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STORMWATER FACILITIES OPERATION & MAINTENANCE MANUAL For SALTESE MEADOWS

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for
SALTESE MEADOWS

I. Purpose

This Operation and Maintenance Manual is intended to provide general guidelines for maintaining the stormwater facilities built in conjunction with Saltese Meadows. The proper operation and maintenance of these facilities will be the responsibility of the Home Owner's Association. Implementation of these guidelines should help to insure that these facilities will continue to operate in the manner which they were designed as defined by the final approved plans of record on file at the Spokane County Division of Engineering and Roads.

The proper operation and maintenance of the stormwater facilities shall include insuring that the stormwater facilities are maintained in such a manner that the established construction specifications, approved plan configuration and design performance standards are maintained at a level that is at least equal to that which the design engineer approved for this project.

II. Description

Stormwater facilities for the Saltese Meadows are divided into north and south facilities. A seasonal creek, located in a "Native Growth Protection Easement" divides the site into north and south stormwater basins/facilities. The stormwater facilities installed in the north basin with this project consist of two primary systems. The first system includes catch basins, manholes and conveyance pipes in the newly constructed private roads. The second system includes evaporation and detention ponds with an outlet structure located at the southeast corner of the north detention pond. Together, these systems operate to collect and control the runoff generated north of the seasonal creek from the on-site storm. Once stormwater leaves the evaporation and detention pond, it is discharged into the seasonal creek that drains into a wetland in the Timberland Terrace plat located west of Saltese Meadows.

The stormwater facilities located in the south stormwater basin consist of a "stacked" evaporation and detention pond. This single pond collects a portion of the runoff generated south of the seasonal creek. The remaining portion of the runoff from the south basin drains into a grass-lined conveyance ditch adjacent to 32nd Avenue that then drains into the same wetland in Timberland Terrace. The intended operation of the systems installed with the Saltese Meadows project are further described as follows:

A. Catch Basins, Manholes and Conveyance Pipes

In the north stormwater basin, catch basins and manholes were located at the low points in the road and were constructed to collect runoff from the adjacent private roads. Conveyance pipes connect the catch basins and manholes and route the stormwater to the

evaporation and detention pond. There are no catch basins manholes or conveyance pipes in the south stormwater basin.

B. Evaporation and Detention Pond with Outlet Structure

Evaporation of the post-development stormwater volume is required in accordance with the Spokane County Conditions of Approval of the preliminary plat for Saltese Meadows. The north evaporation pond may discharge stormwater to the detention pond. The evaporation pond is sized to hold and dispose, through evaporation, runoff from average annual precipitation events. Stormwater runoff from larger events, 2, 10, 50 and 100 year events may enter the detention pond and be disposed at pre-development runoff rates utilizing an outlet structure to meter the flow. The south evaporation/detention pond will contain runoff from average annual precipitation events and runoff from larger stormwater events.

III. Function

The stormwater facilities for Saltese Meadows are generally very simple and should operate with very little attention. In most instances, a non-functioning system will be visually obvious and regular maintenance of the system will eliminate the occurrence of potential problems. The following describes each component of the stormwater systems and the proper function of that component in the system.

A. Catch Basins, Manholes and Conveyance Pipes

The catch basins and manholes located north of the seasonal creek are provided to collect runoff from the road areas and the conveyance pipes are provided to route the runoff to the evaporation/detention facilities. The outlet pipe from the conveyance system has an erosion control feature to protect the pond bottom.

B. Detention Pond with Outlet Structure

The north detention pond accepts runoff from the conveyance pipes from the north evaporation pond and stores the flow until the outlet structure can meter the rate of stormwater outflow for disposal. The conveyance pipes from the evaporation pond to the detention pond have an erosion control feature to protect the detention pond bottom. The outlet structure has been installed at the pond bottom elevation to allow for emptying the detention pond of the stormwater. A sump is provided in front of the outlet structure to help protect it from siltation. Normal operation of the pond will include some ponding; however, runoff will be discharged by the outlet structure and disposed of downstream in the seasonal creek. A riprap pad is provided at the outlet for erosion protection.

The north evaporation and detention ponds are located in a separate drainage tract located adjacent to the Native Growth Protection Easement. Runoff leaves the detention pond the pond through the conveyance pipe and into the outlet structure manhole. The manhole

has a standard Spokane County outlet control device inside. The device consists of a 12-inch cross connected to a pipe that exits the manhole. The cross is installed with one run on the outlet pipe and the other run is installed with a clean out gate that can be opened for cleaning or to allow an emergency overflow for larger storm events. The upward open branch of the cross provides the orifice for large storm events. An orifice plate, cap with a 5-inch hole, is installed on the bottom of the cross branch to allow a metered outflow. The exit pipe extends from the outlet structure manhole, through the detention pond berm to an erosion control pad at the edge of the seasonal creek.

C. Evaporation/Detention Pond

The south evaporation/detention pond accepts runoff from south of the seasonal creek. Stormwater will sheet flow and enter the pond. The pond is sized to contain runoff. Storm water may overflow during the 100-year storm event and enter the seasonal creek.

IV. Responsibility to Maintain

The Saltese Meadows Home Owner's Association will be responsible for the proper operation and maintenance of the stormwater facilities described in this manual. Those systems include catch basins, conveyance pipes, the evaporation and detention ponds and the outlet structure. The Home Owner's Association shall follow the methods described in this manual.

V. Maintenance

The following information provides a maintenance description for each of the stormwater elements included in this project. The Home Owner's Association is responsible to provide the maintenance described on the schedule noted within each element.

A. General

The following stormwater facilities shall be visually inspected following a significant rainfall or snowmelt event.

1. Inspect all catch basins, pipe inlets and pond outlet structures making sure that they are clear of debris and obstructions.

B. Catch Basins and Manholes including the Outlet Control Structure

The catch basins and manholes should have the grates removed at least twice a year, once in the spring (April) and once in the fall (October) to insure that they are free from dirt and silt and to insure that they are operating properly. A check should be made to insure that the pipe and outlet control structure (tee and orifice cap) is free from weeds or obstructions. Should excessive silt or dirt be discovered in any catch basin or manhole, it must be cleaned out by means of a vactor truck.

C. Evaporation and Detention Pond

Periodic maintenance of the ponds should be done to insure they are functioning properly. The following items should be noted:

1. The outlet and rip raps pads, located at the pipe outflow areas, should be secure in the areas defined by the plans and should be free from debris. The edges of the pads should be checked for scouring of the dirt around the pad. Any scouring or gouging of the dirt needs to be repaired and sodded or seeded to insure proper vegetative growth.

2. The bottom of the pond needs to be free from debris and sediment deposition.

3. The evaporation pond outlet pipes are located above the pond bottom elevation to safeguard against siltation and provide dead storage of stormwater for evaporation. The detention pond is provided with a sump below the outlet to minimize siltation building up near the pipe. Any siltation in the sump should be removed and the area reseeded. Any debris or weeds plugging the pipes needs to be removed.

4. The evaporation and detention ponds shall be reseeded, as required to maintain vegetation with the following dryland seed mix:

   Elka Perennial Rye (10%)
   Ruebens Canadian Bluegrass (15%)
   Durar Hard Fescue (20%)
   Covar/Sheep Fescue (45%)

D. Polyvinyl Chloride (PVC), Corrugated Polyethylene (CPE) and Corrugated Metal Pipe (CMP)

The PVC, CPE and CMP pipes should be checked periodically for obstructions at each end and twice a year the pipe should be visually inspected to insure that there is not mid-pipe blockage. Should a mid-pipe blockage be observed, it should be removed immediately. In the event that any of the pipes were to fail by being crushed, they must be replaced with the same type and size pipe as soon as the failure is discovered.

VI. Summary

By understanding the stormwater system as described herein and properly maintaining the components, the home owners of Saltese Meadows will have a long lasting and effective stormwater facility.

Date: 2/3/03
Project: Saltese Meadows
Project #: 02-120 B
By: M. Morse

Taylor Engineering, Inc.
Civil Design and Land Planning

○ Note to file
○ Telephone conv.
○ Meeting Notes
○ Field Report
⊗ Calcs. Chkd. _____

Calculations For Annual Operations and Maintenance Costs and Replacement Costs per lot

Annual Operation & Maintenance Costs — O&M = $400

Present Value of Drainage System — PV = $30,000

Assume 50% Replacement in 20 years — PV/2 = $15,000

Future Value of system to replace in 20 years (Assume inflation = 4%)

FV = PV/2 (F/P, 4%, n=20) *

FV = $15,000 (2.191) — FV = $32,867

Annual Set aside for future replacement (Assume conservative investment, interest = 6%)

A = FV (A/F, 6%, n=20) *

A = $32,867 (0.0272) — A = $894

Total Annual charge = (O&M) + (A)

= $400 + 894

= $1,294

Annual Charge Per lot = (Annual charge) / No. of lots @ Saltese Meadows

= $1,294 / 16 lots

= **$81 per lot / per year**

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* See attached interest tables.

Factor Table - $i = 4.00\%$

n	P/F	P/A	P/G	F/P	F/A	A/P	A/F	A/G
1	0.9615	0.9615	0.0000	1.0400	1.0000	1.0400	1.0000	0.0000
2	0.9246	1.8861	0.9246	1.0816	2.0400	0.5302	0.4902	0.4902
3	0.8890	2.7751	2.7025	1.1249	3.1216	0.3603	0.3203	0.9739
4	0.8548	3.6299	5.2670	1.1699	4.2465	0.2755	0.2355	1.4510
5	0.8219	4.4518	8.5547	1.2167	5.4163	0.2246	0.1846	1.9216
6	0.7903	5.2421	12.5062	1.2653	6.6330	0.1908	0.1508	2.3857
7	0.7599	6.0021	17.0657	1.3159	7.8983	0.1666	0.1266	2.8433
8	0.7307	6.7327	22.1806	1.3686	9.2142	0.1485	0.1085	3.2944
9	0.7026	7.4353	27.8013	1.4233	10.5828	0.1345	0.0945	3.7391
10	0.6756	8.1109	33.8814	1.4802	12.0061	0.1233	0.0833	4.1773
11	0.6496	8.7605	40.3772	1.5395	13.4864	0.1141	0.0741	4.6090
12	0.6246	9.3851	47.2477	1.6010	15.0258	0.1066	0.0666	5.0343
13	0.6006	9.9856	54.4546	1.6651	16.6268	0.1001	0.0601	5.4533
14	0.5775	10.5631	61.9618	1.7317	18.2919	0.0947	0.0547	5.8659
15	0.5553	11.1184	69.7355	1.8009	20.0236	0.0899	0.0499	6.2721
16	0.5339	11.6523	77.7441	1.8730	21.8245	0.0858	0.0458	6.6720
17	0.5134	12.1657	85.9581	1.9479	23.6975	0.0822	0.0422	7.0656
18	0.4936	12.6593	94.3498	2.0258	25.6454	0.0790	0.0390	7.4530
19	0.4746	13.1339	102.8933	2.1068	27.6712	0.0761	0.0361	7.8342
20	0.4564	13.5903	111.5647	2.1911	29.7781	0.0736	0.0336	8.2091
21	0.4388	14.0292	120.3414	2.2788	31.9692	0.0713	0.0313	8.5779
22	0.4220	14.4511	129.2024	2.3699	34.2480	0.0692	0.0292	8.9407
23	0.4057	14.8568	138.1284	2.4647	36.6179	0.0673	0.0273	9.2973
24	0.3901	15.2470	147.1012	2.5633	39.0826	0.0656	0.0256	9.6479
25	0.3751	15.6221	156.1040	2.6658	41.6459	0.0640	0.0240	9.9925
30	0.3083	17.2920	201.0618	3.2434	56.0849	0.0578	0.0178	11.6274
40	0.2083	19.7928	286.5303	4.8010	95.0255	0.0505	0.0105	14.4765
50	0.1407	21.4822	361.1638	7.1067	152.6671	0.0466	0.0066	16.8122
60	0.0951	22.6235	422.9966	10.5196	237.9907	0.0442	0.0042	18.6972
100	0.0198	24.5050	563.1249	50.5049	1,237.6237	0.0408	0.0008	22.9800

Factor Table - $i = 6.00\%$

n	P/F	P/A	P/G	F/P	F/A	A/P	A/F	A/G
1	0.9434	0.9434	0.0000	1.0600	1.0000	1.0600	1.0000	0.0000
2	0.8900	1.8334	0.8900	1.1236	2.0600	0.5454	0.4854	0.4854
3	0.8396	2.6730	2.5692	1.1910	3.1836	0.3741	0.3141	0.9612
4	0.7921	3.4651	4.9455	1.2625	4.3746	0.2886	0.2286	1.4272
5	0.7473	4.2124	7.9345	1.3382	5.6371	0.2374	0.1774	1.8836
6	0.7050	4.9173	11.4594	1.4185	6.9753	0.2034	0.1434	2.3304
7	0.6651	5.5824	15.4497	1.5036	8.3938	0.1791	0.1191	2.7676
8	0.6274	6.2098	19.8416	1.5938	9.8975	0.1610	0.1010	3.1952
9	0.5919	6.8017	24.5768	1.6895	11.4913	0.1470	0.0870	3.6133
10	0.5584	7.3601	29.6023	1.7908	13.1808	0.1359	0.0759	4.0220
11	0.5268	7.8869	34.8702	1.8983	14.9716	0.1268	0.0668	4.4213
12	0.4970	8.3838	40.3369	2.0122	16.8699	0.1193	0.0593	4.8113
13	0.4688	8.8527	45.9629	2.1329	18.8821	0.1130	0.0530	5.1920
14	0.4423	9.2950	51.7128	2.2609	21.0151	0.1076	0.0476	5.5635
15	0.4173	9.7122	57.5546	2.3966	23.2760	0.1030	0.0430	5.9260
16	0.3936	10.1059	63.4592	2.5404	25.6725	0.0990	0.0390	6.2794
17	0.3714	10.4773	69.4011	2.6928	28.2129	0.0954	0.0354	6.6240
18	0.3505	10.8276	75.3569	2.8543	30.9057	0.0924	0.0324	6.9597
19	0.3305	11.1581	81.3062	3.0256	33.7600	0.0896	0.0296	7.2867
20	0.3118	11.4699	87.2304	3.2071	36.7856	0.0872	0.0272	7.6051
21	0.2942	11.7641	93.1136	3.3996	39.9927	0.0850	0.0250	7.9151
22	0.2775	12.0416	98.9412	3.6035	43.3923	0.0830	0.0230	8.2166
23	0.2618	12.3034	104.7007	3.8197	46.9958	0.0813	0.0213	8.5099
24	0.2470	12.5504	110.3812	4.0489	50.8156	0.0797	0.0197	8.7951
25	0.2330	12.7834	115.9732	4.2919	54.8645	0.0782	0.0182	9.0722
30	0.1741	13.7648	142.3588	5.7435	79.0582	0.0726	0.0126	10.3422
40	0.0972	15.0463	185.9568	10.2857	154.7620	0.0665	0.0065	12.3590
50	0.0543	15.7619	217.4574	18.4202	290.3359	0.0634	0.0034	13.7964
60	0.0303	16.1614	239.0428	32.9877	533.1282	0.0619	0.0019	14.7909
100	0.0029	16.6175	272.0471	339.3021	5,638.3681	0.0602	0.0002	16.3711