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COVER SHEET

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806 Metcalf Street
Sedro-Woolley, WA 98284

DOCUMENT TITLE(S) LOHINK PLACE: Operation and Maintenance Manual
For the Stormwater Collection System and Detention Pond

Grantor: Owner and future Owners of the Plat of LOHINK PLACE

Grantee: Skagit County

Legal Description:

Portions of the Northeast Quarter and Southeast Quarter of Section 1, Township 36 North, Range 4 East, W.M.

ASSESSOR'S PROPERTY TAX PARCEL NUMBER: P47514

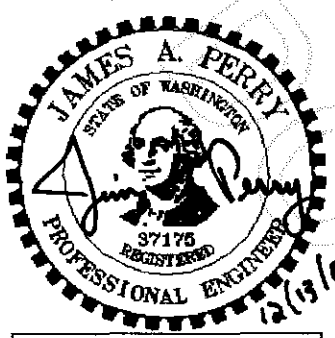
LOHINK PLACE

OPERATION
AND
MAINTENANCE MANUAL

FOR THE
STORMWATER COLLECTION SYSTEM
AND DETENTION POND

DECEMBER 13, 2006

PREPARED BY



EXPIRES 7/18/2007

Skagit Surveyors & Engineers

806 METCALF STREET, SEDRO-WOOLLEY, WA 98284
360-855-2121 360-855-1658FAX
info@sseconsultants.com www.sseconsultants.com

OPERATION AND MAINTENANCE MANUAL

For

LOHINK PLACE

STORMWATER COLLECTION SYSTEM AND DETENTION SYSTEM

TABLE OF CONTENTS

EXHIBITS:

I. PURPOSE OF MANUAL

The purpose of this manual is to outline the procedures for the proper operation and maintenance of the stormwater facilities for LOHINK PLACE as required to be maintained by the LOHINK PLACE lot owners.

Lot owners in LOHINK PLACE have the responsibility for all reasonable and necessary maintenance and repairs of the stormwater facilities within the short plat for LOHINK PLACE. The Skagit County Public Works Department will maintain the side slopes of Lake Samish Road.

This manual is the mechanism for the maintenance, repair and replacement of the stormwater, water detention and drainage facilities.

For the benefit of the owners of the lots in the LOHINK PLACE Plat, conditions should not be allowed to deteriorate, nor maintenance not performed on-site, which would force the Skagit County Public Works Department to assume responsibility of the facility. The stormwater collection system and detention system should add to the beauty and ease of living in LOHINK PLACE as much as possible.

II. PURPOSE OF FACILITY

In the development of the residential lots for LOHINK PLACE, the natural drainage of the area was changed by the construction of the road and houses. Instead of rain falling on trees and grass and percolating into the soil, some of the rain will fall on gravel roads and roofs and quickly run off and collect at low points.

Now with more water reaching the low point faster, this stormwater facility provides control of the quality, amount and rate at which stormwater is discharged to the wetlands.

III. LAYOUT OF FACILITY

The stormwater system for LOHINK PLACE basically is comprised of two parts. First, the collection system and secondly, the detention system.

Exhibit "A" is a copy of a portion of the plat layout of the private road and lots for LOHINK PLACE. Also shown are the drainage easements of which the lot owners have legal right of access for maintenance purposes.

IV. FUNCTION OF UNITS

A. ROAD DITCHES

Culverts are placed, as shown on Exhibit "A", to convey land and road stormwater runoff along the roadside ditches. Ditches over 5% grade are rock-lined in order to prevent erosion and transport of sediment. The ditches convey most of this runoff to the biofiltration swale along the driveway to Lot 1 which directs the flow into the detention pond.

Runoff from Lots 3 and 4 and a short section of the road is allowed to run off down the slope of the natural terrain to the wetland. The detention pond is sized to mitigate for this runoff because it collects all the runoff, not just the increase in runoff.

B. BIOFILTRATION SWALE

Prior to flowing into the detention pond, the collected stormwater flows along a biofiltration swale. This swale provides for water quality control of the stormwater. This control is provided by slowing down the velocity of the water and having it flow along this grass-lined swale. The flat slope and the grass provide for sediment to settle out along the length of the swale. The grass also removes (absorbs) some oil from the stormwater by having the globules of oil attach to the blades of grass.

This swale is designed as part of the stormwater control and detention system. Big weeds should not be allowed to grow in the swale. The grass should be maintained at 6 to 10 inches high.

C. DETENTION POND

The detention pond is designed and sized to store the increase in runoff as a result of the construction of the road and the construction of three new houses. This increase in runoff from "pre-developed" to "developed" conditions was calculated to be 19,494 cubic feet or 145,815 gallons. The only purpose of the detention pond is to store this volume of increased stormwater runoff while it is slowly discharged into the wetland. Exhibit "B" shows the layout of the detention pond as included in the construction drawings.

D. FLOW CONTROL STRUCTURE (FCS)

The purpose of the flow control structure (FCS) is to release the stored water in the detention pond to the wetlands at a slow rate. This rate is regulated by the Skagit County Drainage Ordinance. The flow rate is basically similar to the "pre-developed" runoff rate from the site.

The flow is controlled by three orifices or holes in the discharge riser pipe inside the FCS manhole. These two holes provide for the three flow-rate criteria. Stormwater in excess of these criteria flows over the top of the riser pipe and into the discharge pipe. Excess stormwater also flows over the spillway in the berm of the detention pond. Exhibit "C" shows the details of the flow control structure as included in the construction plans.

The first and lowest hole (orifice) in the riser pipe is designed to discharge 50% of the "pre-developed" 2-year flow rate. A 7/8" hole below the level of the discharge pipe provides for this flow. The rate of flow through this hole is when the pond holds 8,138 cubic feet of water. For this volume the water depth is 1.40 feet (1 foot, 5 inches) in the pond and the discharge rate in 0.025 c.f.s. (11.2 gpm). This is the volume of the difference between the "pre-developed" and "developed" 2-year storm runoff. Note that a "2-year storm" is a rainoff that is likely to occur every 2 years and is a certain amount based on many years of rainfall records.

The second hole is designed to discharge the same as the "pre-developed" 10-year stormwater runoff rate from the site. A 2-3/8" diameter hole in the side of the riser pipe allows 0.167 c.f.s. (175 gpm) of stormwater to be discharged when the water level is the detention pond is 2.25 feet (2 feet 3 inches.)

The third hole is designed to discharge the same as the "pre-developed" 100-year stormwater runoff rate from the site. A 2¼" diameter hole in the side of the riser pipe allows 0.378 c.f.s. (170 gpm) of stormwater to be discharged when the water level is the detention pond is 3.3 feet (3 feet 4 inches)

The overflow pipe (the top of the riser pipe) and the spillway are designed to handle the flow in excess of 0.378 c.f.s. and 19,494 cubic feet, of water in the pond.

It must be understood that the pond and discharge structure are designed to handle only the increase in the stormwater runoff as a result of this development. However, all the collected stormwater runoff is still being directed to the detention pond. Stormwater volume and flow rates in excess of the pond volume and FCS discharge rates will flow over the riser pipe and spillway. This is normal and how the detention system was designed.

V. NORMAL OPERATING PROCEDURES

The stormwater collection and detention system is designed to function on its own. When a rainstorm comes, the water is collected and flows through the ditches and culverts to the detention pond. The only and main operating procedure is to once a month make sure nothing has plugged the culverts and the orifices in the flow control structure (FCS). It is important that this operating procedure be recorded.

Inspect the orifices by removing the manhole lid on the FCS. Visually inspect the orifices to make sure they are not clogged. By looking down the inside of the riser pipe you should be able to see the bottom orifice.

The County may wish to see a record of operating and maintenance procedures actually performed. Keep a log of the date and what was observed and/or done. A copy of a master form for keeping this log is included as Exhibit "F". The person responsible for operating and maintaining the stormwater system for LOHINK PLACE is to keep a copy of this manual in a ring binder with extra copies of the maintenance log form. This way the manual and the log will keep everything recorded and organized.

A "normal" operating procedure is to do the above mention inspection after a very heavy rain. This way you will make sure everything worked property and the system is ready for the next rainstorm. Be sure to log all of your inspection items on the log form.

VI. MAINTENANCE OF FACILITY

The ditches and culverts should be inspected to remove any accumulated debris. This should be part of the monthly operating procedure.

When tall weeds or trees start to grow in the biofiltration swale and on the bottom and sides of the detention pond they should be removed. When this is necessary, record it on the maintenance log form.

One may think that tall weeds and trees do not affect the operation of the pond. Normally they may not, but silt will accumulate in the bottom of the pond and will need to be cleaned out. Thus the pond bottom should be kept in a "grass only" state.

VII. RECORD KEEPING

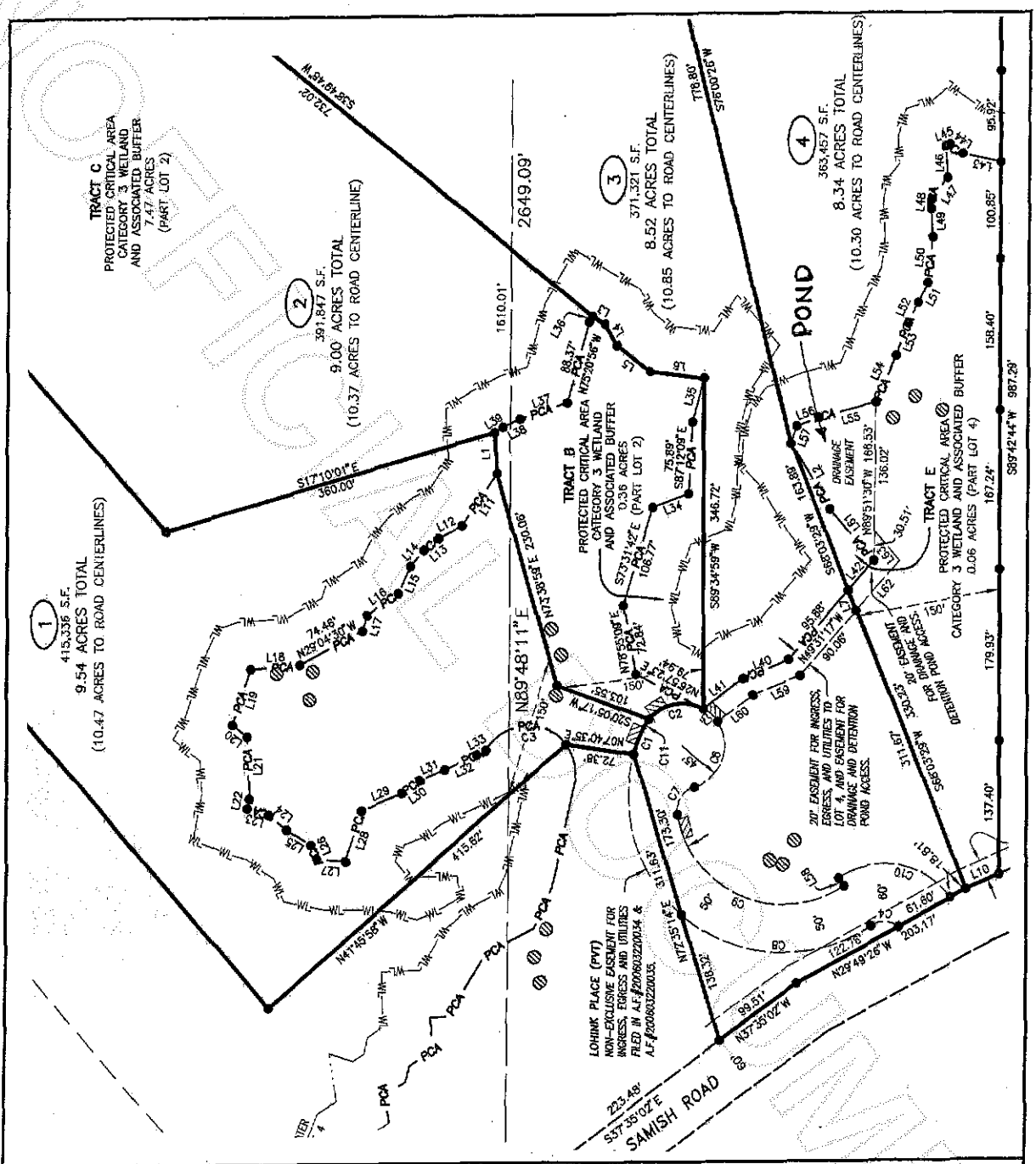
As explained in the previous sections, it is important to keep a log of all inspections and maintenance performed on your stormwater collection and detention system. This log is to be available for inspection by the Skagit County Public Works Department. By keeping this log up to date and kept in a binder, you will be ready for any unexpected inspection.

These maintenance procedures are required by Skagit County pursuant to the terms and conditions set forth on the face of the short plat for LOHINK PLACE.

VIII. EMERGENCIES

If there is a situation, such as a major oil spill into your collection system, or if there is any other type of major damage to the stormwater collection or detention system, be sure to call the Skagit County Public Works Department at 360-336-9400 and report it to them. Inform the County what happened, what you are doing about it, and solicit any help you may need.

If any major repairs are necessary make sure they are done consistent with the initial plans and construction of your facilities. A copy of the construction plans is to be readily available to the maintenance person at all times.



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LOHINK PLACE

LOT & EASEMENT LAYOUT

EXHIBIT "A"

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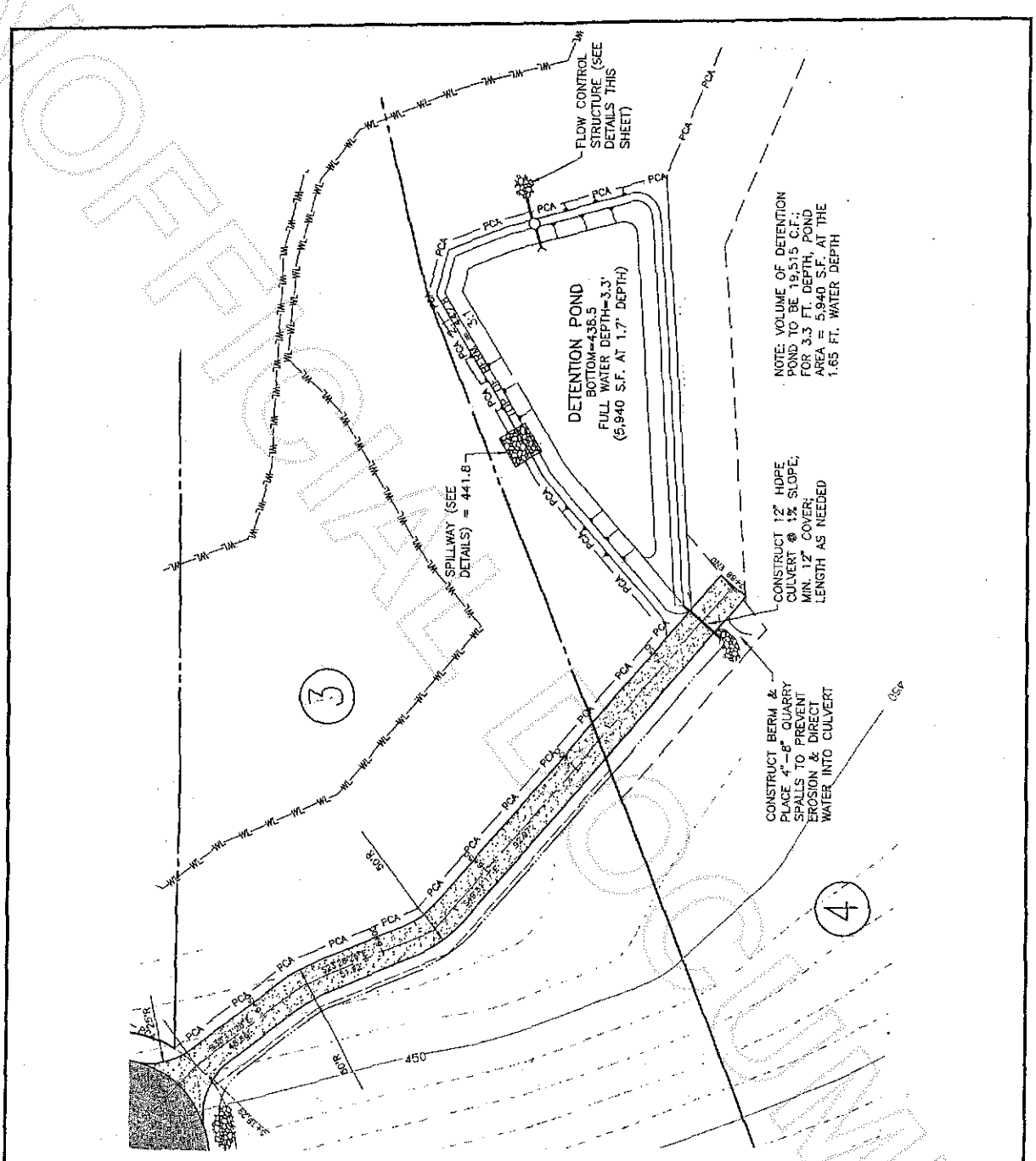

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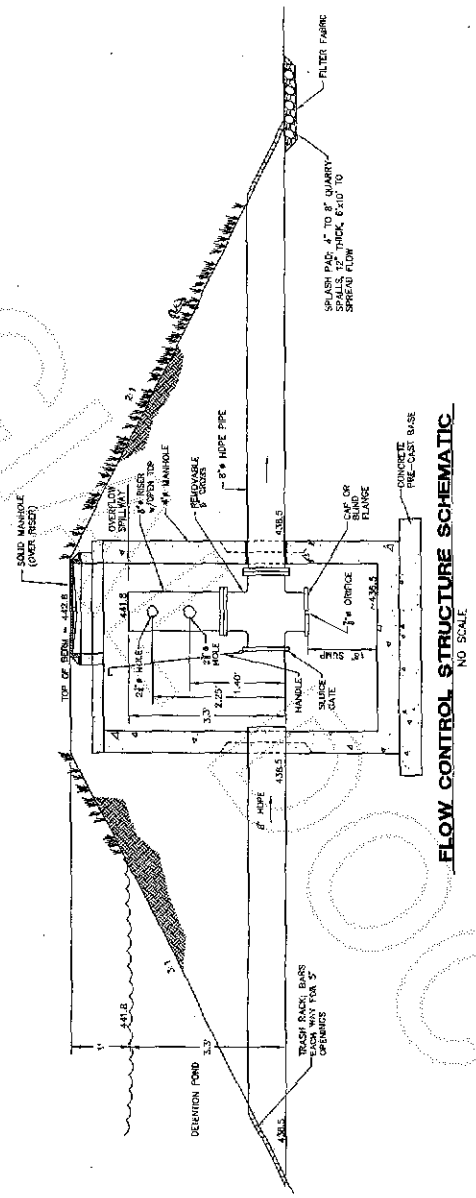
LOHINK PLACE

DETENTION POND LAYOUT

EXHIBIT "B"



FLOW CONTROL STRUCTURE SCHEMATIC
NO SCALE

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LOHINK PLACE

FLOW CONTROL STRUCTURE

EXHIBIT "C"

LOHINK PLACE
STORMWATER SYSTEM

Maintenance Log

DATE	NAME	DESCRIPTION OF INSPECTION/WORK