November 14, 2018

To: Mr. Jim Filby Williams, Director
Department of Public Administration
411 West First Street
Duluth, MN 55802
From: Brian Keighin, Irrigation Technologies

Re: Estimated cost of construction to replace the irrigation system at Enger Park Golf Course

As requested, I have assembled an estimated cost to replace the irrigation system at Enger Park golf course. The estimate is based on current project pricing, known conditions at Enger Park, and Enger park golf staff.
The following are recommendations for the new irrigation system;

Irrigation Pond & Pump Station

Relocate the pump station to the three pond complex just north of the clubhouse area.
Comments:

1. The three pond combination has a greater surface area vs. the existing pond on hole 17. The three ponds combined surface area is 1.18 acres versus the current pond of 0.50 acres. Pond depth at both pond sites is about the same at 6'. Total water volume of the three pond complex is greater than the single pond on hole 17.
2. Install a new pre-fabricated pump station that will supply the proper pressure and volume of water to the sprinklers.
3. The new pump station location is located away from the two DRN trout streams that have been contentious in the past.
4. This location is very close to a city water source that can be used to supplement surface water in the event there is not enough surface water for irrigation.
5. A new wet well, intake pipe, screen and slab will need to be included as part of the pump station.
6. Electrical service will need to be installed at this location. Conceptual design requires 420 volt, 3-phase, 200 amp service.
7. The pump station would have a pumping capacity of 800GPM and will be able to apply 0.15" of water in a 10 hour water window. The 0.15" value is the peak application rate that is needed for Enger Park during the warmest part of the golfing season.
8. The initial cost estimate for the pump station and associated components is;
    - Pump Station with enclosure $145,000
    - Wet well, intake pipe, slab, screen $35,000
    - New electrical service for the station $50,000
    - City water supply discharge pipe & control $10,000
    - Total pump station cost $240,000

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Irrigation System, Pipe, Sprinkler Heads, Valves & Control System

Install all new pipe, sprinklers, wire and control system. The existing components have no value and all need to be replaced with new equipment.

Comments:

1. High density polyethylene (HDPE) pipe will be used for the mainline and lateral piping. HDPE pipe is fused together and forms a continuous pipe that resists freezing and has a longer life cycle than the PVC pipe it is replacing. HDPE will last 50+ years.
2. The proposed irrigation system will have 6-8 sprinklers located around the green surface. Half of the sprinklers will irrigate the green surface and the remaining will irrigate the greens surrounds. This is the best way to manage the two different types of turf grasses at the green location and maximizes the efficiency of the sprinklers performance. The greens heads will be spaced at 65'to 70' between heads, with single head control. All greens heads will be part circle sprinklers.
3. One quick coupler will be located at each greens complex to allow maintenance staff quick access to water at the greens.
4. The fairway irrigation will have a single row of sprinklers spaced at 80' between sprinklers. The heads will be located along the center of the fairway. All the fairway heads will be full circle sprinklers.
5. Tee heads will have the same spacing as the greens heads, about 65' to 70'. Each tee will be irrigated with a sprinkler. There will be a mix of full circle and part circle sprinklers.
6. The sprinkler layout will be designed to maximize sprinkler performance and make the most efficient use of the water available to irrigate the course.
7. There will be about 700 sprinklers for the entire 27 holes of golf.
8. Each hole will have a mainline valve to allow for isolation of the hole.
9. Each of the green and tee complexes will have a 2" diameter isolation valve and will be piped with 2" HDPE pipe. The isolation valve at each location allows for easy isolation of these smaller areas and does not add much total cost to the project.
10. A 2-wire control system will be used to activate the sprinklers. Control wire will be installed with the mainline and looped to each sprinkler. Each sprinkler will be identified by area and controlled with a central computer to be located at the maintenance building.
11. The greatest unknown for this project are the ground conditions and certainty that rock will be encountered during installation. Included in the estimate is an allowance for the rock.
12. The cost for the entire project is estimated to be;
    - Material cost (pipe, wire, sprinklers, control system, valves) $650K to 700K
    - Labor, overhead, and contractor profit $670K to $740K
    - Pump Station $240K
    - Professional Fees $95K to $110K
    - Project Contingency $100K to $125K
    - Total cost including pump station $1.755 to $1.915 Million dollars