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SPOKANE COUNTY ENGINEER

STORMWATER FACILITIES
OPERATION & MAINTENANCE MANUAL
for
NORTHWEST VISTAS ADDITION

July 2007

TAYLOR ENGINEERING, INC.
106 W. Mission Avenue
Spokane, WA 99201
(509) 328-3371

STORMWATER FACILITIES
OPERATION & MAINTENANCE MANUAL
For
NORTHWEST VISTAS ADDITION

Date: July 6, 2007

Prepared By: Mark A. Aronson, P.E.
Lindsay Ray, E.I.T.

MARK A. ARONSON
STATE OF WASHINGTON
24681
REGISTERED
PROFESSIONAL ENGINEER

Mark A. Aronson 7/9/07

EXPIRES 3-10-09

TAYLOR ENGINEERING, INC.
106 W. Mission Avenue
Spokane, WA 99201-2322
(509) 328-3371
tei@taylorengr.com

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STORMWATER FACILITIES
OPERATION AND MAINTENANCE MANUAL
for
NORTHWEST VISTAS ADDITION

I. Purpose

This Operation and Maintenance Manual is intended to provide general guidelines for maintaining the stormwater facilities built in conjunction with Northwest Vistas Addition. The proper operation and maintenance of these facilities will be the responsibility of the Northwest Vistas Addition Home Owners Association. Implementation of these guidelines should help to insure that these facilities will continue to operate in the manner in 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

The stormwater facilities installed with this project consist of one primary system, which is comprised of a series of catch basins, storm manholes, and conveyance pipes that outlet to a treatment pond with drywells for disposal of stormwater.

A. Catch Basin, Manholes and Conveyance Pipes

This system provides a series of catch basins located at low points and on grade to collect the stormwater runoff generated from 17th Avenue, Morningside Heights Drive, Mulligan Drive, and Clover Drive. Once the stormwater is collected by catch basins it is transported through the piping system, which consists of a combination of 10", 12", 15", and 18" HDPE pipe. Stormwater is transported by this system to an outlet to the treatment and detention pond, where it receives treatment and ultimately is disposed of through one of seven (7) Spokane County Standard Type B drywells.

B. Treatment and Detention Ponds with Drywells

Treatment of the stormwater is required in accordance with the Spokane County Aquifer Sensitive Area Ordinance. The treatment pond is also utilized as a detention pond. Design methodology was based on minimizing the land area needed to store runoff volumes.

III. Function

The stormwater facilities for Northwest Vistas Addition 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 drainage problems. The following describes each component of the stormwater systems and the proper function of that component in the system.

A. Catch Basin, Conveyance Pipes, and Manholes

Catch basins provide collection of runoff from the road areas. The conveyance pipes are provided to route the runoff to the treatment and detention facilities. Rip rap outlet pads are placed at all outlet pipes from the conveyance system in order to protect the pond bottoms from erosion. Manholes are provided at all angle points in the piping system.

B. Treatment and Detention Ponds with Drywells or Outlet Structures

Treatment and detention ponds accept runoff from the conveyance pipes for treatment in accordance with the Aquifer Sensitive Area Ordinance and provide storage for the stormwater runoff. Drywell structures are placed with rim elevations 0.5' above the pond bottom. This allows stormwater generated during a storm event to be treated prior to disposal through the drywells. The pond has two rip rap pad outlet structures to provide erosion control. These structures are placed at all pipes discharging to the ponds. Normal operation of the ponds will include some ponding.

IV. Responsibility to Maintain

Northwest Vistas Addition Home Owners 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, treatment and detention ponds, and drywells. Northwest Vistas Addition Home Owners 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. Northwest Vistas Addition Home Owners 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, drywells, and pond overflow and outlet structures making sure that they are clear of debris and obstructions.

B. Catch Basins, Manholes, and Drywells

The catch basins, manholes, and drywells 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, silt, and debris to insure that they are operating properly. Should excessive silt, dirt, or debris be discovered in any catch basin, manhole, or drywell, it must be cleaned out by means of a vactor truck.

C. Treatment and Detention Ponds

Periodic maintenance of the pond should be done to insure it is functioning properly. The following items should be noted:

1. The rip rap pads, located at pipe outlets, should be secure in the areas defined by the plans and should be free from debris. The edges of the rip rap 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 treatment and detention pond shall be seeded with the following dryland seed mix:

   30% Covar Sheep Fescue
   30% Durar Hard Fescue
   20% Canada Bluegrass
   20% Creeping Red Fescue

   Provide mixture composed of grass seed and fertilizer in percentages as follows:

Grass Seed:	50-60 lbs. per acre
Fertilizer:	16-16-16 timed release Composition, 300 lbs. per acre.

D. High Density Polyethylene Pipe (HDPE)

The HDPE 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 homeowners of Northwest Vistas Addition will have a long lasting and effective stormwater facility.

Taylor Engineering, Inc.
W. 106 Mission Ave., Suite 206
Spokane, Washington 99201

prepared by: LDR
date: 7/9/2007

NORTHWEST VISTAS

OPERATIONS AND MAINTENANCE COST PER LOT PER YEAR

ANNUAL OPERATION AND MAINTENANCE COSTS	**(O&M)**	**$2,354**	<<<<<
PRESENT VALUE OF DRAINAGE SYSTEM	**(PV)**	**$163,322**	<<<<<
50% REPLACEMENT VALUE OVER 20 YEARS	**(PV-50%)**	**$81,661**	
ASSUME 4% INFLATION (FROM ATTACHED TABLE)	(F/P)	2.1911	
FUTURE VALUE OF SYSTEM TO REPLACE IN 20 YEARS	**(FV)**	**$178,927**	
ASSUME 6% INVESTMENT (FROM ATTACHED TABLE)	(A/F)	0.0272	
ANNUAL SET ASIDE FOR FUTURE REPLACEMENT	**(A)**	**$4,867**	
TOTAL ANNUAL COST (O&M)+(A)	**(TAC)**	**$7,221**	
NUMBER OF LOTS (TOTAL BUILD OUT)		102	
ANNUAL COST PER LOT (TAC)/#LOTS (TOTAL BUILD OUT)	**(ACL)**	**$70.79**	

ANNUAL OPERATION AND MAINTENANCE COSTS

			unit	rate	cost
Pond:	Debris Removal	(quarterly)	1	$100.00	$100.00
	Inspection	(anually)	1	$100.00	$100.00
	Sediment Remov.	(anually)	1	$90.00	$90.00
	Re-seeding	(anually)	1	$50.00	$50.00
	Drywell Vacuum	(bi-annual)	2	$900.00	$1,800.00
					$2,140.00
	Admin.		10%		$214.00

SYSTEM VALUE

	type		unit	rate	cost
Catch Basins	Std.	(EA)	22	$1,300.00	$28,600.00
Manholes	Std.	(EA)	15	$2,500.00	$37,500.00
Drywells	Dbl.Depth	(EA)	7	$2,500.00	$17,500.00
Pipes: 8"		(L.F.)	0	$20.00	$0.00
10"		(L.F.)	225	$22.00	$4,950.00
12"		(L.F.)	1262	$24.00	$30,288.00
15"		(L.F.)	954	$26.00	$24,804.00
18"		(L.F.)	456	$30.00	$13,680.00
21"		(L.F.)	0	$32.00	$0.00
24"		(L.F.)	0	$34.00	$0.00
30"		(L.F.)	0	$37.00	$0.00
Misc Structures (flow control)		(EA.)	6	1000	$6,000.00
					$163,322.00

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NORTHWEST VISTAS

OPERATIONS AND MAINTENANCE COST PER LOT PER YEAR

ANNUAL OPERATION AND MAINTENANCE COSTS	**(O&M)**	**$2,354 <<<<<**	
PRESENT VALUE OF DRAINAGE SYSTEM	**(PV)**	**$92,902 <<<<<**	
50% REPLACEMENT VALUE OVER 20 YEARS	**(PV-50%)**	**$46,451**	
ASSUME 4% INFLATION (FROM ATTACHED TABLE)	(F/P)	2.1911	
FUTURE VALUE OF SYSTEM TO REPLACE IN 20 YEARS	**(FV)**	**$101,779**	
ASSUME 6% INVESTMENT (FROM ATTACHED TABLE)	(A/F)	0.0272	
ANNUAL SET ASIDE FOR FUTURE REPLACEMENT	**(A)**	**$2,768**	
TOTAL ANNUAL COST (O&M)+(A)	**(TAC)**	**$5,122**	
NUMBER OF LOTS (PHASE 1)		30	
ANNUAL COST PER LOT (TAC)/#LOTS (PHASE 1)	**(ACL)**	**$170.75**	

ANNUAL OPERATION AND MAINTENANCE COSTS

			unit	rate	cost
Pond:	Debris Removal	(quarterly)	1	$100.00	$100.00
	Inspection	(anually)	1	$100.00	$100.00
	Sediment Remov.	(anually)	1	$90.00	$90.00
	Re-seeding	(anually)	1	$50.00	$50.00
	Drywell Vacuum	(bi-annual)	2	$900.00	$1,800.00
					$2,140.00
	Admin.		10%		$214.00

SYSTEM VALUE

	type		unit	rate	cost
Catch Basins	Std.	(EA)	9	$1,300.00	$11,700.00
Manholes	Std.	(EA)	9	$2,500.00	$22,500.00
Drywells	Dbl.Depth	(EA)	7	$2,500.00	$17,500.00
Pipes: 8"		(L.F.)	0	$20.00	$0.00
10"		(L.F.)	159	$22.00	$3,498.00
12"		(L.F.)	224	$24.00	$5,376.00
15"		(L.F.)	708	$26.00	$18,408.00
18"		(L.F.)	264	$30.00	$7,920.00
21"		(L.F.)	0	$32.00	$0.00
24"		(L.F.)	0	$34.00	$0.00
30"		(L.F.)	0	$37.00	$0.00
Misc Structures (flow control)		(EA.)	6	1000	$6,000.00
					$92,902.00