STORMWATER CONVEYANCE
AND
DRAINAGE PONDS

OPERATION & MAINTENANCE MANUAL

North Park West

Spokane County Plat No. P-1924

CLC No. S030106

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By
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STORMWATER CONVEYANCE AND DRAINAGE PONDS
OPERATION & MAINTENANCE MANUAL

1.00 PURPOSE

This document is intended to provide general operations and maintenance guidelines for the drainage conveyance systems, ponds and other drainage facilities located within the North Park West residential neighborhood (Plat, P-1924). Implementation of these guidelines will insure that the drainage facilities installed will function as intended in the design.

2.00 INTRODUCTION

Generally, the drainage system is designed to convey runoff via overland and gutter flow to a catch basin located in Calispel Cul-de-sac or directly to the pond located in Tract A. The drainage facilities consist primarily of a catch basin and storm pipe, a treatment/storage pond, and infiltration structure. 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 affect the performance of the storm pipes, ponds and infiltration structures. If these facilities were to become completely clogged, the only remedy would be complete reconstruction of the drainage facilities. Therefore, periodic maintenance is a must. A full set of engineering drawings is available for review at Spokane County Public Works, under County file P-1924. A site layout exhibit is provided in the Appendix of this document.

3.00 GENERAL OPERATIONAL CHARACTERISTICS

The drainage facilities for North Park West 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 ponds 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 onsite drainage structures include concrete gutters, drainage ditches and catch basins. 12" PVC storm pipe conveys the onsite runoff, collected in the streets, to the treatment/storage pond, located in the drainage tract.

3.20. Drainage Ponds

A stormwater storage pond (Pond A) was designed for the North Park West plat to provide treatment and storage for the runoff created by the development. The storage volume for pond A was designed to adequately contain the runoff created from a 10-year storm event and by the first ½" of rainfall on the street impervious areas and driveway areas draining directly to the streets, within the

drainage basin. The pond volume provides water quality treatment to a depth of 0.5 feet, in accordance with the '208' treatment requirements specified in the Spokane County Guidelines for Stormwater Management.

The pond is enclosed within earthen berms. The floor of a "208" pond includes the level portion of the floor of the swale and the side-slopes up to the outlet or overflow elevation. The soil located in the floor of the pond shall be a medium to well draining material, with a minimum infiltration rate of 0.5 inches per hour.

Pond specifications are provided in Table 3.20A. Additional information is provided in the engineering drawings on file at Spokane County Public Works, file P-1924.

Table 3.20A - Pond Specifications

Storm Event	Pond Bottom Elevation (FT.)	Max. WSEL (FT.)	Required Storm Volume to be stored (CF)	Volume Provided (CF)	Type and number of Drywells
10-year	1999	1999.62	1067	1830	1-Type B
50-year	1999	1999.95	1723	1830	1-Type B

Table 3.20B – '208' Basin Specifications

Basin	*'208' Impervious Area (SF)	'208' Volume Required (CF)	'208'Volume Provided (CF)*	Drywells Provided
1	16,400	683	788	**1-Type B**

* Volume provided is based on pond bottom area at 0.5' depth

3.30 Infiltration Structures

Pond A has one double-depth (Spokane County Standard Type B) drywell, and is used to infiltrate stormwater runoff beyond the required treatment volume. A copy of the Spokane County Standard Plan B-1a *Precast Drywells Placed in Swales* is provided in the Appendix for reference. These structures consist of a grated inlet, perforated concrete barrel sections, and buried washed drain rock, wrapped in porous filter fabric. The grate inlet elevation is set six inches above the pond bottom to provide "208" treatment storage. The barrel sections and washed drain rock provide additional storage during infiltration.

4.00 MAINTENANCE REQUIREMENTS AND SCHEDULES

Below is a maintenance description for each of the drainage system elements contained within the North Park West plat, including the drainage structures, pipes, grate inlets, 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 North Park West plat.

The homeowner's association shall provide to the Spokane County Parks Department and the Spokane County Engineer the name, address, and 24-hour telephone 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 roadside ditches and drainage structures (catch basins and drywells) to ensure they are clear of debris and obstructions.

2. Inspect all pond berms and retaining walls for breaches. Immediately repair any berm breaches with native sandy soil, compacted in place, and wall breaks with new concrete blocks.

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

4.10 Drainage Structures and Storm Pipes

Catch basins and pipes should be inspected every 3 months, or after every significant storm event (½") and/or snowmelt event, whichever is more frequent. All catch basins should be cleaned (vacuumed) every 3 months. 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.

4.20 Drainage Pond

The drainage pond should be inspected every 3 months, or after every significant rainfall and/or snowmelt event, whichever is more frequent. The pond consists of an earthen depression constructed from native soils, enclosed within soil berms. The pond 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 pond will include removal of any accumulated debris, such as leaves, weeds and trash. Any obstructions which would not allow water to flow freely into the drywell should be removed or repaired. Additionally, the berms should be inspected to insure that they are in good repair and structurally competent and that no outflow has occurred other than through an outlet structure or overflow berm.

The homeowner's association shall be responsible for replacement of any grass turf and underlying 1-foot depth of soil in ponds whenever the vegetation appears to indicate a problem due to contamination. The turf and underlying soil shall meet Spokane County requirements for permeability and cation exchange capacity/organic content in effect at the time of replacement.

4.30 Infiltration Structures

The infiltration structure should be inspected every 3 months, or after every significant rainfall and/or snowmelt event, whichever is more frequent. The structure consists of a grated inlet, perforated concrete barrel sections, and buried washed drain rock, wrapped in porous filter fabric.

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.

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 ½ of the pipe, one drywell, and one catch basin will need to be replaced within 20 years.

Table 5.00A - Pipe Replacement

Drainage Facility	½ Total Length	Present Value		Future Value (1)
		Per L.f.	Total	
12" PVC	37'	$ 21	$ 777	$ 1702
Catch Basin	-	-	$ 600	$ 1315
			TOTAL	**$ 3,017**

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

Table 5.00B - Maintenance and Future Replacement Costs

Drainage Facility	Annual Maintenance Costs	Annual Set-Aside Funds for Future Replacement or Major Renovation (1)
Onsite Pipes & Drainage Structures	$ 500	$ 82
Drywell - Spokane County Type B	$ 500	$ 161
Sub-total Annual Costs	**$ 1,000**	$ 243

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

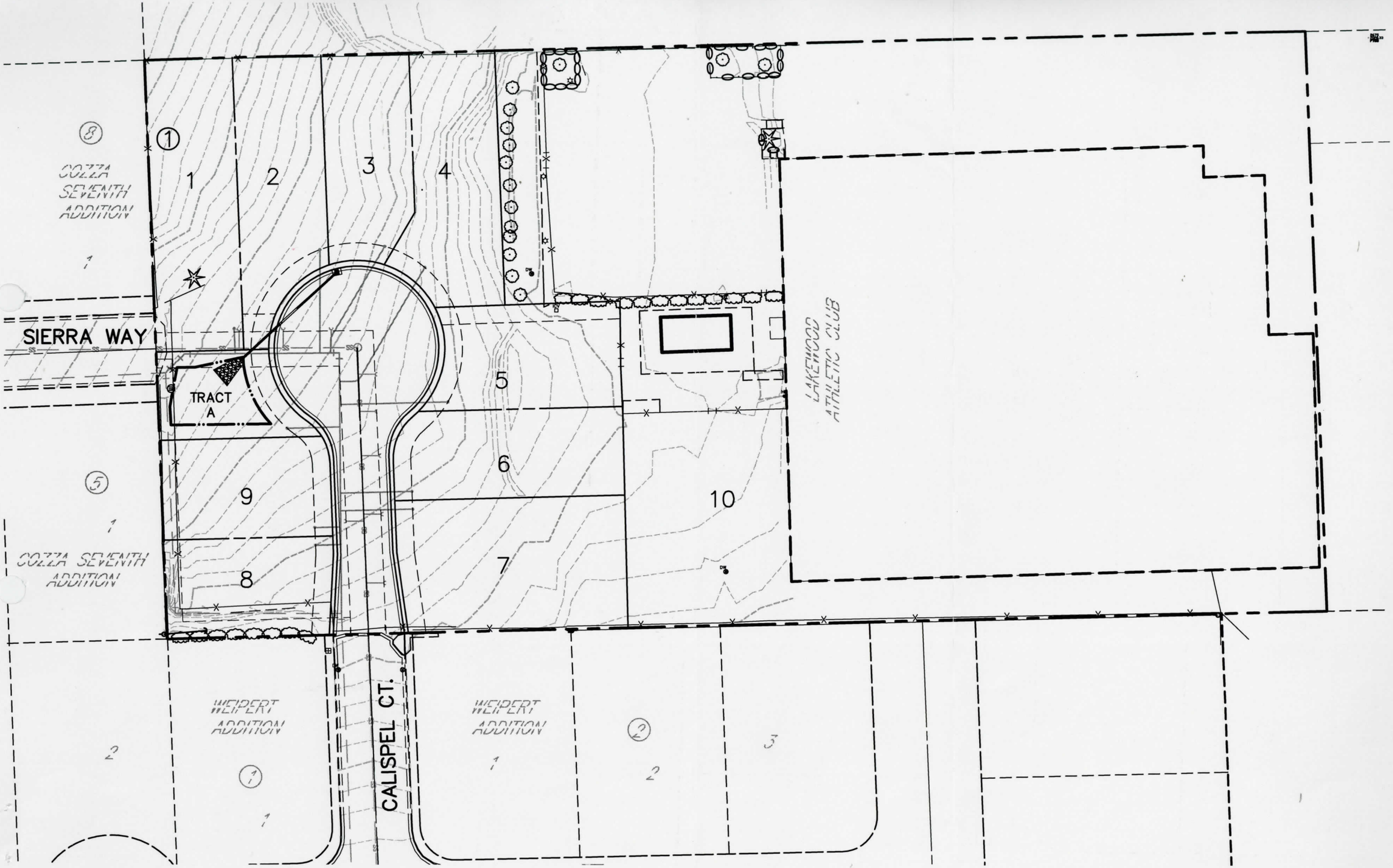
Grand Total/year = $ 1,243
Cost per lot/year = $ 138.10 (9 lots)

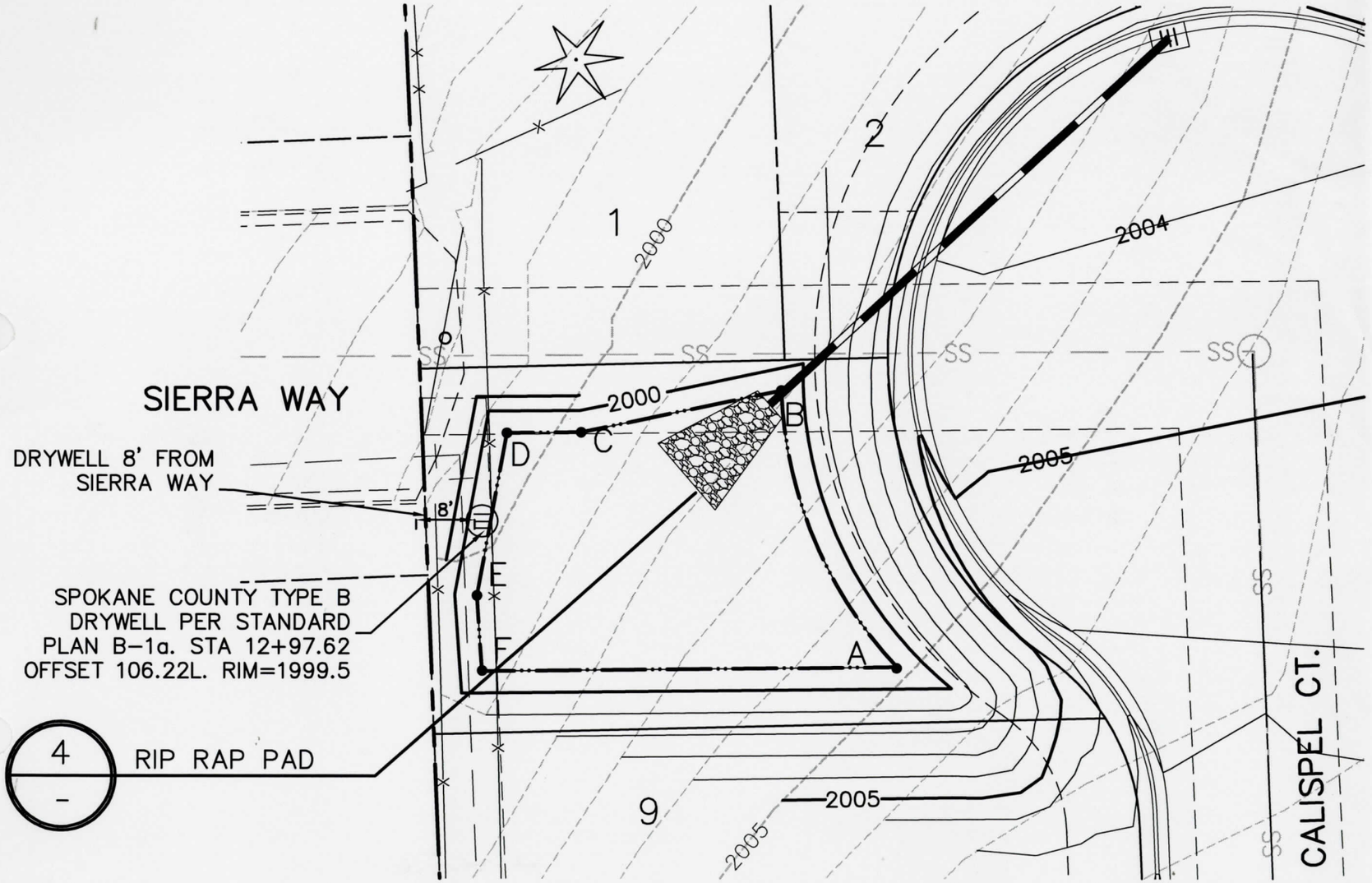
TECHNICAL APPENDIX

SITE MAP

ONSITE POND DETAILS

PRECAST DRYWELL


COZZA SEVENTH ADDITION
SIERRA WAY
TRACT A
1
2
3
4
5
6
7
8
9
10
LAKEWOOD ATHLETIC CLUB
COZZA SEVENTH ADDITION
WEIPERT ADDITION
CALISPEL CT.
WEIPERT ADDITION



POND A DETAIL

SCALE: 1" = 20'

2
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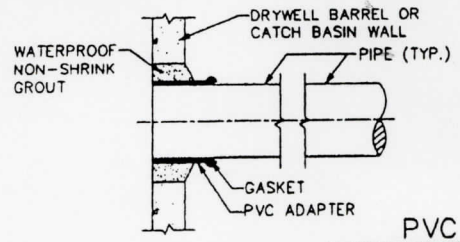
GENERAL NOTES

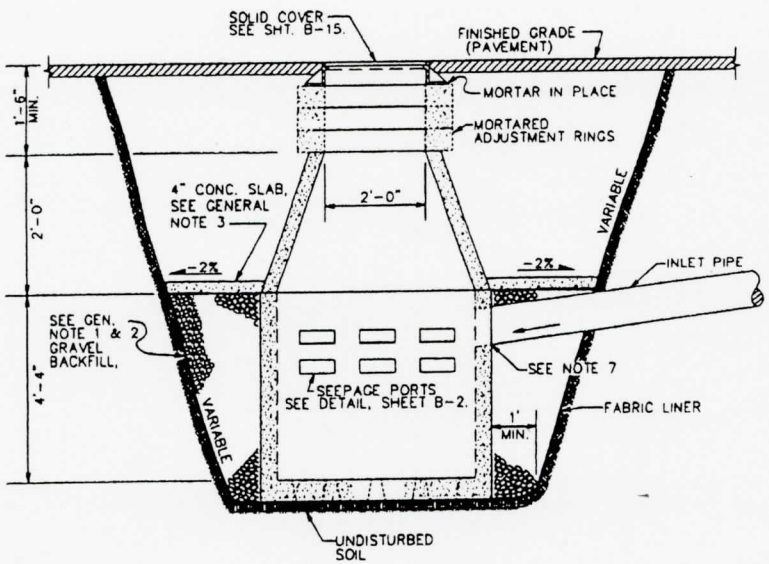
1. GRAVEL BACKFILL QUANTITY FOR DRYWELLS :
   TYPE "A" – 30 CUBIC YARDS MINIMUM / 42 TONS.
   TYPE "B" – 40 CUBIC YARDS MINIMUM / 56 TONS.
   OR AS SPECIFIED ON ROAD PLANS.
2. SPECIAL BACKFILL MATERIAL FOR DRYWELLS SHALL CONSIST OF WASHED GRAVEL GRADED FROM 1" TO 3" WITH A MAXIMUM OF 5% PASSING THE U.S. 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.
3. CONCRETE SLAB SHALL BE CLASS 3000 CONCRETE.
4. SEE STANDARD PLANS SHEETS B-2 AND B-3 FOR PRECAST CONCRETE DETAILS.
5. ADJUSTMENT BLOCKS SHALL BE CEMENT CONCRETE.
6. PRECAST RISER MAY BE USED IN COMBINATION WITH OR IN LIEU OF ADJUSTING BLOCKS.
7. WHEN PVC PIPE IS USED A PVC ADAPTER SHALL BE INSTALLED.
8. PIPES SHALL BE GROUTED INTO DRYWELLS WITH NON-SHRINK GROUT.



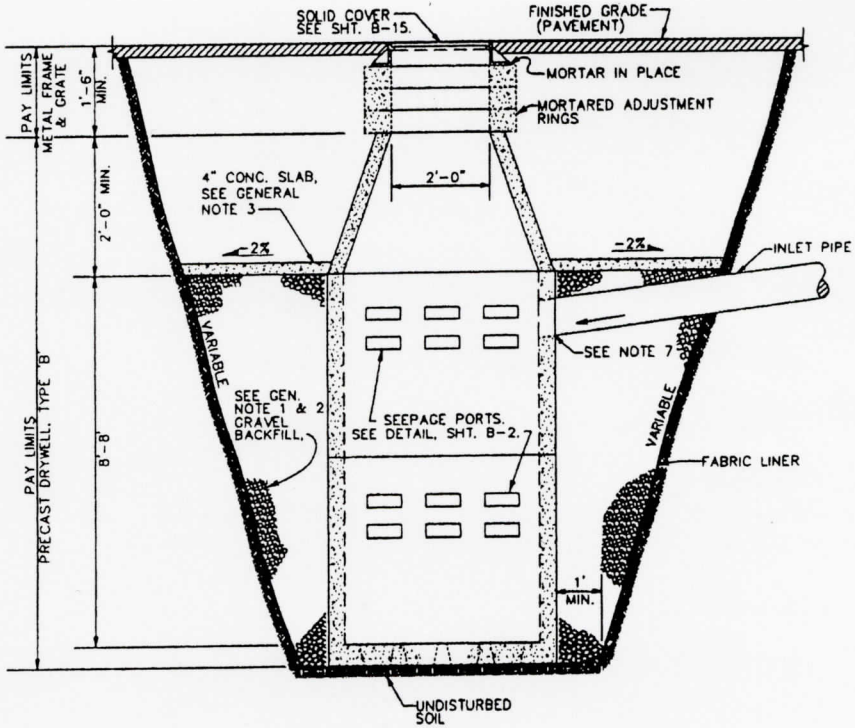
PVC ADAPTER (SAND COLLAR)

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.



DRYWELL – TYPE 'A'



DRYWELL – TYPE 'B'

NO.	DATE	BY	CKD.	APPR.	REVISION
3	10/02	FP	BJG	GSN	REVISED NOTE # 8 & FABRIC LOCATION REVISED
2	9/93	JB	GSN	RCH	SPECIAL BACKFILL NOTE ADDED
1	5/93	JB	GSN	RCH	CHANGED GRAVEL BACKFILL QUANTITIES

SPOKANE COUNTY
DEPARTMENT OF PUBLIC WORKS
SPOKANE, WA. 99260 (509) 477-3600

APPROVED:
COUNTY ENGINEER
DATE: 4-21-03

STANDARD
PRECAST DRYWELLS

SHEET B-1

PLOT DATE 04/23/03