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SPOKANE COUNTY ENGINEER

**STORMWATER CONVEYANCE  
AND  
DRAINAGE POND  
OPERATION & MAINTENANCE  
MANUAL**

**Morgan Murphy Estates**

County File PE-1787-95  
CLC No. S990052

**May 22, 2002**

OFFICIAL PUBLIC DOCUMENT  
SPOKANE COUNTY ENGINEER'S OFFICE

**ORIGINAL**

PROJECT # P1787

SUBMITTAL # 4

RETURN TO COUNTY ENGINEER

By  
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## **1.00 PURPOSE**

This document is intended to provide general operations and maintenance guidelines for the drainage pond and other drainage facilities located within the Morgan Murphy Estates single-family residential neighborhood, which are located outside of the County road rights-of-way. Implementation of these guidelines will insure that the drainage facilities installed will function as intended in the plat design.

## **2.00 INTRODUCTION**

Generally, the drainage system is intended to collect onsite stormwater runoff in the streets and convey it to a detention pond and then to the infiltration pond, via concrete gutters and storm pipes. The drainage facilities consist primarily of a series of onsite drainage structures, storm pipes, treatment/storage pond, and drywells. It is of the utmost importance to provide adequate operations and maintenance activities to insure that the drainage facilities remain silt or dirt free, as this silt or dirt loading will affect the performance of the storm pipes, pond, and drywells. If these facilities were to become completely clogged, the only remedy would be to completely reconstruct the drainage facilities. Therefore, periodic maintenance is a must. A full set of engineering drawings for Morgan Murphy Estates is available, for review at Spokane County Public Works under County file PE-1787-95.

## **3.00 GENERAL OPERATIONAL CHARACTERISTICS**

The drainage facilities for Morgan Murphy Estates are generally very simple, functional, and have low maintenance requirements. A periodic visual inspection of the facilities will identify any required maintenance. Most maintenance will consist of keeping the pipes, structures and pond free of debris and sediment. A specific inspection schedule should be followed. See Section 4.0 for recommended maintenance schedules.

### **3.10 Drainage Structures and Storm Pipes**

The drainage structures include concrete gutters, catch basins, manholes, piping and drywells. The concrete gutters, catch basins, manholes and piping convey stormwater runoff from the surface of the streets to the infiltrative pond where the storm water is treated and then discharged through drywells for subsurface disposal.

### **3.20 Infiltrative "208" Pond**

An infiltrative "208" pond is located at a site that has moderate to high infiltration rates. This drainage pond is located within a drainage tract, which is part of a larger 5-acre parcel. A site map showing the pond location and layout is attached to this document.

The pond has a flat bottom and is enclosed within earthen berms. The soil

located in the floor of the pond is required to be a medium to well draining material, with a minimum infiltration rate of 0.5 inches per hour. The pond volume and outlet structure were designed to address the runoff flow rate and volume for the 50-year design storm event.

Pond characteristic information is provided in Table 3.20. Additional information is provided in the engineering drawings on file at Spokane County Public Works, under file PE-1787-95.

Table 3.20 - Pond Characteristics

Pond Label	Pond Btm. Elev.	Pond Btm. Area (sf)	Pond Volume (cf)	Outlet Structure	Outlet Elev.	Overflow Elev.
Pond 1	2269.10	30,700	16,560	1 - Type "A"	2269.76	2272.08

### 3.30 Detention Pond

A detention pond is located within a tract along the power lines just North of 25<sup>th</sup> Lane. The purpose of this drainage pond is to provide attenuation of the peak storm water runoff rate prior to discharge to the storm drainage system out-falling into the infiltrative "208" pond. A site map showing the pond location and layout is attached to this document.

The pond has a flat bottom and is enclosed within earthen berms. The pond volume and outlet structure were designed to address the runoff flow rate and volume for the 50-year design storm event.

Pond characteristic information is provided in Table 3.30. Additional information is provided in the engineering drawings on file at Spokane County Public Works, under file PE-1787-95.

Table 3.30 - Pond Characteristics

Pond Label	Pond Btm. Elev.	Pond Btm. Area (sf)	Outlet Structure	Outlet Elev.	Overflow Elev.
Pond 2	2407.00	13,350	Discharge Structure	2407.25	2411.00

### 3.40 Infiltration Structures

The infiltration outlet structure (Spokane County Standard Type A) drywell is used to infiltrate stormwater runoff beyond the available pond volume. A copy of the Spokane County Standard Plan B-1a *Precast Drywells* is attached for reference. This structure consists of a grated inlet, perforated concrete barrel sections, and buried washed drain rock, wrapped in porous filter fabric. The grate inlet elevation is set eight inches above the pond bottom to provide stormwater storage, treatment and sediment removal prior to drywell infiltration.

#### **4.00 MAINTENANCE REQUIREMENTS AND SCHEDULES**

As part of the development of Morgan Murphy Estates, a homeowner's association named Broadmoor Homeowner's Association will be formed. Below is a maintenance description for each of the drainage system elements contained within the Morgan Murphy Estates development, including the drainage structures, drywells, pipes and ponds. All drainage facilities located outside of the County road right-of-way, are expected to be maintained by the homeowner's association. Any drainage facilities located on individual residential lots are to be maintained by the respective homeowners. Should the homeowner's association be terminated for any reason, the maintenance responsibilities will become that of the individual homeowners, located within the Morgan Murphy Estates plat.

The homeowner's association shall provide to the Spokane County Parks Department and the Spokane County Engineer the name, address, and 24-hour phone number for the entity responsible for performing routine and emergency maintenance inspections and repairs. This information shall be confirmed on a yearly basis. The homeowner's association shall provide notice of any changes to the Spokane County Parks Department and the Spokane County Engineer within 15 days of said changes.

##### General

Proper maintenance procedures are necessary for the continued functioning of the drainage facilities. Improper maintenance, or lack of attentive maintenance measures, may result in negative drainage impacts. It is strongly recommended that the homeowner's association designate an individual who will be responsible for making sure the maintenance measures are implemented.

Generally, maintenance personnel are to conduct a visual inspection of the drainage facilities immediately following a substantial rainfall event or snowmelt event. Substantial events include:

- Noticeably hard rain for a short period (30 minutes or more),
- Steady rain for a long period (6 hours or more), or
- Significant rainfall and/or snowmelt when the ground is frozen.

For long duration storms, longer than 24 hours, maintenance personnel are to inspect the drainage facilities during the storm event to identify any developing problems and correct them before they become major problems.

1. Inspect all concrete gutters and drainage structures (catch basins and drywells) to ensure they are clear of debris and obstructions.

2. Inspect all pond berms for breaches. Immediately repair any berm breaches with native sandy soil, compacted in place.

The above noted storm related visual inspections are in addition to the maintenance schedules noted for each item.

#### 4.10 Drainage Structures and Storm Pipes

Catch basins, pipes and manholes should be inspected every 3 months, or after every significant storm event ( $\frac{1}{2}$ " ) and/or snowmelt event, whichever is more frequent. Visually inspect the pipes, inlets and outlets, making sure they are clear of debris and checking that the pipe is in good condition, without breaks or cracks. If there is any obstruction present it should be removed immediately.

A flow test in the pipe can be used to readily detect major obstructions or breaks in the pipe. This test requires a water source (hydrant or water truck) and a person at the downstream end of the pipe observing the flow exiting out of the pipe section.

All catch basins should be cleaned (vacuumed) every 6 months.

#### 4.20 Ponds

The drainage ponds should be inspected every 3 months, or after every significant rainfall and/or snowmelt event, whichever is more frequent. The ponds consist of an earthen depression constructed from native soils, enclosed within soil berms. The ponds should be sodded and/or hydro-seeded with a dryland grass mixture, at a minimum. A lawn sod can be used if regular irrigating is implemented.

Routine maintenance and inspections of the ponds will include removal of any accumulated debris, such as leaves, weeds and trash. Any obstructions, which would not allow water to flow freely from the pond via the outlet structures, should be removed. Additionally, the pond berms should be inspected to insure that they are in good repair and structurally sound and that no outflow has occurred other than through the outlet structure.

The homeowner's association shall be responsible for replacement of grass turf and underlying 1-foot depth of soil in the infiltrative pond (Pond 1) whenever the vegetation appears to indicate a problem due to contamination. The turf and underlying soil shall meet Spokane County requirements for permeability in effect at the time of replacement.

#### 4.30 Infiltration Structures

The infiltration structures (drywells) consist of a grated inlet, perforated concrete barrel sections, and buried washed drain rock, wrapped in porous filter fabric. Drywells should be inspected every 3 months, or after every significant rainfall

and/or snowmelt event, whichever is more frequent. During routine inspection, if standing water is found 72 hours or more after the last significant rainfall event, the infiltration structure is most likely clogged due to silt and sediment. The structure shall be vacuumed of standing water and sediment.

All drywells should be cleaned (vacuumed) every 6 months.

**5.00 Recommended Set-Aside Funds for Maintenance & Future Replacement Costs**

There will be annual maintenance costs, major renovation costs and future replacement costs of the drainage facilities. These costs are the responsibility of the homeowner's association or successors in interest. Major renovation and future replacement costs have been converted to annual costs, in the form of recommended set-aside funds. It is assumed that ¼ of the pipe and 1 drywell will need to be replaced within 20 years.

The estimated annual maintenance costs and recommended annual set-aside costs are listed below in Table 5.00. It is recommended the homeowner's association set-aside these funds annually, to ensure that adequate maintenance and replacement measures of the drainage facilities will be implemented.

Table 5.00 - Maintenance and Future Replacement Costs

Drainage Facility	Annual Maintenance Costs	Annual Set-Aside Funds for Future Replacement or Major Renovation <sup>(1)</sup>
Catch Basins, Manholes & Pipes	\$ 16,800	\$ 5,724
Ponds	\$ 4,000	\$ 1,947
Drywell	\$ 400	\$ 119
<b>Sub-Total Annual Costs</b>	<b>\$ 21,200</b>	<b>\$ 7,790</b>

**Grand Total/year = \$ 28,990**  
**Cost per lot/year = \$ 707.07 (41 lots)**

Note: (1) Assume replacement in 20 yrs, with 4% inflation and a 6% rate of return on investments for Future Replacement set-aside account.

# **APPENDICES**

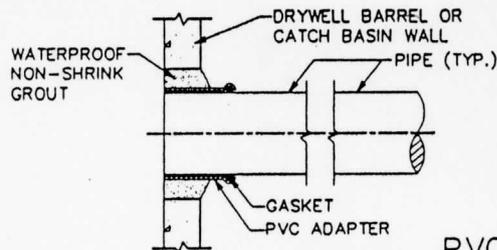
**INFILTRATIVE POND SITE MAP**

**DETENTION POND SITE MAP**

**PRECAST DRYWELL, DETAIL B-1A**

## GENERAL NOTES

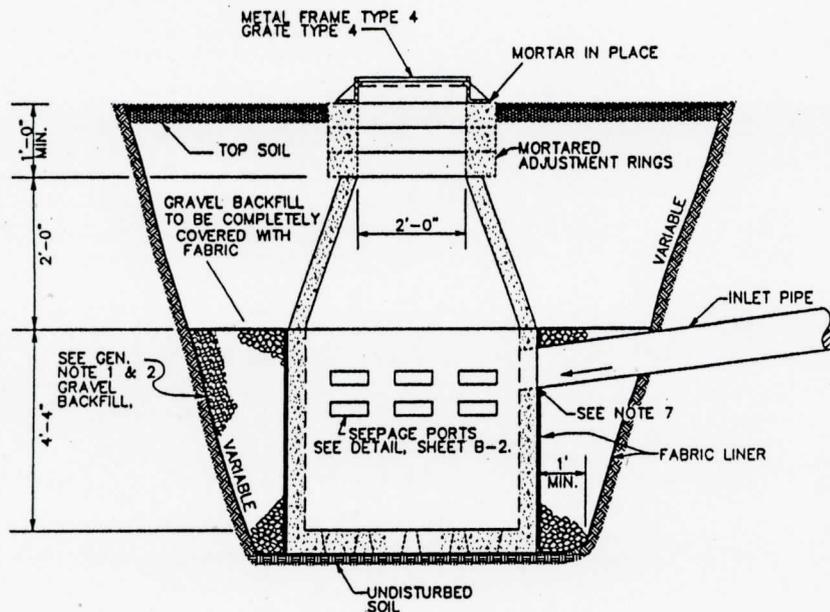
- GRAVEL BACKFILL QUANTITY FOR DRYWELLS :  
TYPE "A" - 30 CUBIC YARDS MINIMUM / 42 TONS.  
TYPE "B" - 40 CUBIC YARDS MINIMUM / 56 TONS.  
OR AS SPECIFIED ON ROAD PLANS.
- SPECIAL BACKFILL MATERIAL FOR DRYWELLS SHALL CONSIST OF WASHED GRAVEL GRADED FROM 1" TO 3" WITH A MAXIMUM OF 5% PASSING THE U.S. No. 200 SCREEN, AS MEASURED BY WEIGHT. A MAXIMUM OF 10% OF THE AGGREGATE, AS MEASURED BY WEIGHT, MAY BE CRUSHED OR FRACTURED ROCK. THE REMAINING 90% SHALL BE NATURALLY OCCURRING UNFRACTURED MATERIAL.
- FABRIC SHALL BE MODERATE SURVIVABILITY AS OUTLINED IN STANDARD SPECIFICATIONS 9-33
- SEE STANDARD PLANS SHEETS B-2 AND B-3 FOR PRECAST CONCRETE DETAILS.
- ADJUSTMENT BLOCKS SHALL BE CEMENT CONCRETE.
- PRECAST RISER MAY BE USED IN COMBINATION WITH OR IN LIEU OF ADJUSTING BLOCKS.
- WHEN PVC PIPE IS USED A PVC ADAPTER SHALL BE INSTALLED.
- PIPES SHALL BE GROUTED INTO DRYWELLS.



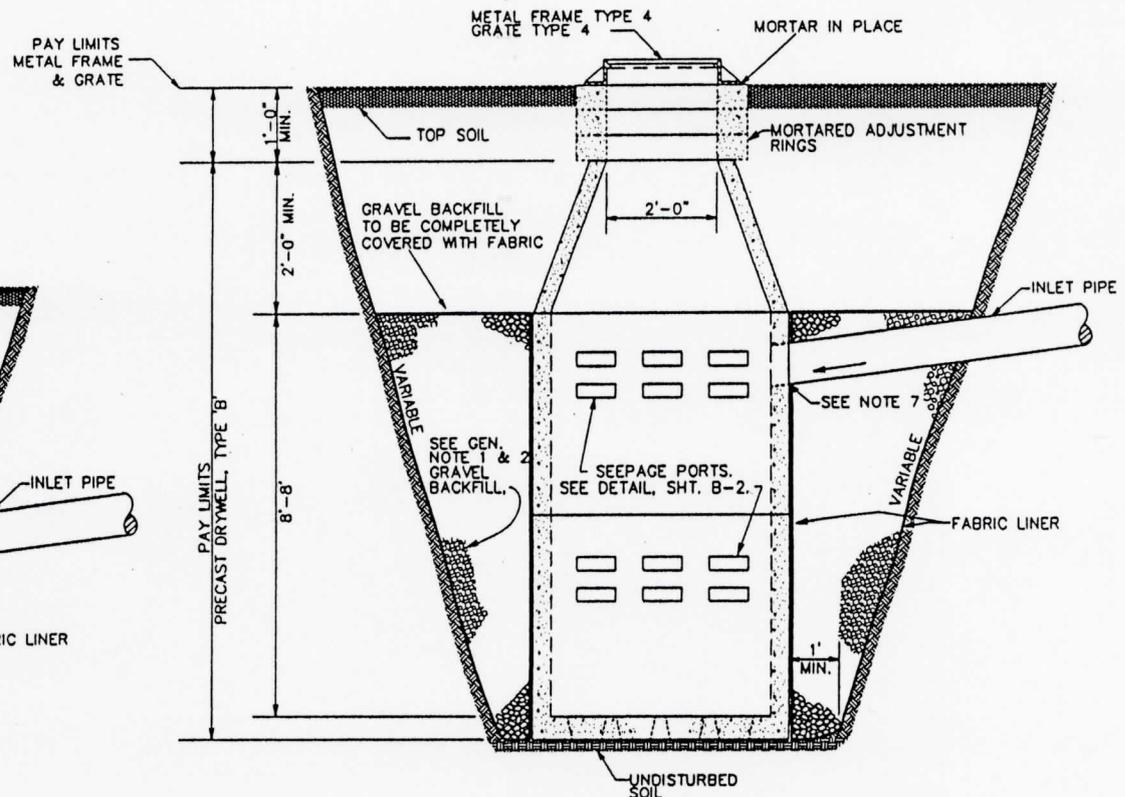
### NOTE:

PVC PIPE ADAPTERS AND GASKET MAY VARY IN SHAPE AND SIZE AS ILLUSTRATED IN DETAIL BY ACCEPTABLE ALTERNATE IN ACCORDANCE WITH A.S.T.M.-C-428.

### PVC ADAPTER (SAND COLLAR)



DRYWELL - TYPE 'A' SWALE



DRYWELL - TYPE 'B' SWALE

SPOKANE COUNTY  
DEPARTMENT OF PUBLIC WORKS  
SPOKANE, WA. 99208 456-3600

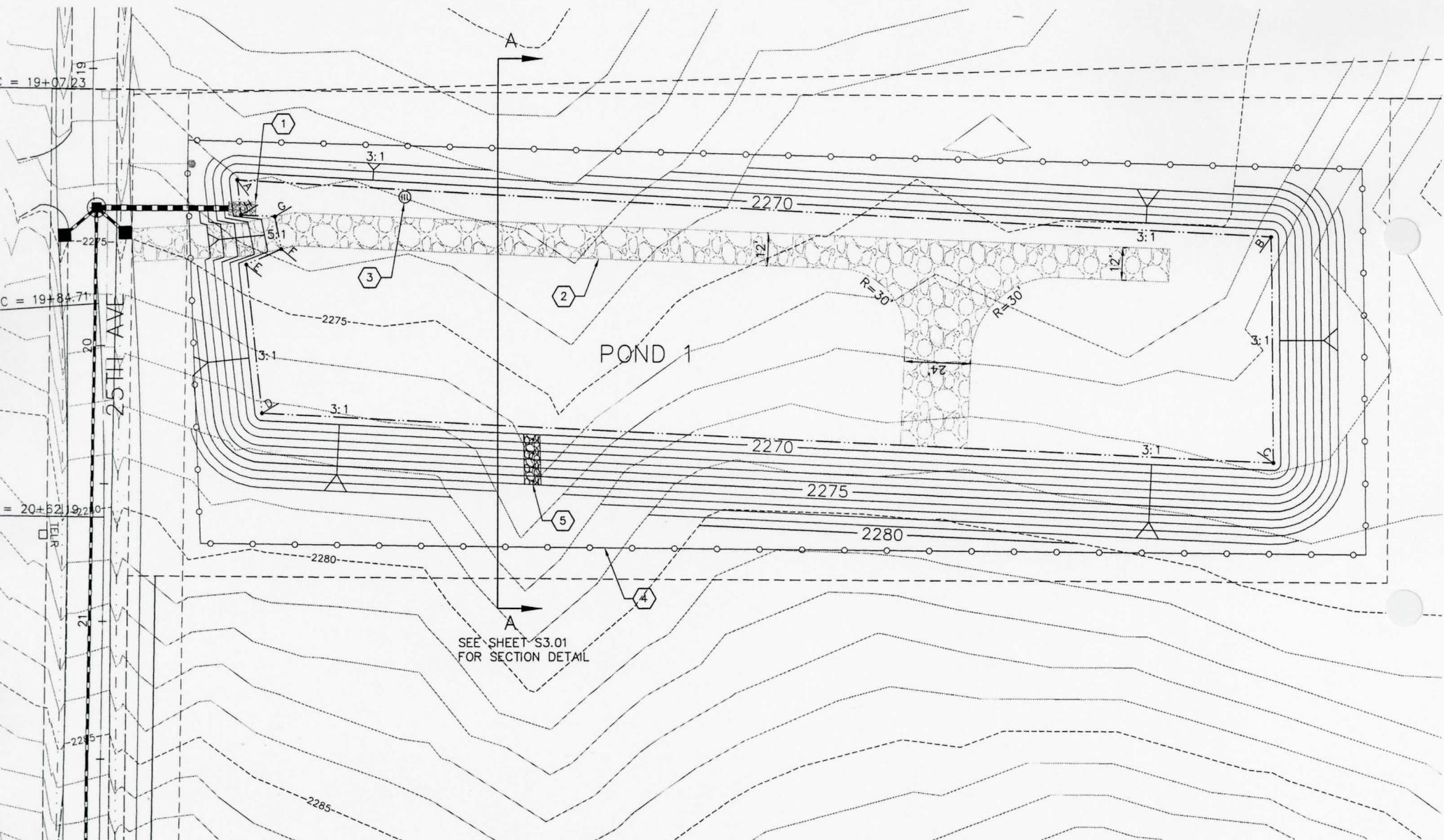
APPROVED:  
COUNTY ENGINEER  
DATE: 11/2/78

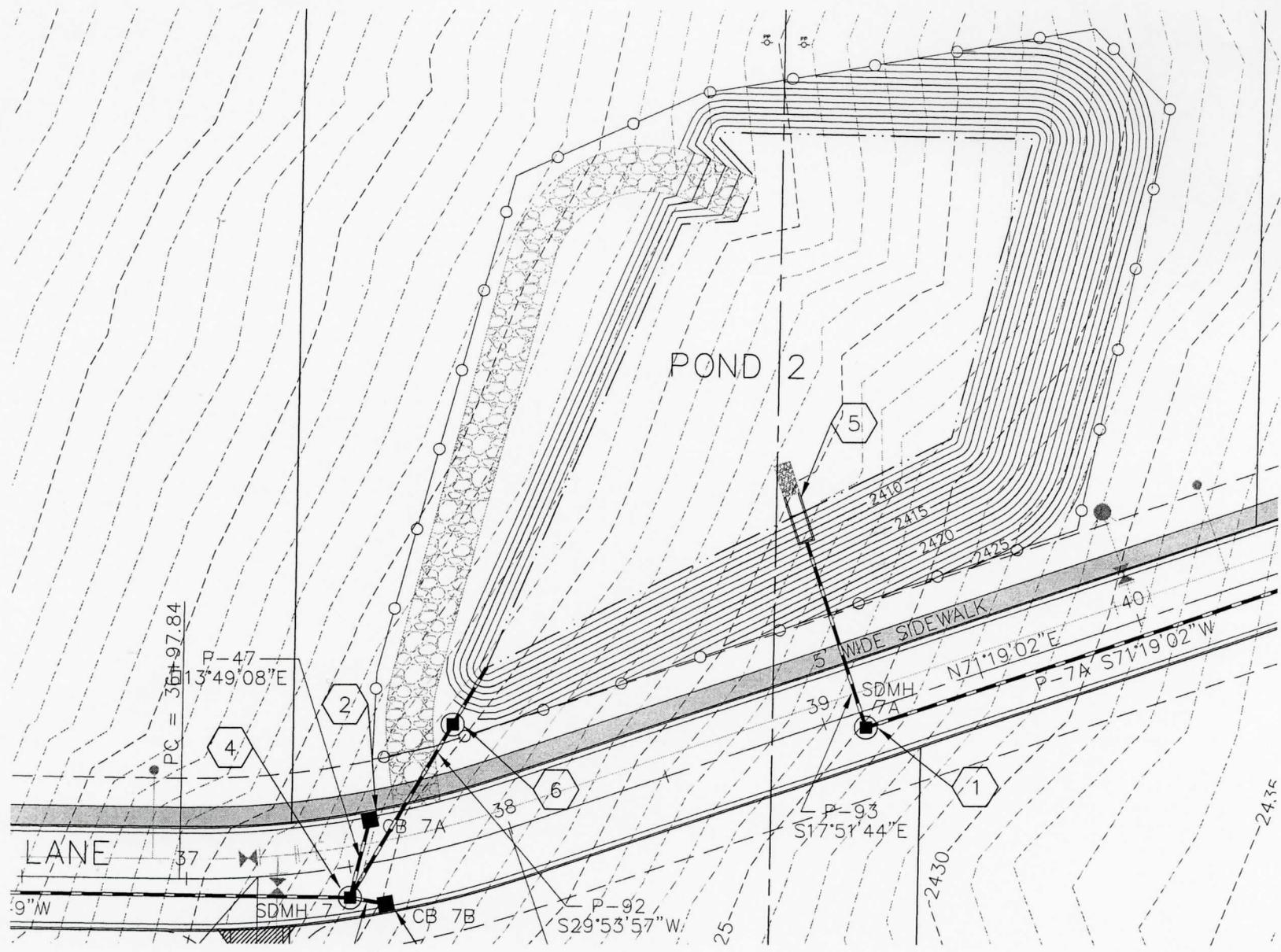
STANDARD  
PRECAST DRYWELLS PLACED IN SWALES

STD-B-4-DPS

SHEET  
B-1a

NO.	DATE	BY	CHKD.	APPR.	REVISION





POND 2

LANE

5' WIDE SIDEWALK

$N71^{\circ}19'02''E$

$S17^{\circ}51'44''E$

$S29^{\circ}53'57''W$

$PC = 361+97.84$

$N13^{\circ}49'08''E$

9'W

2430

2435

25

5

4

2

6

1

3

38

2410

2415

2420

2425

40

39

37

CB 7A

CB 7B

SDMH 7A

SDMH 7

P-47

P-93

P-92

P-7A