# Cedaredge Golf Club Irrigation System Assessment

**Prepared for:**

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Study Completed by:

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# Contents

# Executive Summary

The irrigation system at the Cedaredge Golf Club is an automatic block zone type irrigation system controlled by a 2 wire decoder system that communicates to a central irrigation computer located in the clubhouse. The Cirrus level software is the premium control software from Rainbird and allows for good control. An initial review of the database indicates that the sprinkler flow rates need to be checked and the flow manager database needs to be have the branch and flow zone capacities reduced.

The sprinklers that irrigate the course are a collection of older impact style sprinklers, Rainbird model 47 and 51, and newer gear driven Rainbird model Eagle 700 and 750. There is a wide variety of nozzle sizes and sprinkler head pressure settings. The different nozzles and pressure settings are limiting the performance of the sprinklers. The sprinkler performance testing via catch can took place in two (2) separate locations, 5 fairway and 10 fairway. The irrigation system was operated in the same manner as a normal irrigation cycle during the testing process. The two (2) test area results are 48% and 66% distribution uniformity (DU) respectively. 48% is a poor rating and 66% is a fair to good rating.

The pipe that delivers the water to the sprinklers is constructed of poly vinyl chloride (PVC) and is the standard pipe material for underground irrigation systems of this type and age. The irrigation system is comprised of a mainline pipe that ranges in size from 12” at the source pond near E Main St and NE 4$^{th}$ Street, to 3” pipe crossing the range. The mainline pipe that services the front 9 holes is piped through a 10 horsepower (hp) pump located behind 4 green. At the current time the pump is not operational so the front 9 holes are operating as a gravity fed system. The front 9 system does not have enough pressure for the sprinklers to operate at an adequate level of performance. The back nine holes also rely on gravity to supply the necessary pressure to operate the sprinklers, and with the exception of hole 18, there is adequate pressure to operate the sprinklers.

Pressure monitoring equipment was installed at the pump station and three (3) mainline locations around the course during an overnight irrigation cycle. The monitoring equipment records the dynamic pressure at one minute intervals. The pressure at the locations varied from a high of 140 psi to a low of 38psi. The sprinklers perform most efficiently at 80 psi. The low delivery pressure is severely impacting the performance of the sprinklers and is the main reason for the thin turf areas.

# Irrigation System Components

## *Control System*

The control system at Cedaredge Golf Club is the Rainbird Cirrus software. It is the highest level of control software offered by Rainbird. Each station within the database is defined by sprinkler model type, sprinkler arc, decoder address, flow rate, area of coverage, station flow, and flow manager assignment. The flow manager portion of the database controls when the sprinkler zone can turn on based on available flow capacity of the pipe network. The larger the diameter of the pipe, the greater volume of water that can safely flow through the pipe. The industry standard is to limit the velocity of water through a pipe to 5 feet per second (fps). Higher velocities can cause pipes to be damaged. The chart below identifies the pipe size, the maximum recommended flow rate based on the 5fps rule, the flow rate currently defined in the database, and the amount that the defined flow rate exceeds the recommended flow rate. There will be some instances in the smaller diameter pipe sizes (2.5" & 2.") that due to the number of sprinkler heads on a zone, the actual flow rate will have to exceed the recommended flow rate.

| Pipe Size | Maximum Recommended Flow at 5FPS | Defined Flow in the Flow Manager | Exceeds Recommended Flow by |
|---|---|---|---|
| 12" | 1600 GPM | 2500 GPM | 900 GPM |
| 8" | 700 GPM | 900 GPM | 200 GPM |
| 6" | 425 GPM | 650-450 GPM | 225-25 GPM |
| 4" | 200 GPM | 225 GPM | 25 GPM |
| 3" | 120 GPM | 125 GPM | 5 GPM |
| 2.5" | 80 GPM | 150-100 GPM | 70-30 GPM |
| 2" | 55 GPM | 150-100 GPM | 95-45 GPM |

A second item of note in the database, all the sprinkler run times are the same. The sprinkler zones with part circle heads should be half the run time as the sprinklers with the full circle heads because the part circle heads will apply twice as much water as a full circle in the same amount of time, assuming the part circle heads are adjusted to a 180 degree arc.

### *Control System Recommendation*

- The flow manager portion of the database needs to have the defined flow limits redefined to match more closely the 5 fps rule, especially in the larger diameter pipes. Pipe fatigue and damage will occur when a large volume of water moving at a high velocity and is suddenly stopped.
- Adjust the runtimes to match the type of sprinkler, either full circle or part circle.

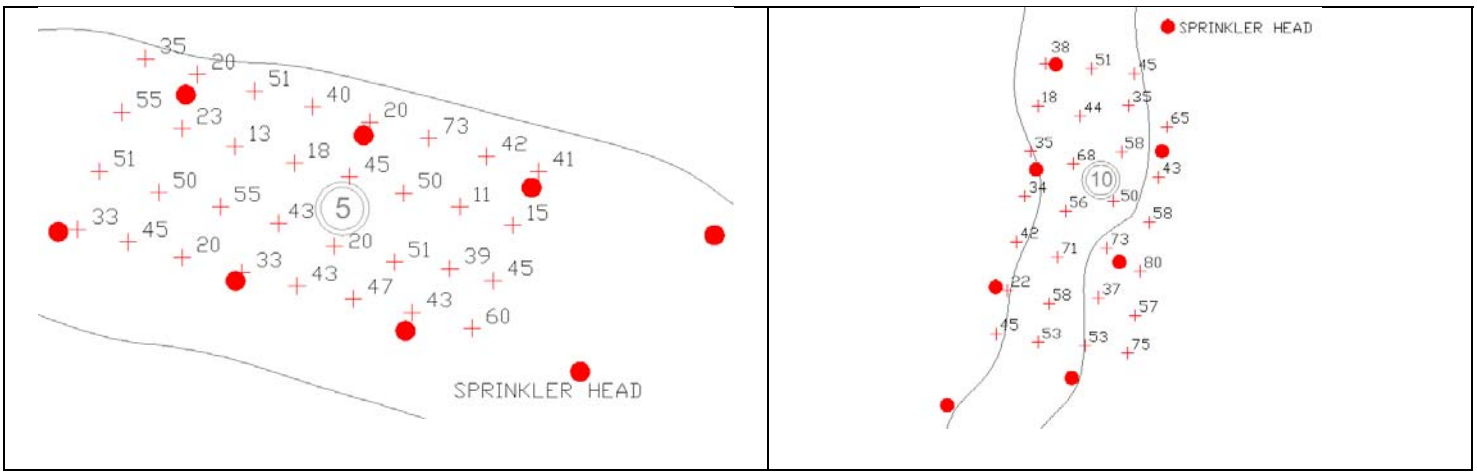
### *Control System Recommendation continued*

- Build a map that can be used in the Central Computer. The files are already available and reside within the map folder of the central computer. The map will help the golf staff during the operation of the system.

*Picture 1. Catch Can Collection Setup - 5 Fairway*

## *Sprinklers*

There are four basic models of sprinklers in place at Cedaredge. The Rainbird 51, a full circle arc brass construction impact sprinkler, the Rainbird 47, an adjustable arc brass construction sprinkler, the Rainbird Eagle 700, a full circle gear driven plastic construction sprinkler, and the Eagle 750, an adjustable arc gear driven sprinkler. The majority of 51's and 47's are located on holes 1-9 and the majority of Eagle series heads are on holes 10-18. All the sprinklers have a built in pressure regulator that is designed to optimize the performance of the sprinkler. Ideally, all the sprinklers on the system should have the pressure regulator factory set to the same pressure. This is not the case at Cedaredge. Pressure regulator settings vary from 50 to 60 to 70 to 80 psi. Sprinkler performance would improve if the pressure regulators were set to a uniform setting on all the sprinklers. The sprinklers perform best at 80psi, unfortunately on most of the front nine holes; the gravity fed system does not supply 80 psi. Refer to the static head model shown in graph 2.




*Picture 2 & 3. Collected volumes of water in the catch cans. Volumes shown are in ml.*

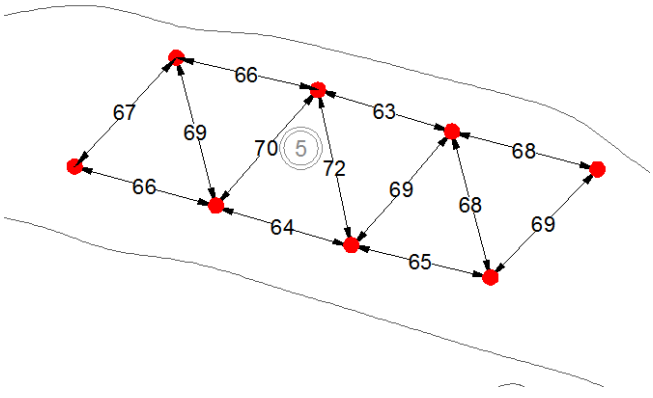
During the data collection process, two (2) areas had the sprinkler application performance tested (picture 1). A number of catch cans were placed in the fairway area and the sprinklers were operated during a normal overnight irrigation cycle. The sprinklers in the test area were GPS mapped and the water collected in the catch cans was noted during (see pictures 2 &3).

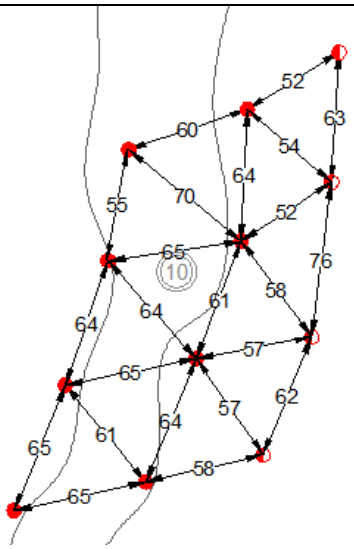
Sprinkler application performance is defined by a sprinklers ability to apply a uniform amount of water across its range of throw. This is termed Distribution Uniformity or DU. A sprinklers DU is expressed as a percentage. 80% and greater is considered excellent, 70% good, 60% fair and 50% or lower is poor. The two test areas, 5 fairway and 10 fairway performed at 48% DU and 66% DU respectively. To help understand why the areas tested as they did, additional data collection occurred.

The operating pressure of several of the sprinklers was checked and the average pressure for the heads on 5 fairway is 45-48 pounds per square inch (psi). The pressure of the heads on hole 10 was in the 75-78 psi range (see pictures 4 &5). The sprinkler heads must have a discharge pressure of 80psi to attain the 65’ radius of throw that matches the sprinkler head spacing. The sprinklers on 5 fairway are not performing at an acceptable level due to lack of pressure. The heads on hole 10 have adequate pressure.



*Pictures 4 &5 Sprinkler head pressure testing during operation. The sprinkler on the left is on hole 5 and has an operational pressure of less than 50 psi. The picture on the right is a sprinkler between the driving range and hole 10, with an operational pressure of 78psi. Optimal operating pressure is 80 psi.*




*Pictures 6 & 7 – Head spacing on 5 fairway and 10 fairway. Spacing is relatively uniform and is not limiting the performance of the sprinklers. The ideal spacing is 65'.*



*Pictures 8,9,10 – All three heads shown are the same Rainbird model 51 sprinkler. Note the nozzle wear in the left picture at the 4 o'clock position. A non-visibly worn nozzle appears in the middle picture. The picture on the right shows a plastic nozzle in the same model. Three of the same head, three different nozzle conditions/types.*

There is a wide variety of nozzles in the sprinklers at Cedaredge. Different nozzles apply different amounts of water and can have a different radius of throw. To maximize sprinkler uniformity performance, the same nozzle needs to be in the same model sprinkler. It is important that the sprinkler flow rate noted in the central computer database match as closely as possible the flow rate of the nozzle. This allows for accurate water use and application data.

## *Sprinkler Performance*

The sprinklers are designed to have a radius of throw that will reach other surrounding sprinklers. This is referred to as 'head to head coverage'. Because of the low pressure on the front 9 holes, very few of the sprinklers have the necessary head to head coverage. Without the head to head coverage, the sprinklers need to run longer to help mask the inefficient application of water, and in some cases thin turf will result (see picture 11).

*Picture 11. Hole 5 fairway, inadequate sprinkler pressure is the leading cause of the thin/brown turf. The other heads that help irrigate this area do not have 'head to head' coverage and also contribute to the poor turf condition. Note the nozzle stream is only irrigating to the near edge of the brown turf (see arrow).*

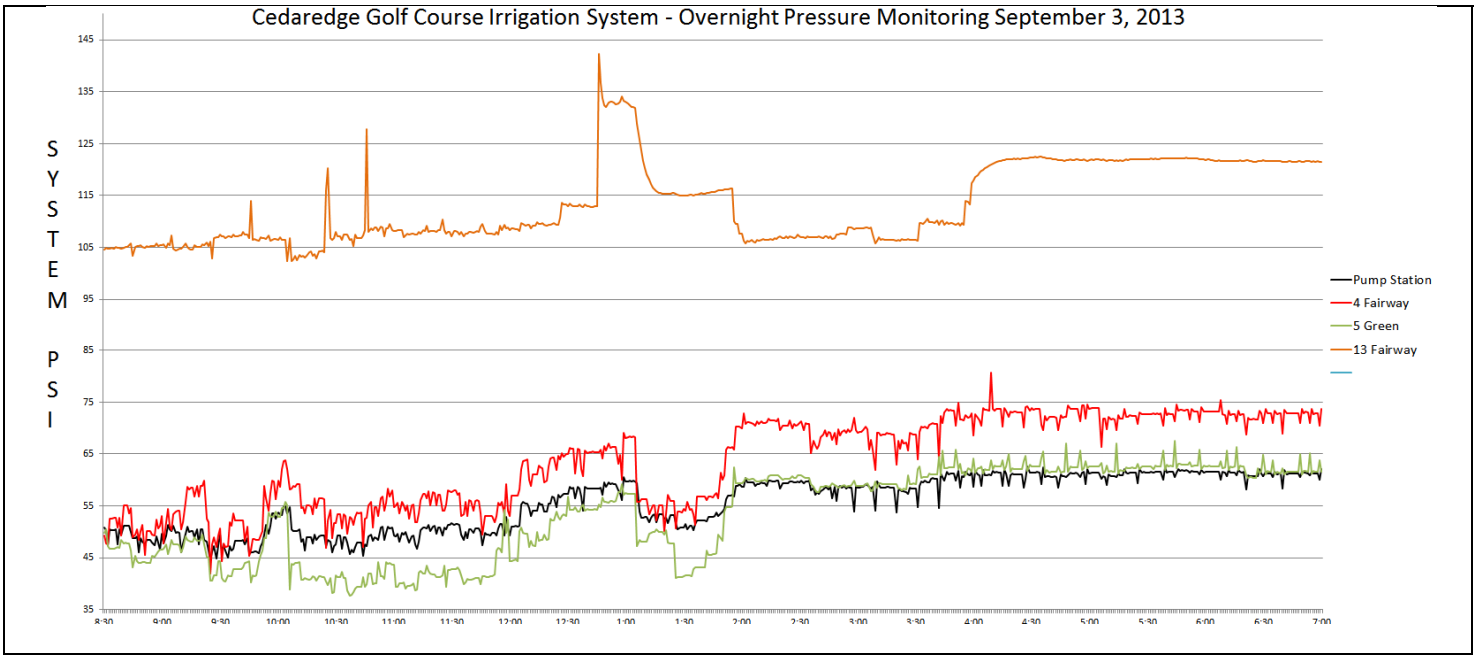
### *Sprinkler Head Recommendations*

- Adjust sprinklers to the same pressure discharge.
- Install the same nozzle in the same model sprinkler. Select a nozzle that will provide a minimum throw of 65' with the pressure available at the sprinkler head.
- It is important to note that sprinkler heads need to have the same nozzle, pressure, and spacing to apply a uniform application of water.
- Replace worn nozzles with new.

## *System Pressure Monitoring*

To understand the pressure that is available during the irrigation cycle, (4) pressure monitoring devices were installed during an overnight irrigation cycle. Devices were installed at the pump station, 4 fairway, 5 green, and 13 fairway (see graph 1). The pressure at the pump station, 4 fairway and 5 green is very low, between 38-75 psi. Keep in mind that the sprinklers perform best with 80 psi at the head. The pressure at 13 fairway is actually higher than it needs to be and could be reduced at the existing pressure reducing valve (PRV) located near 11 green. The PRV was examined during the site visit and was found to be covered with soil inside the

valve box. The PRV should be cleaned and checked at the beginning of every season to verify that it is operating as designed. Based on the collected pressure data the PRV is working, but a pressure spike that occurred around 1:00am and another around 4:00am raise some concern that the valve should be looked at and adjusted as needed.




*Graph 1. Pressure monitoring at the four locations around the course (full size graph in appendices).*

A static pressure model (graph 2) was developed to identify the pressure at each hole. A GPS position was collected at each tee, fairway and green location for each hole, along with an elevation point for the pump station and the source pond located off the course. The pressure on the front 9 is not enough to allow the sprinklers to perform at an acceptable level of performance. The pump station needs to supplement the head pressure that is supplied from the source pond.

**Cedaredge Golf Club - Static Head Model**

| | | | |
|---|---|---|---|
| #4 Green Booster Station Discharge Pressure (psi) | 56 | Date: September 6, 2013 | irrigation technologies |
| Booster Station Elevation | 6122 | | |
| Pond Pressure (psi) | 0 | | |
| Source Pond Elevation | 6253 | | |

| Hole # | Elevation | Tee Static Pressure | Fairway Elevation | Fairway Static Pressure | Green Elevation | Green Static Pressure |
|---|---|---|---|---|---|---|
| 1 | 6032 | 95.0 | 6043 | 90.2 | 6056 | 84.6 |
| 2 | 6053 | 85.9 | 6064 | 81.1 | 6075 | 76.4 |
| 3 | 6086 | 71.6 | 6068 | 79.4 | 6067 | 79.8 |
| 4 | 6068 | 79.4 | 6087 | 71.2 | 6119 | 57.3 |
| 5 | 6114 | 59.5 | 6113 | 59.9 | 6113 | 59.9 |
| 6 | 6114 | 59.5 | 6099 | 66.0 | 6093 | 68.6 |
| 7 | 6092 | 69.0 | 6097 | 66.8 | 6097 | 66.8 |
| 8 | 6095 | 67.7 | 6080 | 74.2 | 6070 | 78.5 |
| 9 | 6063 | 81.5 | 6046 | 88.9 | 6036 | 93.2 |
| 10 | 6028 | 97.4 | 6014 | 103.5 | 6003 | 108.3 |
| 11 | 5994 | 112.1 | 5969 | 123.0 | 5969 | 123.0 |
| 12 | 5966 | 124.3 | 5876 | 163.2 | 5866 | 167.6 |
| 13 | 5879 | 161.9 | 5889 | 157.6 | 5945 | 133.4 |
| 14 | 5974 | 120.8 | 5922 | 143.3 | 5903 | 151.6 |
| 15 | 5963 | 125.6 | 6014 | 103.5 | 6014 | 103.5 |
| 16 | 6058 | 84.4 | 6029 | 97.0 | 6009 | 105.7 |
| 17 | 6018 | 101.8 | 6034 | 94.8 | 6051 | 87.5 |
| 18 | 6124 | 55.9 | 6075 | 77.1 | 6079 | 75.3 |
| Range | 6013 | 103.2 | 6000 | 108.8 | 5989 | 113.6 |
| PG | 6013 | 103.2 | 6013 | 103.2 | 6013 | 103.2 |
| Minimum Pressure | | 55.9 | | 59.9 | | 57.3 |
| Maximum Pressure | | 161.9 | | 163.2 | | 167.6 |

*Graph 2. Static pressure model of each tee, fairway, and green area.*

## *System Pressure Recommendations*

- Improve the pressure for the heads on the front 9.
- Clean out the valve box that contains the pressure reducing valve. Install a pressure gauge on the upstream side and downstream side of the valve. That will allow for a quick check to see if the valve is functioning properly.
- Have the PRV checked for proper operation as soon as possible and at the start of each irrigation season. The suggested maximum operating pressure for Class 200 PVC pipe is 160 psi. If the PRV valve is not operating properly some portions of the pipe network could be subject to pressure in excess of 160psi.

## *Pumping Station*

The pump station near 4 green contains two (2) pumps. One of the pumps is a 15hp pump that supplies water to the cemetery. The second pump is a variable frequency drive (VFD) controlled 10 hp pump that can provide water to the holes on the front 9. The pump is supplied water from an off-site pond located at E Main Street and NE 4th. The source pond is located approximately 130' higher than the pump station. The difference in elevation provides approximately 56 pounds of static pressure to the pump station. At the current time the pump is not operational. During the data collection process, it was determined that even if the pump was operational it is not sized properly to provide the necessary volume or pressure for the front 9 holes. An initial design analysis identified that a properly selected 40hp pump and motor would be able to supply 800 GPM flow rate with a 50 psi boost. The boost would allow the sprinklers on the front 9 to operate at 80 psi and greatly improve the performance of the irrigation system.

*Picture 12. Pump station. The 10hp motor is in the foreground part of the picture.*

### *Pump Station Recommendations*

- Contact a pump company to examine the existing pump components and start the station. Identify the flow rate and pressure that the 10 hp pump will supply.
- Replace the pump and motor if it does not provide 800GPM with a 50psi boost, for a station discharge pressure of 90 psi.
- Consider replacing the pump station with a pre-fabricated pump station from Rainbird, Flowtronex or Watertronics. These companies specialize in building pumping stations for golf course applications.
- Install a simple and inexpensive wye strainer type filter to prevent debris from entering the mainline pipe network.

## *Recommendations by Priority*

1. The irrigation system at Cedaredge is not performing at an acceptable level. The pressure available from the source pond is not enough to properly irrigate the front nine holes. A top priority is to start the existing pump and identify how much pressure and volume that pump will produce. If the pump does not provide at least 90 psi discharge pressure, the equipment needs to be replaced.

2. Clean out the valve box that contains the PRV valve near 11 green and check the valve for proper operation.

3. Adjust all the sprinklers to the same discharge pressure. The pressure regulator on the sprinkler heads can be adjusted from the top of the sprinkler with a small flat blade screwdriver.

4. Edit the flow manager portion of the database to limit the flow through the pipe network to 5 feet per second.

5. Install the same nozzle in all the sprinklers and edit the central computer database to reflect the changes.

6. Adjust the run times in the central computer to match the sprinkler type, either full circle or part circle.

7. Install a wye strainer or similar type of filter on the system to prevent debris from entering the mainline pipe.

8. Assemble the map for use in the central computer. The files are in place in the map folder of the central computer.

# Cedaredge Golf Club Irrigation System Master Plan

**Prepared for:**

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## Contents

## Summary

As the irrigation system ages there will be components that will need to be replaced. This master plan will provide direction and an estimated cost to replace the most critical components. Many of the items that need to be repaired are items that were identified in the Irrigation System Assessment that was completed during the 2013 season.

The key components needing attention are;

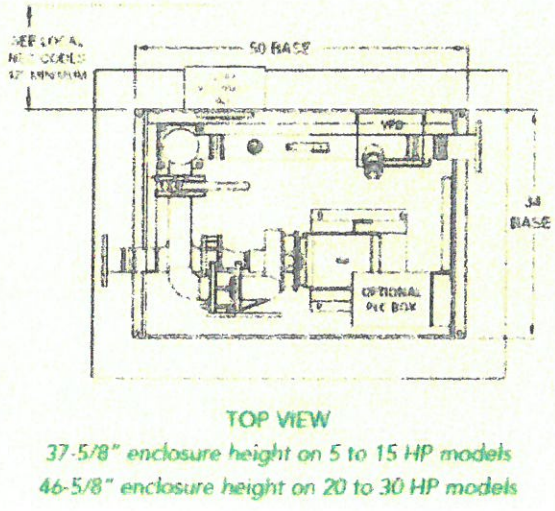
1. Pump station and filtration
2. Irrigation system control wiring
3. Remote control valves
4. Sprinkler heads
5. Pond Storage

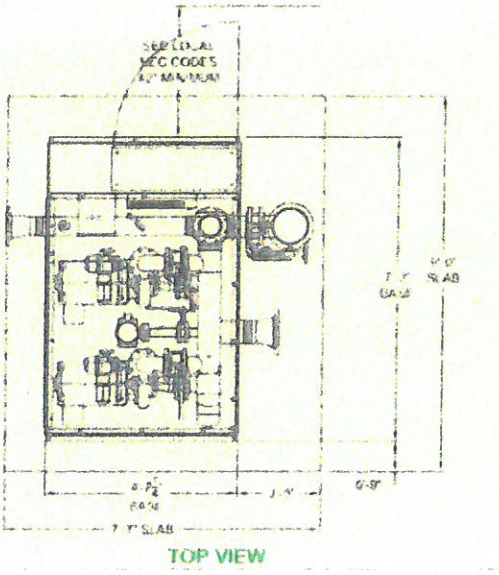
*Picture 1. Current Golf and Cemetery Pump Station Configuration*

## *Pumping Station & Filtration*

The current pump station configuration supplies water to the cemetery and golf course from one pump station unit. The pump does not have any filtration. The current status has the cemetery pump working but the golf course side of the pump is not working. The golf course irrigation system is irrigated by gravity pressure from on off-site pond. Replacing the pump station is an absolute top priority along with an inline filtration device. The 56 pounds of pressure coming from the pond source is about half the pressure needed to properly irrigate the front nine holes and holes 16, 17 and 18 on the back nine. Holes 10-15 and the driving range have adequate pressure supplied from the gravity supply side of the irrigation system.

Replacing the pump station with two separate pump stations would allow for a complete separation of the golf course and cemetery irrigation operation. Each pump station would be enclosed in a steel, lockable enclosure and have separate electric meters to allow for separate billing.




*Picture 2 & 3. Cemetery Pump Station Typical Foot Print* *Golf Course Pump Station Typical Foot Print*

The estimated cost to replace the two stations is:

| | |
|---|---|
| Cemetery pump station (picture 2) | $20,000 |
| Golf course pump station (picture 3) | $92,000 |
| Inline wye strainer filtration | included in cost of golf course station |
| Demolition of existing pump building | $3,000 |
| Installation of pump stations by contractor | $20,000 |
| Electrical utility upgrades/meters | $6,000 |
| Pump station plans and specifications | $6,000 |
| **Total:** | **$147,000** |

## *Irrigation System Control Wiring*

The irrigation system activates the sprinkler zones by means of a two conductor communication cable and a decoder device. The decoder device activates each of the 365 remote control valves which in turn supplies water to each zone of sprinklers. Over the years the integrity of the communication cable has be jeopardized and is not a reliable means to activate the valves. Installing a new communication cable is vital to reliable operation of the irrigation system.

Installation of the cable can be achieved by use of a vibratory plow, (picture 4) that lays wire underground without opening a ditch. The cable would be installed parallel to the existing mainline and connected to the existing remote control valves.

The estimated cost to install 27,000' of new cable is about $2.00 to $2.50/foot, $54,000 to $67,500 total.


*Picture 4. A vibratory plow capable of installing new communication cable*

## Sticking Remote Control Valves & Conversion to Valve in Head

In conjunction with the installation of new communication cable, replacing the failing remote control valves will save thousands of gallons of water. Quite a few of the remote control valves will open when energized by the decoder device, but do not always close. A stuck open remote control valve will waste a tremendous amount of water. Many of the zones require 100 gallons of water per minute during regular operation. A valve that sticks open can waste several thousands of gallons of water during one overnight irrigation cycle.

Replacement of all the valves that stick open is an easy way to save thousands of gallons of water. This is a top priority for the irrigation system.

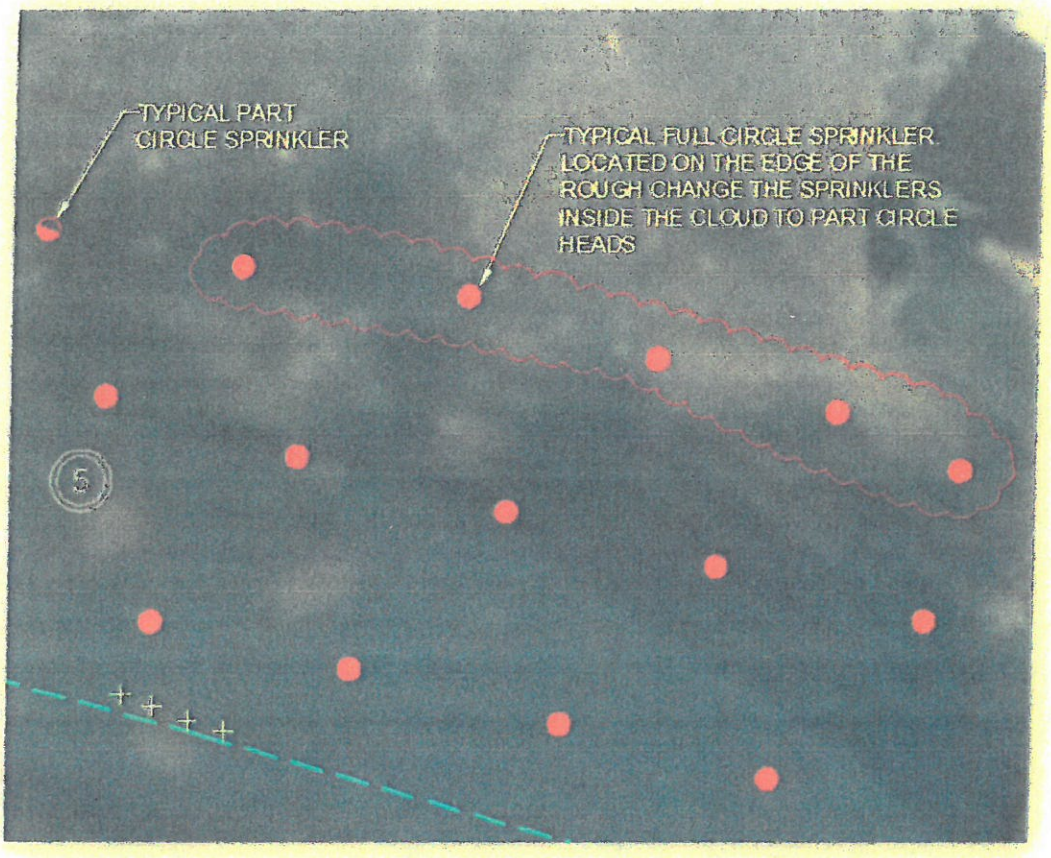
The estimated replacement cost for a contractor to replace a remote control valve is $500/valve. There are approximately 150 valves that stick on regularly that need to be replaced.

As described in the Irrigation System Control Wiring section, one remote control valve supplies water to multiple sprinklers. This type of irrigation zoning is common in large parks where the ground is usually fairly flat and the grass is all the same variety. On a golf course there is more topography, different types of grass as well as mowing heights. With these different environments, there is a need to irrigate in a more controlled manner. Instead of having 3 or more sprinklers controlled by one valve, each sprinkler has its own valve. Termed 'Valve in Head' sprinkler, this is the most common type of sprinkler control that is in place on a golf course. All new golf course irrigation systems are valve in head systems and each sprinkler can be operated independently. Converting to this type of irrigation system at Cedaredge would essentially require replacement of the system, not realistic. Converting the multi head sprinkler zones on the greens to valve in head zones is a realistic plan that should be considered. Currently, there are approximately 70 electric valves that control 225 sprinklers around the greens areas that should be replaced. Staring with a new isolation valve at the current electric valve location is the proper place to begin the conversion to valve in head sprinklers. New pipe and wire should be installed along with new sprinkler heads. The estimated cost to have a contractor install new greens loop is $5,000 per greens loop.

## Sprinkler Heads

The majority of sprinkler heads at Cedaredge have a 65'to 70' radius of throw. That is an ideal radius for most of the golf course areas. There are however a few areas such as the tee complexes on holes 15-18 that are less than 65' wide that could be irrigated by sprinklers that have a 45'radius of throw. The benefit to using a 45' radius sprinkler instead of the 65' radius head is water savings. A 65' head has a flow rate of 25 gallons per minute, whereas the flow rate for a 45' head is 10 gallons per minute. The advantage is that the sprinkler head is irrigating only the target area, that being the tee complex, and not an area outside of the tee complex. By installing new 45' radius heads the actual area that receives water is 30% smaller than the current irrigated area. That translates to a savings of 107,000 gallons per season just for that one area. There are several other areas on the golf course where similar savings can be realized.

The cost to replace the irrigation in these areas is estimated to be $100-$150 per sprinkler. Each area would require 10-15 sprinklers.




*Picture 5. Full circle sprinklers that can be changed to part circle heads. There are approximately 70 full circle sprinkler heads that heads that are in similar areas relative to the edge of the grass line that can be changed.*

Using the 2002 irrigation as-built as a guide and looking the sprinkler arcs relative to the limits of irrigation, there are several areas where full circle arc sprinklers can be changed to a part circle arc sprinklers. By changing the sprinkler from a full circle to a part circle the sprinkler run time can be reduced by 50%. The reason is that if a full circle sprinkler needs 3 minutes to complete a revolution, the part circle will need only half the amount of time to apply the same amount of water for half of the area. The downside to changing from a full circle to a part circle is that the area behind the sprinkler no longer receives water. About 70 heads have been identified that can be changed. Changing the 70 heads would allow for the run time on those sprinkler zones to be reduced from 15 minutes to 8 minutes. Each sprinkler applies about 20 gallons per minute. Water savings would be about 9,800 gallons per irrigation cycle, (based on a 15 minute full circle sprinkler run time).

The estimated cost to convert the sprinkler from a full circle to a part circle is $150/ sprinkler.


*Picture 6. Existing Pond at the upper right side of picture, possible new pond shown in the center of picture*

## Increase Pond Storage

This past winter was unlike most winters on the mesa. Record low snowfall translated to record low runoff and severe drought conditions. The limited water storage at the off-site pond has been a concern in years past and has been amplified this year. Using past seasons, severe drought conditions occur on average every 10 years. Having the ability to store more water during the high runoff periods would benefit the golf course all season long.

The current pond has a useable depth of about 7' and capacity of about 922,000 gallons, lacks a liner and has had the dam face leak in past years. During the peak irrigation, the golf course requires 700,000 gallons for one irrigation cycle. To refill the pond within a 24 hour period, an inflow of 486 gallons per minute is needed. Relying on a high inflow rate for the entire peak season is not a reliable mechanism. A better option would be

to increase the size of the pond thereby increasing the total volume stored and reducing the need to rely on a high inflow rate for refilling.

The town owns a sizable amount of land at the existing pond location and with some engineering thought a larger pond could be constructed. A very basic conceptual layout of a larger pond is shown in picture 6. The proposed pond has a useable depth of 10' and a capacity of 7.62 million gallons, nearly 11 nights of peak use storage. Building the new pond with a geomembrane liner will ensure that no water will be lost due to seepage. Piping the existing open ditch delivery system would also reduce water loss due to seepage through the ditch.

During the site visit I reviewed the pond dam with Adam Conway. He pointed out several locations along the dam face that have leaked in past years. This leaking was repaired using an expanding sealant similar to an expanding foam insulation used in home construction. The town should look into the potential liability of a future leak on the dam face.

The cost to enlarge the pond is difficult to estimate at this conceptual stage. Engaging the town engineer on a project of this scale is the first step to identify a cost. For reference, Battlement Mesa Golf Course located in Parachute, CO is currently working through the process of building a new golf course reservoir. The proposed size of the reservoir is 9.9 million gallons and the estimated cost is one million dollars. Ground conditions at Battlement Mesa are very rocky, including non-yielding material that will most likely require blasting.

## *Recommendations by Priority*

1. Pump stations need to be replaced. This is the heart if the irrigation system and with adequate pressure and volume
2. Install new control wire to each remote control valve. Replace the remote control valves that stick open, convert greens loops to valve in head sprinklers.
3. Change out the 70 full circle sprinklers for part circle sprinklers.
4. Install new 45' radius sprinklers at tee complexes 15-18.
5. Construct a larger water storage reservoir.

# IRRIGATION WATER AGREEMENT

**Between Town of Cedaredge and Cedaredge Cemetery District**

This agreement, dated this 20th day of November, 2014, between The Town of Cedaredge, Colorado, herein referred to as the "Town", and the Cedaredge Cemetery District, herein referred to as the "District", is to set forth the agreement between the entities as to the delivery of irrigation water through the joint system which serves both the Cedaredge Cemetery District and the Town of Cedaredge Golf Course.

## Town/Cemetery Common Irrigation System

Irrigation water is delivered through a common irrigation system which serves both the cemetery and the Town's Golf Course hereafter referred to as the "Town/Cemetery Common Irrigation System," or "Common Irrigation System."

The Town/CemeteryCommon Irrigation System serves only the Town and the District and consists of the following:

1. Pipe from Hovde Diversion to the Pond identified as "Golf Course" pond.
2. Golf Course pond
3. Approximately 5000' of 12" waterline from the Golf Course pond to Pump House a/k/a Cemetery/Golf Course diversion or apparatus.
4. Pump House

The Town/Cemetery Common Irrigation System Does Not Include:

1. Approximately 1800' of 6" pipe from Pump House to Cemetery.
2. Electrical equipment and electricity used exclusively by either entity.
3. District's Pump.
4. Water Rights: Each entity is responsible for its own water rights and to acquire additional water as required for irrigation if necessary.
5. Cook Ditch: However, the parties agree that they will endeavor to reach an agreement between themselves and among all the other users of the Cook Ditch regarding responsibility for repair, maintenance, replacement and operation of the Cook Ditch.
6. Any part of the system serving the golf course below the Pump House.

## Water

1. District water usage shall measured by a functioning meter that must be installed adjacent to the pump house and which meter shall be available to be read by authorized personnel from either entity. District employees shall report the District's weekly water usage to the Water Commissioner who will maintain an accounting of the District's water usage and monitor the District's need to draw upon its reservoir water rights. The Water Commissioner's and the Grand Mesa Water Users records shall be available to authorized

personnel from both entities. If the District runs out of water, additional water for the District's use shall be delivered through the common irrigation system only upon the parties reaching a mutually acceptable negotiated price for leased water from the Town, or if the Town is provided proof through the Water Commissioner that the District has secured water supplies from other sources. The parties agree that when District reservoir water is ordered, that an additional 3% shrinkage factor shall be added to the order to compensate the Town for shrinkage relating to the Cook Ditch and common irrigation system.

**Water Meter/Usage**

1. Meter: In order to determine the actual usage, the District shall maintain an operational flow meter adjacent to the pump house. Both entities may have representatives monitor the flow meter installed to measure the amount of water pumped by the District to the Cemetery, and both entities agree to share all flow meter data with the other entity beginning with any and all such data for 2015.
2. Time of Water Usage/Flow: The District shall irrigate only from 8:00 a.m. to 8:00 p.m. The Town may irrigate at any time. Both entities agree to cooperate in maintaining adequate flow to the common irrigation system, including the pump house. The District will maintain, at its own expense, a low-flow shut off valve to protect its pump. The Town agrees that it will not interfere with water available to the District's pump without notice and only for emergency circumstances.

**Operational Costs**

1. Operational costs of water delivery shall be shared by both entities – 85% by the Town and 15% by the District. The electricity for the District's pump will be paid by the District. If the Town decides to use a pump or other electrical devices, the Town will install a second electric meter for the Town's use and the Town will be responsible for paying for its own electricity used.
2. Agreed upon operations: (1) Operations of common irrigation system, (2) Noxious Weed Abatement. As between the parties to this agreement, it is understood that operations involving either the Hovde diversion structure or the headgate on that structure shall be exclusively controlled by the Town, but the costs of any such operations shall be shared by both entities.
    a. Employee Costs: Labor and mileage for common irrigation system operations: If employees of the entities are used for the agreed upon operations itemized above, both entities agree to account for the actual number of man-hours involved in operational maintenance and the amounts charged will include the actual hourly rate paid to such employee plus state and federal taxes.
    b. Contractor Costs: If contractors are used, the actual amount paid to the contractor by one entity will determine the total cost to be shared by the entities.

If either entity determines the necessity of any of the above operations, they will first notify staff from the other entityof the need to undertake the operation and request assistance. If the other staff is not available to render assistance within a reasonable time after notification, which depends upon the urgency to complete the operation, the requesting entity may undertake the operation and bill the other party for its share of the expense.

**Town/Cemetery Common Irrigation System Repairs, Maintenance and Replacement Costs**

1. Town/Cemetery Common Irrigation System repairs, maintenance and replacement costs shall be shared by theTown and the District wherein the District will pay 15% of the costs and the Town will pay 85% of such costs, except for such costs associated with the pump house wherein the entities agree to share in such costs equally.

2. Expenditures up to $5,000 for any single item of repair, maintenance or replacement of the Town/Cemetery Common Irrigation system shall require mutual consent only by the administration/management of both entities. Either manager/administrator proposing expenditures up to $5,000 per expenditure shall make such proposal to the other entity in writing by mailing such proposal to the other entity at the addresses listed hereinbelow. The other entity shall then respond to the proposing entity's request for an expenditure of up to $5,000 per expenditure, within thirty (30) days of mailing of the proposing entity's written request; otherwise, the proposing entity shall be entitled to incur the proposed expenditure (the responding entity having been deemed to consent by untimely response) and the entities shall be liable for their respective portions of the expenditure even in the absence of a mutually signed writing.

3. Expenditures over $5,000 on any portion of the common irrigation system shall require the mutual consent of the governing boards of both entities. Such consent shall be expressed in a document signed by officials of both governing boards. The governing Boards of both entities agree to respond to such proposals within a reasonable time, but in no event more than 45 days, and if the noticed Board does not act within the 45 days, it shall be deemed that such Board agreed to the expense.

4. Emergency situations shall be exempt from the above consent requirements. An "emergency" shall be defined as a situation requiring immediate action to correct or avoid property damage, insufficient water supply or impending harm to the Town/Cemetery Common Irrigation system. Either entity making any such emergency repair shall notify the other entity as soon as is practicable.

**Electrical Equipment**

In the event electrical equipment in the pump house requires replacement or repair the District will assume the costs of repair or replacement of electrical equipment serving its electrical needs and the Town will assume the costs of repair or replacement of electrical equipment serving its needs. The entities understand that the Town has no such present needs. The District will investigate a way to isolate the District's existing electrical system from the Town's in the pump house, and may do so; however, the District agrees not to do so without first giving reasonable notice to the Town.

**Joint Obligations**

1. No transaction, agreement, commitment, or promise with or without monetary exchange, involving any portion of the Town/Cemetery Common Irrigation system shall be undertaken without compliance with the agreements contained herein.
2. The entities shall cooperate in the planning of capital construction, operation, and maintenance of the common system.

**Billing**

1. Monthly bills to or from the District and to or from the Town for the other party's share of any maintenance, repair replacement and/or operational costs or charges for water delivered, if any, shall be due and payable within 30 (thirty) days from the date the bill is mailed to the other party with appropriate detail as to claimed costs. Any bill not paid when due shall bear interest at the rate of eight percent (8%) per annum from its due date.
2. Verification: Either party or its agents shall have the right, at reasonable times and pursuant to reasonable notice, to inspect the books and records of the other party for the purpose of verifying costs associated with any billings.
3. In the event of a dispute as to the accuracy of the billing, which cannot be resolved within thirty days from the date the accounting is furnished to the other party, the dispute shall thereupon be submitted for arbitration to a board of three persons, consisting of one person appointed by each of the governing boards of the entities hereto and a third person selected by said appointees. Said arbitration board shall examine the records of the billing party concerning common Town/Cemetery irrigation system costs, and shall hold at least one hearing, at which time each entity hereto shall be entitled to present such evidence as it desires on the matters in issue. The decision of the board of arbitration shall be final and binding on both entities hereto precluding either entity from appealing the arbitration board's decision regarding the disputed bill to any court of law (the entities may assert their legal rights as to other non-billing related matters in court in the absence of an agreement to limit such rights). The balance determined to be owed shall be paid not later than thirty (30) days from the date of the board's decision, together with interest

at the rate of eight percent (8%) per annum, calculated from the due date of the disputed bill.

**Terms of this Agreement**

1. If an entity desires a change in terms of this agreement, the entities shall, upon written request, enter into negotiations concerning the requested change.
2. In the event of any non-billing related default by either of the entities in the performance of this Agreement, the non-defaulting entity shall be entitled to obtain specific performance of the terms of this agreement, as well as damages or any other remedy available at law or in equity. A non-defaulting entity that, through representation by legal counsel, successfully enforces its rights under this Agreement (including a billing question asserted to the Arbitration Board) shall be entitled to reimbursement from the defaulting entity for reasonable attorney's fees and court costs, if any, in said enforcement action.

The entities have executed this Agreement with the effective day, month and year written above.

"Town"
**Town of Cedaredge**
PO Box 398
235 W Main ST
Cedaredge, CO 81413
Town Hall 970-856-3123
Golf Course 970-856-7781
Public Works 970-856-5013
www.cedaredgecolorado.com
Authorized Contacts:

- Town Administrator
- Golf Course Superintendent
- Public Works Director

Approved this 16th day of October 2014
by the Town of Cedaredge Board of Trustees

By Patricia Means
Mayor Patricia Means

Attest: Patricia V Luna
Town Clerk Patricia V. Luna

"District":
**Cedaredge Cemetery District.**
Mailing Address: PO Box 202
Site Address: 205 SE Independence AVE
City, State and ZIP: Cedaredge, CO 81413
Telephone: 970-856-2373
Manager:
Grounds:

Authorized Contacts:
President
Grounds Keeper
Vice President

Approved this 20 day of Nov 2014
by the Cedaredge Cemetery District

By _____
District Authorized Representative

Print Name: Michael R. Street

By _____

Print Name: _____

Town of Cedaredge Colorado

# Town/District Irrigation Water Agreement October 16, 2014