ENVIRONMENT CANADA

MONITORING AND SYSTEMS BRANCH

NETWORK DESIGN AND IMPLEMENTATION DIVISION

ANNUAL CONSTRUCTION REPORT 1993/1994

FIELD INVESTIGATIONS CONSTRUCTION, UPGRADING AND MAINTENANCE FOR ONTARIO REGION

L.J. Kamp
Manager

R.J. Myslik
Head, Integrated Projects

REPORT BY:

B.D. Magee
Project Coordinator
March 1994

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

This annual construction report, prepared by the Monitoring and Systems Branch of the Ontario Region, is for the fiscal year 1993/1994.

The purpose of this report is to detail the construction activities within the Ontario Region's hydrometric and sediment network of 410 stations.

The hydrometric network is operated and maintained under the terms of the Federal/Provincial Cost Share Agreement. The Cost Share Agreement (C.S.A.) originated in 1975. The cooperating parties of the Agreement within the Region are: Environment Canada, Ontario Ministry of the Environment, Ontario Hydro and Ontario Ministry of Natural Resources and their associated 38 Conservation Authorities.

Funds for the construction activities are provided by the requesting agency(s) under the Cost Share Agreement guidelines. The capital cost of constructing new stations and the upgrading or major maintenance of existing stations is the responsibility of the requesting or ownership party. General maintenance at individual stations is charged to operation and maintenance funds and the expenditures contribute to the unit station operating cost for the network.

Environment Canada provides the basic water level recorder for all new stations. Any additional or specialized equipment is the responsibility of the requesting party.

Projects and priorities are established with the cooperation of and in consultation with the Cost Share Agreement members and/or their agencies.

Under a separate Memorandum of Understanding between Environment Canada and the Canadian Hydrographic service of Fisheries and Oceans Canada similar activities are carried out with regard to water level gauges on the Great Lakes and connecting waterways.

Construction activities are divided into four categories:

1. Field Investigations

   Reconnaissance, surveys, preparation of plans, meetings and correspondence to obtain approval to construct new hydrometric installations or to upgrade or maintain existing stations.

2. Construction

   Installation of stilling wells, intakes, instrument shelters, artificial controls, cableways, access roads, and vertical control markers.

3. Upgrading

   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

   General maintenance carried out at existing gauging stations. (Does not include minor repairs done by hydrometric field staff.)

2.0 CONSTRUCTION PROGRAM 1993/1994

During the fiscal year thirteen (13) field investigations were carried out to select new installation sites or to assess current sites for upgrading or maintenance.

Three (3) new construction projects were completed by MIB Staff or were carried out jointly with the requesting agency.

One (1) upgrading project was carried out.

Thirty-three (33) maintenance projects were carried out that ranged from Shelter repairs to replacing heating cables.

2.1 Definitions for Project Cost Breakdown

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

Salaries

Hourly rate of pay for engineers, supervisors, foreman, terms employees and hydrometric personnel associated with field investigations, construction, upgrading and maintenance of the stations in this report.

Materials/Supplies

Instrument shelter, stilling well, plumbing and electrical materials, concrete, gravel/fill, lumber, steel, excavating machinery, rental equipment and contract services.

Meals/Accommodation

Living expenses for field personnel.

Transportation

Cost of operation and depreciation of government owned vehicles, shipping and freight charges, ferry charges and airfare.

2.2 Equipment and Personnel

One standard Suburban equipped with a roll-out cargo deck, mounted vice, trailer hitch, heavy duty suspension, and a safety screen installed for personnel safety, and a one-ton 4x4 crewcab pick-up equipped with fibreglass cap, tailgate mounted vice and trailer hitch were used to carry out the construction program.

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

Tools include an air operated pavement breaker equipped with a pile driving head, electric 'skill' saws, electric drills, hammer drills, pipe threaders, grinders, 3 ton and ¾ ton pullers, oxyacetylene cutting torches, 120 volt gasoline generator and other necessary hand tools.

Work was performed by the Construction Supervisor, Construction Foreman, Construction Labourer and on some projects assistance was provided by the Hydrometric Section. Projects solely carried out by the hydrometric staff have been noted as such in the project description section. 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, or Field Purchase Authority.

TABLE 1
FIELD INVESTIGATION EXPENDITURES 1993/1994

		Cost ($)
1.	Centreville Creek near Cedar Mills	$237.51
2.	Mad River below Avening	460.97
3.	Moorefield Creek at Rothsay	
4.	Avon River above Stratford	922.59
5.	Avon River below Stratford	
6.	N. Thames River near Thorndale	
7.	N. Thames River below Fanshawe Dam	
8.	Cranberry Lake near Seely's Bay	791.52
9.	Mad River near Glencairn	222.36
10.	Fifth Concession Drain near Essex	1380.78
11.	Lake Huron at Thessalon	2540.67
12.	Niagara River at Fort Erie	237.70
13.	Sandusk Creek near Hagersville	164.74
	TOTAL	$6,958.84

TABLE 2
NEW CONSTRUCTION EXPENDITURES 1993/1994

		Cost ($)
1.	Hunsberger Creek near New Hamburg	$6,896.95
2.	Avon River above Stratford	14,669.24
3.	Cranberry Lake near Seely's Bay	12,283.18
4.	Bear Brook near Bourget	8,425.52
	TOTAL	$42,274.89

TABLE 3
UPGRADING EXPENDITURES 1993/1994

		Cost ($)
1.	Pukaskwa River at Pukaskwa National Park	$19,967.04

TABLE 4
MAINTENANCE EXPENDITURES 1993/1994

		Cost ($)
1.	Lake Ontario at Toronto	$6,863.39
2.	Hamilton Creek near Holland Centre	753.46
3.	O.W.R.C. #1 near Stayner	565.98
4.	Blackash Creek at Collingwood	565.98
5.	St. Lawrence River at Summerstown	2,465.94
6.	St. Lawrence River at Cornwall	
7.	Little Nordic Creek at Elliot Lake	947.22
8.	Nordic Mine Tailing Ditches 1,2, & 3 at Elliot Lake	882.22
9.	Serpent River at Outlet Dunlop Lake	887.22
10.	Bob's Creek near Minden	1,404.50
11.	Alder Creek near New Dundee	254.65
12.	Goring Drain at Concession 13	2,343.50
13.	Pagwachuan River at Hwy. 11	2,569.04
14.	Nagagami River at Hwy. 11	936.55
15.	Montreal River at Mountain Chutes	1,894.08
16.	Lake Temiskaming at Temiskaming	3,766.01
17.	Larder River above Raven Lake	1,720.43
18.	Moira River near Deloro	1,912.65
19.	South Nation River at Casselman	10,883.69
20.	Thames River at Byron	742.91
21.	South Maitland River near Summerhill	1,067.15
22.	Whiteman"s Creek near Mount Vernon	519.22
23.	Moorefield Creek at Rothsay	1,307.18
24.	Mattawa River below Bouillon	2,039.36
25.	South River at South River	953.33
26.	Niagara River at Fort Erie	1,361.32
27.	Fifth Concession Drain near Essex	6,376.67
28.	Redhill Creek at Hamilton	2,935.08
29.	North Thames River at St. Mary's	291.14
30.	Sandusk Creek near Hagersville	656.90
31.	Carrick Creek near Carlsrue	231.24
32.	Sturgeon River at Sturgeon Bay	401.28
33.	Lake Huron at Thessalon	6963.25
	TOTAL	$67,462.54

TABLE 5
BREAKDOWN OF TOTAL EXPENDITURES 1993/1994

Direct Cost to Agencies

	No. of Projects			Federal			Provincial			Sub-Totals		
	F	F/P	P	Salaries	O&M	Capital	Salaries	O&M	Capital	Salaries	O&M	Capital
New Stations	3	0	1	8,186.67	0.00	15,656.55	1,018.50	0.00	2,930.22	9,205.17	0.00	18,586.77
Relocations	0	0	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Upgrading	1	0	0	9,764.76	0.00	10,202.28	0.00	0.00	0.00	9,764.76	0.00	10,202.28
Maintenance	5	0	5	7540.77	9,663.32	0.00	7,243.52	1302.88	8,863.41	14,784.29	10,966.20	8,863.41
TOTAL	9	0	6	25,492.20	9,663.32	25,858.83	8,262.02	1302.88	11,793.63	33,754.22	10,966.20	37,652.46
										GRAND TOTAL		82,372.88

Other Costs

	Totals			
	Salaries	O&M	Capital	Total
Maintenance (included in station unit cost)	9,233.74	9,251.12	0.00	18,484.86
Field Investigations	818.10	267.18	0.00	1,085.28
Instrumentation (Basic Recorder)	0.00	0.00	16,196.46	16,196.46
Tides and Water Level Stations	6,700.19	12,133.06	0.00	18,833.25
TOTAL	16,752.03	21,651.36	16,196.46	54,599.85
TOTAL CONSTRUCTION PROGRAM COST	50,506.25	32,617.56	53,848.92	136,972.73

CONSTRUCTION COST COMPARISON
1984/85 TO 1993/94

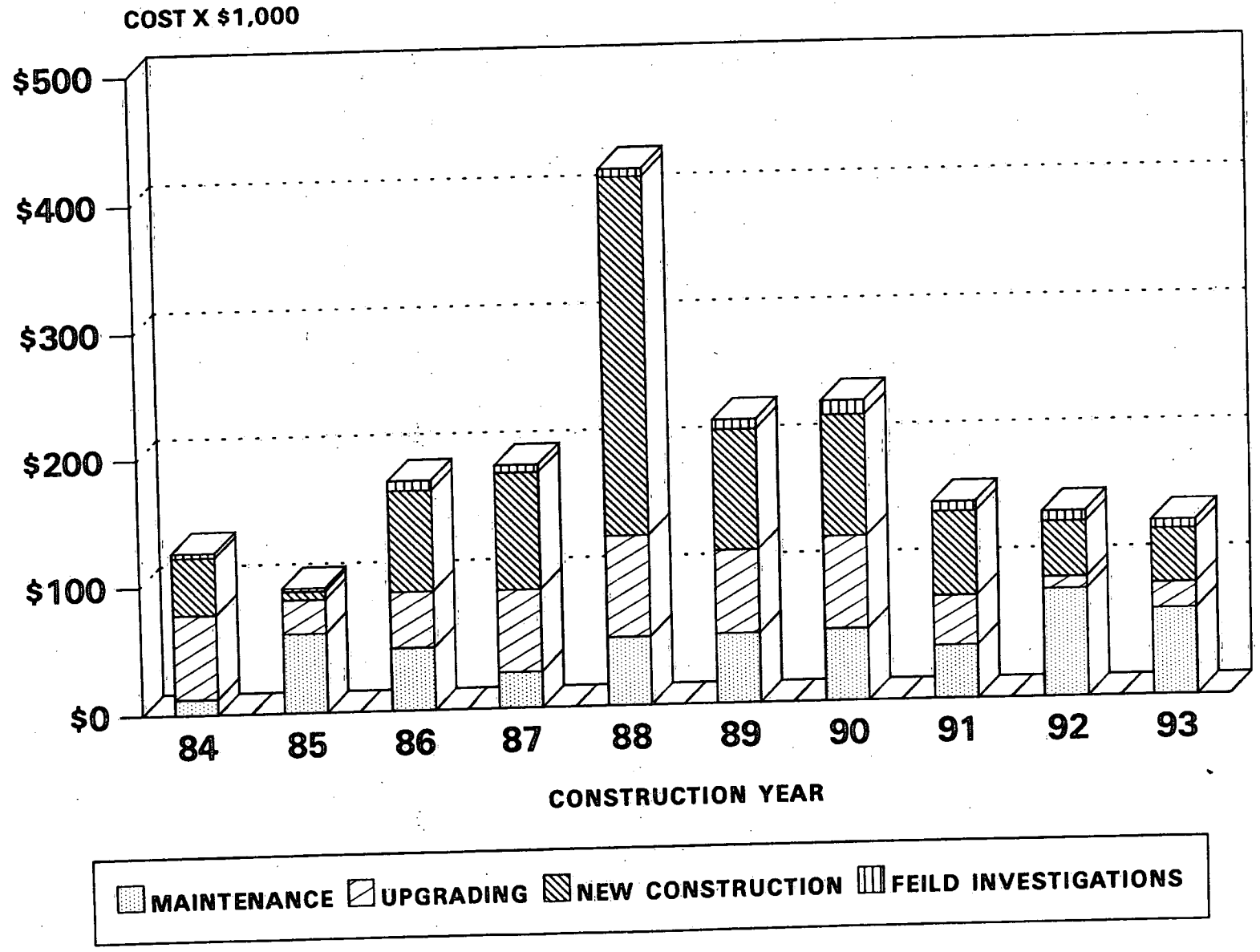


FIGURE 1

CONSTRUCTION COSTS 1993-94
CAPITAL NON-SHAREABLE EXPENDITURES

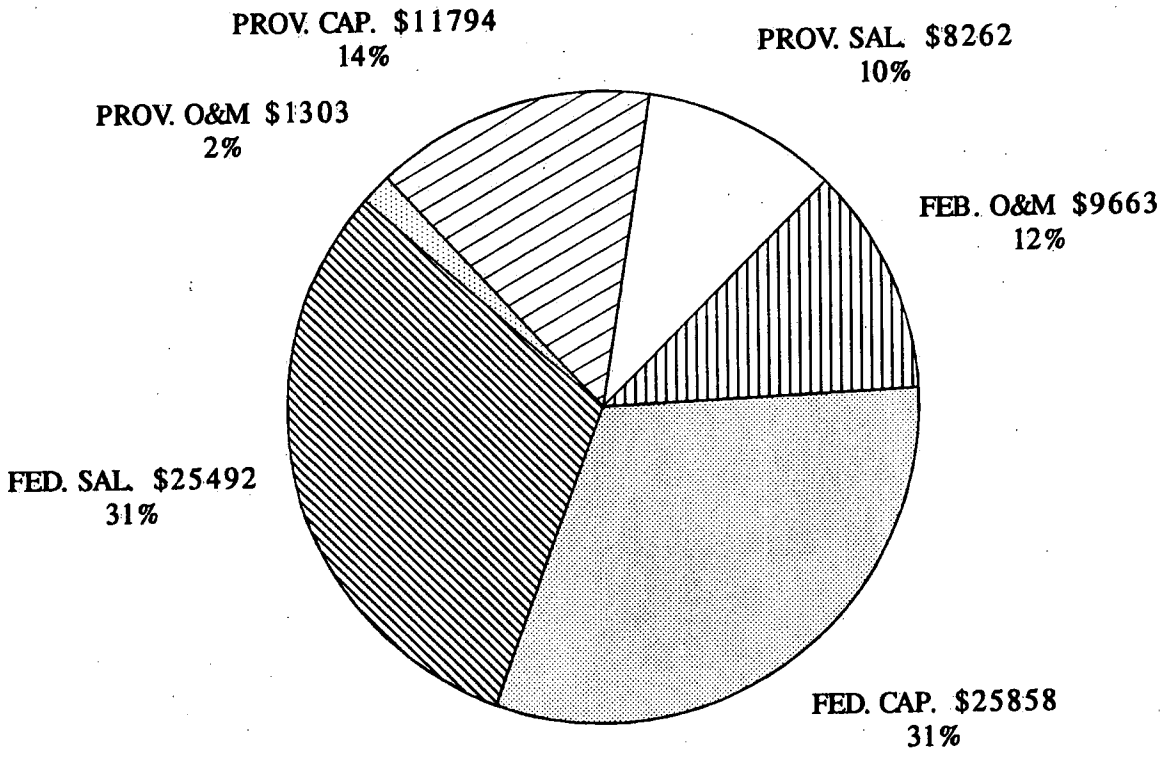


FIGURE 2

CONSTRUCTION COSTS 1992-93
DISTRIBUTION OF SHAREABLE EXPENDITURES

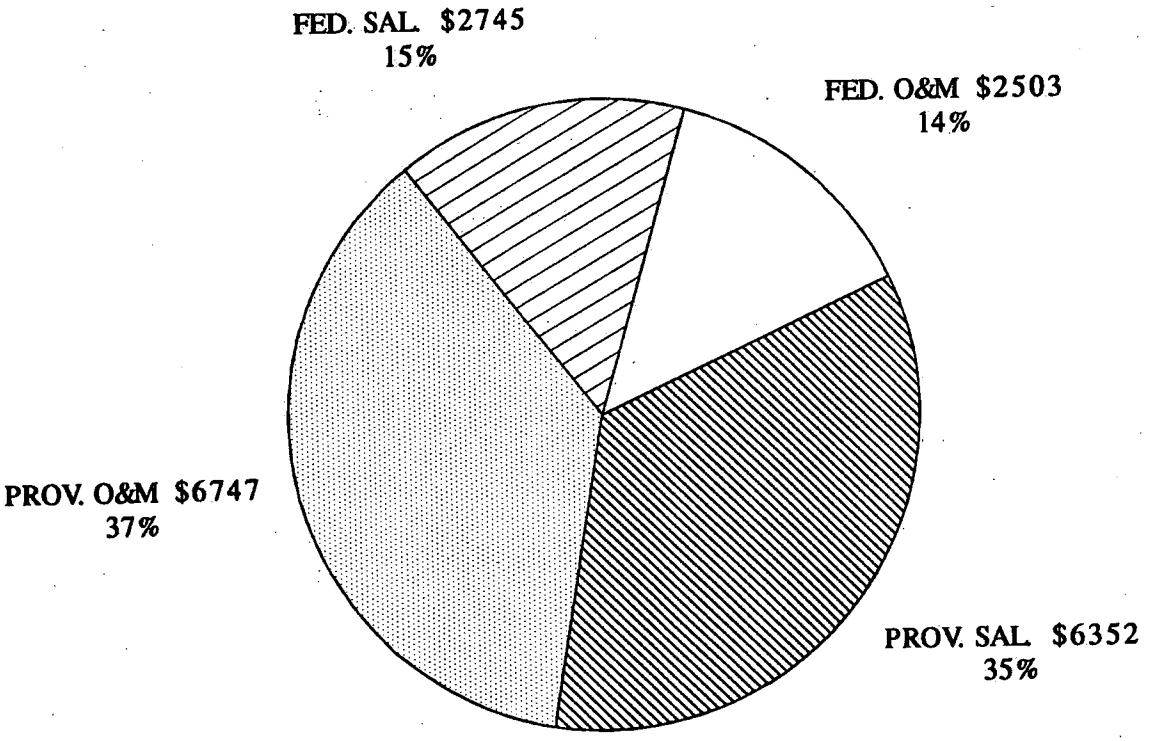


FIGURE 3

3.0 CONSTRUCTION PROJECT DESCRIPTIONS AND COSTS

3.1 Field Investigations

1. Centreville Creek near Cedar Mills 35633 P

A reconnaissance was carried out with a representative of a consulting firm to select the method and site required to best address the monitoring needs for a ground water study.

Salaries	$183.37
Travel Expenses (meals and lodging)	8.90
Vehicle	45.24
TOTAL	$237.51

2. Mad River below Avening 35633 F-P
3. Moorefield Creek at Rothsay 35634 P

The Project Coordinator and Hydrometric Supervisor for the area assessed the above sites for required maintenance.

Salaries	$366.73
Travel Expenses (meals and lodging)	17.50
Vehicle	76.44
TOTAL	$460.97

4. Avon River above Stratford
5. Avon River below Stratford
6. North Thames River near Thorndale
7. North Thames River below Fanshawe Dam 35637 F

Site visits were made by the Integrated Project Section and the Area Head North to assess the above sites for the Water Quality Sensor Pilot Project. A subsequent construction reconnaissance was completed.

Salaries	$818.09
Travel Expenses (meals and lodging)	35.60
Vehicle	68.90
TOTAL	$922.59

8. Cranberry Lake near Seely's Bay 35630 F

An on site meeting was held with a representative from Parks Canada to discuss the construction of a water level monitoring station.

Salaries	$479.57
Travel Expenses (meals and lodging)	110.45
Vehicle	201.50
TOTAL	$791.52

9. Mad River near Glen Cairn 35634 F-P

The previously operated monitoring site was assessed for reactivation. A title search of the property was conducted.

Salaries	$155.16
Travel Expenses (meals and lodging)	8.90
Vehicle	53.30
Miscellaneous	5.00
TOTAL	$222.36

10. Fifth Concession Drain near Essex 35635 F

The Project Coordinator and Hydrometric Supervisor for the area carried out a survey to determine the characteristics of the drain and proposed weir.

Salaries	$959.14
Travel Expenses (meals and lodging)	226.64
Vehicle	195.00
TOTAL	$1,380.78

11. Lake Huron at Thessalon 35631 F

Branch divers investigated the bottom of the harbour at the selected site for the relocation of the lake level monitoring gauge. The site was measured for the new installation.

Salaries	$1,599.20
Travel Expenses (meals and lodging)	551.47
Vehicle	390.00
TOTAL	$2,540.67

12. Niagara River at Fort Erie 35635 F

The Construction Foreman made arrangements for the removal of the gauge shelter. The shelter was located on Customs Canada property which had been transferred to the Niagara Parks Commission.

Salaries	$148.10
Travel Expenses (meals and lodging)	9.00
Vehicle	80.60
TOTAL	$237.70

13. Sandusk Creek near Hagersville 33722 P

An on site meeting was held with Ontario Hydro to arrange for the connection of hydro to the monitoring site.

Salaries	$112.84
Travel Expenses (meals and lodging)	9.00
Vehicle	42.90
TOTAL	$164.74

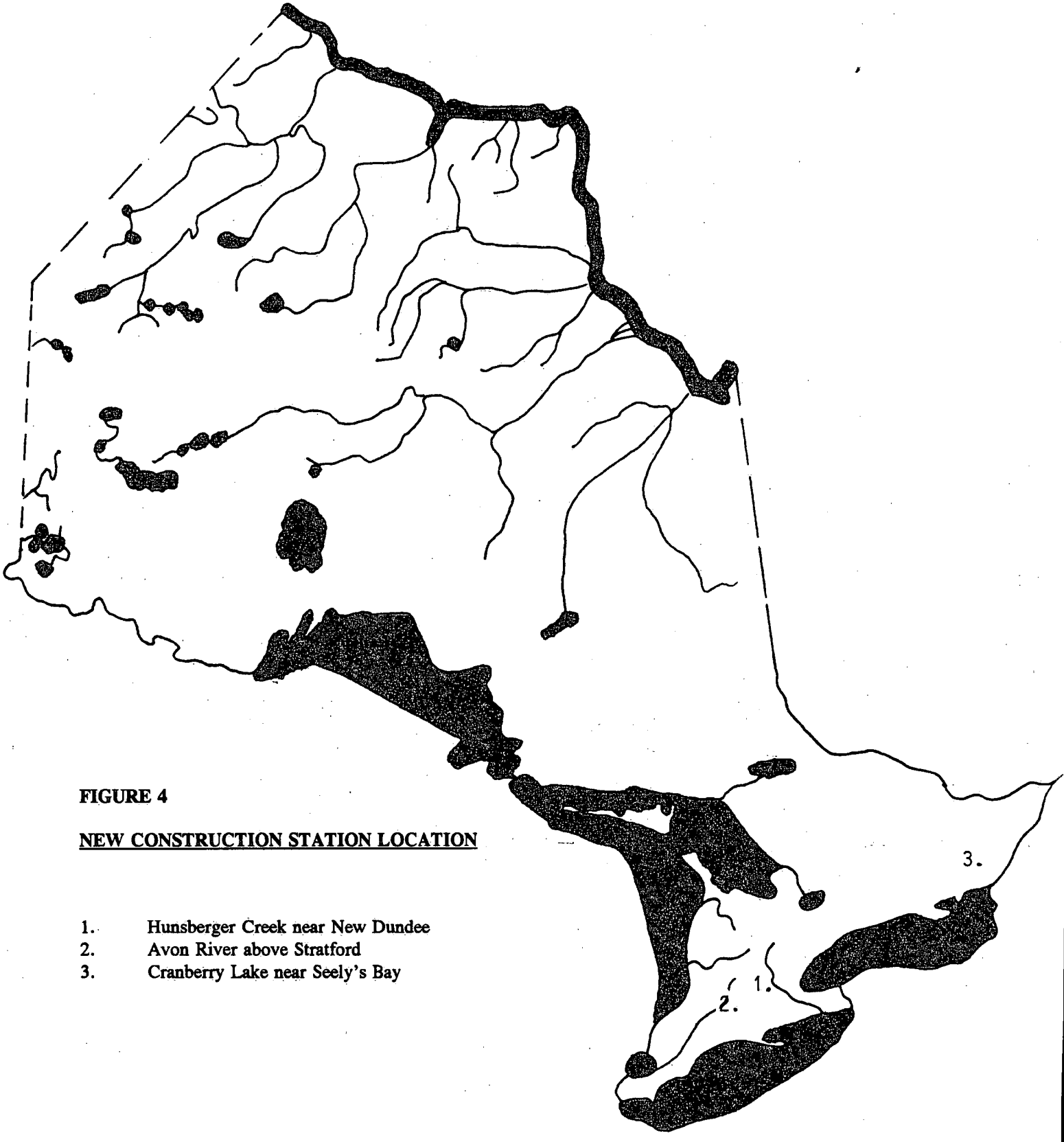


FIGURE 4

NEW CONSTRUCTION STATION LOCATION

1. Hunsberger Creek near New Dundee
2. Avon River above Stratford
3. Cranberry Lake near Seely's Bay

3.2 New Construction

1. Hunsberger Creek near New Hamburg 35634 P

A stilling well, complete with intakes and heating cable, was installed. A wooden look-in shelter was electrical wired for a 30 ampere over head service and placed atop the stilling well. Brush was cleared from the downstream banks.

Salaries	$1018.50
Building Materials & Supplies	2145.11
Contracts, Services & Equipment Rental	610.81
Travel Expenses (meals and lodging)	53.40
Vehicle	120.90
Instrumentation	2948.23
TOTAL	$6,896.95

2. Avon River above Stratford 35637 F

An aluminum shelter was insulated, panelled, electrically wired with a 30 ampere under ground service and placed on a pedestal. The pedestal was designed to accommodate a nitrogen cylinder for the operation of a pressure transducer.

Salaries	$984.55
Building Materials & Supplies	2668.63
Contracts, Services & Equipment Rental	457.96
Travel Expenses (meals and lodging)	62.50
Vehicle	195.60
Instrumentation	10,300.00
TOTAL	$14,669.24

3. Cranberry Lake near Seely's Bay 35630 F

A stilling well, complete with intakes and heating cable, was installed. A previously used steel walk-in shelter was placed on a concrete pad over the stilling well. The shelter was rewired for a 60 ampere over head electrical service.

Salaries	$3233.74
Building Materials & Supplies	2218.80
Contracts, Services & Equipment Rental	1336.35
Travel Expenses (meals and lodging)	1309.46
Vehicle	1236.00
Instrumentation	2948.23
TOTAL	$12,283.18

4. Bear Brook at Bourget 35637 F

The project for the above station was cancelled due to difficulties encountered while excavating for the weir. The station was proposed as part of the Ontario Reference Network for water quality monitoring.

Salaries	$2670.72
Building Materials & Supplies	1578.21
Contracts, Services & Equipment Rental	2338.00
Travel Expenses (meals and lodging)	965.69
Vehicle	872.90
Miscellaneous	0.00
TOTAL	$8,425.52

3.3 Upgrading

1. Pukaskwa River at Pukaskwa National Park 35622 F

A cableway was erected at the above remote site. The majority of materials had been flown in the previous year. All trenching for the main cable anchors and the tower legs was excavated by hand.

Salaries	$9764.76
Building Materials & Supplies	939.35
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	2941.23
Vehicle	2086.70
Miscellaneous (aircraft charter)	4235.00
TOTAL	$19,967.04

3.4 Maintenance

1. Lake Ontario at Toronto — 35631 F

The walk-in shelter was refurbished by replacing the interior panelling and electrical wiring, steel door and frame, and skylight. The electrical service entrance was replaced.

Salaries	$3912.74
Building Materials & Supplies	1656.80
Contracts, Services & Equipment Rental	222.10
Travel Expenses (meals and lodging)	413.85
Vehicle	657.50
Miscellaneous	0.00
TOTAL	$6,862.99

2. Hamilton Creek near Holland Centre — 33722 F

Cedar trees were planted around the shelter and general landscaping was carried out to improve the appearance of the installation.

Salaries	$407.40
Building Materials & Supplies	32.16
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	208.90
Vehicle	105.00
Miscellaneous	0.00
TOTAL	$753.46

3. O.W.R.C. #1 near Stayner — 33722 P

The discontinued station was removed.

Salaries	$271.60
Building Materials & Supplies	0.00
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	220.58
Vehicle	73.80
Miscellaneous	0.00
TOTAL	$565.98

4. Blackash Creek at Collingwood — 33722 F-P

The discontinued station was removed.

Salaries	$271.60
Building Materials & Supplies	0.00
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	220.58
Vehicle	73.80
Miscellaneous	0.00
TOTAL	$565.98

5. St. Lawrence River at Cornwalll 35631 F
6. St. Lawrence River at Summerstown

Repairs to the shelter exteriors and upgrading of the electrical wiring was completed.

Salaries	$1188.25
Building Materials & Supplies	312.55
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	636.34
Vehicle	328.80
Miscellaneous	0.00
TOTAL	$2,465.94

7. Little Nordic Creek at Elliot Lake 33722 P

The discontinued station was removed.

Salaries	$475.30
Building Materials & Supplies	0.00
Contracts, Services & Equipment Rental	7 0.00
Travel Expenses (meals and lodging)	263.92
Vehicle	138.00
Miscellaneous	0.00
TOTAL	$947.22

8. Nordic Mine Tailing Ditch 1,2, & 3 at Elliot Lake 33722 P

The discontinued stations were removed.

Salaries	$475.30
Building Materials & Supplies	5.00
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	263.92
Vehicle	138.00
Miscellaneous	0.00
TOTAL	$882.22

9. Serpent River at Outlet of Dunlop Lake (old site) 33722 P

The discontinued station was removed.

Salaries	$475.30
Building Materials & Supplies	10.00
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	263.92
Vehicle	138.00
Miscellaneous	0.00
TOTAL	$887.22

10. Bob's Creek near Minden 33722 P

The discontinued station was removed.

Salaries	$814.80
Building Materials & Supplies	0.00
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	394.40
Vehicle	195.30
Miscellaneous	0.00
TOTAL	$1,404.50

11. Alder Creek near New Dundee 33722 P

The electrical service and wiring was inspected. The old lead heating cable was removed from the well intake system

Salaries	$169.75
Building Materials & Supplies	0.00
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	26.70
Vehicle	58.20
Miscellaneous	0.00
TOTAL	$254.65

12. Goring Drain at Concession 13 35622 F

The discontinued SWEEP station was removed.

Salaries	$1358.00
Building Materials & Supplies	45.00
Contracts, Services & Equipment Rental	550.90
Travel Expenses (meals and lodging)	89.00
Vehicle	300.60
Miscellaneous	0.00
TOTAL	$2,343.50

13. Pagwachuan River at Hwy. 11 33722 F

The stilling well was extended and insulated. Additional fill was placed around the well.

Salaries	$1018.50
Building Materials & Supplies	154.46
Contracts, Services & Equipment Rental	625.50
Travel Expenses (meals and lodging)	506.07
Vehicle	264.51
Miscellaneous	0.00
TOTAL	$2,569.04

14. Nagagami River at Hwy. 11 35622 P

Safety loops were installed on the main cable of the cableway.

Salaries	$509.25
Building Materials & Supplies	42.00
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	253.04
Vehicle	132.26
Miscellaneous	0.00
TOTAL	$936.55

15. Montreal River at Mountain Chutes 35622 P

Aircraft warning markers for the cableway were replaced.

Salaries	$1018.50
Building Materials & Supplies	105.00
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	506.07
Vehicle	264.51
Miscellaneous	0.00
TOTAL	$1,894.08

16. Lake Temiskaming at Temiskaming 33722 F

The intake system was examined. The dry well was converted to a wet well and the intake was flushed.

Salaries	$2003.05
Building Materials & Supplies	0.00
Contracts, Services & Equipment Rental	318.00
Travel Expenses (meals and lodging)	956.95
Vehicle	488.01
Miscellaneous	0.00
TOTAL	$3,766.01

17. Larder River above Raven Lake 33722 P

The discontinued station was removed.

Salaries	$984.55
Building Materials & Supplies	15.00
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	450.88
Vehicle	270.00
Miscellaneous	0.00
TOTAL	$1,720.43

18. Moira River near Deloro 35657 P

Modifications were made to the natural rock control and adjacent stream channel.

Salaries	$1081.59
Building Materials & Supplies	141.85
Contracts, Services & Equipment Rental	21.40
Travel Expenses (meals and lodging)	716.65
Vehicle	354.32
Miscellaneous	72.50
TOTAL	$2,388.31

19. South Nation River at Casselman 35634 P

The deteriorated stilling well was replaced with a coated C.S.P. well. A new concrete pad was poured and the original steel walk-in shelter was placed on the pad.

Salaries	$3819.38
Building Materials & Supplies	1516.04
Contracts, Services & Equipment Rental	2924.25
Travel Expenses (meals and lodging)	1842.82
Vehicle	781.20
Miscellaneous	0.00
TOTAL	$10,883.69

20. Thames River at Byron 33722 P

The upper intake for the stilling well was located and extended.

Salaries	$407.40
Building Materials & Supplies	36.23
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	233.58
Vehicle	65.70
Miscellaneous	0.00
TOTAL	$742.91

21. South Maitland River near Summerhilll 33722 P

The intake heating cable was replaced.

Salaries	$407.40
Building Materials & Supplies	337.15
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	256.90
Vehicle	65.70
Miscellaneous	0.00
TOTAL	$1,067.15

22. Whiteman's Creek near Mount Vernon 33722 P

The intake heating cable was replaced and the well shut off valve was repaired.

Salaries	$271.60
Building Materials & Supplies	200.12
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	17.80
Vehicle	29.70
Miscellaneous	0.00
TOTAL	$519.22

23. Moorefield Creek at Rothsay 35634 P

The existing shelter was insulated and panelled. A beaver dam was removed from the concrete weir. The weir was extended on the left bank.

Salaries	$814.80
Building Materials & Supplies	286.58
Contracts, Services & Equipment Rental	18.00
Travel Expenses (meals and lodging)	54.00
Vehicle	133.80
Miscellaneous	0.00
TOTAL	$1,307.18

24. Mattawa River below Bouillon Lake 33722 P

The deteriorated wooden shelter was replaced with a vandal resistant galvanized steel look-in shelter.

Salaries	$636.56
Building Materials & Supplies	695.72
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	407.08
Vehicle	300.00
Miscellaneous	0.00
TOTAL	$2,039.36

25. South River at South River 33722 P

The discontinued station was removed.

Salaries	$458.33
Building Materials & Supplies	8.00
Contracts, Services & Equipment Rental	183.00
Travel Expenses (meals and lodging)	239.80
Vehicle	64.20
Miscellaneous	0.00
TOTAL	$953.33

26. Niagara River at Fort Erie — 35635 F

The discontinued station was removed.

Salaries	$543.20
Building Materials & Supplies	163.84
Contracts, Services & Equipment Rental	340.00
Travel Expenses (meals and lodging)	207.18
Vehicle	107.10
Miscellaneous	0.00
TOTAL	$1,361.32

27. Fifth Concession Drain near Essex — 35635 F

A concrete weir was installed. The previous weir had been removed for dredging of the drain.

Salaries	$2,427.43
Building Materials & Supplies	574.75
Contracts, Services & Equipment Rental	1,765.50
Travel Expenses (meals and lodging)	1,094.79
Vehicle	514.20
Miscellaneous	0.00
TOTAL	$6,376.67

28. Redhill Creek at Hamilton — 35635 F

Concrete baffles were placed in the stream below the concrete weir. The baffles were designed to assist in fish passage within the concrete channel.

Salaries	$1,086.40
Building Materials & Supplies	902.00
Contracts, Services & Equipment Rental	722.28
Travel Expenses (meals and lodging)	63.00
Vehicle	161.40
Miscellaneous	0.00
TOTAL	$2,935.08

29. North Thames River at St. Mary's — 33722 P

The door lock was replaced.

Salaries	$152.64
Building Materials & Supplies	71.00
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	9.00
Vehicle	58.50
Miscellaneous	0.00
TOTAL	$291.14

30. Sandusk Creek near Hagersville 33722 P

Hydro service to the monitoring station was restored.

Salaries	$248.04
Building Materials & Supplies	15.52
Contracts, Services & Equipment Rental	72.00
Travel Expenses (meals and lodging)	18.00
Vehicle	138.60
Miscellaneous	0.00
TOTAL	$492.16

31. Carrick Creek near Carlsrue 33722 P

Hydro service to the monitoring station was restored.

Salaries	$152.64
Building Materials & Supplies	0.00
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	9.00
Vehicle	69.60
Miscellaneous	0.00
TOTAL	$231.24

32. Sturgeon River at Sturgeon Bay 33722 F/P

The interior electrical wiring was repaired.

Salaries	150.48
Building Materials & Supplies	12.53
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	115.27
Vehicle	123.00
Miscellaneous	0.00
TOTAL	$401.28

33. Lake Huron at Thessalon 35631 F

Materials were purchased for the reconstruction of the lake level gauge.

Salaries	0.00
Building Materials & Supplies	6963.25
Contracts, Services & Equipment Rental	0.00
Travel Expenses (meals and lodging)	0.00
Vehicle	0.00
Miscellaneous	0.00
TOTAL	$6,963.25

4.0 DESCRIPTION OF CONSTRUCTION METHODS AND PROCEDURES

4.1 Well Construction

Stilling Wells for Streamflow Gauges

These are inbank installations of 2.0 mm thickness (14 gauge), 800 mm diameter galvanized "Hel-Cor" pipe. The stilling well is fabricated at a welding shop at the Regional Office and consists of welding in a 5 mm steel bottom and a 51 mm galvanized tee and coupling for attachment of intake pipes, gate valve and stand pipe. (Figure 5)

At the job site, while the excavating is underway, the lower intake, valve, valve handle extension and heating cable are attached to the well ready for installation. When the excavation is at the required depth, the complete well assembly, with the intake supported by 3 mm wire, is picked up by the excavating machine and lowered into the hole. The well is held plumb by guy lines while the machine places backfill equally around the well. When the backfill reaches the 51 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 M are connected from a boat or raft before the backfilling is started in order to lift the end of the 20 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. (Figure 6)

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 a stacom servometer.

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 or other anchoring structure. (Figure 7)

Stilling Wells for Tides and Water Level Gauges

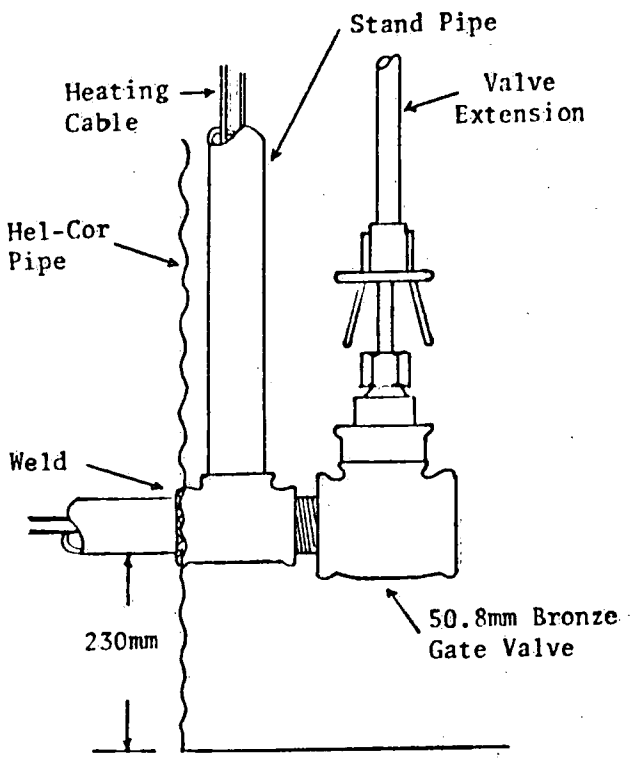
This type is fabricated by welding a 900 mm diameter and a 1,600 mm diameter galvanized "Hel-Cor" pipe to a common 5 mm steel bottom. A 1.5 M long 51 mm diameter intake pipe is attached to a 51 mm gate valve and stand pipe. (Figure 8)

The stilling well is lowered over the side of the dock and while resting plumb and evenly on the bottom is secured to the dock by a cable while the top is formed to accommodate an "Armco" house. Concrete is placed and fills the 35 cm space between the two pipes from the bottom of the well to the top of the formwork.

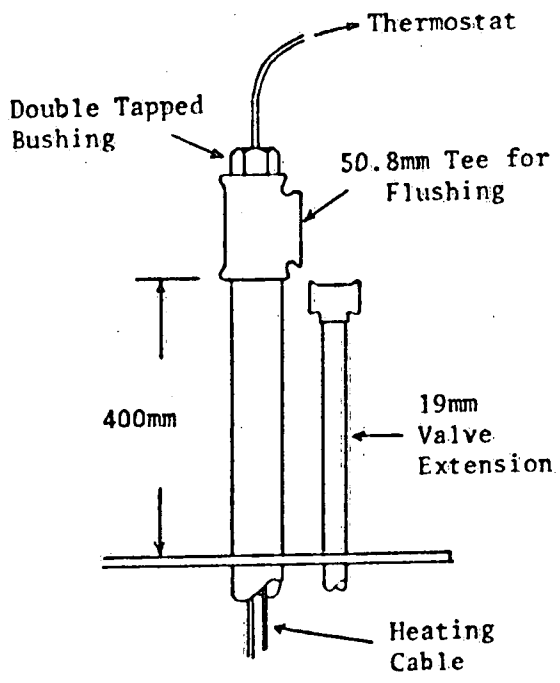
4.2 Inlet Systems

Lower Intake (Active)

The lower intake is a 51 mm diameter galvanized steel pipe screwed into a 51 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 51 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 51 mm x 13 mm x 13 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 water's edge and may vary from 3 M to 36 M or longer.



DETAIL "A"



DETAIL "B"

FIG. 5

INBANK STILLING WELL

FIG. 6

INBANK STILLING WELL
WITH ARMCO SHELTER

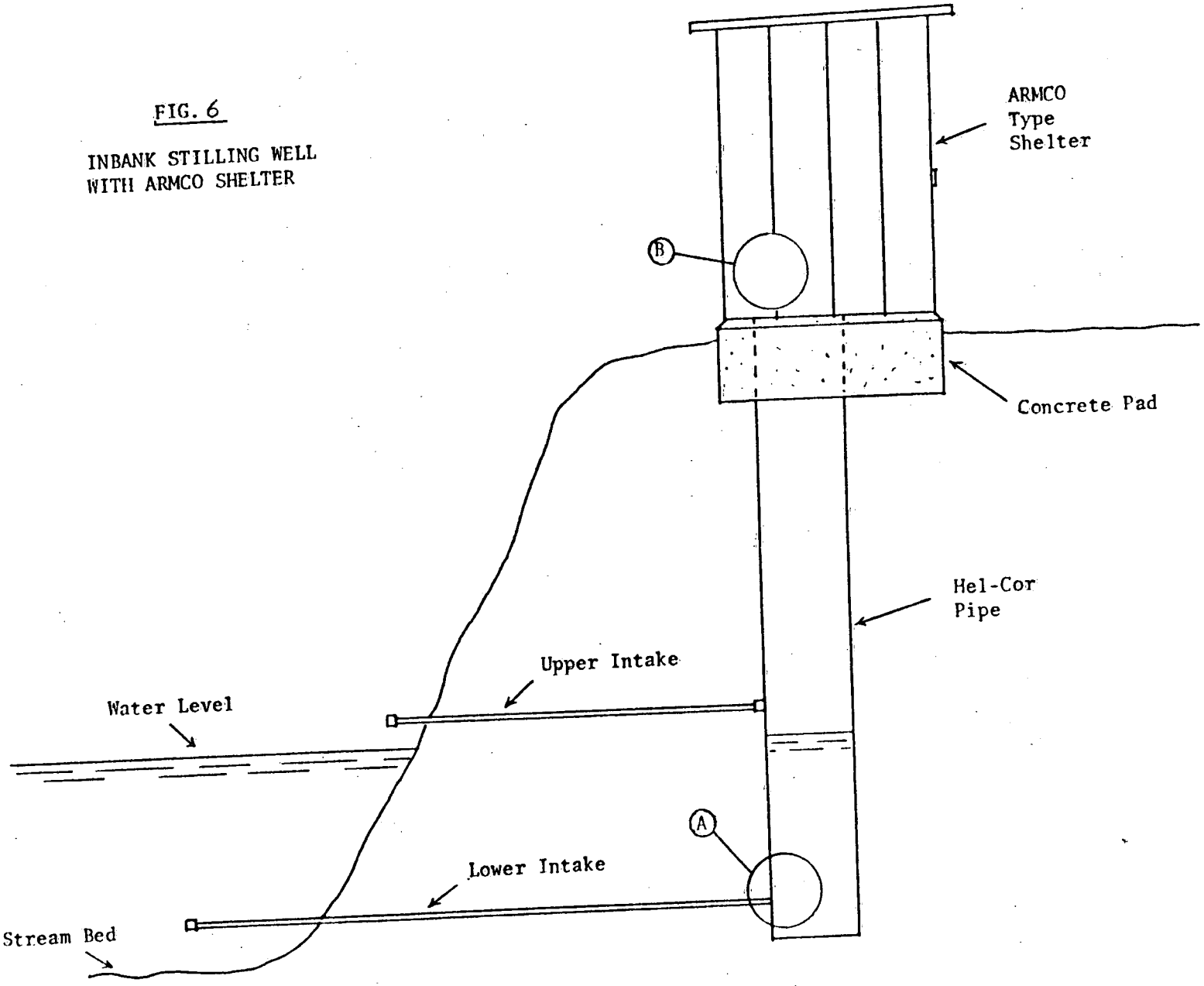


FIG. 7

STACOM SERVOMANOMETER GAUGE
WITH ARMCO SHELTER

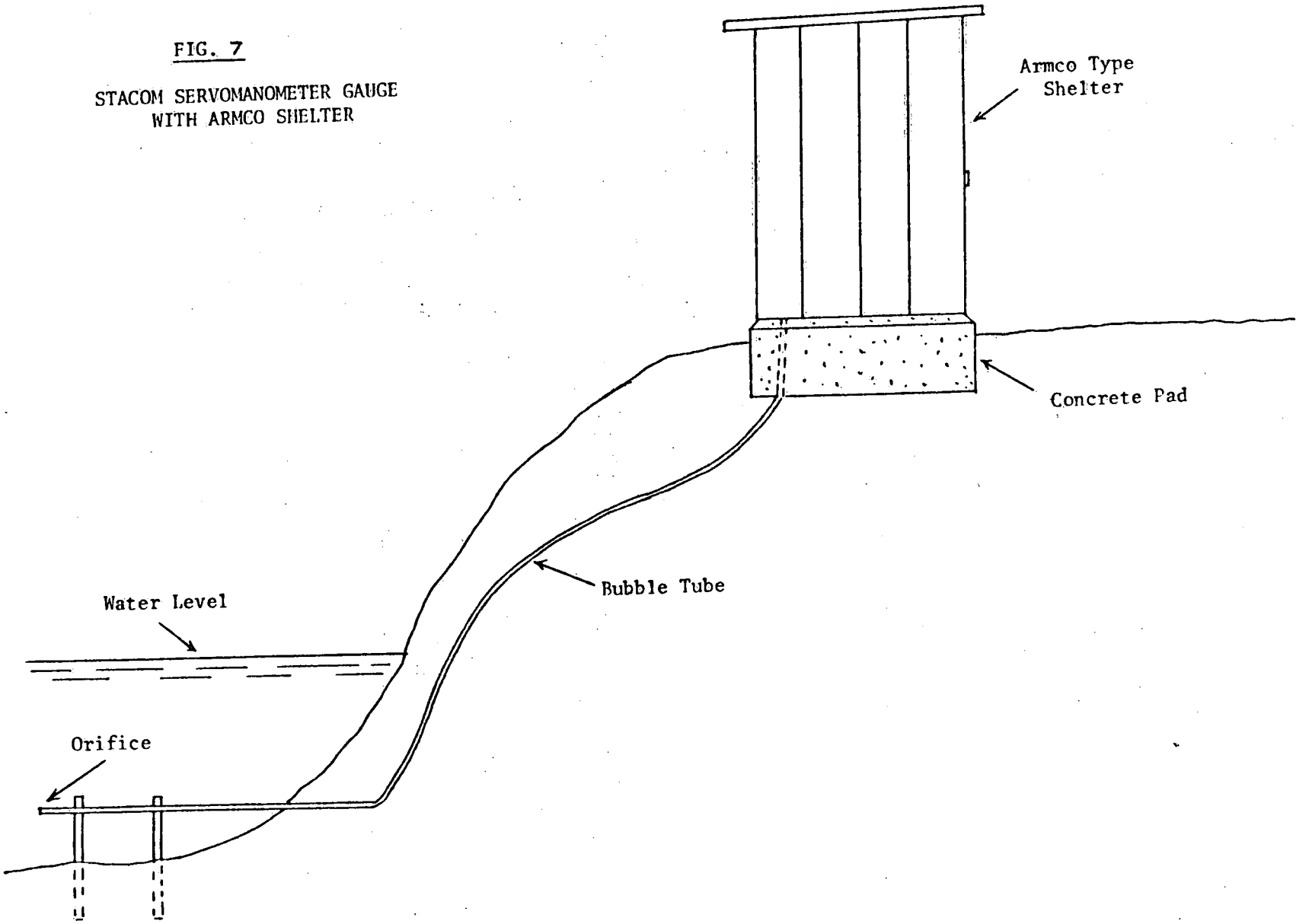
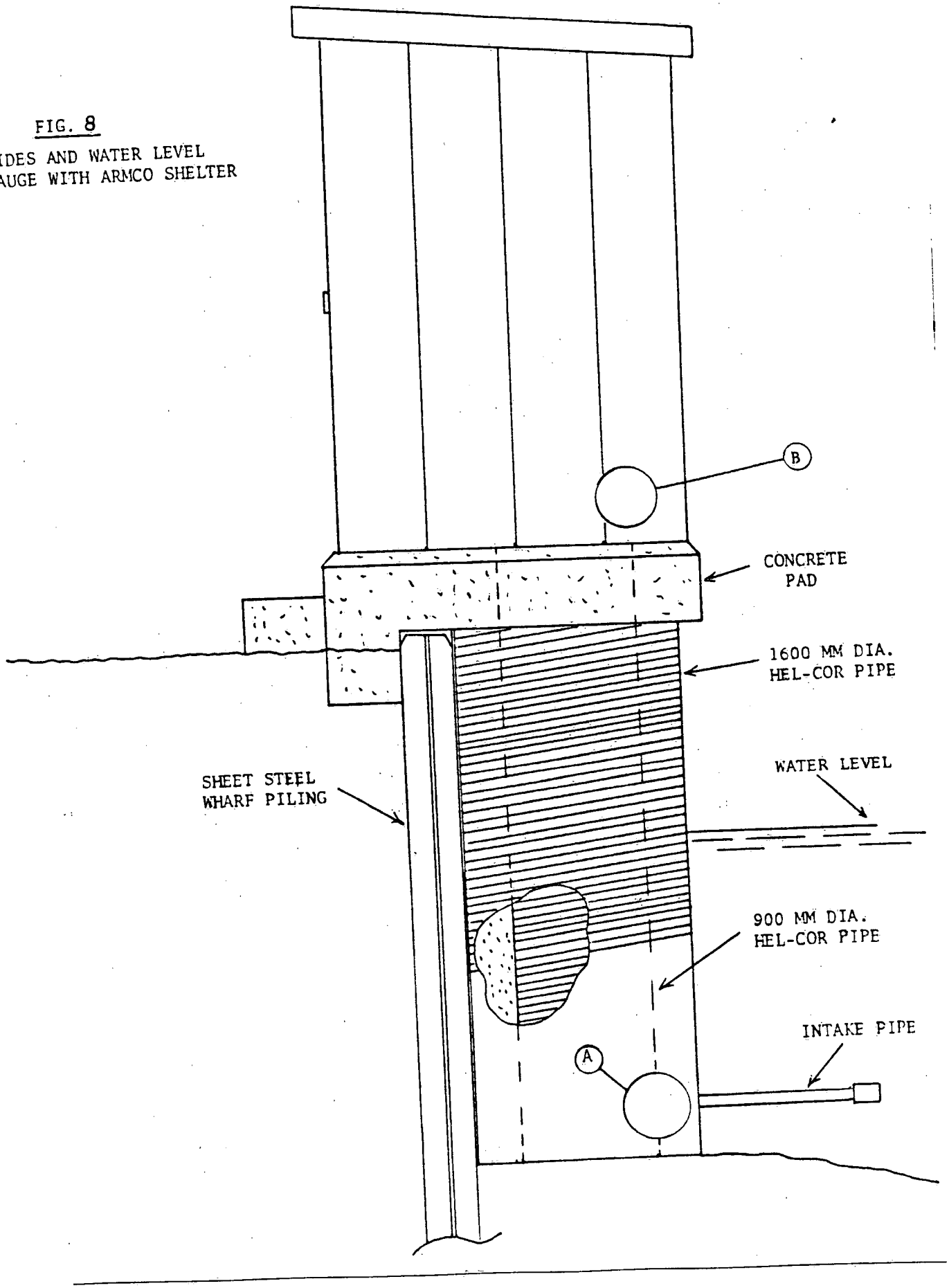


FIG. 8

TIDES AND WATER LEVEL
GAUGE WITH ARMCO SHELTER



Upper Intake (Auxiliary)

The upper intake is a 51 mm galvanized steel pipe screwed into a 51 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 51 mm tee at the top of the stand pipe and with the valve in the well closed forcing water under pressure through intake system.

4.3 Instrument Shelters

Look-in Shelter

The standard wooden Guelph-type look-in shelter is installed at all sites where the instrumentation consists of the Stevens A-71 analogue recorder. An aluminum look-in shelter has been designed and fabricated for installation that requires an analogue recorder and a data logger. The shelter is constructed of 6 mm high strength aluminum which provides good protection from vandalism. The interior is insulated with rigid or sprayed insulation and a wooden floor is installed over the well to facilitate instrument placement. Both shelters are mounted on an 800 mm diameter stilling well.

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 Shelter

Armco metal buildings from 1,626 mm x 1,626 mm x 2,438 mm to 4,876 mm x 3,658 mm x 2,438 mm in size are used at all sites requiring room for several instruments and/or personnel accommodation. These buildings are insulated, paneled, and where electricity is available, provided with a 60 ampere service complete with well heaters, baseboard heaters, thermostats, lights and out lets. 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.

4.4 Artificial Controls and Weirs

Steel

Most controls are made from Armco steel sheeting type M581, 690 mm in width, 5 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

Concrete controls and weirs of various design are constructed. They may be formed or free-formed and poured-in-place in the stream bed.

Timber

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

4.5 Cableways

Wire Rope

6 x 19 Independent Wire Rope Core right regular lay, preformed, galvanized, improved plow steel wire rope of 19 mm or 22 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 10 mm or 13 mm guy strand and attached by means of preformed guy strips 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. Aluminum and 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 aluminum and equipped with safety finger guards.

Aircraft Warning Markers

Where required, Transport Canada approved international orange coloured, spherical shaped aircraft warning markers are suspended on a separate 10 mm wire rope cable above the main cable. Cable towers are also painted inter national orange and white to Transport Canada specifications.

Fittings

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