

Section 3  
Rum River Hills Golf Club

## **Rum River Hills Golf Club**

### **Summary**

Rum River Hills Golf Club has recently experienced flooding on some fairways and cart paths. Exhibit 9 shows the discharge points and problem areas throughout the golf course. The following will address the problem areas throughout the golf course.

#### **Flooding along Hole #1**

The first area of concern includes flooding of the large pond along Hole #1. This pond discharges through an existing concrete outlet structure and a 12" plastic pipe to the east. The outlet is labeled as Area 1 on Exhibit 9. It is our understanding that after large storm events, the pond remains elevated for long periods of time. The 100-year high water level (HWL) is 870.3.

After reviewing video recordings of the outlet pipe, it appears that the pipe has several sags in it and several joints have been compromised. The outlet pipe is relatively shallow and may have been affected by frost heave. This outlet pipe is likely causing the pond to operate inefficiently.

We believe that the best alternative for this outlet is to remove the existing outlet structure and the 12" outlet pipe and replace them with a new 4-foot diameter concrete outlet structure and 18" high density polyethylene pipe outlet in the same location as the existing pipe. Exhibit 10 shows the proposed outlet structure. The new pipe would be installed at a lower elevation than it exists now, reducing the impact of frost heave on the pipe. The polyethylene pipe is also more rigid and is solid (no air voids) and therefore more resistant to frost heave or buoyancy when soils are saturated. A removable, weir wall would be installed in the new outlet structure. We would propose to leave the weir height at the same elevation as existing. By installing the weir wall, it will allow for greater flexibility in controlling the water elevations of the pond. Installing this outlet structure would result in a 100-year HWL of 870.0.

The estimated cost to construct the new outlet pipe and structure is \$29,853. Table 15 includes the individual costs for this alternative.

#### **Cart path flooding near the clubhouse**

Based on the HWL of the pond along Hole #1, it appears that there could be an issue with the cart paths flooding near the clubhouse, Areas 2A and 2B on Exhibit 9. The existing culverts under the cart paths are a 15" diameter and 12" diameter. If flooding the cart paths is an issue, the best alternative would be to install larger diameter culverts under the cart paths.

Installing 24" diameter culverts will reduce the flooding during small storm events. However, since the HWL elevation for the area is controlled by the downstream outlet structure discussed above, the paths will still flood during large storm events. To reduce the flooding during the large storm events, the cart paths would have to be raised

approximately 1.5 feet. This would, however, increase the HWL in the pond near the clubhouse, which would appear to adversely affect the fairway for Hole #18.

The estimated cost to replace the two culverts under the carts paths is \$6,642. Table 16 includes the individual costs this alternative.

**Saturated soil along Hole #15**

Another issue is occurring along Hole #15 near the Rum River. The soil in the area is saturated. There is an existing rock dam, Area 3 on Exhibit 19, southeast of the most saturated area of the fairway. Part of the fairway was excavated to help to determine the problem and drain the area.

Based on our review, it appears that the water being contained by the rock dam may be infiltrating into the soil and causing the saturation. There is a dropped of approximately seven feet from the rock dam to the bottom of the downstream channel. We also noticed that the existing drain tile that was excavated along Hole #15 was plugged with roots and soil.

We recommend two alternatives to address the soil saturation along Hole #15. First, the drain tile should be replaced to improve the drainage in the area. Second, the area of the creek that is being contained by the rock dam should be lined with an impermeable material to eliminate the water infiltrating through the soil. Lining the creek will eliminate the infiltration into the soil and the new drain tile will help to keep the existing soil dry.

The estimated cost to replace the drain tile and line the creek bed is \$13,530. Table 17 includes individual costs for this alternative.

**Flooding of Hole #3 and #17**

Flooding of Hole #3 and #17 is also an issue at the golf course. The stormwater drains south through three 15” culverts, labeled Area 4A, Area 4B and Area 4C on Exhibit 9, and then to the Rum River.

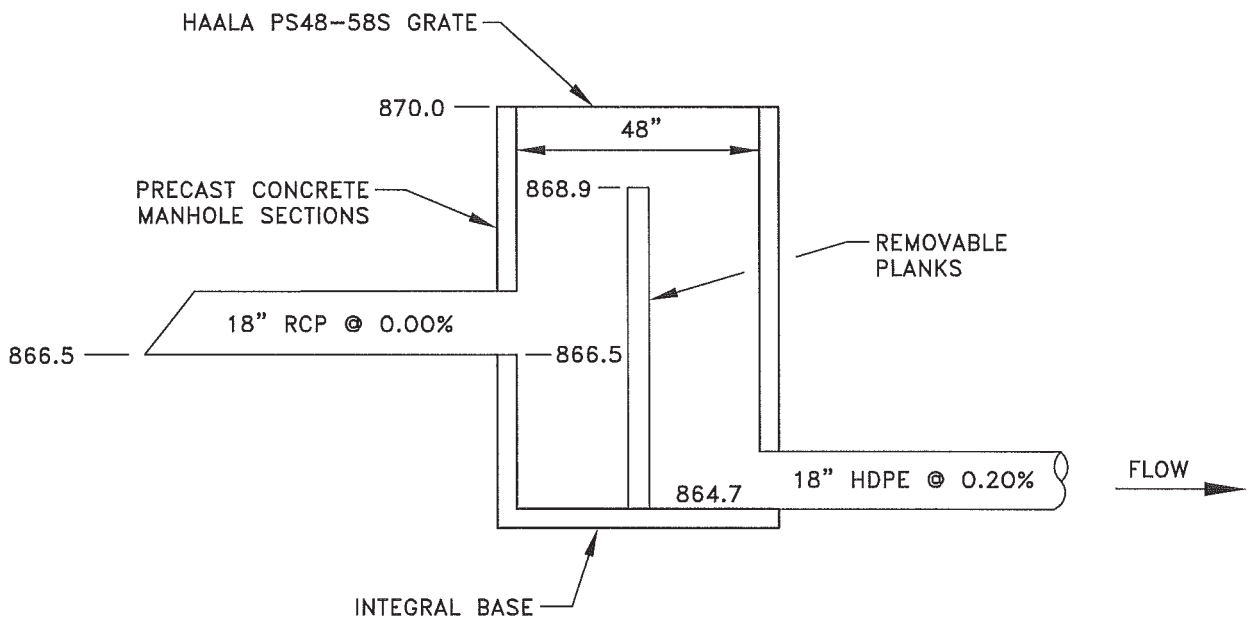
One alternative to lower the HWL’s in the area would be to install bigger culverts. A 21” culvert was modeled to replace the culverts at Area 4A and 4B and a 24” culvert was modeled to replace the culvert at 4C. The following table summarizes the 100-year HWL’s for the three areas:

Existing 100-Year HWL			Proposed 100-Year HWL		
Area 4A	Area 4B	Area 4C	Area 4A	Area 4B	Area 4C
859.3	859.3	858.5	859.1	858.7	858.3

The estimated cost to replace the three culverts is \$4,990. Table 18 includes individual costs for this alternative.



EXHIBIT 9  
RUM RIVER HILLS GOLF CLUB  
EXISTING CONDITIONS  
CITY OF RAMSEY, MINNESOTA



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EXHIBIT 10  
 RUM RIVER HILLS GOLF CLUB  
 PROPOSED OUTLET STRUCTURE  
 CITY OF RAMSEY, MINNESOTA

**TABLE 15**  
**RUM RIVER HILLS GOLF CLUB**  
**FLOODING AROUND HOLE #1 - NEW OUTLET STRUCTURE**

ITEM NO.	DESCRIPTION	UNIT	UNIT COST	TOTAL ESTIMATED QUANTITY	TOTAL ESTIMATED COST
1	MOBILIZATION	LUMP SUM	\$800.00	1	\$800
2	CLEARING	ACRE	\$1,500.00	0.2	\$300
3	GRUBBING	ACRE	\$1,500.00	0.2	\$300
4	REMOVE STORM SEWER	LIN FT	\$1.50	856	\$1,284
5	18" METAL APRON	EACH	\$275.00	1	\$275
6	18" RC PIPE APRON	EACH	\$350.00	1	\$350
7	18" HDPE PIPE SEWER	LIN FT	\$22.00	850	\$18,700
8	18" RC PIPE SEWER DESIGN 3006, CL III	LIN FT	\$23.00	10	\$230
9	OUTLET CONTROL STRUCTURE	EACH	\$4,000.00	1	\$4,000
10	TURF ESTABLISHMENT	ACRE	\$1,500.00	0.6	\$900

Estimated Construction Cost	\$27,139
Contingency (10%)	\$2,714
Total Estimated Construction Cost	<u>\$29,853</u>

**TABLE 16**  
**RUM RIVER HILLS GOLF CLUB**  
**CART PATH FLOODING NEAR CLUBHOUSE - NEW CULVERTS**

ITEM NO.	DESCRIPTION	UNIT	UNIT COST	TOTAL ESTIMATED QUANTITY	TOTAL ESTIMATED COST
1	MOBILIZATION	LUMP SUM	\$200.00	1	\$200
2	REMOVE STORM SEWER	LIN FT	\$4.00	96	\$384
3	REMOVE BITUMINOUS PAVEMENT	SQ YD	\$5.00	30	\$150
4	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	\$3.00	48	\$144
5	4" AGGREGATE BASE CLASS 5	SQ YD	\$8.00	30	\$240
6	4" BITUMINOUS PAVEMENT	SQ YD	\$34.00	30	\$1,020
7	24" METAL APRON	EACH	\$325.00	4	\$1,300
8	24" CP PIPE CULVERT	LIN FT	\$25.00	96	\$2,400
9	TURF ESTABLISHMENT	LUMP SUM	\$200.00	1	\$200

Estimated Construction Cost	\$6,038
Contingency (10%)	\$604
Total Estimated Construction Cost	<u>\$6,642</u>

**TABLE 17**  
**RUM RIVER HILLS GOLF CLUB**  
**HOLE #15 SATURATION - CREEK LINING AND DRAIN TILE**

ITEM NO.	DESCRIPTION	UNIT	UNIT COST	TOTAL ESTIMATED QUANTITY	TOTAL ESTIMATED COST
1	MOBILIZATION	LUMP SUM	\$350.00	1	\$350
2	4" PERF PIPE DRAIN	LIN FT	\$15.00	450	\$6,750
3	CREEK LINING	LUMP SUM	\$5,000.00	1	\$5,000
4	TURF ESTABLISHMENT	LUMP SUM	\$200.00	1	\$200

Estimated Construction Cost	\$12,300
Contingency (10%)	\$1,230
Total Estimated Construction Cost	<u>\$13,530</u>

**TABLE 18**  
**RUM RIVER HILLS GOLF CLUB**  
**FLOODING AROUND HOLE #3 AND #17 - NEW CULVERTS**

ITEM NO.	DESCRIPTION	UNIT	UNIT COST	TOTAL ESTIMATED QUANTITY	TOTAL ESTIMATED COST
1	MOBILIZATION	LUMP SUM	\$200.00	1	\$200
2	REMOVE STORM SEWER	LIN FT	\$4.00	72	\$288
3	21" METAL APRON	EACH	\$300.00	4	\$1,200
4	24" METAL APRON	EACH	\$325.00	2	\$650
5	24" CP PIPE CULVERT	LIN FT	\$26.00	46	\$1,196
6	24" CP PIPE CULVERT	LIN FT	\$27.00	26	\$702
7	TURF ESTABLISHMENT	LUMP SUM	\$300.00	1	\$300

Estimated Construction Cost	\$4,536
Contingency (10%)	\$454
Total Estimated Construction Cost	<u>\$4,990</u>