

ANNUAL CONSTRUCTION REPORT

1980 - 81

FIELD INVESTIGATIONS
CONSTRUCTION, UPGRADING
AND MAINTENANCE FOR
ONTARIO REGION

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1980-81

DEPARTMENT OF THE ENVIRONMENT
INLAND WATERS DIRECTORATE
WATER RESOURCES BRANCH

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FIELD INVESTIGATIONS
CONSTRUCTION, UPGRADING
AND MAINTENANCE FOR
ONTARIO REGION

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MARCH 31, 1981.

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INTRODUCTION

This annual construction report, prepared by the Ontario Region of the Water Resources Branch, is for the fiscal year 1980-1981.

The purpose of this report is to detail the construction activities associated with the installation of hydrometric stations required to compile and provide data for interested public and/or private agencies.

Funds for the construction activities, which include reconnaissance, construction, upgrading and maintenance, are provided under the Federal-Provincial Cost-Sharing Agreement.

Construction activities are divided into four categories:

1. FIELD INVESTIGATIONS (F)

Reconnaissance, surveys, preparation of plans, meetings and correspondence to obtain approval to construct hydrometric installations on private or public land.

2. CONSTRUCTION (C)

Installation of stilling wells, intakes, instrument shelters, artificial controls, cableways, access roads, and instrumentation.

3. UPGRADING (U)

Construction of controls, erection of larger shelters to house more sophisticated instruments, installation of electrical and telephone service at existing stations, installation of sediment sampling apparatus and other appurtenances.

4. MAINTENANCE (M)

General maintenance (except minor repairs done by hydrometric staff).

CONSTRUCTION METHODS AND PROCEDURES, MATERIAL AND EQUIPMENT

WELL CONSTRUCTION

STILLING WELLS FOR STREAMFLOW GAUGES

These are in-bank installations of 2.0 mm thickness, 800 mm diameter galvanized "Hel-Cor" pipe. Fabrication of the stilling well is done at Regional Headquarters at a local shop and consists of welding in a 4.2 mm steel bottom and a 50.8 mm galvanized tee and coupling for attachment of intake pipes, gate valve and stand-pipe. (See Figure 1).

At the job site, while the excavating is underway, the lower intake, valve, valve handle extension and heating cable are all attached to the well ready for installation. When the excavation is at the required depth this whole apparatus, with the intake supported by 2.9 mm wire, is picked up by the excavating machine and lowered into the hole. The well is held plumb by guylines while the machine places backfill equally around the well. When the backfill reaches the 50.8 mm coupling the upper intake is attached and supported by suitable timbers or posts to maintain a horizontal position while the rest of the fill is placed.

When the lower intake exceeds 20 M in length, additional sections of 6.7 M are connected from a boat or raft before the backfilling is started in order to lift the end of the 20.1 M length above the water surface to make these connections, after which normal backfilling takes place.

If a concrete pad is to be poured for the erection of a walk-in shelter, all the backfill above the water line is compacted at 30 cm intervals with a mechanical tamper. (See Figure 2)

WALK-IN SHELTER FOR BUBBLE GAUGES

An "Armco" walk-in shelter mounted on a poured-in-place concrete pad is used for the installation of stacom servomanometer and exactel gauges. The bubble tube is buried in the bank and supported in the river inside a length of steel conduit. This conduit is buried in the bank at one end and fastened securely to two steel fence posts driven into the river bottom. (See Figure 3)

STILLING WELLS FOR TIDES AND WATER LEVEL GAUGES

This type is fabricated by welding a 900 mm diameter, 2 mm thick galvanized "Hel-Cor" pipe and a 1600 mm diameter, 2 mm thick galvanized "Hel-Cor" pipe to a common 8 gauge steel bottom. A 1.5 M long 50.8 mm diameter intake pipe is attached to a 50.8 mm tee with a 50.8 mm gate valve and stand-pipe. (See Figure 4)

The stilling well is lowered over the side of the dock and while resting plumb and evenly on the bottom it is secured to the dock by a cable while the top is formed to accommodate an "Armco" house. Concrete is placed and fills the 30.5 cm space between the two pipes from the bottom of the well to the top of the formwork.

INLET SYSTEMS

LOWER INTAKE (ACTIVE)

The lower intake is a 50.8 mm diameter galvanized steel pipe screwed into a 50.8 mm galvanized steel tee that is welded onto the inside of the well 230 mm up from the bottom which allows room to screw the 50.8 mm bronze gate valve on the inside and also leaves a 230 mm sediment sump at the bottom of the well. A Pyrotenax heating cable of suitable length is installed from the end of this intake up the stand-pipe through a 50.8 mm X 12.7 mm X 12.7 mm double tapped bushing and connected to a number 4688 "Pyrotenax" thermostat (where electricity is available). The length of this lower intake is determined by the distance the stilling well is set back from the waters edge and may vary from 3 M to 36 M or longer.

UPPER INTAKE (AUXILIARY)

The upper intake is a 50.8 mm galvanized steel pipe screwed into a 50.8 mm galvanized coupling that is welded onto the outside of the stilling well at a distance above the lower intake to be about 15 cm above the winter ice cover level.

FLUSHING

Flushing of the active intake is accomplished by attaching the discharge hose of a gasoline driven pump to the 50.8 mm tee at the top of the stand-pipe and with the valve in the well closed forcing water under pressure through the intake system.

INSTRUMENT SHELTERS

LOOK-IN SHELTER

The standard Guelph-Type look-in shelter is installed at all sites using the 800 mm diameter stilling well and where the instrumentation consists of the Stevens A-71 analogue recorder only. Where electricity is available a 30 ampere service is installed with well heating cable and thermostat, light and outlets. Propane "Cata-Dyne" heaters are used at stations where electricity is not available.

WALK-IN SHELTERS

Armco metal buildings from 1626 mm X 1626 mm X 2438 mm to 4876 mm X 3658 mm X 2438 mm in size are used at all sites requiring room for several instruments and/or personnel accommodation. These buildings are insulated, panelled and, where electricity is available, provided with a 60 ampere service complete with well heaters, baseboard heaters, thermostats, lights and outlets. Propane heaters or wood stoves are used where power is not available.

SEDIMENT SHELTERS

Bridge mounted manual sediment sampling equipment is housed in the Guelph-Type sediment sampler shelter.

ARTIFICIAL CONTROLS AND WEIRS

STEEL

Most controls are made from Armco steel sheeting type M581, 690 mm in width, 4.2 mm thick available in lengths from 1.83 M to 4.88 M.

The sections are cut and pointed on the job and driven into the stream bed with a hand operated pneumatic pile driver. The top is trimmed by flame cutting to approximately a 5 percent grade from the centre to each side and rip-rapped on the downstream side to prevent erosion.

CONCRETE

Some concrete controls and weirs of various designs are constructed. They are formed and poured-in-place in the stream bed.

TIMBER

Some timber controls used on small streams are constructed of preservative treated planks and plywood.

CABLEWAYS

WIRE ROPE

6 X 19 Independent Wire Rope Core right regular lay, preformed, galvanized, improved plow steel wire rope of 19.1 mm or 22.2 mm diameter, depending on the span, is used on most installations. Spelter or swaged sockets are installed on the ends of the wire rope at the factory.

Tower backstays are of 9.5 mm or 12.7 mm guy strand and attached by means of preformed guy grips or cable clips.

TOWERS

The cable is supported on "A" towers made from 203 mm X 203 mm preservative treated timbers mounted on concrete pedestals or 101 mm X 101 mm galvanized "H" beams (19.35 kg/m wide flange) resting on a concrete footing or steel pad. Wooden or steel landing platforms are constructed where required.

ANCHORS

The cable is anchored at each end to a poured-in-place concrete block, rock anchor or steel deadman and equipped at one end with a turnbuckle for adjustment of sag.

CABLE CARS

Cable cars are two-man sit-down design constructed of plywood and galvanized steel and equipped with safety finger guards.

AIRCRAFT WARNING MARKERS

Where required, Department of Transport approved international orange coloured, spherical shaped aircraft warning markers are suspended on a separate 9.5 mm wire rope cable above the main cable. Cable towers are also painted international orange and white to Department of Transport specifications.

FITTINGS

Sockets, turnbuckles, thimbles, shackles, saddles, sheaves, wire rope clips and all other metal parts are hot-dipped galvanized.

EQUIPMENT

One standard full size station wagon equipped with 110 volt AC motor mounted electric generator, roof-top carrier, tailgate mounted vice, trailer hitch, heavy duty load lifters on rear suspension, and complete with safety screen for personnel protection, and one F-250 3/4 ton super cab pick-up equipped with fiberglass cap, 110 volt AC motor mounted electric generator, tailgate mounted vice and trailer hitch.

Two heavy duty boat trailers modified to carry wells, hydro poles, intake pipes and instrument shelters are used to transport equipment and material to the job site.

Tools include an air operated "Atlas Copco" pavement breaker equipped with a pile driving head, an electric "Skill" saw, electric 1/2 inch, 3/8 inch and 1/4 inch drills, electric hammer drill, 3 ton and 3/4 ton pullers, oxy-acetelene cutting torch and all other necessary hand tools.

PERSONNEL

All work was performed by the construction supervisor, construction foreman and assistant(s). Excavating equipment with operator, compressors, scuba divers, and other specialized services were rented on an hourly basis under service contract. Materials such as fill, concrete, rip-rap, and lumber, were purchased by service contract.

STATION COST BREAKDOWN

The following is an interpretation of the headings used in this report for station cost breakdown.

SALARIES

Engineers, Supervisor, Foreman, term employees and Hydrometric Personnel associated with field investigation, construction, upgrading and maintenance of the stations in this report.

MATERIALS/SUPPLIES

Stilling well, plumbing materials, electrical materials, concrete, instrument shelter, gravel, lumber, excavating machinery, rental equipment, steel, and contract services.

MEALS/ROOMS

Living expenses for field personnel.

VEHICLES

Cost of operation and depreciation.

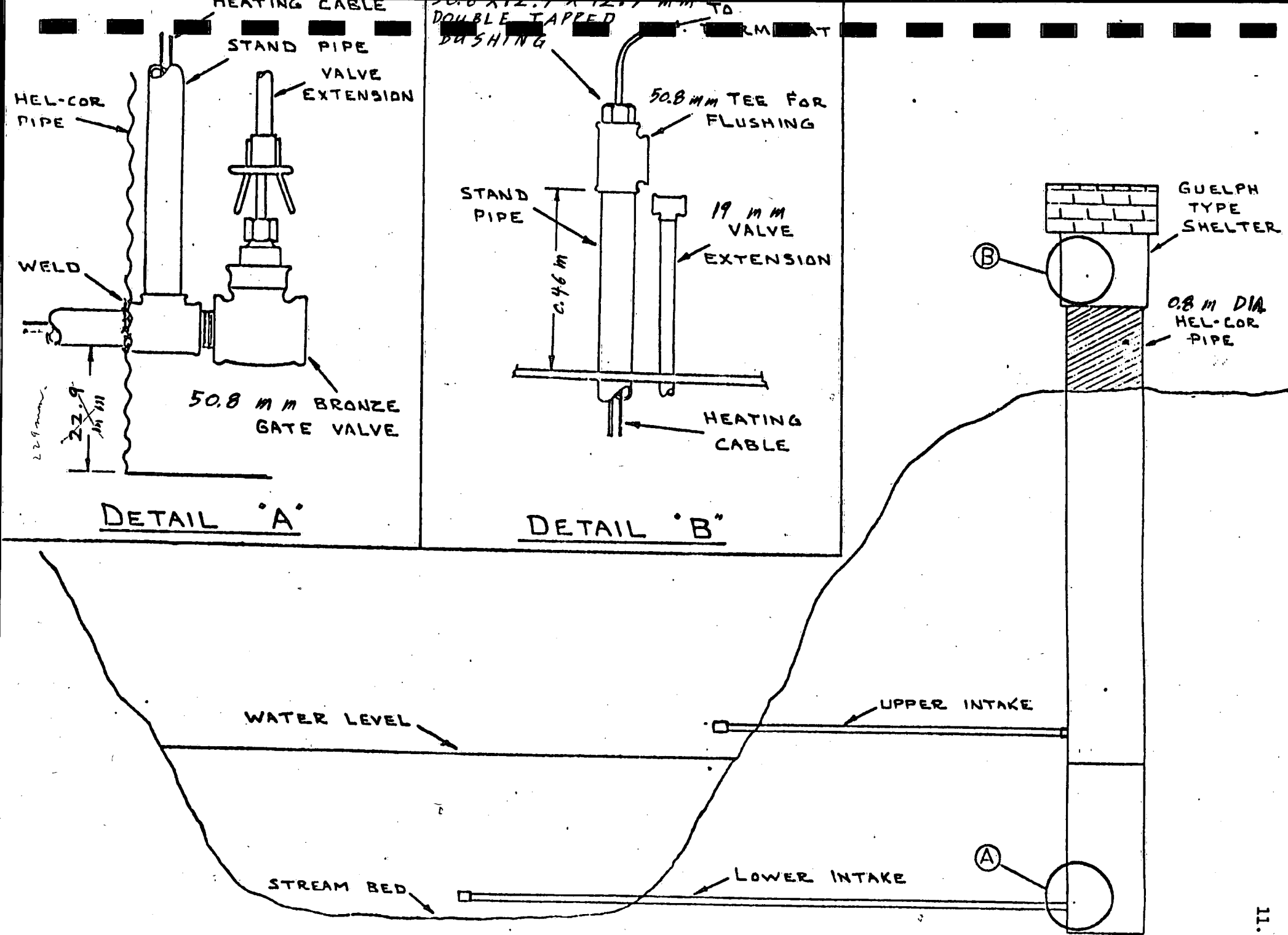


FIG.1 INRANK STILLING WELL

FIG. 2

INBANK STILLING WELL
WITH ARMCO SHELTER

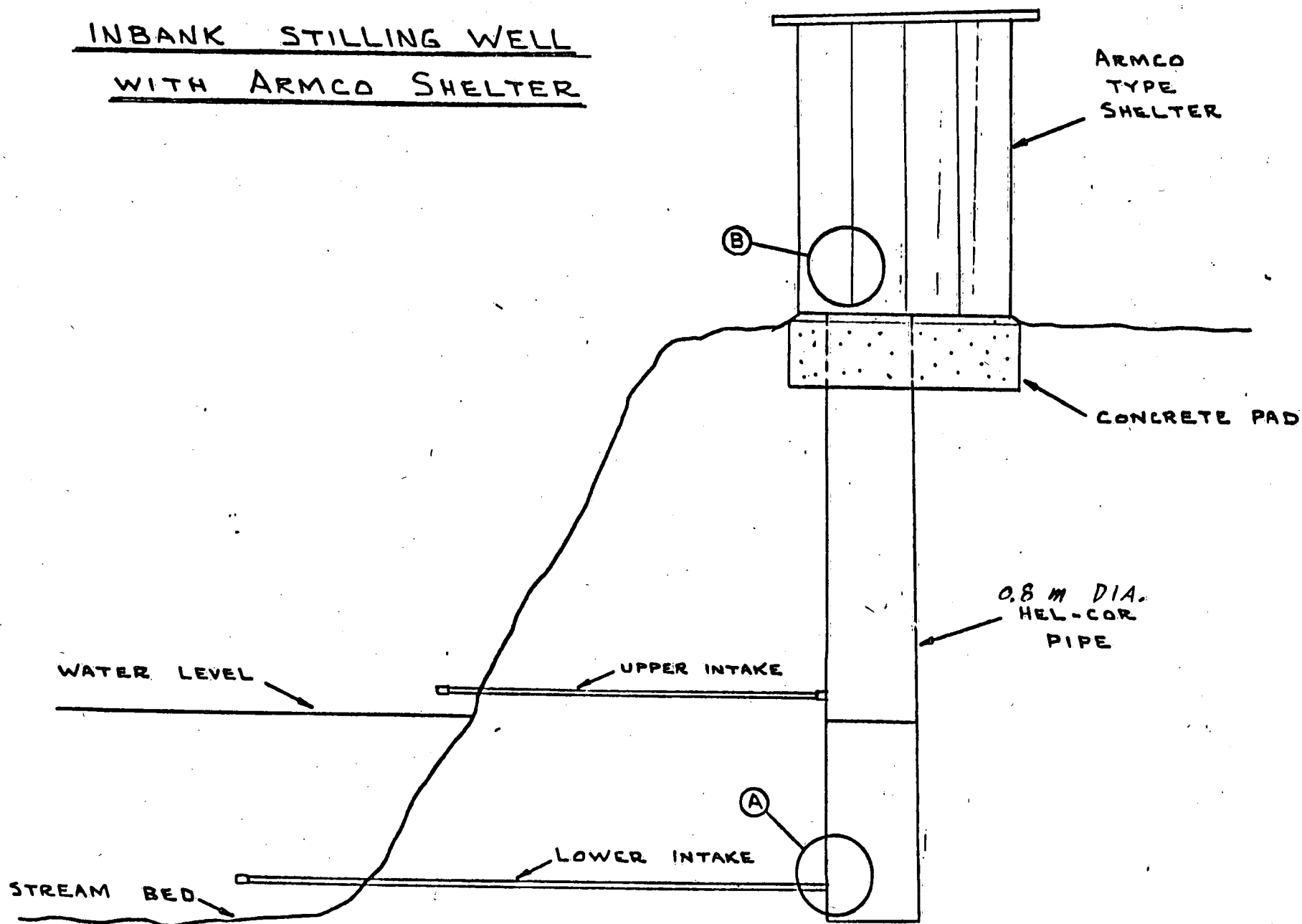
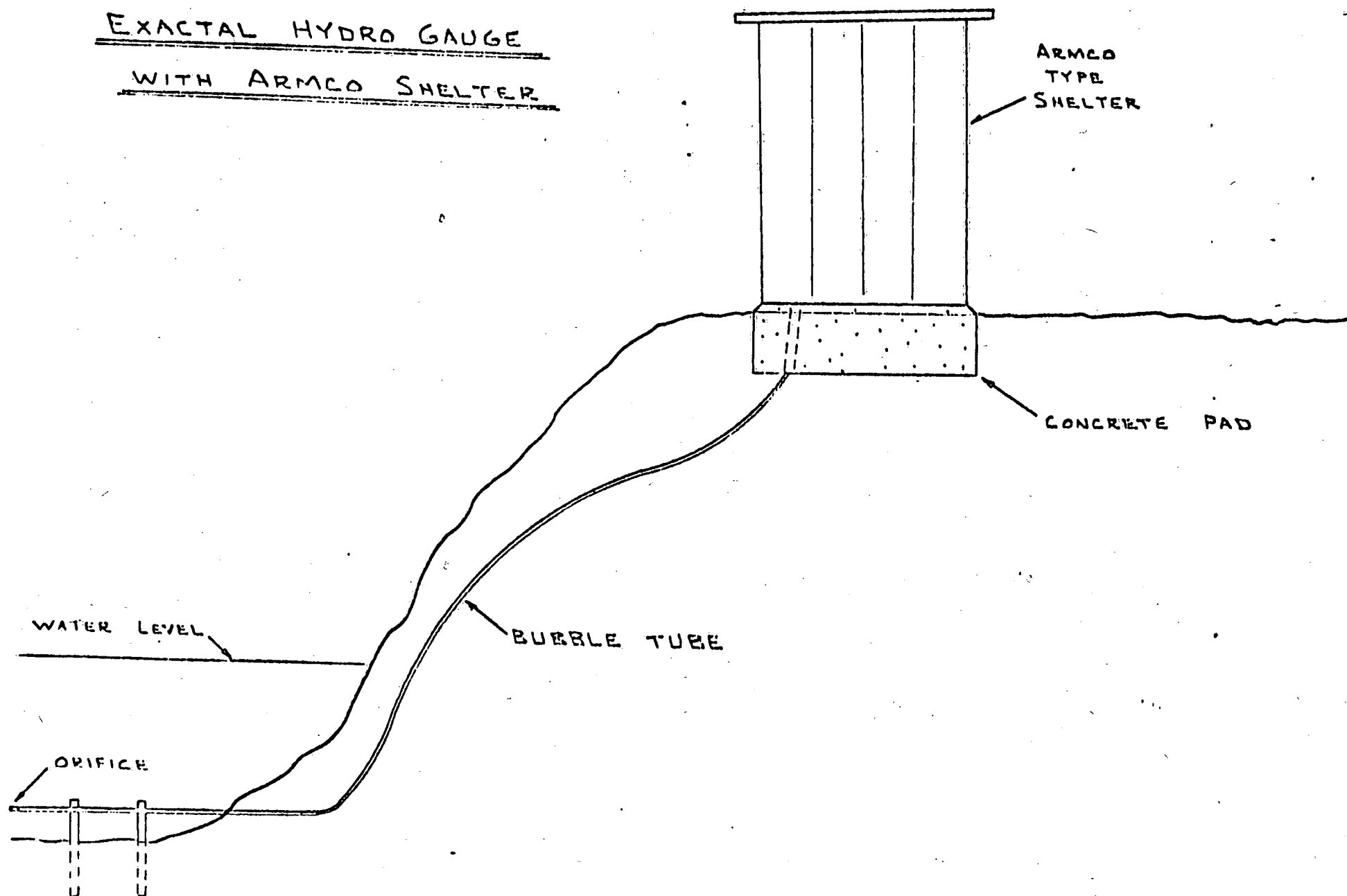


FIG. 3

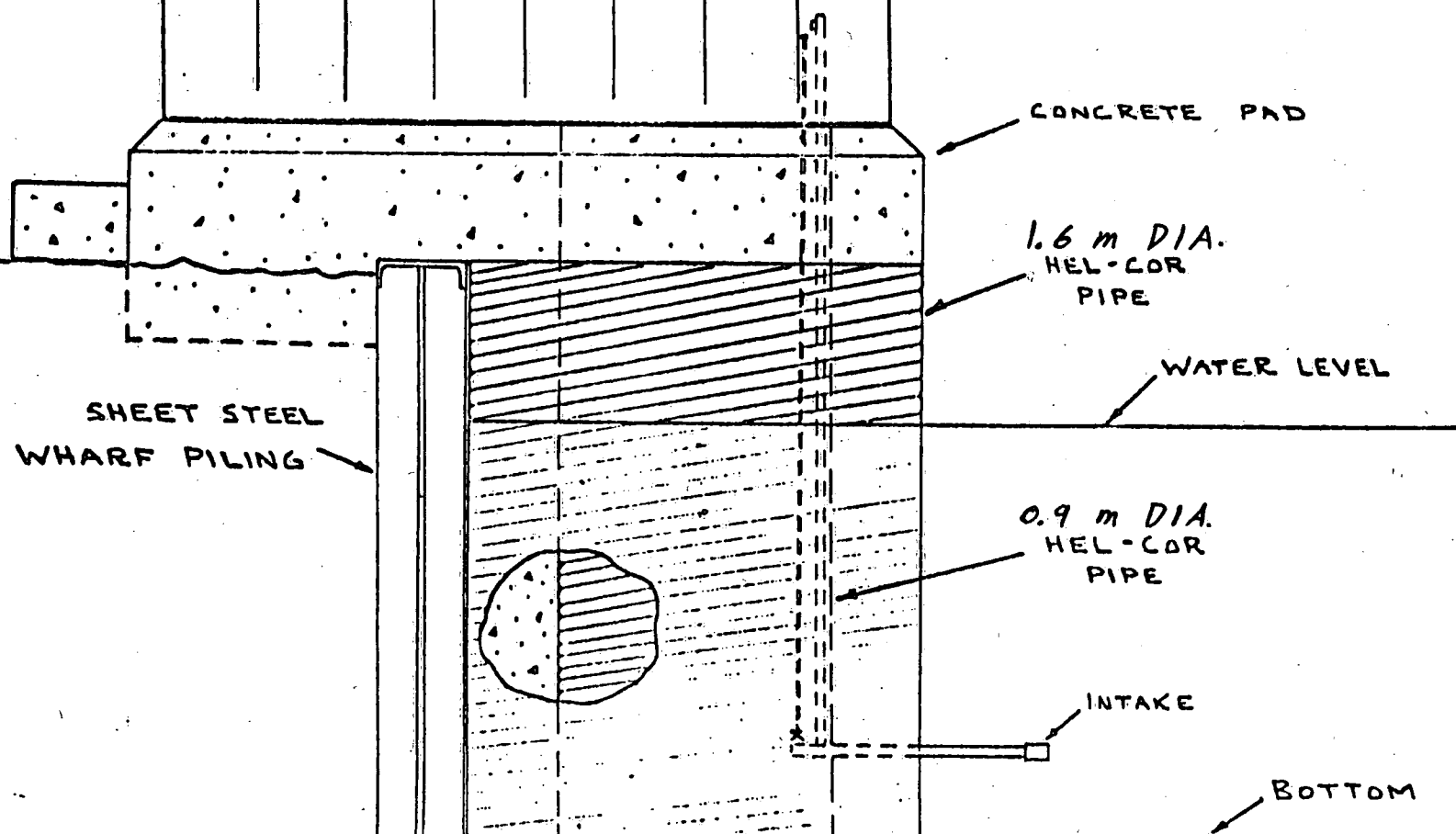
EXACTAL HYDRO GAUGE
WITH ARMCO SHELTER

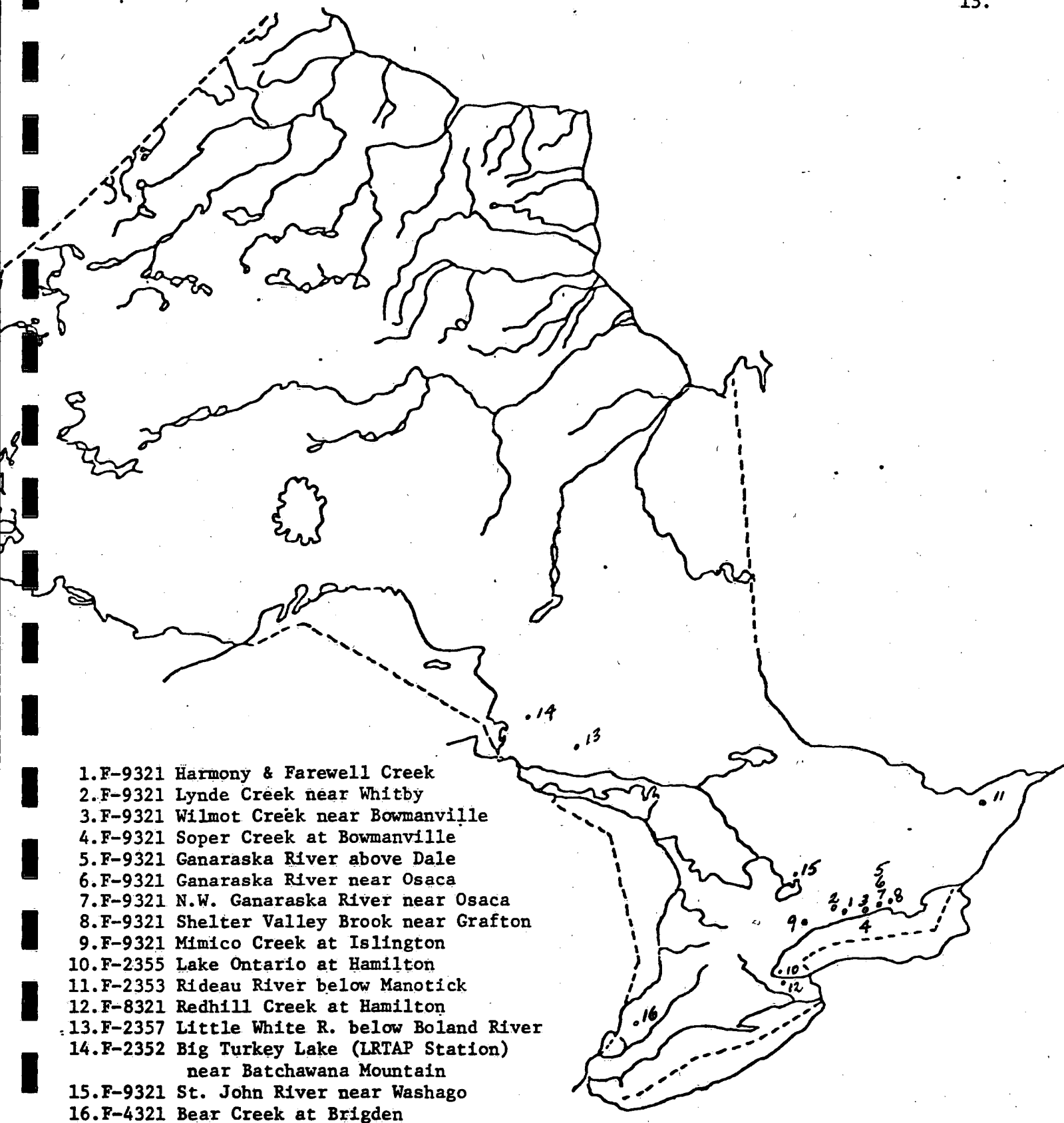


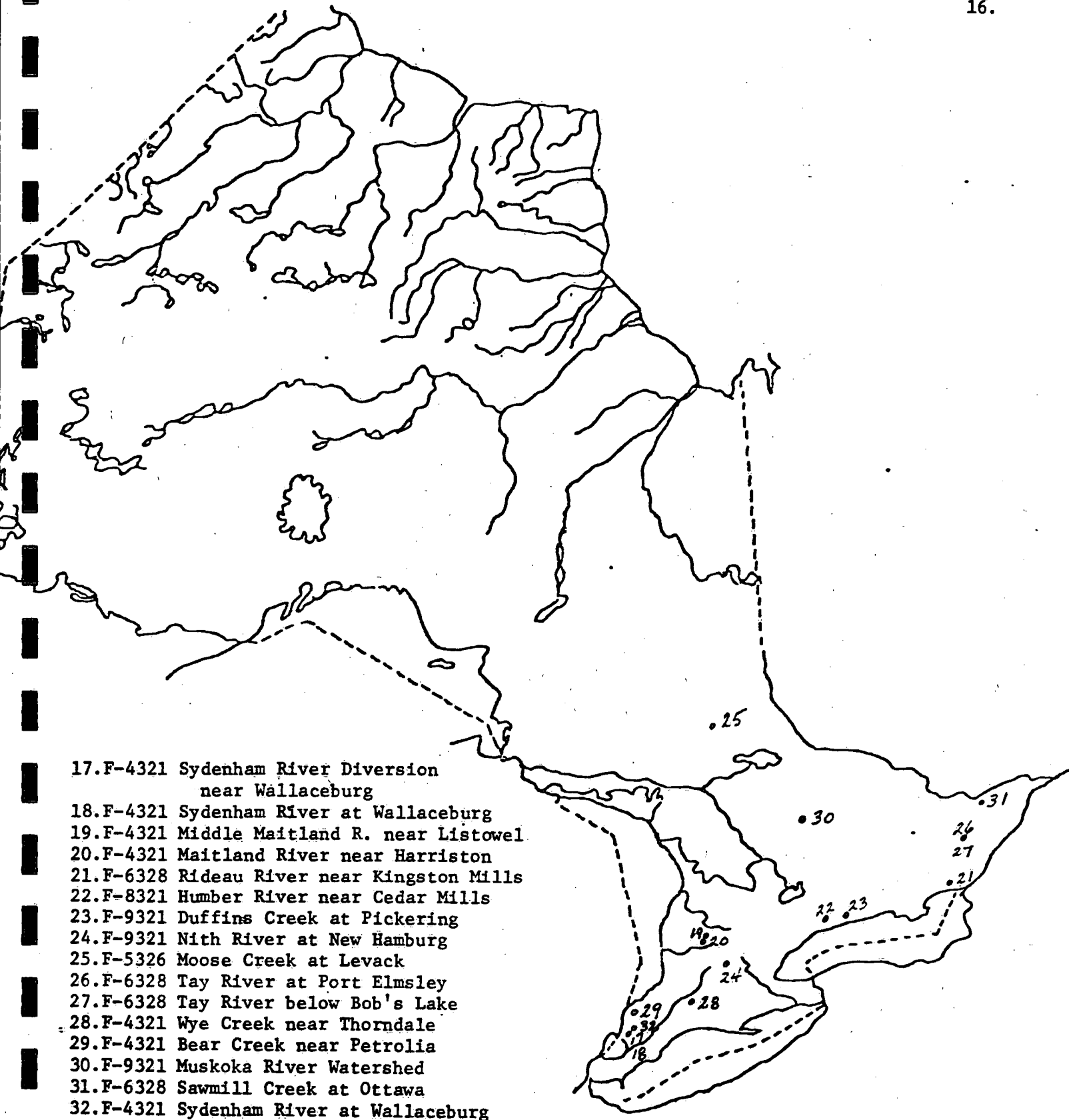
ARMCO
TYPE
SHELTER

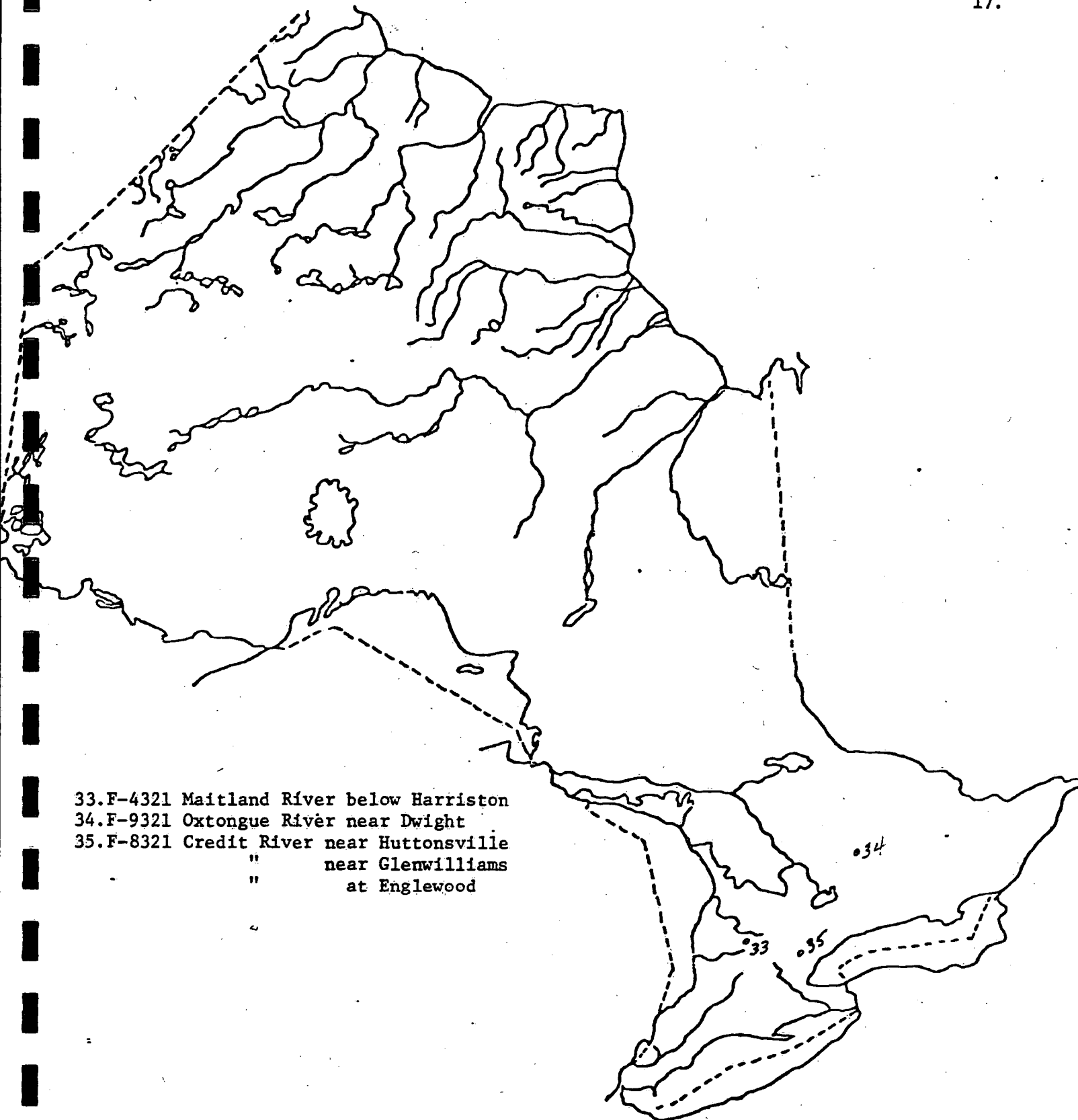
FIG. 4

TIDES & WATER LEVEL GAUGE
WITH ARMCO SHELTER.









F - FIELD INVESTIGATIONS 1980-1981

F-9321 Harmony Creek and Farewell Creek at Oshawa

A field investigation and survey was conducted at these two creeks with regard to establishing hydrometric and sediment sampling stations.

COST:

Salaries (0.4 Man-Weeks)	\$ 503.66
Meals/Rooms	22.50
Vehicles	<u>97.49</u>
Total	\$ 623.65

- F-9321
1. Lynde Creek near Whitby
 2. Wilmot Creek near Newcastle
 3. Soper Creek at Bowmanville
 4. Ganaraska River near Dale
 5. Ganaraska River near Osaca
 6. N. W. Ganaraska River near Osaca
 7. Shelter Valley Brook near Grafton
 8. Mimico Creek at Islington

A field investigation was conducted to ascertain the flood damage and estimate the cost of repairs at the above stations.

COST:

Salaries (0.8 Man-Weeks)	\$ 357.60
Meals/Rooms	109.90
Vehicles	<u>94.08</u>
Total	\$ 561.58

F - FIELD INVESTIGATIONS 1980-1981F-2355 Lake Ontario at Hamilton

Field investigations and surveys were conducted and an on-the-site meeting was held with a representative of the Department of Public Works with regard to the selection of a suitable site for a water level gauge.

COST:

Salaries (0.9 Man-Weeks)	\$ 396.32
Meals/Rooms	22.50
Vehicles	<u>76.26</u>
Total	\$ 495.08

F-2353 Rideau River near Manotick

A field investigation and survey was conducted with regard to the installation of a hydrometric gauging station at this site.

COST:

Salaries (0.4 Man-Weeks)	\$ 202.72
Meals/Rooms	63.33
Vehicles	<u>112.22</u>
Total	\$ 378.27

F - FIELD INVESTIGATIONS 1980-1981F-8321 Redhill Creek at Hamilton

An on-the-site meeting was held with representatives from the Ministry of the Environment with regard to the installation of water quality sampling equipment at this hydrometric gauging station.

COST:

Salaries (0.1 Man-Weeks)	\$ 50.60
Meals/Rooms	4.50
Vehicles	<u>22.78</u>
Total	\$ 77.88

F-2357 Little White River below Boland River

Field investigations and surveys were conducted and a suitable site was selected for the installation of a hydrometric gauging station.

COST:

Salaries (1.0 Man-Weeks)	\$ 456.12
Meals/Rooms	184.50
Vehicles	<u>223.04</u>
Total	\$ 863.66

F - FIELD INVESTIGATIONS 1980-1981F-2352 Big Turkey Lake (LRTAP Stations)
near Batchawana Mountain

Another field investigation and survey was conducted and an additional site was selected for the installation of a hydrometric gauging station.

COST:

Salaries (0.2 Man-Weeks)	\$ 101.36
Meals/Rooms	50.85
Vehicles (transportation supplied)	<u>-</u>
Total	\$ 152.21

F-9321 St. John River near Washago

A field investigation and on-the-site meeting was conducted with a representative of the Huronia District Conservation Authority.

COST:

Salaries (0.3 Man-Weeks)	\$ 152.04
Meals/Rooms	42.20
Vehicles	<u>69.39</u>
Total	\$ 263.63

F - FIELD INVESTIGATIONS 1980-1981F-4321 Bear Creek at Brigden

A field investigation and survey was conducted and a suitable site selected for the installation of a hydrometric gauging station.

COST:

Salaries (0.08 Man-Weeks)	\$ 85.24
Meals/Rooms	20.78
Vehicles	<u>22.41</u>
Total	\$ 128.43

F-4321 Sydenham River Diversion Channel near Wallaceburg

A field investigation and survey was conducted and a site was chosen for the installation of a hydrometric gauging station.

COST:

Salaries (0.08 Man-Weeks)	\$ 85.24
Meals/Rooms	20.78
Vehicles	<u>22.41</u>
Total	\$ 128.43

F-4321 Sydenham River at Wallaceburg

A field investigation was conducted to locate a site for the installation of a water level gauge and an acoustic flow meter.

COST:

Salaries (0.08 Man-Weeks)	\$ 85.24
Meals/Rooms	20.78
Vehicles	<u>22.41</u>
Total	\$ 128.43

F - FIELD INVESTIGATIONS 1980-1981F-4321 Middle Maitland River above Listowel

A field investigation and survey was conducted and a suitable site was chosen for the installation of a hydrometric and flood forecasting station.

COST:

Salaries (0.08 Man-Weeks)	\$ 85.24
Meals/Rooms	20.78
Vehicles	<u>22.41</u>
Total	\$ 128.43

F-4321 Maitland River above Harriston

A field investigation and survey was conducted and a suitable site was chosen for the installation of a hydrometric gauging station above the town.

COST:

Salaries (0.08 Man-Weeks)	\$ 85.24
Meals/Rooms	20.78
Vehicles	<u>22.41</u>
Total	\$ 128.43

F - FIELD INVESTIGATIONS 1980-1981

F-9321 Harmony Creek at Oshawa

A contract was let to a local electrical contractor to install underground electrical service to this new gauging station.

The following agencies were contacted in regard to the installation of this gauging station.

Oshawa Public Utilities Commission
- re electric service

Bell Telephone Company - re underground cable

Union Gas Company - re buried gas lines

George Harding Construction Limited
- re machinery rental.

COST:

Salaries (0.5 Man-Weeks)	\$ 302.92
Meals/Rooms	146.90
Vehicles	<u>90.06</u>
Total	\$ 539.88

F-6328 Rideau River near Kingston Mills

A field investigation was conducted with regard to the installation of a cableway to measure high flows.

COST:

Salaries (0.2 Man-Weeks)	\$ 101.36
Meals/Rooms	39.48
Vehicles	<u>57.66</u>
Total	198.50

F - FIELD INVESTIGATIONS 1980-1981F-8321 Humber River at Cedar Mills

An on-the-site meeting was held with representatives from Metropolitan Toronto and Region Conservation Authority with regard to the relocation of this gauging station.

COST:

Salaries (0.1 Man-Weeks)	\$ 213.11
Meals/Rooms	9.00
Vehicles	<u>39.60</u>
Total	\$ 261.71

F-9321 Duffins Creek at Pickering

A field investigation was made with the Area Engineer regarding the relocation of this station.

COST:

Salaries (0.8 Man-Weeks)	\$ 397.07
Meals/Rooms	18.60
Vehicles	<u>76.57</u>
Total	\$ 492.24

F - FIELD INVESTIGATIONS 1980-1981F-9321 Nith River at New Hamburg

A field investigation was made with the Area Engineer in regard to this station being rendered inoperable by the removal of the dam gate by the local town council.

COST:

Salaries (0.2 Man-Weeks)	\$ 106.56
Meals/Rooms	4.65
Vehicle	<u>29.92</u>
Total	\$ 141.13

F-5326 Moose Creek at Levack

Field investigations were conducted with regard to establishing a hydrometric gauging station at this location.

COST:

Salaries (0.8 Man-Weeks)	\$ 405.44
Meals/Rooms	119.20
Vehicle	<u>186.77</u>
Total	\$ 711.41

F - FIELD INVESTIGATIONS 1980-1981F-2354 Tay River at Port Elmsley

A field investigation was carried out with the Officer-In-Charge, Ottawa Area, Construction Foreman and a representative from Rideau Canals, Parks Canada and a suitable site was chosen for the installation of a hydrometric gauging station.

COST:

Salaries (0.2 Man-Weeks)	\$ 89.40
Meals/Rooms	35.70
Vehicle	<u>11.94</u>
Total	\$ 137.04

F-2354 Tay River below Bob's Lake

A field investigation was carried out with the Officer-In-Charge, Ottawa Area, Construction Foreman, and a representative from Rideau Canals, Parks Canada, and a suitable site was chosen for the installation of a hydrometric gauging station.

COST:

Salaries (0.2 Man-Weeks)	\$ 89.40
Meals/Rooms	23.35
Vehicle	<u>11.94</u>
Total	\$ 124.69

F - FIELD INVESTIGATIONS 1980-1981F-4321 Wye Creek near Thorndale

A field investigation was conducted to ascertain the cost of removal of silt and gravel collected above the control and intake pipe at this hydrometric gauging station.

COST:

Salaries (0.2 Man-Weeks)	\$ 89.40
Meals/Rooms	4.65
Vehicle	<u>38.75</u>
Total	\$ 132.80

F-4321 Bear Creek near Petrolia

A field investigation was conducted to ascertain the method and estimate the cost of repairs to the bank erosion caused by high water around one end of the sheet steel control.

COST:

Salaries (0.2 Man-Weeks)	\$ 89.40
Meals/Rooms	4.65
Vehicle	<u>38.60</u>
Total	\$ 132.65

F - FIELD INVESTIGATIONS 1980-1981F-4321 Sydenham River - Wallaceburg

A field investigation was made with regard to locating a flow meter and water level recorder in the existing building that houses lift bridge machinery.

COST:

Salaries (0.1 Man-Weeks)	\$ 50.68
Meals/Room	13.85
Vehicle	<u>53.16</u>
Total	\$ 117.69

F-9321 Muskoka River Watershed

A field investigation was carried out with the Area Engineer and two representatives from the Ministry of Natural Resources with regard to the proposed upgrading of the Hydrologic Gauge Network on the Muskoka River Watershed. Five existing and proposed sites were visited and advice and assistance were offered for this expansion as requested.

COST:

Salaries (0.8 Man-Weeks)	\$ 426.22
Meals/Rooms	118.30
Vehicle	<u>120.12</u>
Total	\$ 664.64

F - FIELD INVESTIGATIONS 1980-1981F-8321 Humber River at Cedar Mills

A field investigation was made with the Area Engineer, Construction Supervisor and Construction Foreman to inspect the gauging station installed by Metropolitan Toronto and Region Conservation Authority with regard to the installation of data collecting instruments.

COST:

Salaries (0.3 Man-Weeks)	\$ 145.27
Meals/Rooms	6.96
Vehicle	<u>29.60</u>
Total	\$ 181.83

F-9321 Farewell Creek at Oshawa

A field investigation and survey was made with regard to the fabrication and installation of a galvanized steel stairway for access to staff gauge.

COST:

Salaries (0.3 Man-Weeks)	\$ 145.28
Meals/Rooms	6.99
Vehicle	<u>29.60</u>
Total	\$ 181.87

F - FIELD INVESTIGATIONS 1980-1981F-6328 Sawmill Creek at Ottawa

A field investigation and on-the-site meeting was held with representatives from the Ottawa Sub-Office, Robinson & Associates Consulting Engineers, and the City of Ottawa Works Department regarding the installation of a hydrometric gauging station at this location.

COST:

Salaries (0.5 Man-Weeks)	\$ 253.40
Meals/Rooms	108.20
Vehicle	<u>184.76</u>
Total	\$ 546.36

F-4321 Sydenham River at Wallaceburg

A field investigation and on-the-site meeting was held with the Director of Engineering and Planning Services of the Town of Wallaceburg and representatives from the St. Clair Region, Conservation Authority with regard to the location of the proposed flow meter and water level gauge.

COST:

Salaries (0.9 Man-Weeks)	\$ 435.83
Meals/Rooms	166.50
Vehicles	<u>78.90</u>
Total	\$ 681.23

F - FIELD INVESTIGATIONS 1980-1981F-4321 Maitland River below Harriston

A field investigation was conducted and a suitable site chosen for the installation of a hydrometric gauging station below the Town.

COST:

Salaries (0.3 Man-Weeks)	\$ 145.28
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Meals/Rooms	-
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Vehicles	<u>22.30</u>
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Total	\$ 167.58
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F-9321 Oxtongue River near Dwight

A field investigation and survey was conducted with regard to the location of this proposed gauging station.

COST:

Salaries (1.0 Man-Weeks)	\$ 447.00
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Meals/Rooms	204.40
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Vehicles	<u>79.00</u>
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Total	\$ 730.40
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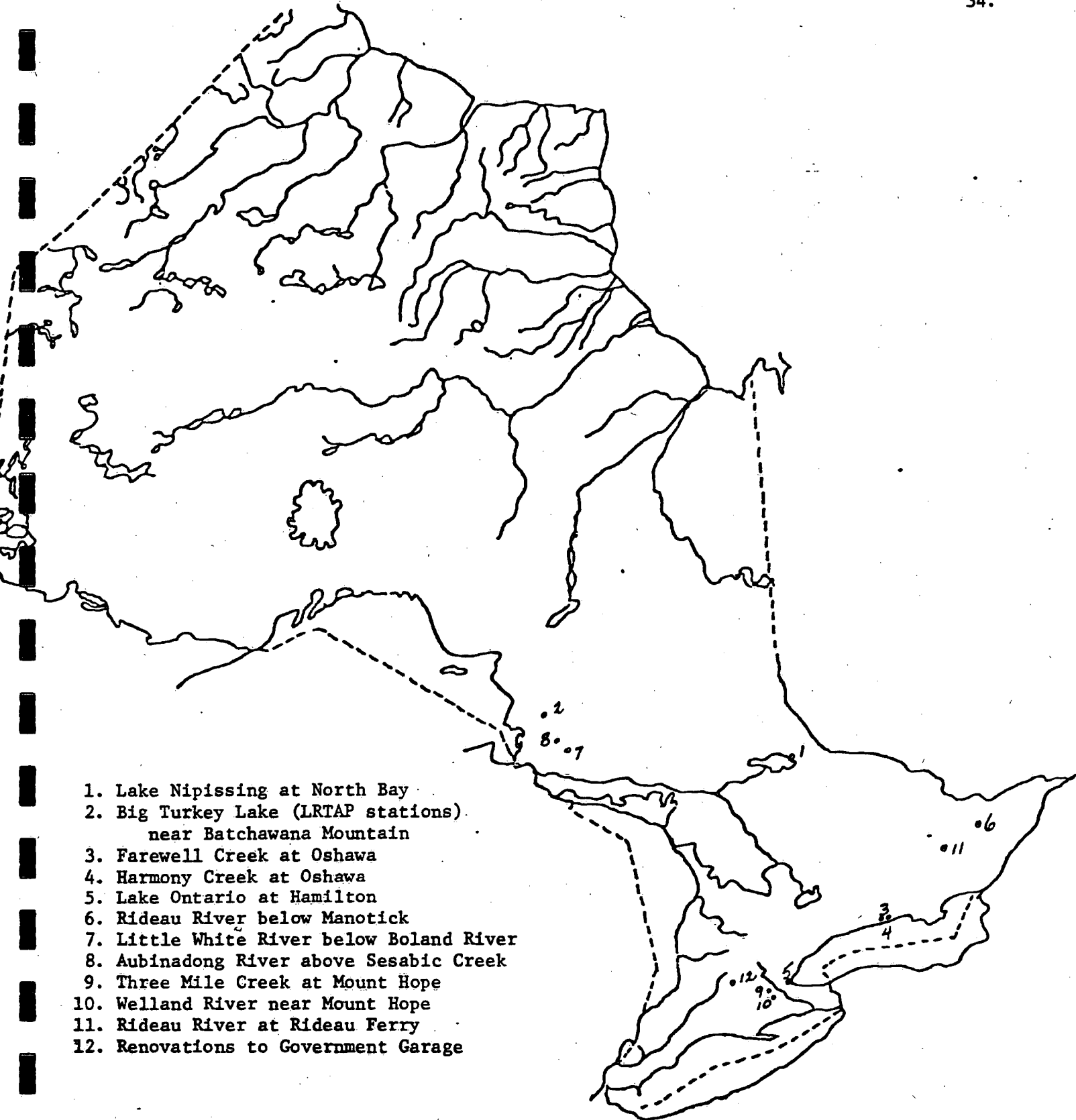
F - FIELD INVESTIGATIONS 1980-1981

F-8321 Credit River - Huttonville
- Glen Williams
- Inglewood

A field investigation was conducted with regard to proposed gauging stations at the above sites.

COST:

Salaries (0.2 Man-Weeks)	\$ 101.36
Meals/Rooms	4.80
Vehicles	<u>22.80</u>
Total	\$ 128.96



C - CONSTRUCTION 1980-1981C-1386 Lake Nipissing at North Bay

The existing electric conductors on the government dock were connected to the conductors to the recently constructed gauge shelter and electric power was switched on to activate the instruments and supply heat and light. Telephone service was established to make access to telemetric monitoring of the Lake levels for the flood forecasting network.

COST:

Salaries (0.4 Man-Weeks)	\$ 202.72
Materials/Supplies	5.48
Meals/Rooms	55.95
Vehicles	<u>134.27</u>
Total	\$ 398.42

C-2352 Big Turkey Lake (L.R.T.A.P. Stations)
near Batchawana Mountain

The four remaining gauging stations of the total of five for monitoring the Long Range Transportation of Air Pollutants were completed. This included three stilling wells with Guelph-type instrument shelters, two Stacom gauges with walk-in shelters, and two artificial controls.

COST:

Salaries (13.8 Man-Weeks)	\$ 5998.93
Materials/Supplies	6257.15
Meals/Rooms	2927.87
Vehicles	<u>1620.33</u>
Total	\$16804.28

C - CONSTRUCTION 1980-1981C-3351 Farewell Creek at Oshawa

A staff gauge was installed on the concrete bridge abutment and sediment sampling apparatus was installed on the bridge railing.

COST:

Salaries (0.7 Man-Weeks)	\$ 241.12
Materials/Supplies	528.46
Meals/Rooms	172.89
Vehicles	<u>71.13</u>
Total	\$ 1013.60

C-3350 Harmony Creek at Oshawa

Installed a 0.8 M diameter galvanized steel "Hel-Cor" stilling well, intakes and Guelph-type instrument shelter, complete with a 30 ampere electrical service and a Stevens analogue recorder.

Installed 15 M of sheet steel control with rip-rap apron.

Installed sediment sampling apparatus on bridge railing.

COST:

Salaries (2.6 Man-Weeks)	\$ 924.72
Materials/Supplies	2629.45
Meals/Rooms	600.64
Vehicles	158.35
Instrumentation	<u>1812.28</u>
Total	\$ 6125.44

C - CONSTRUCTION 1980-1981C-2355 Lake Ontario at Hamilton

A stilling well was installed and a concrete base formed and poured to accommodate the construction of an insulated ribbed modular concrete block instrument shelter complete with a 110/220 Volt 15 ampere electrical service.

COST:

Salaries (5.9 Man-Weeks)	\$ 2378.62
Material/Supplies	4099.64
Meals/Rooms	426.65
Vehicles	<u>232.76</u>
Total	\$ 7137.67

C-2353 Rideau River near Manotick

Installed a 76.2 cm. diameter galvanized steel "Hel-Cor" stilling well and intakes. Erected a 1.63m X 1.63m X 2.44m insulated steel "Armco" walk-in shelter on a 1.83m X 1.83m X 0.61m concrete pad. Installed two concrete anchor blocks and galvanized steel tower. Erected 22.2 mm wire rope cableway and sit-down cable car.

COST:

Salaries (8.9 Man-Weeks)	\$ 3744.15
Building Material and Supplies	6891.69
Meals/Rooms	1878.84
Vehicle	845.89
Instrumentation	<u>1812.28</u>
Total	\$15172.85

C - CONSTRUCTION 1980-1981C-2357 Little White River below Boland River

Installed a 76.2 cm. diameter galvanized steel "Hel-Cor" stilling well and intakes. Erected a 1.63m X 1.63m X 2.44m insulated steel "Armco" walk-in shelter on a 1.83m X 1.83m X 0.61m poured-in-place concrete pad.

Installed an analogue recorder and D.C.P.

D.C.P. installation and instrumentation costs not included.

COST:

Salaries (4.5 Man-Weeks)	\$ 1753.50
Materials/Supplies	4058.87
Meals/Rooms	942.50
Vehicles	562.98
Instrumentation (A-71)	<u>1812.28</u>
Total	\$ 9130.13

C-2356 Aubinadong River above Sesabic Creek

Installed a 76.2 cm. diameter galvanized steel "Hel-Cor" stilling well and intakes. Erected a 1.63m X 1.63m X 2.44m insulated steel "Armco" walk-in shelter on a preservative treated wooden floor.

Installed an analogue recorder and D.C.P.

D.C.P. installation and instrumentation costs not included.

COST:

Salaries (3.2 Man-Weeks)	\$ 1267.28
Materials/Supplies	4289.33
Meals/Rooms	703.55
Vehicles	393.06
Instrumentation (A-71)	<u>1812.28</u>
Total	\$ 8465.50

C - CONSTRUCTION 1980-1981C-3355 Three Mile Creek at Mount Hope

A concrete control with a 90° galvanized steel notch was poured-in-place at this station to improve the stage-discharge relationship at low flows.

COST:

Salaries (0.8 Man-Weeks)	\$ 317.72
Materials/Supplies	160.35
Meals/Rooms	139.75
Vehicles	<u>75.11</u>
Total	\$ 692.93

C-3354 Welland River near Mount Hope

A concrete control with a 90° galvanized steel notch was poured-in-place at this station to improve the stage-discharge relationship at low flows. Stone and concrete rubble was removed to improve the channel downstream of the new control.

COST:

Salaries (1.0 Man-Weeks)	\$ 291.80
Materials/Supplies	290.00
Meals/Rooms	72.45
Vehicles	<u>60.06</u>
Total	\$ 714.31

C - CONSTRUCTION 1980-1981C-2354 Big Rideau Lake at Rideau Ferry

Installed a 76.2 cm. diameter galvanized steel "Hel-Cor" stilling well and intakes. Erected a 1.63m X 1.63m X 2.44m insulated steel "Armco" walk-in shelter on a 1.83m X 1.83m X 0.61m concrete pad.

COST:

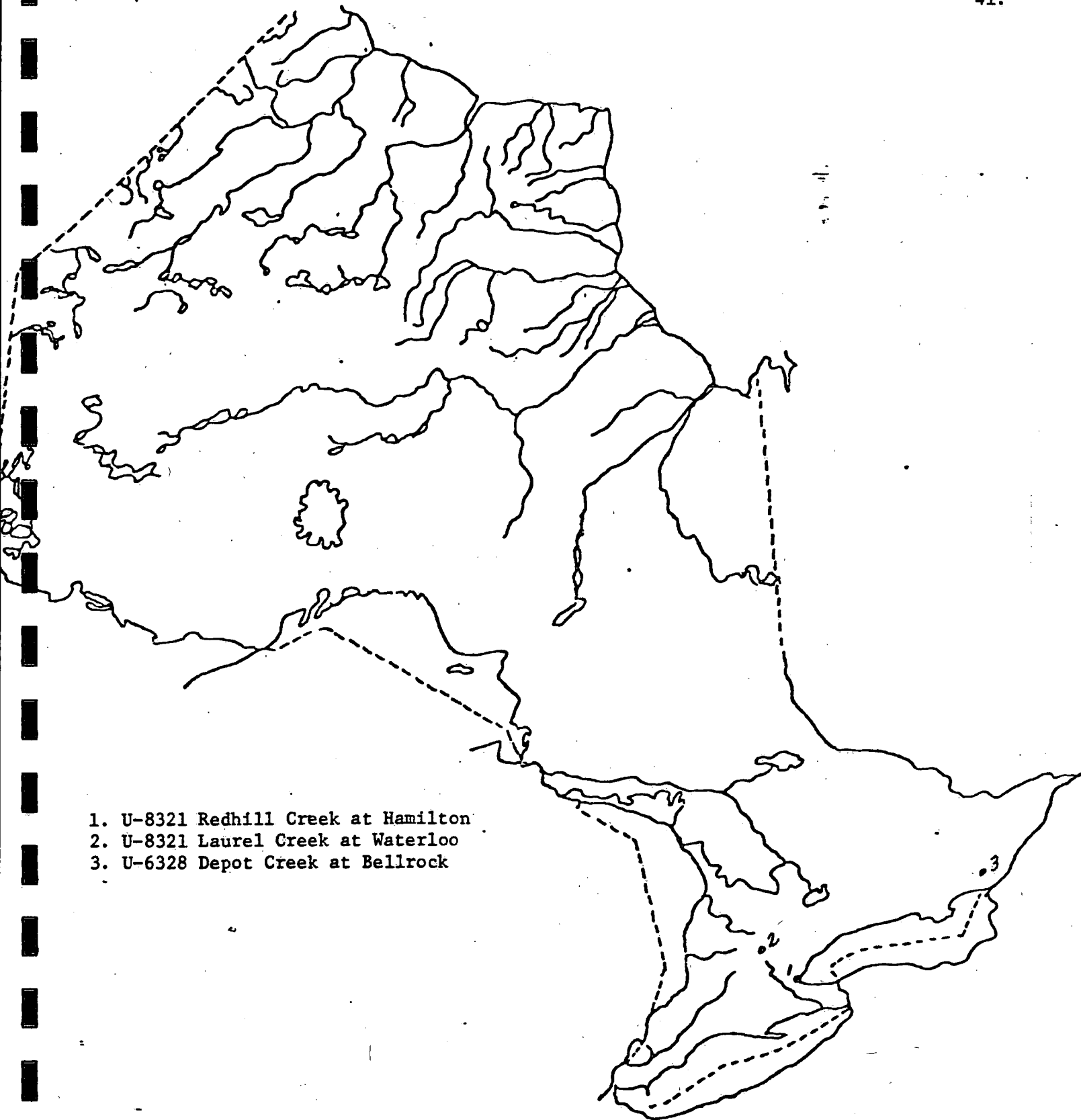
Salaries (4.4 Man-Weeks)	\$ 1496.24
Materials/Supplies	2518.46
Meals/Rooms	1046.55
Vehicles	275.61
Instrumentation (Stevens A-71)	<u>1812.28</u>
Total	\$ 7149.14

C-1300 Renovations to Government Garage

Four individual locked storage shops of approximately 100 sq. ft. each were constructed, complete with work bench, shelf, outboard motor and ice auger brackets, and additional electric outlets.

COST:

Materials/Supplies	\$ 1096.72
Total	<u>\$ 1096.72</u>



1. U-8321 Redhill Creek at Hamilton
2. U-8321 Laurel Creek at Waterloo
3. U-6328 Depot Creek at Bellrock

U - UPGRADING 1980-1981U-8321 Redhill Creek at Hamilton

The electrical system was expanded and another shelf installed to accommodate water quality sampling apparatus for the Ministry of the Environment.

COST:

Salaries (0.3 Man-Weeks)	\$ 140.08
Materials/Supplies	31.00
Meals/Rooms	9.00
Vehicles	<u>51.28</u>
Total	\$ 231.36

U-8321 Laurel Creek at Waterloo

Erected a 1.63m X 1.63m X 2.44m insulated steel "Armco" walk-in shelter, complete with a 60 ampere electrical service, on a 1.83m X 1.83m X 0.61m poured-in-place concrete pad around the existing well, replacing the existing Guelph-type shelter.

COST:

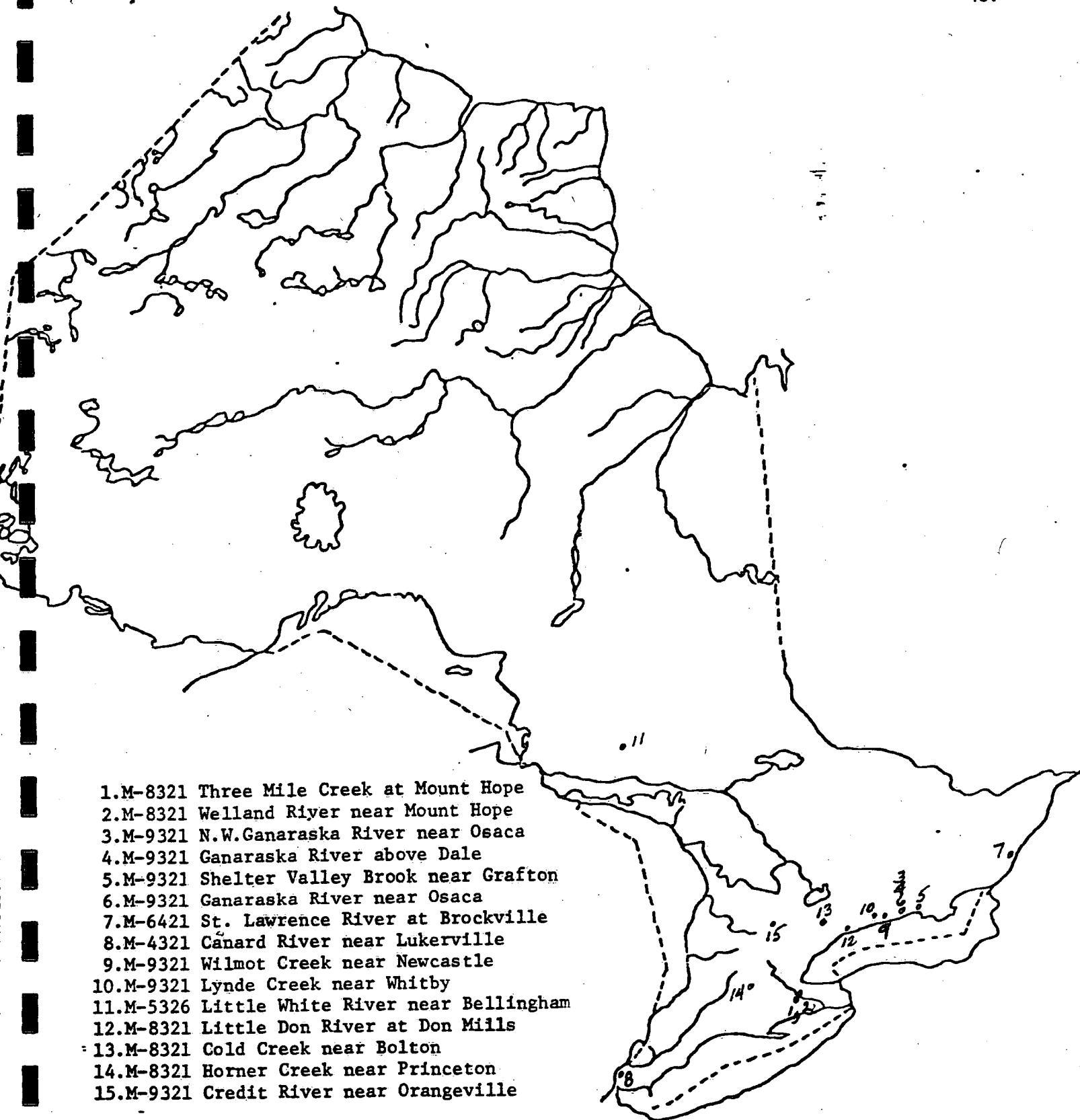
Funding for this project was supplied by the Grand River Conservation Authority who were invoiced directly from the suppliers.

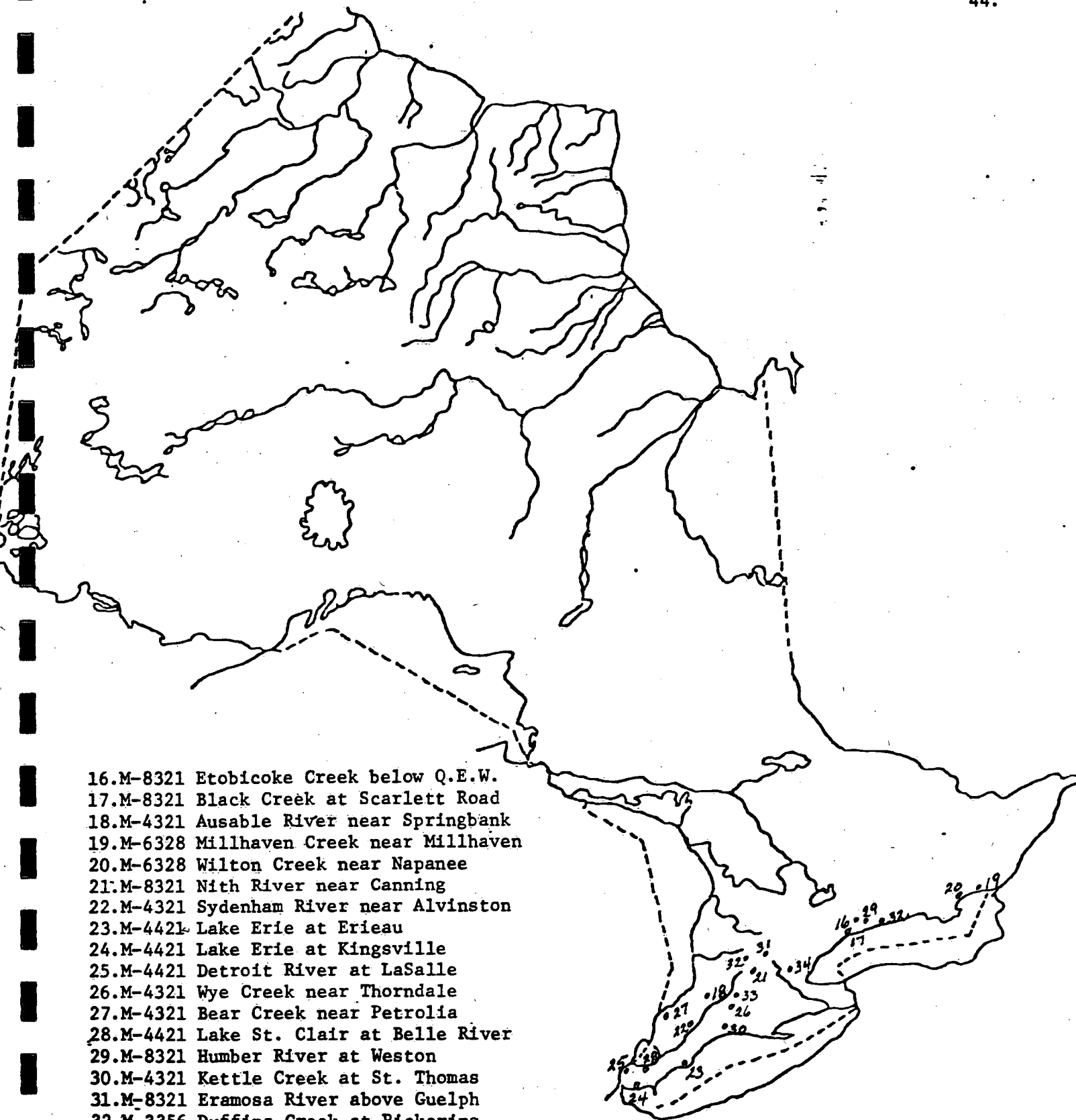
U-6328 Depot Creek at Bellrock

A thermostat was installed to control to heating cable.

COST:

Salaries (0.2 Man-Weeks)	\$ 89.40
Meals/Rooms	-
Vehicles	<u>-</u>
Total	\$ 89.40





- 16.M-8321 Etoibicoke Creek below Q.E.W.
- 17.M-8321 Black Creek at Scarlett Road
- 18.M-4321 Ausable River near Springbank
- 19.M-6328 Millhaven Creek near Millhaven
- 20.M-6328 Wilton Creek near Napanee
- 21.M-8321 Nith River near Canning
- 22.M-4321 Sydenham River near Alvinston
- 23.M-4421 Lake Erie at Erieau
- 24.M-4421 Lake Erie at Kingsville
- 25.M-4421 Detroit River at LaSalle
- 26.M-4321 Wye Creek near Thorndale
- 27.M-4321 Bear Creek near Petrolia
- 28.M-4421 Lake St. Clair at Belle River
- 29.M-8321 Humber River at Weston
- 30.M-4321 Kettle Creek at St. Thomas
- 31.M-8321 Eramosa River above Guelph
- 32.M-3356 Duffins Creek at Pickering
- 33.M-4321 Thames River at Byron
- 34.M-8321 Bronte Creek at Progreton

M - MAINTENANCE 1980-1981M-8321 Three Mile Creek at Mount Hope

Installed a 25.4 mm diameter X 3.05 m length of rigid aluminum conduit formed to fit the contours of the stone wall to protect the plastic water quality sampler tubing from damage.

Painted metal door, trim, soffit and fascia.

Installed identification sign on door.

Backfilled around building.

Installed an analogue recorder.

COST:

Salaries (0.4 Man-Weeks)	\$ 178.80
Materials/Supplies	22.67
Meals/Rooms	9.00
Vehicles	47.41
Instrumentation (A-71)	<u>1812.28</u>
Total	\$ 2070.16

M - MAINTENANCE 1980-1981M-8321 Welland River near Mount Hope

Painted metal door, trim, soffit and fascia.

Installed identification sign on door.

Backfilled around building.

Paid building permit fee.

Installed an analogue recorder.

COST:

Salaries (0.2 Man-Weeks)	\$ 38.72
Materials/Supplies	89.00
Meals/Rooms	4.50
Vehicles	17.96
Instrumentation	<u>1812.28</u>
Total	\$ 1962.46

M-9321 N.W. Ganaraska River near Osaca

Repaired washout around the end of the sheet steel control
with on-site material. Removed fallen trees and debris from river.

COST:

Salaries (0.4 Man-Weeks)	\$ 178.80
Materials/Supplies	-
Meals/Rooms	93.70
Vehicles	<u>24.57</u>
Total	\$ 297.07

M - MAINTENANCE 1980-1981M-9321 Ganaraska River near Dale

A form was constructed and 3.06 cubic metres of concrete was placed to repair the erosion damage caused by flood waters.

COST:

Salaries (0.4 Man-Weeks)	\$ 178.80
Materials/Supplies	160.91
Meals/Rooms	85.20
Vehicles	<u>48.06</u>
Total	\$ 472.97

M-9321 Shelter Valley Brook near Grafton

Removed large maple tree that was washed downstream by flood waters and lodged on control.

COST:

Salaries (0.4 Man-Weeks)	\$ 178.80
Materials/Supplies	-
Meals/Rooms	26.70
Vehicles	<u>52.92</u>
Total	\$ 258.42

M - MAINTENANCE 1980-1981M-9321 Ganaraska River at Osaca

A wooden walkway was built across the river to replace the timber bridge that was removed by flood waters.

COST:

Salaries (0.4 Man-Weeks)	\$ 154.88
Materials/Supplies	196.23
Meals/Rooms	54.95
Vehicles	<u>83.70</u>
Total	\$ 489.76

M-6421 St. Lawrence River at Brockville

A concrete step was formed and poured.

A faulty baseboard heater thermostat was replaced.

A punch tape recorder was installed.

COST:

Salaries (0.2 Man-Weeks)	\$ 101.36
Materials/Supplies	15.76
Meals/Rooms	34.35
Vehicles	<u>72.08</u>
Total	\$ 223.55

M - MAINTENANCE 1980-1981M-4321 Canard River near Lukerville

Repairs were made to the electrical system that was damaged by vandals.

COST:

Salaries (0.3 Man-Weeks)	\$ 116.16
Materials/Supplies	38.47
Meals/Rooms	62.45
Vehicles	<u>130.41</u>
Total	\$ 347.49

M-9321 Wilmot Creek near Newcastle

Repairs were made to the control that was damaged by flood waters.

COST:

Salaries (2.4 Man-Weeks)	\$ 492.47
Materials/Supplies	645.81
Meals/Rooms	247.03
Vehicles	<u>100.44</u>
Total	\$ 1485.75

M - MAINTENANCE 1980-1981M-9321 Lynde River near Whitby

Repairs were made to the control that was damaged by flood waters.

COST:

Salaries (2.4 Man-Weeks)	\$ 492.47
Materials/Supplies	774.42
Meals/Rooms	247.03
Vehicles	<u>100.44</u>
Total	\$ 1614.36

M-5326 Little White River near Bellingham

Repairs were made to the well heating cable when working in this area.

COST:

Nil

M-8321 Little Don River at Don Mills

Two additional electrical outlets were installed. One controlled by a thermostat for the well heater.

COST:

Salaries (0.1 Man-Weeks)	\$ 50.68
Materials/Supplies	49.60
Meals/Rooms	2.25
Vehicles	<u>21.70</u>
Total	\$ 124.23

M - MAINTENANCE 1980-1981M-8321 Cold Creek near Bolton

A lighting fixture was installed in the ceiling.

COST:

Salaries (0.1 Man-Weeks) \$ 50.68

Materials/Supplies 10.00

Meals/Rooms 2.25

Vehicles 21.54

Total \$ 84.47

M-8321 Horner Creek near Princeton

Rip-rap was placed at the end of the sheet steel control
to help prevent further stream bank erosion.

COST:

Salaries (0.2 Man-Weeks) \$ 63.48

Materials/Supplies -

Meals/Rooms 9.00

Vehicles 35.10

Total \$ 107.58

M - MAINTENANCE 1980-1981M-9321 Credit River near Orangeville

Installed electrical outlet and controlling thermostat
for well heater.

COST:

Salaries (0.1 Man-Weeks)	\$ 50.68
Materials/Supplies	30.00
Meals/Rooms	4.50
Vehicles	-
Total	\$ 85.18

M-8321 Etobicoke Creek below Q.E.W.

Installed a new baseboard heater thermostat to replace
faulty one.

COST:

Salaries (0.1 Man-Weeks)	\$ 50.68
Materials/Supplies	5.76
Meals/Rooms	2.25
Vehicles	14.57
Total	\$ 73.26

M - MAINTENANCE 1980-1981M-8321 Black Creek at Scarlett Road

Installed a heating cable in the intake pipe with a controlling thermostat and additional outlet.

COST:

Salaries (0.2 Man-Weeks) \$ 101.68

Materials/Supplies 142.20

Meals/Rooms 4.50

Vehicles 46.03

Total \$ 294.41

M-4321 Ausable River near Springbank

Repairs were made to the sediment sampler shelter that was damaged by vandals.

COST:

Salaries (0.1 Man-Weeks) \$ 50.68

Materials/Supplies 10.00

Meals/Rooms -

Vehicles 4.96

Total \$ 65.64

M - MAINTENANCE 1980-1981M-6328 Millhaven Creek near Millhaven

A thermostat was installed to control the heating cable.

COST:

Salaries (0.1 Man-Weeks)	\$ 50.68
Materials/Supplies	30.00
Meals/Rooms	6.68
Vehicles	<u>32.78</u>
Total	\$ 120.14

M-6328 Wilton Creek near Napanee

A thermostat was installed to control the heating cable.

COST:

Salaries (0.1 Man-Weeks)	\$ 50.68
Materials/Supplies	30.00
Meals/Rooms	6.68
Vehicles	<u>32.78</u>
Total	\$ 120.14

M - MAINTENANCE 1980-1981M-8321 Nith River near Canning

The roads superintendant for the townships of Blandford and Blenheim was contacted regarding repairs to the access road that was washed out by flood waters. It was agreed the township would repair the road at their expense the next time the grader was in the vicinity.

COST:

Salaries (0.1 Man-Weeks)	\$ 50.68
Materials/Supplies	-
Meals/Rooms	4.50
Vehicles	<u>29.63</u>
Total	\$ 84.81

M-4321 Sydenham River near Alvinston

Repairs were made to the underground electric service cable that was severed by a steel fence post driven into the ground by a local farmer.

COST:

Salaries (0.5 Man-Weeks)	\$ 253.40
Materials/Supplies	77.71
Meals/Rooms	87.30
Vehicles	<u>134.85</u>
Total	\$ 553.26

M - MAINTENANCE 1980-1981

- M-4421 (1) Lake Erie at Eriean
 (2) Lake Erie at Kingsville
(3) Detroit River at LaSalle

New lumber was installed to replace decayed roof, soffit, and facia boards. New rolled roofing was also applied.

COST:

Salaries (2.7 Man-Weeks)	\$ 1027.44
Materials/Supplies	223.56
Meals/Rooms	574.80
Vehicles	<u>294.24</u>
Total	\$ 2120.04

M-4321 Wye Creek near Thorndale

Gravel and silt build-up was removed from the river above the control and well and intakes were flushed.

COST:

Salaries (0.6 Man-Weeks)	\$ 220.44
Materials/Supplies	84.00
Meals/Rooms	120.30
Vehicles	<u>63.18</u>
Total	\$ 487.92

M - MAINTENANCE 1980-1981M-4321 Bear Creek near Petrolia

Rock fill was placed at the left side of the sheet steel control to help prevent further bank erosion.

COST:

Salaries (1.0 Man-Weeks)	\$ 317.40
Materials/Supplies	142.00
Meals/Rooms	201.70
Vehicles	125.55
	<hr/>
Total	\$ 786.65

M-4421 Lake St. Clair - Belle River

The old concrete base was removed and backfilled to grade at this water level gauge as requested by Small Craft Harbours of Fisheries and Oceans.

COST:

Salaries (0.4 Man-Weeks)	\$ 202.72
Materials/Supplies	275.00
Meals/Rooms	55.95
Vehicles	158.87
	<hr/>
Total	\$ 692.54

M - MAINTENANCE 1980-1981M-8321 Humber River at Weston

Well and intake flushed.

COST:

Salaries (0.8 Man-Weeks)	\$ 253.92
Materials/Supplies	6.39
Meals/Rooms	108.30
Vehicles	<u>37.80</u>
Total	\$ 406.41

M-4321 Kettle Creek at St. Thomas

Repairs were made to the sheet steel control by the placement of 2.5 cubic metres of concrete to prevent further bank erosion.

COST:

Salaries (0.4 Man-Weeks)	\$ 253.92
Materials/Supplies	202.85
Meals/Rooms	118.30
Vehicles	<u>62.10</u>
Total	\$ 637.17

M - MAINTENANCE 1980-1981M-8321 Eramosa River above Guelph

A new door was fabricated installed and painted and the door latch was repaired at this gauging station that was damaged by vandals.

COST:

Salaries (0.2 Man-Weeks)	\$ 63.48
Materials/Supplies	5.00
Vehicles	<u>2.00</u>
Total	\$ 70.48

M-9321 Duffins Creek at Pickering

Erected a 1.63m X 1.63m X 2.44m insulated steel "Armco" walk-in shelter, on a 1.83mX 1.83m X 0.61m poured-in-place concrete pad. Installed bubble tube from shelter to river.

COST:

Salaries (2.4 Man-Weeks)	\$ 1072.80
Materials/Supplies	1324.39
Meals/Rooms	443.40
Vehicles	<u>139.86</u>
Total	\$ 2980.45

M.- MAINTENANCE 1980-1981M-4321 Thames River at Byron

The electrical system was checked and tested and the malfunction diagnosed as a separated conductor in the lead-in triplex. This is the responsibility of the local P.U.C. who were notified of the condition.

COSTS:

Salaries (0.3 Man-Weeks)	\$ 145.28
Meals/Rooms	13.95
Vehicles	22.30
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Total	\$ 181.53

M-8321 Bronte Creek at Progreston

A meter protector box was designed fabricated and installed at Ontario Hydro's request to protect their meter from vandalism.

COST:

Salaries (0.4 Man-Weeks)	\$ 178.80
Materials/Supplies	16.35
Meals/Rooms	-
Vehicles	32.40
	<hr/>
Total	\$ 227.55

CONSTRUCTION COSTS FOR 1980-1981

<u>FIELD INVESTIGATIONS</u>		<u>COST</u>
1.	F-9321 Harmony Creek and Farewell Creek at Oshawa	\$ 623.65
2.	F-9321 Lynde Creek near Whitby Wilmot Creek near Newcastle Soper Creek at Bowmanville Ganaraska River near Dale Ganaraska River near Osaca North West Ganaraska River near Osaca Shelter Valley Brook near Grafton Mimico Creek at Islington	561.58
3.	F-2355 Lake Ontario at Hamilton	495.08
4.	F-2353 Rideau River below Manotick	378.27
5.	F-8321 Redhill Creek at Hamilton	77.88
6.	F-2357 Little White River below Boland River	863.66
7.	F-2352 Big Turkey Lake (L.R.T.A.P. Stations) near Batchawana Mountain	152.21
8.	F-9321 St. John River near Washago	263.63
9.	F-4321 Bear Creek at Brigden	128.43
10.	F-4321 Sydenham River Diversion Channel near Wallaceburg	128.43
11.	F-4321 Sydenham River at Wallaceburg	128.43
12.	F-4321 Middle Maitland River above Listowel	128.43
13.	F-4321 Maitland River above Harriston	128.43
14.	F-9321 Harmony Creek at Oshawa	539.88
15.	F-6328 Rideau River near Kingston Mills	198.50
16.	F-8321 Humber River at Cedar Mills	261.71
17.	F-9321 Duffins Creek at Pickering	492.24
18.	F-9321 Nith River at New Hamburg	141.13
19.	F-5326 Moose Creek at Levack	711.41
20.	F-2354 Tay River at Port Elmsley	137.04

CONSTRUCTION COSTS FOR 1980-1981

<u>FIELD INVESTIGATIONS</u> cont'd.	<u>COST</u>
21. F-2354 Tay River below Bob's Lake	\$ 124.69
22. F-4321 Wye Creek near Thorndale	132.80
23. F-4321 Bear Creek near Petrolia	132.65
24. F-4321 Sydenham River at Wallaceburg	117.69
25. F-9321 Muskoka River Watershed	664.64
26. F-8321 Humber River at Cedar Mills	181.83
27. F-9321 Farewell Creek at Oshawa	181.87
28. F-6328 Sawmill Creek at Ottawa	546.36
29. F-4321 Sydenham River at Wallaceburg	681.23
30. F-4321 Maitland River below Harriston	167.58
31. F-9321 Oxtongue River near Dwight	730.40
32. F-8321 Credit River	128.96
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TOTAL	\$ 10,330.72

CONSTRUCTION COSTS FOR 1980-1981

<u>NEW CONSTRUCTION</u>		<u>COST</u>
1.	C-1386 Lake Nipissing at North Bay	\$ 398.42
2.	C-2352 Big Turkey Lake (L.R.T.A.P. Stations) near Batchawana Mountain	16,804.28
3.	C-3351 Farewell Creek at Oshawa	1,013.60
4.	C-3350 Harmony Creek at Oshawa	6,125.44
5.	C-2355 Lake Ontario at Hamilton	7,137.67
6.	C-2353 Rideau River below Manotick	15,172.85
7.	C-2357 Little White River below Boland River	9,130.13
8.	C-2356 Aubinadong River above Sesabic Creek	8,465.50
9.	C-3355 Three Mile Creek at Mount Hope	692.93
10.	C-3354 Welland River near Mount Hope	714.31
11.	C-2354 Big Rideau Lake at Rideau Ferry	7,149.14
12.	C-1300 Renovations to Government Garage	1,096.72
TOTAL		\$ 73,900.99

<u>UPGRADING</u>		<u>COST</u>
1.	U-8321 Redhill Creek at Hamilton	\$ 231.36
2.	U-8321 Laurel Creek at Waterloo	Nil
3.	U-6328 Depot Creek at Bellrock	89.40
TOTAL		\$ 320.76

CONSTRUCTION COSTS FOR 1980-1981

<u>MAINTENANCE</u>	<u>COST</u>
1. M-8321 Three Mile Creek at Mount Hope	\$ 2,070.16
2. M-8321 Welland River near Mount Hope	1,962.46
3. M-9321 North West Ganaraska River near Osaca	297.97
4. M-9321 Ganaraska River near Dale	472.17
5. M-9321 Shelter Valley Brook near Grafton	258.42
6. M-9321 Ganaraska River at Osaca	489.76
7. M-6421 St. Lawrence River at Brockville	223.55
8. M-4321 Canard River near Lukerville	347.49
9. M-9321 Wilmot Creek near Newcastle	1,485.75
10. M-9321 Lynde River near Whitby	1,614.36
11. M-5326 Little White River near Bellingham	Nil
12. M-8321 Little Don River at Don Mills	124.23
13. M-8321 Cold Creek near Bolton	84.47
14. M-8321 Horner Creek near Princeton	107.58
15. M-9321 Credit River near Orangeville	85.18
16. M-8321 Etobicoke Creek below Q. E. W.	73.26
17. M-8321 Black Creek at Scarlett Road	294.41
18. M-4321 Ausable River near Springbank	65.64
19. M-6328 Millhaven Creek near Millhaven	120.14
20. M-6328 Wilton Creek near Napanee	120.14
21. M-8321 Nith River near Canning	84.81
22. M-4321 Sydenham River near Alvinston	553.26
23. M-4421 Lake Erie at Erieau Lake Erie at Kingsville Detroit River at LaSalle	2,120.04

CONSTRUCTION COSTS FOR 1980-1981

<u>MAINTENANCE</u> cont'd.		<u>COST</u>
24.	M-4321 Wye Creek near Thorndale	\$ 487.92
25.	M-4321 Bear Creek near Petrolia	786.65
26.	M-4421 Lake St. Clair at Belle River	692.54
27.	M-8321 Humber River at Weston	406.41
28.	M-4321 Kettle Creek at St. Thomas	637.17
29.	M-8321 Eramosa River above Guelph	70.48
30.	M-9321 Duffins Creek at Pickering	2,980.45
31.	M-4321 Thames River at Byron	181.53
32.	M-8321 Bronte Creek at Progreston	227.55
TOTAL		<u>\$ 19,525.85</u>

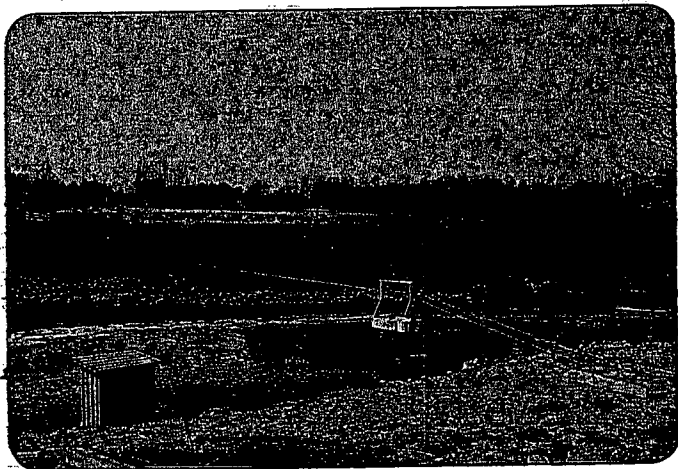
SUMMARY OF CONSTRUCTION COSTS

FIELD INVESTIGATIONS	\$ 10,330.72
NEW CONSTRUCTION	73,900.99
UPGRADING	320.76
MAINTENANCE	<u>19,525.85</u>
GRAND TOTAL	<u><u>\$ 104,078.32</u></u>

SUMMARY

CONSTRUCTION COSTS FOR 1980-1981

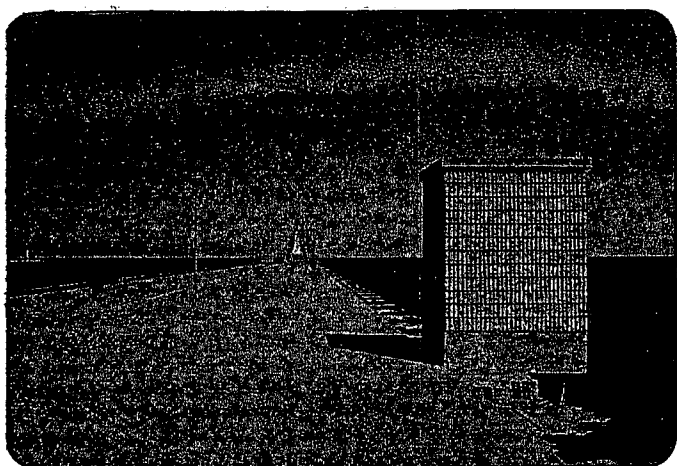
<u>ITEM</u>	<u>SALARY</u>	<u>OPERATION & MAINTENANCE</u>	<u>CAPITAL</u>	<u>INSTRUMENTATION</u>	<u>TOTAL</u>
FIELD INVESTIGATIONS	\$ 6,681.00	\$ 2,834.09	\$ 815.63	\$ -	\$ 10,330.72
NEW CONSTRUCTION	18,616.80	6,251.06	39,971.73	9,061.40	73,900.99
UPGRADING	229.48	91.28	-	-	320.76
MAINTENANCE	<u>6,671.46</u>	<u>9,229.83</u>	<u>-</u>	<u>3,624.56</u>	<u>19,525.85</u>
 TOTAL	 \$32,198.74	 \$18,406.26	 \$40,787.36	 \$12,685.96	 \$104,078.32



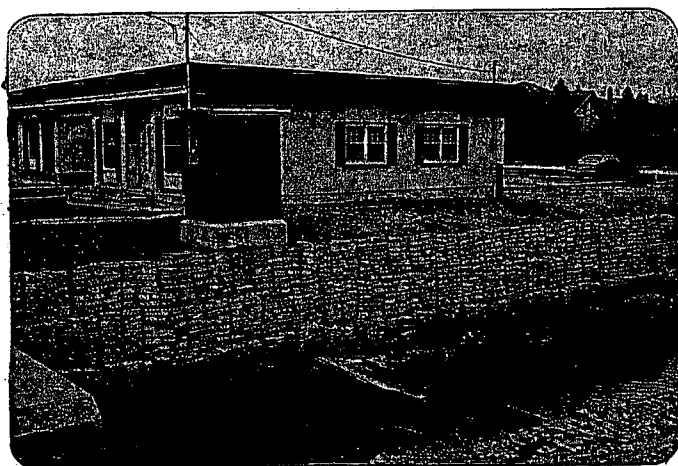
RIDEAU RIVER BELOW MANOTICK



HARMONY CREEK AT OSHAWA



LAKE ONTARIO AT BURLINGTON



LAUREL CREEK AT WATERLOO



LITTLE WHITE RIVER BELOW BOLAND RIVER



THREE MILE CREEK
AT MOUNT HOPE

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1980-81

