle.

Solution #9: Replace nozzles (to address application rates) or heads (if it is an older model of head) to match area of coverage

Issue #10: Systems one, two, four, and five had a booster pump to maintain operating pressure on the systems. However, this often resulted in 60-80 pounds per square inch

(psi) at the heads of each zone. A spray head recommended operating pressure is 30 psi, and a rotor head is 45 psi. This extra pressure creates a water wasting “misting” effect that is water immediately evaporating as it comes out of the head. However, when the pumps are turned off the operating pressure is too low to operate the zones.

Solution #10: Install heads with pressure regulation that will manage the psi to manufacturer recommended settings at each head and install a pump with a Variable Frequency Drive (VFD) that will manage pressure demand for each zone at the water source, reducing stress on system piping and valves.

Issue #11: There are many zones with mixed sprinkler types (rotors and sprays) on the same zone. Sprays apply approximately two to three times as much water in their areas as rotors, causing over watering.

Solution #11: Split up head types on separate zones or convert spray nozzles to rotary nozzles. Rotary nozzles can replace the spray nozzle on a spray head and have a similar application rate to rotor heads and work well with each other.

Issue #12: Some areas on the property have long-range rotor heads covering a small area of grass or overthrowing onto hard surfaces resulting in wasted water. The rotors in the small areas have their throw reduced as much as they can but rotor manufacturers don’t recommend reducing throw distance more than 25 percent of the max throw (about 22.5 feet of a max of 30 feet). The current rotors are throwing around 12 to 18 feet. There are also areas that overthrow onto hard surfaces/paths, and if the rotors were reduced, they would have the same issue as above.

Solution #12: Convert rotors in these areas to shorter distance spray heads with rotary nozzles that have similar application rates to the rotors on the rest of the zone. Additional heads will be needed to make up distances between the rotors that are swapped out.

Issue #13: Systems one, two, four, and five have remote-read receivers on the meter that are hanging loose. They are at a risk of damage when being handled while loose.

Solution #13: Mount remote-read receivers to water pipes for each meter with zip ties or wire.

Issue #14: Systems two, four, and five have high voltage wire exposed (out of electrical conduit) for the pump wiring.

Solution #14: Have an electrician install new connection and/or electrical conduit piping.

The following are individual system changes that do not fit neatly into the “Critical Repairs and Adjustments” tables that are meant to serve as system-wide recommendations.

Irrigation System 2:

Issue #15: The number of heads and the degree to which they are out of adjustment is worth noting here. Heads are hitting houses and throwing far into streets and driveways.

Solution #15: Adjust heads

Issue #16: Zone 21 & 26 (front yards affected), may have a pinched line or a leak that is reducing the functionality of the zone.

Solution #16: Find restriction and replace and/or reroute piping.

Issue #17: This system has a doubler for zone 36 and 37. A doubler acts as a switch on the same activating wire to allow two zones to activate. For example, turning on zone one the first time activates one valve for a certain area, then activating zone one again will activate the doubler to switch to a different valve that controls a different area. This is a wiring issue that was temporarily solved using the doubler but should be permanently fixed. Like a Band-Aid, it doesn't resolve the wiring issue that made it necessary.

Solution #17: Resolving this issue will require a more in-depth investigation of the wiring issue before a more permanent solution can be proposed. As a note, it is suspected that there are one or two more doublers on this system.

Irrigation System 3:

Issue #18: Zone 11 are rotors that water about 28 feet of woods in order to water the 2-foot wide strip of grass close to the sidewalk.

Solution #18: Install all new spray heads with rotary nozzles.

Issue #19: Zone 18 has 14 sprays and a rotor on the zone with very different water application rates on the same zone.

Solution #19: Rotor is watering a large area, so converting 14 spray nozzles to rotary nozzles is the best solution. (Part of D2 in Design Improvements in the cost tables)

Irrigation System 4:

Issue #20: Rain sensor receiver dangling

Solution #20: Re-mount sensor receiver

Issue #21: Backyard zones are wired to also irrigate the grass in between homes. Areas between homes need less water and have a grid design which applies more water than single line design like the backyards have. This amplifies the problem of too much or too little water.

Solution #21: Nozzle rotors according to area/microclimate to resolve this issue. It would be better to separate the areas into different zones but there likely isn't extra wire in the field for this option.

Irrigation System 5:

Issue #22: Controller is loose and needs to be mounted

Solution #22: Mount controller

Issue #23: Rain sensor is bypassed since it gets hit by irrigation water and shuts down the system. Might be easiest to go to a wireless model that could be mounted to the nearby home's gutter/roof line.

Solution #23: Install wireless rain sensor

Issue #24: Zone five has a valve that provides water to backyards and a valve that provides water to front yards. The backyards are very shaded and front yards are very sunny, requiring different amounts of water to be applied to each.

Solution #24: The two valves for this zone should be electrically separated if possible (depends on wiring situation in the field and in the controller)

Issue #25: Zone 15 is single line of irrigation heads leading to poor distribution uniformity. Distribution uniformity is how evenly water is applied to a given area. Dry areas are a result of low distribution uniformity and runtimes must increase to cover these dry spots.

Solution #25: Add opposing line of heads to improve uniformity and reduce overall water usage for the area.

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)	\$3.80
Threshold per quarter	Irrigation Metered System
Sewer Rate per unit (if unmetered):	None

Historical Water Usage:

Water Source #1

Year	Annual Water Usage (gallons)	Annual Water Cost*
2020	763,000	\$2,899
2019	936,000	\$3,557
2018	733,000	\$2,785
3 Year Average	811,000	\$3,082

Water Source #2

Year	Annual Water Usage (gallons)	Annual Water Cost*
2020	4,170,000	\$15,846
2019	1,959,000	\$7,444
2018	2,900,000	\$11,020
3 Year Average	3,010,000	\$11,438

*Based on current Water Rates for best year to year comparison.

Water Source #3

Year	Annual Water Usage (gallons)	Annual Water Cost*
2020	631,000	\$2,398
2019	846,000	\$3,215
2018	787,000	\$2,991
3 Year Average	755,000	\$2,869

Water Source #4

Year	Annual Water Usage (gallons)	Annual Water Cost*
2020	2,710,000	\$10,298
2019	2,023,000	\$7,687
2018	2,031,000	\$7,717
3 Year Average	2,255,000	\$8,569

Water Source #5

Year	Annual Water Usage (gallons)	Annual Water Cost*
2020	763,000	\$2,899
2019	936,000	\$3,557
2018	733,000	\$2,785
3 Year Average	811,000	\$3,082

Combined Water Sources

Year	Annual Water Usage (gallons)	Annual Water Cost*
2020	9,037,000	\$34,341
2019	6,700,000	\$25,460
2018	7,184,000	\$27,999
3 Year Average	7,640,333	\$29,033

*Based on current Water Rates for best year to year comparison.

2017 water usage data was abnormally low and skewing averages, so it is not included.

Plant Water Requirement (ET Data):

Plant Material Need: **3,383,637** gallons

Cost: **\$12,858 /year**

$$Eff \% = \frac{water\ need}{water\ use}$$

$$Eff \% = \frac{3,383,637}{7,640,333} = \mathbf{44.29\%}$$

EPA Standard $\geq 75\%$ Efficiency

$Eff = 75\%$: 4,511,516 gallons used at an annual cost of **\$17,144**

	2018 Usage	2019 Usage	2020 Usage	Avg Usage	Water Budget*
Total (gallons)	7,184	6,700	9,037	7,640	4,511

*Values are per 1,000 gallons. Water Budget does not account for increasing water rates, as these are not predicable

System Components:

Water Source			Deficiency?	
#1	Location		13648 Crossmore Court, Rosemount, MN 55068	
	Source		1" City Feed	
	Anti-syphon			
		Brand	Wilkins Zurn	
		Size	1"	
		Inspection Date	Done in 2021	
		Visual Inspection	Good	
	Deduct Meter			
		Brand	Sensus	
		Size	1"	
		Serial Number	76224669	
		Reading	5,377,910.5 Gallons	
		Visual Inspection	Mostly good – loose remote receiver, should be mounted	
	Booster Pump			
		Brand	Flint & Walling	
		Size	1 ½", 1 horse (1 Phase)	
		Volt/AMP	115-230 Volt / 12.2/6.1 AMP	
		Visual Inspection	ok	
	Notes:		No Master Valve	

Water Source			Deficiency?	
#2	Location	3791 Crossridge Way, Rosemount, MN 55068		
	Source	City		
	Anti-syphon			
		Brand	Wilkins Zurn RPZ	
		Size	2"	
		Inspection Date	Done in 2021	
		Visual Inspection	Good, no leaks	
	Deduct Meter			
		Brand	Sensus	
		Size	2"	
		Serial Number	12136822	
		Reading	64,436,600 Gallons	
		Visual Inspection	Mostly good – loose remote receiver, should be mounted	
	Booster Pump			
		Brand	Flint & Walling	
		Size	1 ½" , 1 horse (1 Phase)	
		Volt/AMP	230 Volt / 6.1 AMP	
		Visual Inspection	High voltage wire loose into pump relay	
	Notes:	No master Valve		

Water Source		Deficiency?		
#3	Location	3640 Crosslough Trail – in water room closet beyond kitchen		
	Source	City		
	Anti-syphon			
	Brand	Watts		
	Size	1 ½"		
	Inspection Date	Done in 2021		
	Visual Inspection	Good		
	Deduct Meter			
	Brand	Sensus		
	Size	1 ½"		
	Serial Number	63256738		
	Reading	10,371,432 Gal		
	Visual Inspection	Good		
	Booster Pump			
	Brand	None		
	Size			
	Volt/AMP			
	Visual Inspection			
	Notes:	No master Valve		

Water Source			Deficiency?	
#4	Location	3625 Crosslough Trail, Rosemount, MN 55044		
	Source	City		
	Anti-syphon			
		Brand	Wilkins	
		Size	1 ½"	
		Inspection Date	Done in 2021	
		Visual Inspection	Good, no leaks	
	Deduct Meter			
		Brand	Sensus	
		Size	1 ½"	
		Serial Number	71861003	
		Reading	16,435,000 Gallons	
		Visual Inspection	Good	
	Booster Pump			
		Brand	Flint & Walling	
		Size	1 ½" horse, 1 phase	
		Volt/AMP	230Volt / 12AMP	
		Visual Inspection	High voltage wire exposed	
	Notes:	No master Valve		

Water Source			Deficiency?	
#5	Location	Behind 13760 Crosscroft Ave, Rosemount, MN 55068		
	Source	City		
	Anti-syphon			
		Brand	Wilkins Zurn RPZ	
		Size	2"	
		Inspection Date	Done in 2021	
		Visual Inspection	Good, no leaks	
	Deduct Meter			
		Brand	Sensus	
		Size	2"	
		Serial Number	61279548	
		Reading	18,804,979 Gallons	
		Visual Inspection	Mostly good – loose remote receiver, should be mounted	
	Booster Pump			
		Brand	Flint & Walling	
		Size	2 horse (1 Phase)	
		Volt/AMP	230 Volt / 6.1 AMP	
		Visual Inspection	High voltage wire exposed	
	Notes:	No master Valve		

Recommend Critical Repairs and Adjustments: Source #1

	Zones																						
Head Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Total
Total # Rotors	9	8	8	8	8	8	7	7	9	9	9	8	6	7	6								117
Total # Sprays						5	1			1		1		1	1	10	10	9					39
Rotating Nozzles																							
Mini Rotors																							
High Pop Rotors																							
6" Sprays																							
12" High Pop Sprays																							
Drip																			X	X	X	X	
Mixed Head Types																							
Repairs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Total
Damaged Rotors	2	3	3	3	1	2	2	3	3			2											24
Damaged 4" Sprays																2							2
Damaged 6" Sprays																							
Damaged High Pop Rotor																							
Damaged High Pop Spray																							
Line Leaks																							
Wrong Nozzles Sizing		1				5	1			2		1		1	1	6	4	3					25
Damaged Spray Head Nozzles																							
Raise/Straighten Heads	1			3	1	1						2						1					9
Design Improvements	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Total
Move Head for better coverage				1	1			1	1	1		1	1										7
Add Head for better coverage			1		2																		4
Cap Head																							

Recommend Critical Repairs and Adjustments: Source #2

	Zones																						
Head Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Total
Total # Rotors	15		15	N	16	16	9	16	16	14	15	18	15	12	11	17	22	10	7	21	22	N	287
Total # Sprays				O										2	1	2		1		5	4	O	15
Rotating Nozzles				T																		T	
Mini Rotors				A																		A	
High Pop Rotors				C																		C	
6" Sprays				T																		T	
12" High Pop Sprays				I																		I	
Drip		X		V																		V	
Mixed Head Types				E																		E	
Repairs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Total
Damaged Rotors	6		4		4	1	2	1	31	2	3	6	2			6	9	3	3	11	6		100
Damaged 4" Sprays																					1		1
Damaged 6" Sprays																							
Damaged High Pop Rotor																							
Damaged High Pop Spray																							
Line Leaks																							
Wrong Nozzles Sizing							5							1	1			3		1	4		15
Damaged Spray Head Nozzles																							
Raise/Straighten Heads	1				4			4		4	3	1											17
Design Improvements	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	Total
Move Head for better coverage						1	1								1	1	1						5
Add Head for better coverage							1	4	1	1	2	2	1	1	1	2							16
Cap Head																							

Recommend Critical Repairs and Adjustments: Source #2 (Continued)

	Zones																							
Head Type	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	Total	
Total # Rotors	20	33	27	24	16	28	22	26	23	7	7	9	10	22	24	19	30							347
Total # Sprays				1	2	1					3	3	1											11
Rotating Nozzles			3																					3
Mini Rotors																								
High Pop Rotors																								
6" Sprays																								
12" High Pop Sprays																								
Drip																								
Mixed Head Types																								
Repairs	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	Total	
Damaged Rotors	1	5	4	2	5	8	6	3	8	1	3	2	5	3	3	10	8							77
Damaged 4" Sprays																								
Damaged 6" Sprays																								
Damaged High Pop Rotor																								
Damaged High Pop Spray																								
Line Leaks				1						1	2	1		1										6
Wrong Nozzles Sizing			1		1																			2
Damaged Spray Head Nozzles					1																			1
Raise/Straighten Heads	5	2						2	1				1		2									13
Design Improvements	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	Total	
Move Head for better coverage	1											1			1		2							5
Add Head for better coverage			1		1		5	2	3	1	2				1	4	2							22
Cap Head			1		1																			2
Notes	Many heads are significantly out of adjustment.																							

Recommend Critical Repairs and Adjustments: Source #3

	Zones																							
Head Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Total # Rotors	9	10	9	6	18	10	9		11	7	10	10	10	11	7			1		13	11			162
Total # Sprays								18								14	11	15	26	1				85
Rotating Nozzles			2																					2
Mini Rotors																								
High Pop Rotors																								
6" Sprays																								
12" High Pop Sprays																								
Drip																						x	x	
Mixed Head Types																								
Repairs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Damaged Rotors	2	2	4	2	3	6	2		4	1	3	1	1	4	1					3	3			42
Damaged 4" Sprays																								
Damaged 6" Sprays																								
Damaged High Pop Rotor																								
Damaged High Pop Spray																								
Line Leaks																								
Wrong Nozzles Sizing							3		7	4	2							14		1				31
Damaged Spray Head Nozzles			2					3								3	1							9
Raise/Straighten Heads	2	3		1				2	1			2	2	2		1			1	1				18
Design Improvements	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	Total
Move Head for better coverage								1												1				2
Add Head for better coverage			2				1		1								2			1				7
Cap Head																								

Recommend Critical Repairs and Adjustments: Source #4

	Zones														
Head Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
Total # Rotors	31	18	19	15	30	30	18	22	18	20		10	15	21	267
Total # Sprays											23	3	3	7	36
Rotating Nozzles	2					1									3
Mini Rotors															
High Pop Rotors															
6" Sprays															
12" High Pop Sprays															
Drip															
Mixed Head Types	X					X									
Repairs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
Damaged Rotors	4	7	7	2	14	4	12	8	1			1			60
Damaged 4" Sprays															
Damaged 6" Sprays															
Damaged High Pop Rotor															
Damaged High Pop Spray															
Line Leaks															
Wrong Nozzles Sizing			1					3	5	1	1				11
Damaged Spray Head Nozzles						1									1
Raise/Straighten Heads	1		2	1	2	4				1					11
Design Improvements	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total
Move Head for better coverage						1							1		2
Add Head for better coverage		2	3	1	1	2			2				1	3	15
Cap Head														1	1

Recommend Critical Repairs and Adjustments: Source #4 (Continued)

	Zones													
Head Type	15	16	17	18	19	20	21	22	23	24	25	26	27	Total
Total # Rotors	29	17	26	13	14	26	18	N			17	11	12	183
Total # Sprays								O					2	2
Rotating Nozzles	9			2	3			T						14
Mini Rotors								A						
High Pop Rotors								C						
6" Sprays								T						
12" High Pop Sprays								I						
Drip								V	X	X				
Mixed Head Types					X			E						
Repairs	15	16	17	18	19	20	21	22	23	24	25	26	27	Total
Damaged Rotors	8	7	11	4	6	9	5	N			5	3		58
Damaged 4" Sprays								O						
Damaged 6" Sprays								T						
Damaged High Pop Rotor								A						
Damaged High Pop Spray								C						
Line Leaks	1					4		T			1			6
Wrong Nozzles Sizing	3	2			6			I					1	12
Damaged Spray Head Nozzles				1				V						1
Raise/Straighten Heads	2	1	1	1	1	1	2	E			2			11
Design Improvements	15	16	17	18	19	20	21	22	23	24	25	26	27	Total
Move Head for better coverage				1										1
Add Head for better coverage			4	2		3	1				2		1	13
Cap Head														

Recommend Critical Repairs and Adjustments: Source #5

	Zones																					
Head Type	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Total
Total # Rotors	19	22	17	22	31	12	17	13	16	16	15	15	17	18	9	10		10		13		292
Total # Sprays		2		1	1	1			4							4		1		1		15
Rotating Nozzles				1		2		1			3		2									9
Mini Rotors																						
High Pop Rotors																						
6" Sprays																						
12" High Pop Sprays																						
Drip																	X		X		X	
Mixed Head Types		X		X	X	X			X							X		X				
Repairs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Total
Damaged Rotors	4	4	5	6	10		9	4	8	4	4	5	8	12	2	5		3	2			95
Damaged 4" Sprays					1																	1
Damaged 6" Sprays																						
Damaged High Pop Rotor																						
Damaged High Pop Spray																						
Line Leaks									1													1
Wrong Nozzle		2		1	1	1		3			5		4	5				1		4		27
Damaged Spray Head Nozzles																						
Raise/Straighten Heads		1	1	1				1			1	2	1	1	1	1		1				12
Design Improvements	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	Total
Move Head for better coverage																						
Add Head for better coverage			1	1	1		1					4			5	2						15
Cap Head																						

Critical Repairs and Adjustments

Repairs	Price (each)	Count		Total
R1.) Installed 4" spray (Issue #3)	\$ 65.00	4		\$ 260.00
R2.) Installed 5" rotor (Issue #2)	\$ 65.00	456		\$ 29,640.00
R3.) Damaged spray nozzles (Issue #4)	\$ 20.00	12		\$ 240.00
R4.) Poly line leaks (Issue #5)	\$ 90.00	13		\$ 1,170.00
R5.) Raise/Straighten Heads (Issue #6)	\$ 15.00	91		\$ 1,365.00
R6.) Resolve pinched or restricted lines (Issue #16)	\$ 150.00	2		\$ 300.00
R7.) Remount controller system 5 (per 1 hr of labor) (Issue #22)	\$ 140.00	.5		\$ 70.00
R8.) Remount rain sensor system 4 (per 1 hr of labor) (Issue #20)	\$ 140.00	.5		\$ 70.00
R9.) Remount all meter remote receivers (per 1 hr of labor) (Issue #13)	\$ 140.00	1		\$ 280.00
R10.) Investigate electrical issues that resulted in current doublers on system 5. (T&M) (Issue #17)	\$ 140.00	≥3		\$ 420.00
R11.) Hire electrician to resolve exposed high voltage wires at water sources (Issue #14)	TBD	3		TBD
R12.) Adjust rotors that are out of adjustment. (Should be part of regular maintenance visits) (Issue #15)	\$ 0.00	-		\$ 0.00
				\$ 33,815.00

Design Improvements

Design Improvements	Price (each)	Count		Total
D1.) Cap a head (Issue #8)	\$ 30.00	3		\$ 90.00
D2.) Replace spray nozzle with rotary nozzle (matching precipitation rate) (Issue #4, #11, & #19)	\$ 20.00	36		\$ 720.00
D3.) Add a Head (Issue #7)	\$ 150.00	92		\$ 13,800.00
D4.) Move a head (Issue #7)	\$ 150.00	22		\$ 3,300.00
D5.) New rotary nozzled spray head zone (Issue #18)	\$ 1,200.00	1		\$ 1,200.00
D6.) Convert rotors to small sprays with rotary nozzles (Issue #12)	\$ 150.00	43		\$ 6,450.00
D7.) Rotor nozzle replacement for incorrectly nozzled rotors that are otherwise functional (Issue #9 & #21)	\$ 25.00	56		\$ 1,400.00
D8.) Split zone 5 (system 5) front and backyards (Issue #24) (hourly rate-time & materials)	\$ 140.00	1		\$ 140.00
D9.) Add opposing line of rotors to zone 15 System 5 (Issue #25)	\$ 1,100.00	1		\$ 1,100.00
				\$ 28,200.00

Recommended Efficiency Upgrades

System Efficiency and Design Upgrades	Price (each)	Count		Total
U1.) Controller #1, 3, & 5: Hunter HCC (22 zones). Hot Spot for Internet Access to Local Weather Station Data sold separately by internet providers (Issue #1)	\$ 1425.00	3		\$ 4,275.00
U2.) Controller #4: Hunter HCC (26 zones) Hot Spot for Internet Access to Local Weather Station Data sold separately by internet providers (Issue #1)	\$ 1,475.00	1		\$ 1,475.00
U3.) Controller #2 only needs a hot spot for internet access to get weather data. (Price depends on provider) (Issue #1)	\$30 for unit & \$50 per month (estimated)	5		\$30 for unit & \$50 per month (estimated) \$ 3,250.00
U4.) Install Wireless rain sensor (system 5) (Issue #23)	\$ 150.00	1		\$ 150.00
U5.) VFD Booster Pumps (conditional on availability and market) (Issue #10)	\$ 4,200-4,500	4		\$ 16,800-18,000
U6.) Replace remaining heads after repairs with psi regulated heads. (Issue #10)	\$ 70.00	1,312		\$ 91,840.00
				\$ 118,990.00

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

Next Steps:

- ☐ Fix repair issues
- ☐ Move heads to a better position
- ☐ Upgrade controllers to a smart controller based on weather and add hot spot to gain smart controller functionality
- ☐ Raise/straighten heads as needed to have proper coverage
- ☐ Cap unneeded heads
- ☐ Add heads/change heads in areas that are lacking proper coverage
- ☐ Address electrical issues regarding doubler(s)
- ☐ Replace rotor nozzles (gpm application rate) that are incorrect for the area the head is to cover with the correct size nozzles
- ☐ Address high pressures with recommended solutions
- ☐ Annually maintain (including adjustments) & monitor property