

G.I.-30 SEPT. 1976

GEOCRES No. 30M3-210

DIST. A REGION

W.P. No. _____

CONT. No. _____

W. O. No. 89-11004

STR. SITE No. _____

HWY. No. 406

LOCATION Hwy 406 S.B. just N of
 Hwy 58 (Slope Failure)

No. of PAGES - 1 Threshold

OVERSIZE DRAWINGS TO BE INCLUDED WITH THIS REPORT. _____

REMARKS: _____

M E M O R A N D U M

Geotechnical Section, Central Region

Telephone: 224-7405

To: Mr. M. Devata
Chief Foundation Engineer
3rd Floor, Central Bldg.
1201 Wilson Ave. W.

Date: 1989 06 20

Re: Slope Failure - Hwy. 406 S.B., North of Hwy. 58

Further to my memo of last month, would you please review the above slope failure and make recommendations to alleviate the problem. This site was visited by myself, Mr. Guy Cautillo, Mr. Doug Robb and Mr. George Allan on May 4, 1989.

Location: The failure is located at the ramp from Hwy. 406 S.B. to Hwy. 58. (See attached plan).


Description: The failure is located on the outlet side of a concrete culvert which passes beneath the roadway.

The direction of the water is also shown on the plan.

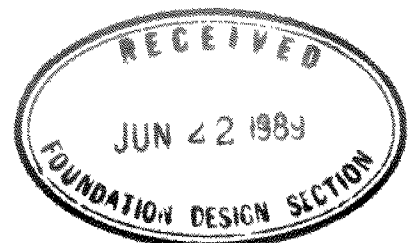
The maintenance office has attempted to treat this area by diverting the run-off water with asphalt run-offs, but these have also been washed away.

Background: This section of Hwy. 406 was built under Contract 68-103. The pavement design of the 406 mainlanes and Interchange ramps is 9" of Granular 'A' under 9" of concrete. There was a slope failure in this area in 1981; I have enclosed the appropriate memos.

AB/GC/ndp


A. Bradbury
Soils Unit Supervisor
for:
G. Cautillo
Head, Geotechnical Section

disk file: slope



Mr. G. Norman
Maintenance Engineer
Hamilton

81-07-21

Attention: Mr. M. Scrimshaw

Re: Slope Failures on Highway 406

On July 12, 1982, three areas where earth fill slopes have failed, were visually investigated by Mr. Murray Hill from your Maintenance Section and myself.

The location of these failures are as follows:

1. Northbound ramp to West Chester Avenue.
2. South of Glendale interchange on West side of southbound lane.
3. On the west side of the south approach fill to the C.N.R. overpass.

A description of the failures is as follows:

1. This slope failure has occurred on the northbound ramp exit to West Chester Avenue. The failure is on the fill side (west side) of the ramp and extends from a point 75 feet south of West Chester Avenue southerly for a distance of 100 feet. It appears that the original embankment was built with a slope steeper than 2:1. There has been a gradual slippage of the upper 2% of the embankment and further aggravated by heavy rainfall in May and June of 1982. At the present time, the steel beam guide rail has been partially undermined and has partially collapsed.

Treatment

The treatment recommended is as follows;

1. Strip the topsoil from the failed area. → Which extends from the end of the curb on the radius to West Chester Avenue, southerly for a distance of 150 feet. The additional 50 feet beyond the failed area is also steeper than 2:1 and should be treated now before it eventually starts to slide, since 406 construction within this area is not proposed till 1985. This work should be done now.
2. Flatten the embankment slope with suitable earth or granular materials to provide a gradient of 2 horizontal to vertical. The new fill will be keyed into the existing

slope. Use standard DD-414 area guide.

3. The slopes should be landscaped by adding topsoil and seed. The District Horticulturist should be consulted on this item.
2. This failure has occurred on the west side of the southbound lane of 406 in the vicinity of the bullnose of the ramp that carries traffic to St. Davids Road. Water flowing in the West ditchline in a northerly direction down the escarpment is causing severe erosion at the base of the embankment. At this location the ditch bottom has been cut down to the underlying bedrock and the toe of the slope washed away. This has resulted in the failure of the slope over a distance of 150 feet. The north limit of the failure terminates at a concrete culvert which carries surface water from the east ditchline of 406 to the creek on the west side.

Treatment

1. Treatment at this location will consist of removing earth materials from the failed area and replacing it with random rip rap with a maximum size of rock of 12 inches. Prior to placing the stone the slope should be cleared of any loose soil and a geotextile fabric placed over it. Reference should be made to M.T.C. specification 1860. Any geotextile meeting the requirements listed under class I will be suitable. For installation details please contact this section.
2. Earth materials are not recommended here because the present slope cannot be flattened.
3. The third failure we investigated is located on the fill slope of the southbound lane south of the C.N.R. overpass. At the present time there is a shallow movement on the fill slope which is undermining the guiderail and shoulder gravel. Also, the guiderail has moved out of line over a distance of 300 feet.

Treatment

1. Strip the topsoil from the slope and remove all loose earth from the slide area. Using suitable earth from this area and importing additional suitable material, flatten the slopes to a gradient of 2 horizontal to 1 vertical. Use standard DD-414 as a guide when flattening the slopes.
2. Consult the District Horticulturist for recommendations regarding topsoil and seeding of the treated area.

Materials suitable for widening the slopes at failures 1 and 3 are available from the following sources.

- a) At the Union Carbide Plant on the east side of the Welland Canal just north of townline road (58A). I understand this material is available free of charge.

- b) Shale from the Glenridge Quarry in the northwest quadrant at St. David's Road and Highway 406. The city of St. Catharines has a proposal to remove 200,000 cubic yards from the bottom of the old quarry so it can be developed as a dump site. The proposal is to stockpile it on the site and make it available to M.T.C. free of charge if needed. However, to date no decision has been made on the removal of this rock.

These two locations have been considered as possible borrow areas for W.P. 11-68-01; the construction of the southbound lanes of 406 from Beaverdams Road to just north of Port Robinson Road.

The rip-rap for the #2 failure will have to be provided by a local quarry. However, if the shale from the Glenridge quarry is available when this work is done then consideration should be given to forming the upper part of the slope with this material. However, before this can be done the actual material in the stockpile should be evaluated before a decision is made to use it.

PFW:RDG:jao

C.C. M. Scrimshaw
M. Hill



P.F. Weber

For: R.D. Gunter
Head, Geotechnical Section