



200805290020

Skagit County Auditor

5/29/2008 Page 1 of 13 9:15AM

Document Title: Operation and Maintenance Manual

Reference Number:

Grantor(s): additional grantor names on page ___

1. Larry & Claire Pinnow

2.

Grantee(s): additional grantee names on page ___

1. Public

2.

Abbreviated legal description: full legal on page(s) ___

Portion of the SW 1/4 of the SE 1/4 of Section 2, Township 35 North, Range 1 East w.m.

Assessor Parcel / Tax ID Number: additional tax parcel number(s) on page ___

P31201

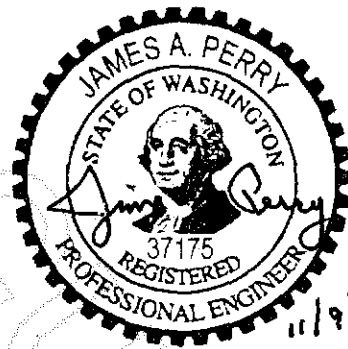
LARRY PINNOW

OPERATION AND MAINTENANCE MANUAL

FOR THE STORMWATER COLLECTION SYSTEM AND DETENTION SYSTEM

November 9, 2007

PREPARED BY



EXPIRES 7/18/09



806 Metcalf Street, Sedro-Woolley, WA 98284
360-855-2121 360-855-1658 Fax

info@sseconsultants.com

www.sseconsultants.com



200805290020

Skagit County Auditor

OPERATION AND MAINTENANCE MANUAL

For

LARRY PINNOW

STORMWATER COLLECTION SYSTEM AND DETENTION SYSTEM

TABLE OF CONTENTS

I.	PURPOSE OF MANUAL.....	2
II.	PURPOSE OF FACILITY.....	2
III.	LAYOUT OF FACILITY.....	2
IV.	FUNCTION OF UNITS.....	3
V.	NORMAL OPERATING PROCEDURES.....	5
VI.	MAINTENANCE OF FACILITY.....	5
VII.	RECORD KEEPING.....	5
VIII.	EMERGENCIES.....	6

EXHIBITS:

- A. LOT & EASEMENT LAYOUT
- B. DETENTION POND LAYOUT
- C. FLOW CONTROL STRUCTURE DETAIL
- D. MAINTENANCE LOG FORM



200805290020

Skagit County Auditor

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 the lot owners of Short Plat PL070493 as required to be maintained by the lot owners.

Lot owners have the responsibility for all reasonable and necessary maintenance and repairs of the stormwater facilities within the short plat. 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 short plat lots, 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 on these lots as much as possible.

II. PURPOSE OF FACILITY

In the development of these residential lots, 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 this short plat is comprised of two parts—the collection system and the detention system.

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



200805290020

Skagit County Auditor

5/29/2008 Page

4 of 13 9:15AM

IV. FUNCTION OF UNITS

A. ROAD DITCHES

Culverts are placed in the roads to convey land and road stormwater runoff into the roadside ditches. The ditches convey most of this runoff to the biofiltration swale along West Shore Drive which directs the flow to the detention pond.

Runoff from portions of Lots 1 and 2 is allowed to run off site to the north. 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 two new houses. This increase in runoff from "pre-developed" to "developed" conditions was calculated to be 39,341 cubic feet or 294,270 gallons. The only purpose of the detention pond is to store this volume of increased stormwater runoff while it is slowly discharged into the roadside ditch. 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 ditch 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.



200805290020

Skagit County Auditor

5/29/2008 Page

5 of 13 9:15AM

The flow is controlled by three orifices or holes in the discharge riser pipe inside the FCS manhole. Excess stormwater flows over the top of the riser pipe or over the spillway in the berm of the detention pond. Exhibit "C" shows the details of the flow control structure.

The first and lowest hole (orifice) in the riser pipe is designed to discharge 50% of the "pre-developed" 2-year flow rate. This hole is on the bottom cap of the riser pipe. A 2 ¼" diameter hole below the level of the discharge pipe provides for this flow. The rate of flow through this hole is determined when the pond holds 18,573 cubic feet of water. For this volume the water depth is 1.18 feet (1 foot 2 inches) in the pond and the discharge rate is 1.62 c.f.s. (727 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 6" diameter hole in the side of the riser pipe allows 0.989 c.f.s. (444 gpm) of stormwater to be discharged when the water level in the detention pond is 1.87 feet (1 foot 10 inches.)

The third hole is designed to discharge the same as the "pre-developed" 100-year stormwater runoff rate from the site. A 7" diameter hole in the side of the riser pipe allows 2.329 c.f.s. (1,045 gpm) of stormwater to be discharged when the water level in the detention pond is 2.5 feet (2 feet 6 inches)

The overflow pipe (the top of the riser pipe) and the spillway are designed to handle the flow in excess of 2.329 c.f.s. and 39,341 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



200805290020

Skagit County Auditor

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 orifices.

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 "D". The person responsible for operating and maintaining the stormwater system 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 Larry Pinnow.



200805290020

Skagit County Auditor

VIII. EMERGENCIES

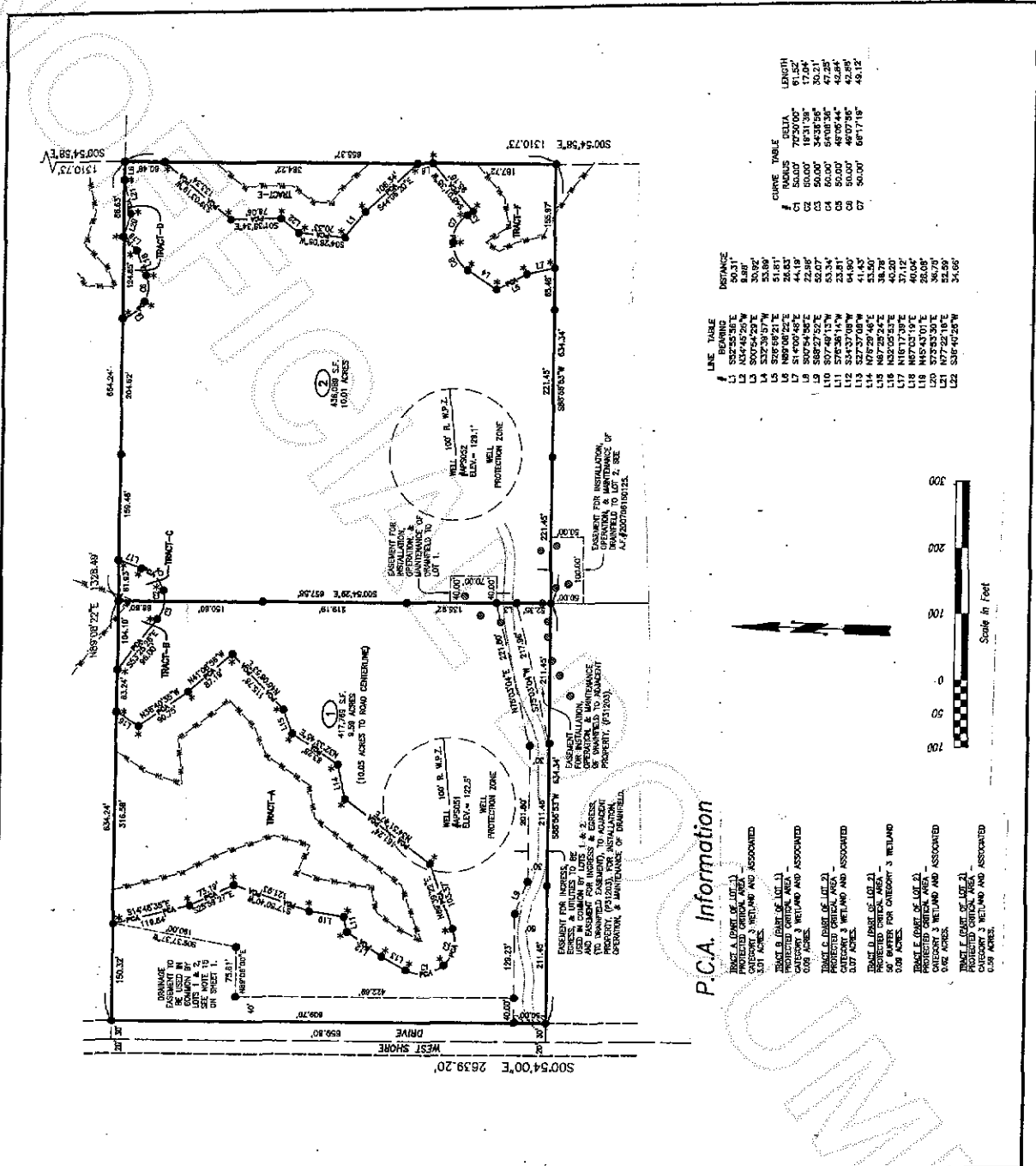
If there is a situation, such as a major oil spill into your collection system, or if there is any other type of major damage to the stormwater collection or detention system, be sure to call the Skagit County Public Works Department at 360-336-9400 and report it to them. Inform the County what happened,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



200805290020
Skagit County Auditor

5/29/2008 Page 8 of 13 9:15AM



LINE TABLE

LINE #	BEARING	DISTANCE
L1	S82°55'36\"	50.31'
L2	S84°45'20\"	8.89'
L3	S84°45'20\"	53.80'
L4	S32°33'57\"	53.80'
L5	S28°59'21\"	51.81'
L6	N89°08'22\"	26.83'
L7	S89°08'22\"	26.83'
L8	S87°54'58\"	22.19'
L9	S88°27'52\"	52.07'
L10	S97°49'13\"	53.34'
L11	S83°37'14\"	23.81'
L12	S34°37'14\"	41.43'
L13	S27°37'08\"	53.50'
L14	N79°29'46\"	53.50'
L15	N67°29'24\"	38.78'
L16	N67°29'24\"	37.12'
L17	N161°7'39\"	37.12'
L18	N87°03'19\"	40.04'
L19	N45°43'01\"	26.08'
L20	N45°43'01\"	26.08'
L21	N77°22'18\"	34.70'
L22	S36°40'25\"	34.69'

CURVE TABLE

Curve #	Radius	Chord	Length
C1	50.00'	19.3139'	17.04'
C2	50.00'	34.5356'	30.21'
C3	50.00'	54.0836'	47.29'
C4	50.00'	40.7365'	42.89'
C5	50.00'	40.7365'	42.89'
C6	50.00'	66.1718'	49.12'

P.C.A. Information

TRACT A (PART OF LOT 1) ASSOCIATED WITH CATEGORY 3 WETLAND AND ASSOCIATED PROTECTED CRITICAL AREA 0.09 ACRES.

TRACT B (PART OF LOT 1) ASSOCIATED WITH CATEGORY 3 WETLAND AND ASSOCIATED PROTECTED CRITICAL AREA 0.09 ACRES.

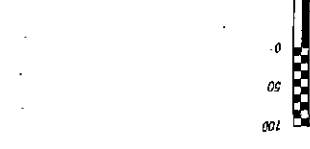
TRACT C (PART OF LOT 1) ASSOCIATED WITH CATEGORY 3 WETLAND AND ASSOCIATED PROTECTED CRITICAL AREA 0.09 ACRES.

TRACT D (PART OF LOT 2) ASSOCIATED WITH CATEGORY 3 WETLAND AND ASSOCIATED PROTECTED CRITICAL AREA 0.09 ACRES.

TRACT E (PART OF LOT 2) ASSOCIATED WITH CATEGORY 3 WETLAND AND ASSOCIATED PROTECTED CRITICAL AREA 0.09 ACRES.

TRACT F (PART OF LOT 2) ASSOCIATED WITH CATEGORY 3 WETLAND AND ASSOCIATED PROTECTED CRITICAL AREA 0.09 ACRES.

TRACT G (PART OF LOT 2) ASSOCIATED WITH CATEGORY 3 WETLAND AND ASSOCIATED PROTECTED CRITICAL AREA 0.09 ACRES.



Skagit Surveyors & Engineers

SURVEYING • CIVIL ENGINEERING • SUBDIVISIONS • LAND USE PLANNING • ELEVATIONS

806 Meical Street Sedro-Woolley, WA 98284 (360) 855-2121 Fax (360) 855-1658

www.skagitconsultants.com

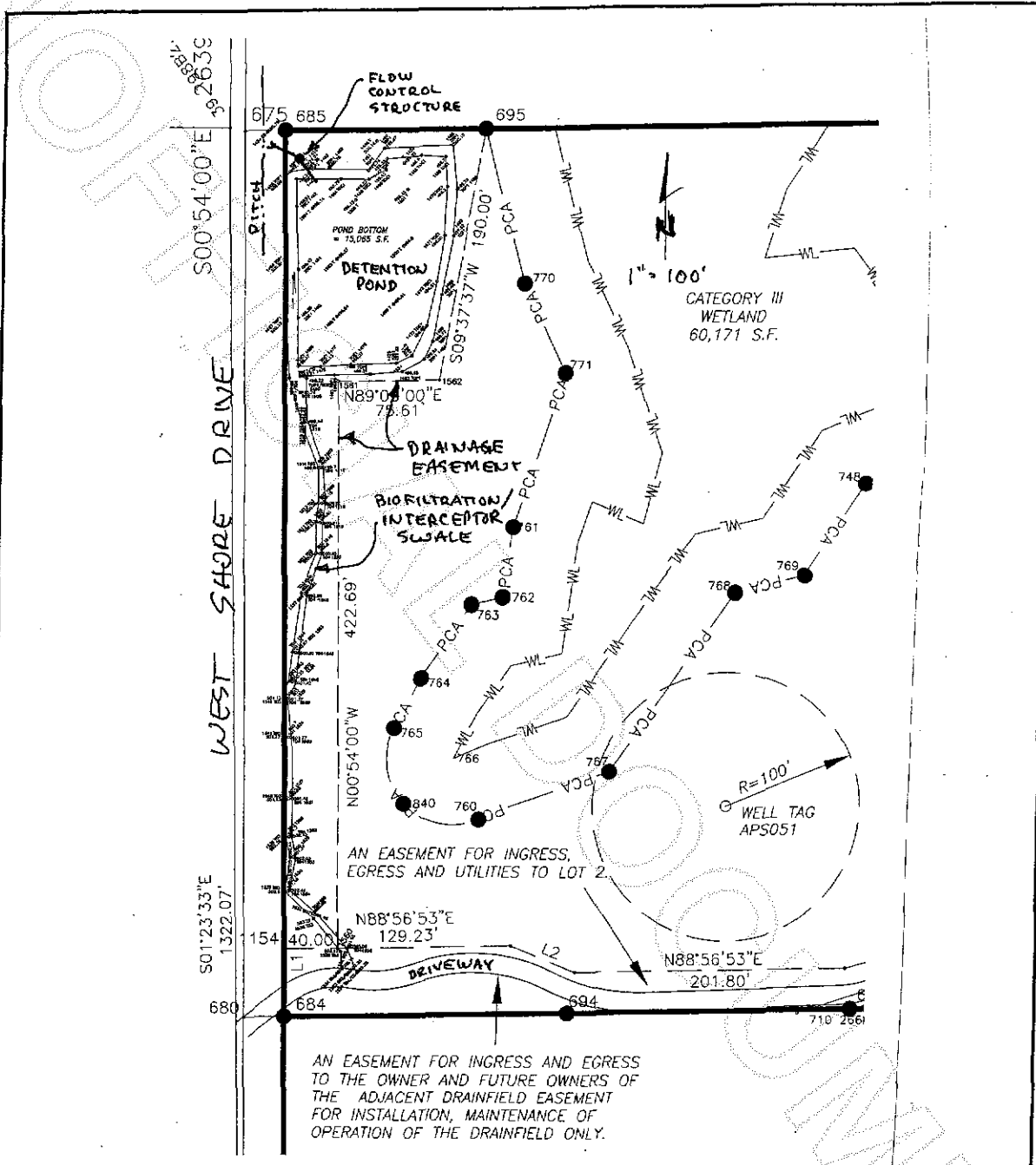
LARRY PINNOW: PL 07-0493

PLAT LAYOUT

EXHIBIT "A"

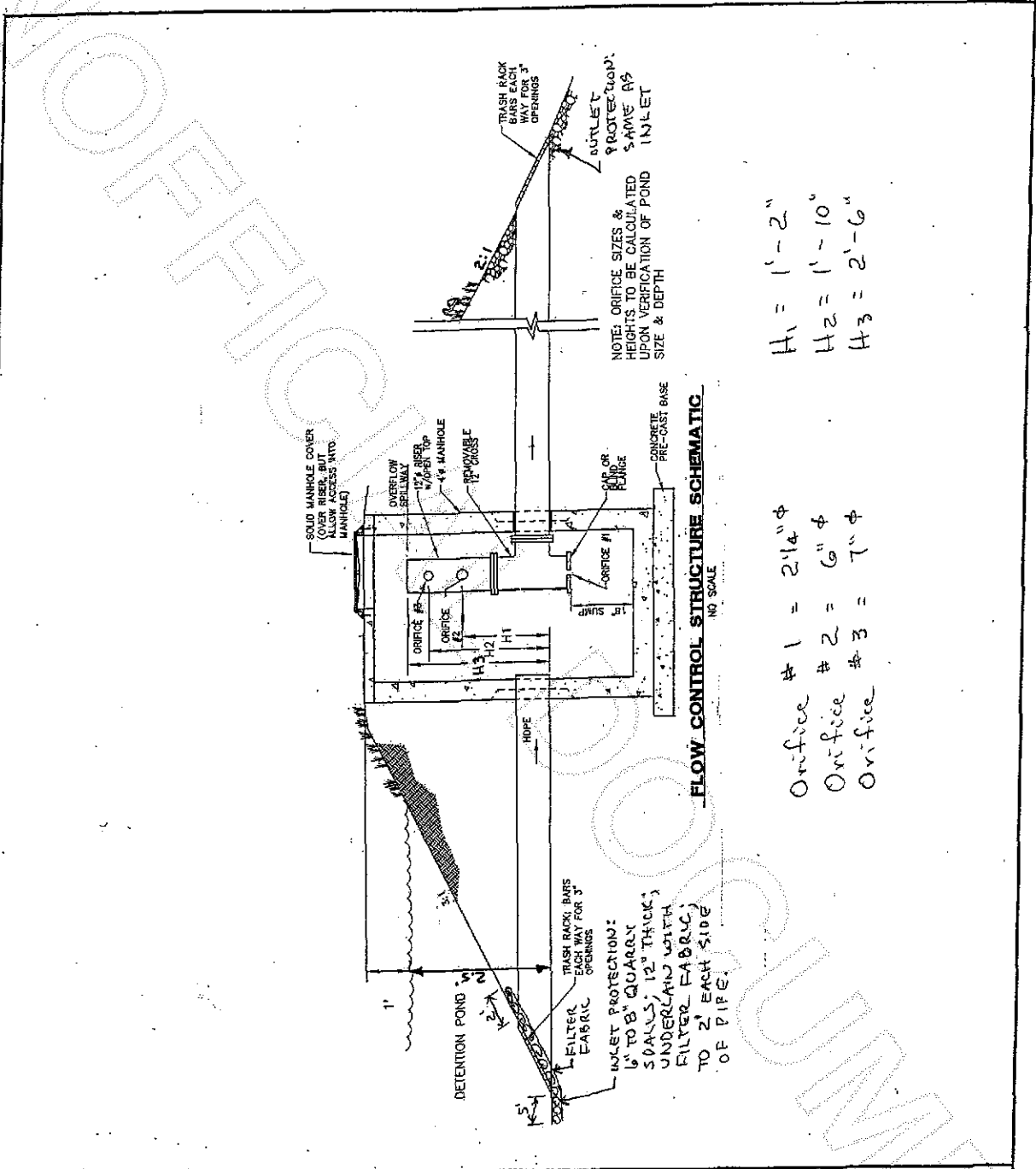
200805290020

Skagit County Auditor



Skagit
Surveyors & Engineers
 SURVEYING • CIVIL ENGINEERING • SUBDIVISIONS • LAND USE PLANNING • ELEVATIONS
 806 Metcalf Street Sedro-Woolley, WA 98284 (360) 855-2121 Fax (360) 855-1658
 www.sseconsultants.com

LARRY PINNOW: PL 07-0493
 DETENTION POND LAYOUT
 EXHIBIT "B"



FLOW CONTROL STRUCTURE SCHEMATIC
NO. SCALE

Skagit
Surveyors & Engineers
SURVEYING • CIVIL ENGINEERING • SUBDIVISIONS • LAND USE PLANNING • ELEVATIONS
806 Melcalf Street, Sedro-Woolley, WA 98284 • (360) 855-2121 Fax (360) 855-1658
www.skagitsurveyors.com

LARRY PINNOW: PH 07-0493
FLOW CONTROL STRUCTURE
EXHIBIT "C"

200805290020
Skagit County Auditor

