

TO: All Headquarters Directors, Prof. Services, Planning & Major Projects
All Regional Directors
All Regional Managers, Prof. Services, Planning & Operations
All District Highways Managers

SUBJECT: Horizontal Drain Maintenance

PURPOSE:

To provide a systematic program of inspection, monitoring and maintenance of horizontal drains.

BACKGROUND:

Horizontal Drains have been and are being installed along some slopes of provincial highways affected by mass movements of unstable materials triggered by the presence of groundwater.

A systematic program of inspection, monitoring and maintenance, with appropriate funds and resources is necessary to mitigate seepage forces which contribute to the development of ground mass movements in unstable materials.

Maintenance Services Branch requested guidance from Geotechnical & Materials Engineering Branch on how to proceed with the maintenance of the Ministry's horizontal drains. There is currently no consistent procedures for maintaining drains nor up-to-date inventory of drains.

At the HQ/Regional Professional Services meeting on October 13/94 it was decided that Geotechnical and Materials Engineering Branch would produce and manage a plan to maintain horizontal drains.

PROCEDURE:

Each Regional Geotechnical and Materials Engineering Office will establish and maintain an up-to-date inventory of horizontal drain installations. The operational status and functionality of each drain installation will be reviewed annually by the R.G.M.E.'s office. Maintenance requirements will be forwarded annually to the Manager, Geotechnical Operations, Burnaby.

Geotechnical Operations Office will set an annual horizontal drain maintenance schedule in co-operation with the Regions. This office will also co-ordinate Regional and Geotechnical Operations resources to deliver the annual drain maintenance program as well as supply necessary equipment to carry out the program.

Horizontal drains will be maintained according to the attached "Horizontal Drain Maintenance Guidelines".

CONTACT:

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Chief Highway Engineer

Attachment

HORIZONTAL DRAIN MAINTENANCE GUIDELINES

1.0 ADMINISTRATION:

1.1 Site and Drain Locations:

Horizontal drain installation sites will be referenced in the field and on Ministry plans. Drain installations and individual drains will be visibly marked in the field and site locations will be entered into the Ministry inventory system. Site identification must be visible to inspection and maintenance personnel in order to reduce damage during ditch cleaning, snow ploughing or rehabilitation work.

The Geotechnical Operations Rockwork Section will help to identify drains installed in soil and bedrock areas located above the highway during their current slope mapping program. This information will be shared with the Regional Geotechnical and Materials Engineering offices.

Regional Geotechnical and Materials Engineering office will send to each District the location of each horizontal drain installation. The installation locations are to be included in the culvert section of the Road Features Inventory System (RFI).

1.2 Drain Identification:

Individual drains will be labeled with a metal tag attached to the outlet or stamped on the metal sleeve. The tag or sleeve will state the year of installation and drill hole number. This number must not change over the life of the drain. Replacement drains to be assigned new numbers and plans updated.

2.0 INSPECTION AND MAINTENANCE:

2.1 Condition of Metal Drains:

Metal drains will require inspection for corrosion and overall integrity of the metal casing before flushing proceeds. The majority of metal drains have been in place for over twenty-five years and are nearing the end of their operational life.

2.2 Protecting Plastic Drain Outlets:

Plastic drain outlets must be protected from rolling rocks and sloughing slopes by driving or pushing a galvanized pipe sleeve over the outlet. The metal pipe will be embedded 1.5 metres into the slope. The advantage of having a metal outlet is, that should the outlet become buried, it can be located using a metal detector.

2.3 Collector Systems:

Regional Geotechnical and Materials Engineering Group will identify horizontal drain installations requiring collection systems. The group will prepare design drawings and forward them to the District Highways Manager who will arrange for construction of the collection system.

3.0 CLEANING PROCEDURES:

3.1 Locating Drain Outlets and Cleanouts:

Horizontal drain installation sites will require clearing of vegetation cover before drain outlets and collector system cleanouts can be inspected or flushed. The clearing of vegetation to be carried out by the maintenance contractor at the direction of the Geotechnical and Materials Engineering group. Disturbance to vegetation and soil around drain outlets need to be kept to a minimum to reduce sloughing around the drain outlet.

Note: The Ministry does not permit the use of herbicides to control vegetation.

3.2 Roots Removal:

Remove roots with a cutting tool before using a water flushing system. Care must be exercised not to damage the PVC casing during this procedure.

3.3 Controlling Discharge Water:

Cleaning crews will obtain clearance from Federal and Provincial Fishery Agencies before proceeding with drain flushing near fish bearing water courses. Discharge water from flushing drains needs to be controlled to minimize erosion of surrounding slopes.

3.4 Cleaning Systems:

Cleaning is to be carried out using the Geotechnical Drilling Section flushing equipment. The nozzle configuration will consist of fine slots or small diameter orifices equally spaced around the circumference of the nozzle oriented at 90 degrees to the nozzle axis with one or two orifices directed forward from the tip.

3.5 Flushing Rate:

Restoring drain efficiency requires sufficient time to flush the drain casing of sediment, clean the slots and perforations of obstructions and caking. The rate of nozzle advancement up the drain is guided by the cleaning operator observing the colour and sediment content of the discharged water. As the discharge flow clears, the nozzle can be pushed further into the drain using a back and forth motion. The average time to flush a drain adequately is with an advancement rate of approximately 3 metres/minute. The nozzle needs to be kept in motion to limit abrasion to PVC drain casings and/or metal drains weakened by corrosion. Each drain requires a complete pass with the water pressure on as the nozzle is being inserted and withdrawn.

3.6 Blockages/Recorded Length of Drain:

Should blockages be encountered in the drain, additional time will be required for the forward spray to breakdown the blockage by working the nozzle back and forth in a 0.5 metre stroke. In bent or deformed drains, the use of excessive force to advance the nozzle could jam the nozzle and hose in the drain. Operator care will be required cleaning these drains. The nozzle must not be advanced past the recorded length of drain.

3.7 Encrustation Buildup/Bacteria Buildup/Special Treatments:

Drains showing minor amounts of iron bacteria sludge or algae growth buildup can be cleaned by flushing and by inserting a stiff radial wire brush to sweep the inside of the drain. Drains with minor calcium deposits at the outlet can be cleaned manually. Drains with a moderate to severe calcium build up should be abandoned and new drains installed in conjunction with a regular flushing program or consider other engineering options.

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