Drainage
FACTSHEET

BRITISH COLUMBIA
Ministry of Agriculture and Food

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PREPARING A FARM DRAINAGE PLAN

The design and installation of a good drainage system requires information on soils, crops, climate and topographical field data. Once the system has been installed, the plan needs to be updated to show the system as built. The drainage plan should be passed on to subsequent landowners.

REASONS FOR A DRAINAGE PLAN

A drainage plan provides step by step information on how to construct and install a complete land drainage system. The plan includes information on:

- Best possible outlet location (without a topographical survey the best outlet location is not always obvious).
- Location, size, depth, spacing and slope of all open ditches and subsurface drains.
- Location of all pertinent obstructions – buildings, trees, fences, gas, oil, water, telephone and transmission lines.
- Upland and surface runoff considerations.
- Backfilling, blinding and outlet requirements.
- Unusual construction problems.

A project plan enables the drainage contractor and designer to lay out the drainage system in the most cost-effective way. The plan also allows for evaluation of materials required and anticipated projects costs.

Specifications, design standards and work schedules as set out on a plan form the basis of any contractual agreements between the installation contractor and the farmer.

The plan provides a record for future reference and is useful for other development work such as planning crop rotation, land leveling and irrigation.

ESSENTIAL FEATURES OF A PLAN

Soil Survey

A soil survey is required to determine:

- The drainage need.
- The type of drainage system (surface or underdrainage).
- The subdrain spacing and depth requirements.
- Construction methods and materials for special soil conditions.
- Post-construction management requirements.

A soil base map should be prepared showing land boundaries, roads, creeks and other landscape features. Soil boundaries and profile pits should also be shown. These pits should be 0.5 m wide and 1 m deep. The purpose of the pit is to determine hydrologic properties of the soil. A brief description of the profile pit data and soil survey reports should be included with the soil survey base map.

The number of pits should be sufficient to make a reliable assessment of all pertinent drainage features. See sample drainage survey report attached.

Preliminary Survey

As a first step, obtain existing maps for the problem area. Air photos are often useful preliminary assessments of the problem and to plan a survey strategy.

Visual observations of field conditions and location of poorly drained areas should be done during the winter or when the problem is evident.

Maps and air photos are readily available for most areas of BC and can be obtained from:

Ministry of Environment, Lands and Parks
MAPS BC, Geographic Data BC
4th Floor, 810 Blanshard Street
Victoria, BC
Phone: (250) 356-5263
Fax: (250) 387-3022
Internet: http://www.env.gov.bc.ca

Topographic Survey

A topographic survey, showing important elevations and key physical features of the property, used in conjunction with soils and groundwater information enables the designer to layout the drainage plan. Before beginning the survey, locate existing and potential outlet property boundaries, all problem areas and any other important topographical features that should be included.

- Topographic surveys should be conducted on a 30 m grid.
- The plan should be drawn with 0.5 m contour lines. On steep slopes, 1.0 – 2.0 m contours may suffice while 0.25 m contours may be required on level fields. Good vertical accuracy is required because of the low grades on agricultural land.
- A permanent bench mark must be established on concrete footings of existing buildings or a new bench mark stake set.
- The topographical survey should include fence lines, ditch bottoms and water levels at regular intervals, culvert inverts and diameters, power poles, farm roads and gates, farm buildings, rock outcroppings, trees and any other pertinent obstacles.

Drainage Plan and Design

A drainage plan is essential for the installation of a drainage system and equally important for future maintenance purposes. In producing a drainage plan, the following standards are recommended:

- Use a plan of 1:1000 or 1:2000 (i.e. 1 mm on paper equals 2 m in the field) or other suitable scale based on data obtained in the field.
- Show bench marks and give their descriptions and locations.
- Locate ditches, drains, culverts, miscellaneous structures and appropriate landmarks on the drawing.
- Show the invert elevation and size of culverts and other structures which could restrict water movement.
- Indicate the sizes, grades, lengths and control elevations of drains plus the locations of changing grades and sizes of drains.
- Provide various cross sections and complete profiles of new and existing outlet ditches.
- Show the maximum, minimum and normal water levels of the outlets (i.e. ditch water level fluctuations).
- Provide a clear legend of all the symbols used.
- Include a north arrow and suitable geographic landmarks (i.e. major roads, rivers, and all utility lines, special caution may be required for underground services.
- Supply a table of the total length of drains and their sizes.
- Provide special notes and recommendations (if any) for the system designed.
- Provide a map of the soil boundaries with a description and recommendations.
- Indicate pump location and provide information on size, capacity and power location.

A sample soil map is shown in **Figure 1**. A properly prepared drainage plan is shown in **Figure 2**.

Ministry of Environment Approval

Ministry of Environment approval may be necessary prior to commencing work involving ditching, water diversion, filling or excavating land adjacent to or draining into a stream or ditch.

WHERE TO OBTAIN A PLAN

Preparing a drainage plan requires expertise in soils, crops, surveying, system design and installation. Choose a drainage contractor or engineering consulting firm that specializes in land drainage to assist in preparing your farm drainage plan. Factsheet #525.140-1 contains a list of Drainage Contractors in BC.

For further information on preparing a farm drainage plan, see the BC Agricultural Drainage Manual

FOR FURTHER INFORMATION CONTACT
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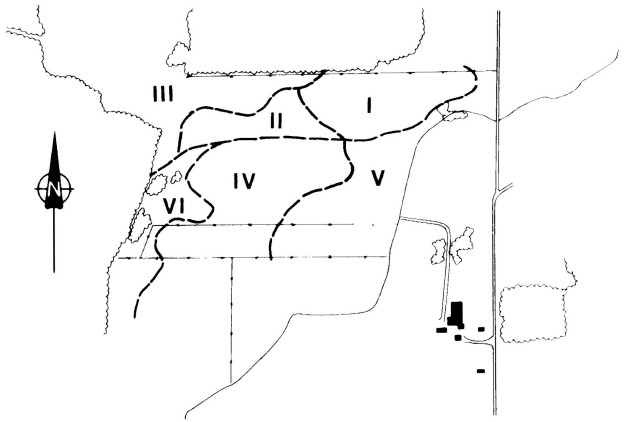
Resource Management Branch
Ministry of Agriculture and Food
1767 Angus Campbell Road
Abbotsford, BC CANADA V3G 2M3

Figure 1 Sample Soil Map

SOIL MAP



DESCRIPTION

SOIL TYPE	DEPTH cm	DESCRIPTION
I	0 - 70	Humified organic material interstratified with thin lenses of mineral sediment (silt loam - clay loam).
	70 - 230+	Mesic to fibric organic material becoming mesic with depth, scattered wood debris.
II	0 - 10	Humified organic material.
	10 - 37	Sandy clay, reddish brown, abundant concretions, in places weak or quasi-cemented.
	37 - 70	Fine sandy clay, abundant concretions distinct mottling and gleying.
	70 - 105+	Stoney, gravelly, sandy clay very firm, strongly gleyed.
III		Not surveyed. Mostly well drained sands and gravelly materials.
IV	0 - 20	Loam - sandy loam, scattered gravels, concretionary, moderately firm.
	20 - 50	Concretionary stoney sandy clay, very firm compact.
V	0 - 30	Loam to fine sandy loam, granular.
	30 - 50	Silt loam to silty clay loam, firm and compact, occasionally weakly cemented.
	50 - 150+	Clay, firm to very firm, strongly mottled, moderately gleyed. Occasional, scattered stones.
VI		Similar to type IV soil except for higher degree of poor drainage.

SCALE 1:8,900

LEGEND: SOIL BOUNDARY, FENCE, ROAD, DITCH, UNCLEARED LAND, BUILDING

DRAINAGE SURVEY REPORT

PROVINCE OF BRITISH COLUMBIA
SOILS BRANCH
MINISTRY OF AGRICULTURE AND FOOD

SURVEY: M. Driehuyzen & D. Pedersen
REPORT

PHOTO NO. 7761:258

REPORT NO. 82-08-13

NAME & ADDRESS

EXAMPLE DRAINAGE
PLAN NO. 100.448

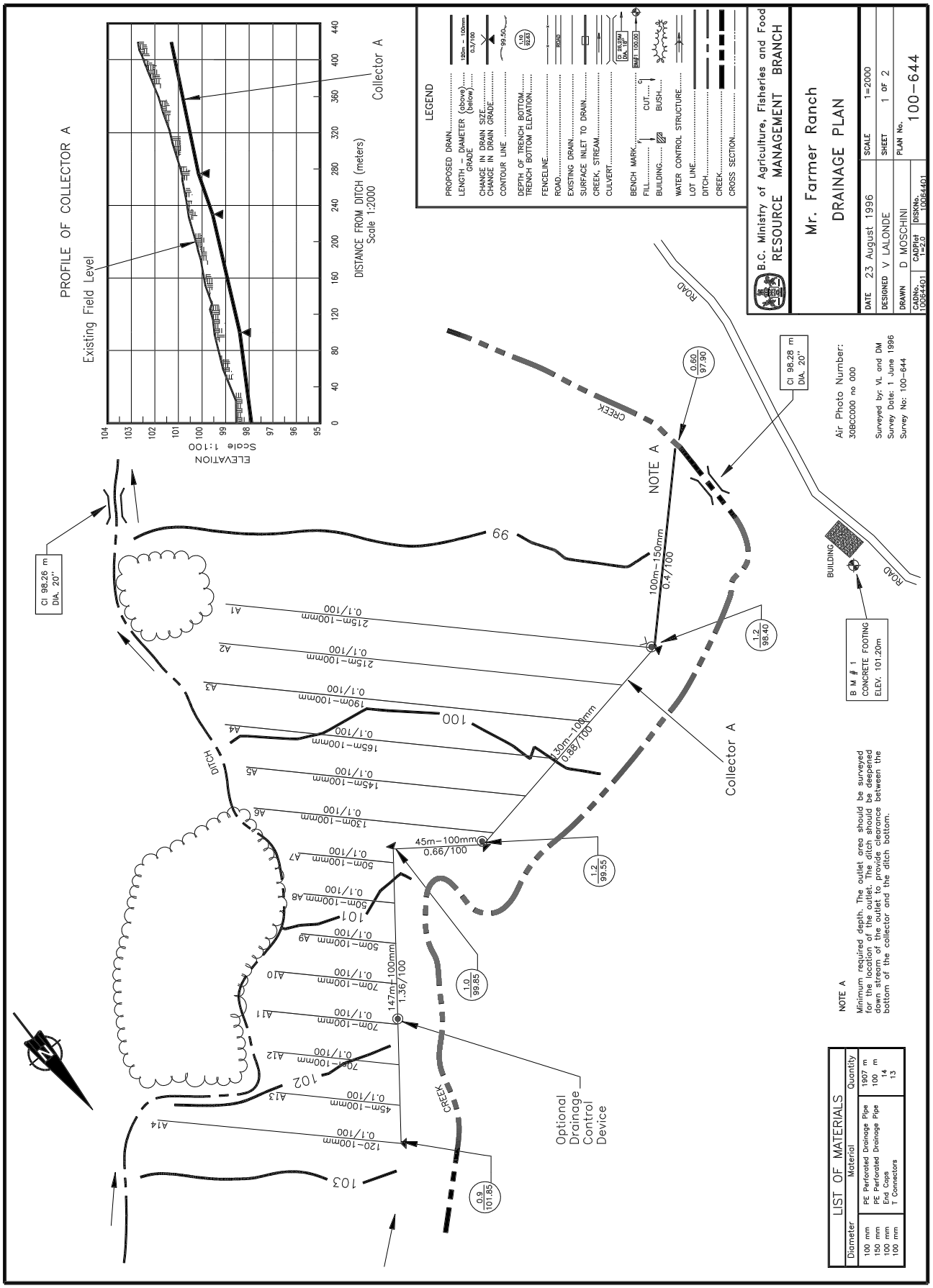


Figure 2 Sample Drainage Plan