

APPENDIX "A" Maintenance Plan

for the Drainage Control System at Remington Hill

Updated June 2004 to include improvements at Remington Hill 3rd Addition

(Note: This supercedes the April 2001 version that was prepared for Remington Hill 2nd Addition)

Owners of homes and/or lots within Remington Hill 3rd Addition will become members of The Estates At Remington Hill Homeowners' Association, along with the owners of homes and/or lots within Short Plat 1163-97, Short Plat 1164-97, Short Plat 1165-97, and Remington Hill 2nd Addition P.U.D. The surface water drainage facilities located within Remington Hill and (future) Timberlane Terrace are for the use of the members of The Estates At Remington Hill Homeowners' Association on an equal basis, subject to the provisions promulgated by the Association in the *Declaration of Covenants, Conditions and Restrictions of The Estates at Remington Hill*. It shall be the responsibility of the Association to inspect and maintain the stormwater drainage system serving the included properties as per the maintenance schedule outlined herein.

Note that the drainage facilities located along Man o'War Court in Remington Hill 1st Addition are excluded from this maintenance plan, as Man o'War Court is a public road up to the point where Man o'War Lane and Secretariat Lane begin, so the drainage facilities along Man o'War Court are to be maintained by Spokane County.

Facilities Inventory:

The plats listed above contain the following stormwater drainage facilities to date (existing or designed as of date in footer, below):

	Catch Basins and Inlets	Access Manholes	Pipe, LF ¹ (approx.)	Ponding Areas
SP 1163-97, 1164-97, 1165-97	8	3	1,554	1 ²
Remington Hill 2 nd Addition PUD	14	0	1,220	0 ³
Remington Hill 3 rd Addition PUD	7	2	701 ⁴	1 ⁵
Timberlane Terrace subdivision ⁶	6 ⁷	7 ⁸	1,713 ⁹	1 ¹⁰
Totals	35 CBs	12 MHs	5,188 LF	3 Pond Areas

- Footnotes:
1. Excludes groundwater collection and conveyance systems, and pond subdrains.
 2. "Interim Pond," located west of Secretariat Lane in Timberlane Terrace.
 3. Remington Hill 2nd Addition drains to the Interim Pond via Storm System A.
 4. Includes pipes P-1 through P-8, as shown on the Rem. Hill 3rd Drainage Plan.
 5. "RH3 Treatment Pond" (a permanent two-level stormwater treatment system).
 6. Storm System C constructed through future subdivision for use by Remington Hill 3rd.
 7. Includes catch basins CB-8 through CB-13, as shown on the Storm System C map sheet.
 8. Includes storm manholes MH-3 through MH-9, as shown on the Storm System C map.
 9. Includes pipes P-9 through P-21, as shown on the Storm System C map sheet.
 10. "Limerick Pond" (a permanent stormwater detention facility) including the temporary RH3 Evaporation Pond adjacent to Limerick Pond.

Maintenance Plan - *continued*

Maintenance of Drainage Facilities:

Maintenance procedures for the stormwater drainage facilities are described on the following pages. Refer to the *Drainage Plan* map sheets for the locations of the drainage facilities.

- Catch Basin Grates

Catch basin grates must be kept clear of debris such as leaves, pine needles, litter and sediment. Grates should be visually inspected weekly, with extra emphasis in the spring (due to debris and sediment from winter) and autumn (due to the prevalence of organic debris such as leaves). In the winter, grates must be kept clear of snow and ice to permit inflow of meltwater.

Catch basin grates can be cleared of debris with a shovel, with no special equipment or expertise required. The area surrounding the grate must also be kept clear to prevent blockage of flow into the grate. Remove any weeds or other vegetation growing across and blocking the grate openings or the flow path to the grate.

The grate shall be replaced if it is missing or has any broken members (or openings wider than 1"). The grate should sit flush within the frame; any separation of $\frac{3}{4}$ " or greater should be adjusted or repaired.

- Catch Basins

Remove grate and inspect catch basin for sediment or debris buildup twice per year (e.g. in the spring and autumn). Sediment and debris must be removed before buildup reaches the invert of the lowest pipe into or out of the catch basin.

Check annually for structural damage to the frame, top slab, walls or bottom of the catch basin. The frame should sit flush on the top slab. Any separation of $\frac{3}{4}$ " or greater should be adjusted and repaired. The top slab and the walls and floor of the catch basin should be free of cracks, to maintain structural integrity and to assure that flows stay contained and sediments are kept out. The catch basin should be replaced or repaired to design standards if it has settled more than 1" or has rotated more than 2" out of alignment.

Repairs should be made to cracks as follows:

- any cracks wider than $\frac{1}{4}$ " in the top slab
- any cracks wider than $\frac{1}{2}$ " and longer than 3 feet in the catch basin walls or floor
- any cracks wider than $\frac{1}{2}$ " and longer than 1 foot at the joint of any inlet or outlet pipe
- if there is any evidence of sediment entering through a crack

If the maintenance person judges the structure is unsound due to cracks or any other problem, the catch basin should be replaced or repaired to design standards. The life expectancy of catch basins is at least that of the roadway, which is generally 20 years.

Maintenance Plan - *continued*

- Access Manholes

Three storm sewer access manholes (without inflow grates) are provided at angle points in Storm Sewer System A in Secretariat Lane, four access manholes are provided in Storm Sewer System C northwest of the west end of Whirlaway Lane, and seven access manholes are provided in Storm Sewer System C within future Timberlane Terrace subdivision (as presently designed). These access manholes are for vacuuming of the pipe (if necessary due to sediment buildup) or for flow monitoring (which is not a specific requirement of the Association). Visually check the access lids monthly to be sure they are not missing and to ensure they sit flush in position within the manhole rim. Any separation of $\frac{3}{4}$ " or greater should be adjusted or repaired. Remove lids annually and check to be sure flow is not obstructed, and to examine for structural damage. Repair cracks as detailed above for catch basins.

- Pipes and other Conveyance Systems

1. Pipes shall be cleared of accumulated sediment or debris that exceeds 20% of the diameter of the pipe. Any vegetation that reduces the free movement of water through the pipe shall be removed. Inspect pipes annually (where possible) for any damage or deformation, and repair or replace pipe as necessary to maintain flow characteristics. Repair or replace pipes having any dent or deformation that reduces the cross-sectional area of the pipe by more than 20%. Maintain sufficient cover over pipes to provide protection from structural damage.
2. Open ditches, berms, culverts and other surface drainageways (e.g. near the Interim Pond) shall be kept clear of trash and debris. Inspect ditches, berms and culverts monthly, remove accumulated sediment that exceeds 20% of the design depth, and regrade as necessary so that the ditch, berm or culvert matches design specifications and retains full functionality. Any vegetation that reduces the free movement of water through a drainageway shall be removed. Inspect ditches for erosion damage, especially after storms, and repair or regrade drainageways as necessary to maintain flow characteristics and design specifications.
3. Rock rip rap or channel linings should be inspected monthly and after large storms for any missing or misplaced rocks, and replaced or repaired as necessary. Soil should not be visible beneath the rock lining.

- Ponding Areas

1. "Interim Pond"

The Interim Pond is an existing temporary facility located immediately west of the west boundary of Short Plat 1164-97 (i.e. west of the west end of Secretariat Lane) in Timberlane Terrace. Runoff water from Short Plats 1163-97, 1164-97 and 1165-97 and from Remington Hill 2nd Addition reaches the Interim Pond via the storm sewer pipe system (referred to as "Storm Sewer System A") in Secretariat Lane, which was extended to the southeast portions of Whirlaway Lane and Man o'War Lane during the development of Remington Hill 2nd Addition.

Maintenance Plan - *continued*

1. "Interim Pond" - *continued*

The Interim Pond provides two functions: water quality treatment, which occurs via settling and bioinfiltration, and disposal via infiltration, evaporation, and surface overflow. The overflow function is regulated to approximate pre-development flow rates by detention within the pond and controlled outflow through a weir. The interim pond should require only minimal attention to maintain it in condition. The dryland grass mixture lining the interim pond shall be kept at less than 24" in height, and any noxious weeds shall be removed. Any accumulation of sediments, debris or oils (especially near the interim storm sewer outlet) should be removed.

Visually inspect monthly to watch for signs of erosion or other degradation of the pond, its side slopes, or the maintenance access road around the pond. Rock rip rap at the outlet weir should be inspected monthly and after large storms for any missing or misplaced rocks, and repaired as necessary. Soil should not be visible beneath the rock rip rap. Watch for erosion of the access road, especially in ditches and at culverts, and repair as necessary to maintain road integrity.

Design Life: The Interim Pond is so-named because it is proposed to ultimately be replaced with a permanent swale system (the "Stepped Swales") for water quality treatment and disposal. The Stepped Swales will be located just east of, and draining into, the Spring Alcove Wetlands in the southern portion of Timberlane Terrace as that subdivision is developed. Storm System A is proposed to be extended to the south and west, terminating at the upper portion of the Stepped Swales. Replacement cost is unknown, since the extension of the storm sewer and the permanent swale system have not been designed beyond the initial concept.

2. "RH3 Treatment Pond"

RH3 Treatment Pond is a permanent two-level facility located within Tract A at the northwest corner of Remington Hill 3rd Addition. Runoff water from Remington Hill 3rd Addition and from the undeveloped hillside above the plat to the northeast reaches RH3 Treatment Pond via Storm Sewer System C, which begins in the west portion of Whirlaway Lane. RH3 Treatment Pond, which actually consists of two ponds in series, provides for water quality treatment to collected stormwater runoff via settling and bioinfiltration. Each level has a subdrain system, which collects infiltrated water and conveys it to a catch basin within each pond level. Each of the catch basins has an overflow grate, to divert excess water to the outflow pipe. From the lower level catch basin, water flows via the pipes of "lower" Storm Sewer System C to Limerick Pond in future Timberlane Terrace for detention and disposal.

The pond should require very little attention to maintain it in condition. The dryland grass mixture lining the treatment ponds shall be kept at less than 24" in height, with reseeding of bare areas as needed, and any noxious weeds shall be removed. Any accumulation of sediments, debris or oils (especially near the storm sewer outlet) should be removed.

Visually inspect monthly to watch for signs of erosion or other degradation of the pond, its side slopes, the rocks providing slope stabilization, or the maintenance access road serving the pond. Watch for erosion of the access road, and repair as necessary to maintain road integrity.

Maintenance Plan - *continued*

3. "Limerick Pond" and temporary RH3 Evaporation Pond

Limerick Pond is a permanent stormwater detention facility, located in future Timberlane Terrace subdivision at the south side of the intersection of Limerick Drive and Sonora Drive. Collected stormwater that has been treated for water quality improvement exits from RH3 Treatment Pond via Storm Sewer System C, which discharges into the RH3 Evaporation Pond, with an outflow weir into the Limerick Pond. The RH3 Evaporation Pond controls excess runoff water volumes from Remington Hill 3rd Addition, until a permanent stormwater disposal facility is constructed near Timberlane Drive. Water outflows from the evaporation pond via a weir at 2.4 feet depth to the Limerick Pond, where runoff water flow rates are attenuated to pre-development rates before being released. Water collected in Limerick Pond is released onto the ground surface in the existing drainage gully just west of the ponding area as a temporary disposal system, until the permanent stormwater disposal facility is constructed. Limerick Pond provides for disposal of collected stormwater runoff by allowing outflow at a computed maximum rate through an outlet structure and pipes. The outflow function is designed to approximate pre-development flow rates by detention of excess water (due to post-development conditions) within the pond. Outflow water passing through the outlet piping flows over rock rip rap to protect the outfall and spread-out the flow, and disposal on the ground surface occurs via infiltration, evaporation, and dissipation.

The ponds should require only minimal attention to maintain it in condition. The dryland grass mixture lining the pond shall be kept at less than 24" in height, with reseeding of bare areas as needed, and any noxious weeds shall be removed. Any accumulation of sediments, debris or oils should be removed, especially near the storm sewer outlet.

Visually inspect monthly to watch for signs of erosion or other degradation of the pond, its side slopes, the evaporation pond weir and spillway, or the maintenance access road serving the ponds. Watch for erosion of the access road along its entire length, especially in ditches and at culverts, and repair as necessary to maintain road integrity.

Rock rip rap at the pond outlets should be inspected monthly and after large storms for any missing or misplaced rocks, and repaired as necessary. Soil should not be visible beneath the rock rip rap.

* * *

Sinking Fund for Annual Costs

for the Drainage Control System at Remington Hill

Updated June 2004 to include improvements at Remington Hill 3rd Addition

(Note: This supercedes the April 2001 version that was prepared for Remington Hill 2nd Addition)

The following are assumptions, estimates and recommendations for providing annual set-aside funds for annual maintenance costs and future replacement costs in the form of a sinking fund for the portions of the drainage system that may need replacement or major renovation within the next 20 years. The sinking fund is an approximation of the replacement costs of the primary drainage facilities that are the responsibility of The Estates At Remington Hill Homeowners' Association.

The fund reserve amount is computed with consideration for probable inflation over the life of the materials, structures, and facilities, and includes a summary of the amount of money to be set aside annually for the fund and the annual charge per lot to equal the annual set-aside.

Note that the sinking fund calculations are only an estimate, using approximated values. The Homeowners' Association should use these computations as a guide, and modify them as needed to more accurately reflect actual costs.

Assumptions:

1. The drainage facilities are constructed properly, as per the approved plans and details.
2. Inspection and minor maintenance & repairs (e.g. removing debris) performed by Association members/volunteers; labor charge = zero or minimal
3. Catch basins will be cleaned-out by hired vector truck, once per year
4. Roadway life = 20 years
5. Catch Basin life = greater than roadway = 20 years or more
6. Access Manhole life = 20 years or more
7. Pipes: assume 50% replacement of pipes in 20 years
8. Interim Pond, RH3 Treatment Ponds, RH3 Evaporation Pond and Limerick Detention Pond to need reseeding every 5 years (Note: Interim Pond and RH3 Evaporation Pond are temporary facilities, and will be eliminated when permanent facilities are constructed in Timberlane Terrace during a future phase of development).

Sinking Fund for Annual Costs – *continued*Estimated Operation & Maintenance Costs:

Operation cost of the surface runoff drainage facilities is essentially zero, as there are no electric or fuel-driven pumps or other devices specified for the system. Maintenance items, as detailed in the *Maintenance Plan*, include the following:

- **Ponding Areas** (3 total; the two-level RH3 Treatment Pond is counted as one ponding area, as are the RH3 Evaporation Pond and adjacent Limerick Detention Pond):
Removal of sediment/debris, inspection/repair of rock rip rap/slope stabilization, reseeding.
Approximate annual maintenance cost: \$ 300 per ponding area, plus reseeding (dryland mixture) @ \$ 1,000 per ponding area per 5-year cycle = \$ 200/year per pond.
Total approximate annual cost: 3 Ponds at (\$ 300 + \$ 200) = 3 x \$ 500 = \$ 1,500.
- **Catch Basins** (35 total):
Clearing grates, removing vegetation, repairing (grouting) cracks at approximate annual cost of \$ 20 per catch basin, plus vactoring once per year at approximately \$ 50 per catch basin;
Total approximate annual cost: 35 Catch Basins at (\$ 20 + \$ 50) = 35 x \$ 70 = \$ 2,450.
- **Access Manholes** (12 total):
Checking and repairing (grouting) cracks at approximate annual cost of \$ 20 per manhole;
Total approximate annual cost: 12 Manholes at \$ 25 = \$ 300.
- **Pipes** (approximately 5,188 lineal feet):
Manually clearing pipe ends of sediment/debris, removal of vegetation, repair/replacement of damaged pipe, repairing/grouting at pipe ends;
Total approximate annual cost: 5,188 LF at \$ 0.10 per LF = \$ 520.
- **Surface Drainageways** (berms, ditches, rip rap, etc., especially at the 3 ponding areas):
Clear trash & debris, remove sediment & regrade, remove vegetation, repair erosion damage;
Total approximate annual cost: 3 ponding areas at \$ 100 each = \$ 300.
- **Miscellaneous Facilities:**
Checking, maintaining and repairing various features such as maintenance access roads, groundwater collection & conveyance system, and RH3 Treatment Pond subdrain system;
Total approximate annual cost = \$ 150.

Total Approximate Annual Operation & Maintenance Costs:

(\$1,500 + \$2,450 + \$300 + \$520 + \$300 + \$150) = approximately \$ 5,220 per year

Sinking Fund Reserve Account
Calculations for Operation & Maintenance Costs plus Replacement Costs

<u>Symbol</u>	<u>Factor</u>	<u>Cost</u>
OM	Annual Operation and Maintenance costs	\$ 5,220
PV ₁	Present Value of Storm Sewer System A, Original portion, in Secretariat Lane (as per bid by Eller Corp. for initial construction)	\$ 53,961
PV ₂	Present Value of Storm Sewer System A, newer portion, in Remington Hill 2 nd Addition (approximated)	\$ 30,000
PV ₃	Present Value of Storm Sewer System C, proposed portion for Remington Hill 3 rd Addition (approximated)	\$ 50,000
PV ₄	Present Value of Storm Sewer System C, proposed portion for Timberlane Terrace (approximated)	\$ 65,000
PV	Total Assumed Present Value (rounded up)	\$200,000
PV/5	Assume 20% replacement of system in 20 years ¹	\$ 40,000
FV	Future Value of system to replace in 20 years ² assuming inflation = 4%, $FV = PV/5(2.1911)$	\$ 87,644
A	Annual Set-aside for future replacement costs assume conservative investment, interest = 5% ³ [@ 5% and $n = 20$, $A/F = 0.08024$; $A = FV (A/F)$]	\$ 7,033
Total Annual Charge = Annual O&M Costs + Annual Set-aside = $OM + A =$		\$ 12,253
<u>Total Annual Charge per Lot</u> ⁴ = $(OM + A) / 44 =$		<u>\$ 280</u>

- Footnotes:
1. Catch basins and access manholes should generally have a useful life of 20 years or more, especially considering the relatively light traffic loads expected in this location. The HDPE pipe specified in plans for the storm sewer system has a Design Life of 50+ years (Hancor, Inc.: *Drainage Handbook*, p. 5-6.).
 2. The inflation rate over the past few years has been approximately 4%.
 3. Interest rates are presently relatively low, with money market rates below 5%.
 4. 13 lots in Phase "A" short plats, plus 19 lots in Remington Hill 2nd Addition, plus 12 lots in Remington Hill 3rd Addition = 44 lots total

NOTE: These figures are only a preliminary estimate, and are intended to serve as an initial approximation.