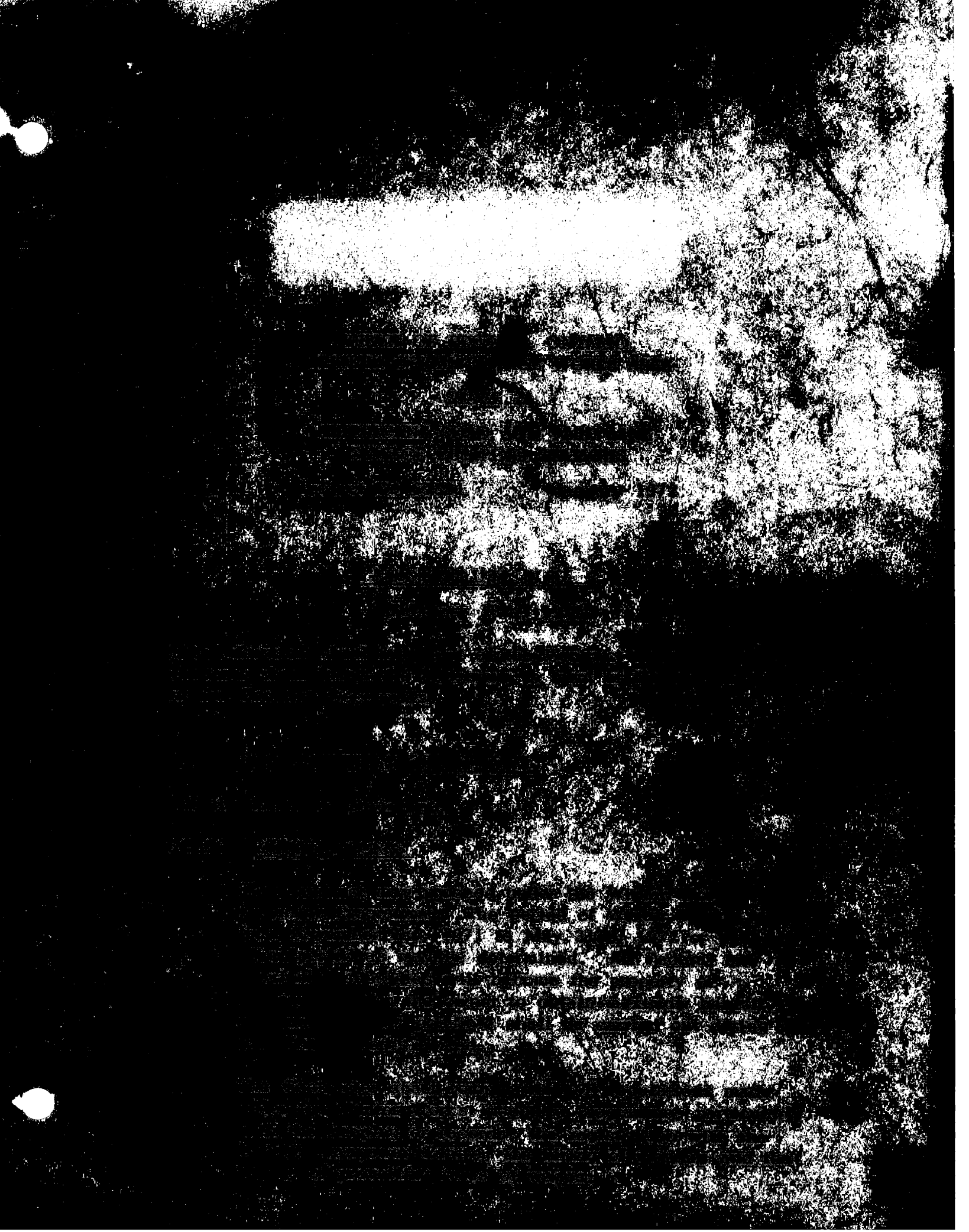


TOWN OF PELHAM, ONTARIO

PELHAM URBAN SEWAGE WORKS AREA

STAGE 2A

HURRICANE ROAD AND PARK LANE

SEWAGE PUMPING STATIONS

Proctor & Redfern Limited
Consulting Engineers
75 Eglinton Avenue East
Toronto 12, Ontario

Project EO-69581
February 9, 1972
DRF/RH

ADDENDUM NO. 1

This addendum shall form part of the Contract Documents. The Tenderer shall insert the addendum behind the cover page of the Contract Documents.

1. Project Specifications, Section 11B.02, Clause D, paragraph 1

   This paragraph shall be revised to read:

   "Provision shall be made for pressure gauges to be installed complete with isolating valves on the discharge piping and discharge header. Two gauges shall be supplied, each 3 1/2 inch diameter with 1/4 inch NPT connections and rated 0-100 psi.

2. Project Specification, Section 15A

   The following clauses shall be inserted or amended.

   01.A.1(E) The supply and installation of water service for the pumping station.

   02.H. Delete paragraph 1.

   02.H.3 "Tunnel" should read "Funnel".

   02.J. Water Piping

   1. Water services from the nearest supply point to be laid in the street line shall be 6 inch diameter Class 200 Tyton Cast Iron.

   2. Water piping from the service main to the pumping station shall be 2 inch diameter copper Type "K", soft.

3. Interior water piping shall be Type "L", hard drawn copper tubing. Fittings shall be the solder joint cast bronze type.

4. Valves

(A) Valves shall be of one manufacture unless otherwise shown, and shall have the manufacturer's name and pressure rating clearly marked on the outside of the body.

Gate Valves	McAvity Fig. 185M
Check Valves	McAvity Fig. 195M
Hose Bibbs	Mueller C-12210

03. Execution

D. Water Service

1. The 6 inch main service line shall be laid from the existing supply main, approximately 500 feet west of the station, as shown on the drawings.

2. The 2 inch copper service line shall terminate inside the dry well as shown on the drawings.

3. Interior Water Piping

(A) Water piping shall be sloped so that the system may be drained. Where a branch cannot be drained through fixtures, a hose bibb shall be provided in an accessible location.

(B) Stop valves and unions shall be provided at connections to fixtures and equipment accessibly located, to facilitate removal of such equipment.

(C) All exposed pipe shall be arranged in space provided, run close to walls, columns or other piping to present a neat and orderly appearance.

(D) Joints in copper piping shall be properly lead soldered.

4. Testing

(A) All work shall be installed, inspected and tested in accordance with the requirements of the Canadian Plumbing Code and of the local authoritie having jurisdiction. The contractor shall provide all labour and equipment and pay the fees for all inspections and tests, and shall notify the local plumbing inspector of the tests and conduct same to the satisfaction and in the presence of their representatives. A certificate of approval shall be furnished to the Engineer.

(B) The testing pressure for the water piping shall be 150 psig; all joints shall remain drop free for a period of two (2) hours.

3. Project Specifications, Section 16B.02, Level Control Panel

Paragraph 3 (E), insert

"Each magnetic starter shall be equipped with an N.O. auxiliary contact and tagged terminals for connection to a seal water solenoid valve. The solenoid valve shall energize when the pump starts."

Paragraph (F), insert

"The control transformer shall have capacity to operate two 1/2" seal water solenoid valves."

Clause 5, External Connections, insert

"Wiring connections shall be provided for the seal water solenoid valves".

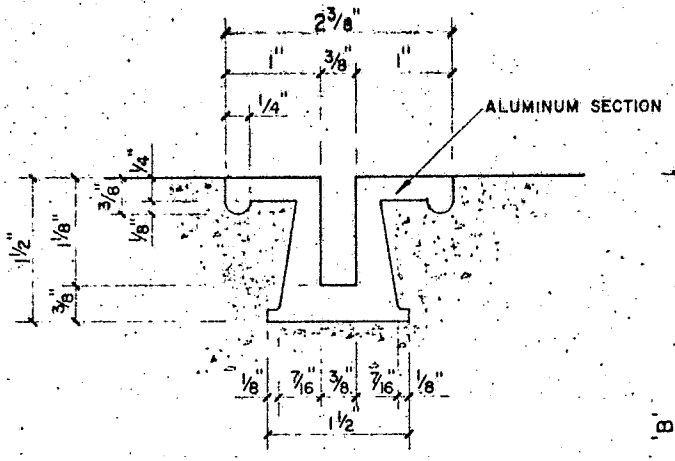
Clause K, Solenoid Valves, this clause shall be inserted:

"Seal water solenoid valves, size 1/2", shall be provided for each pump. On de-energizing, the valves shall be capable of closing against a water pressure of 150 psi and shall be suitable for 120 volt single phase 60 cycle operation. The valves shall be equal to ASCO manufacture.

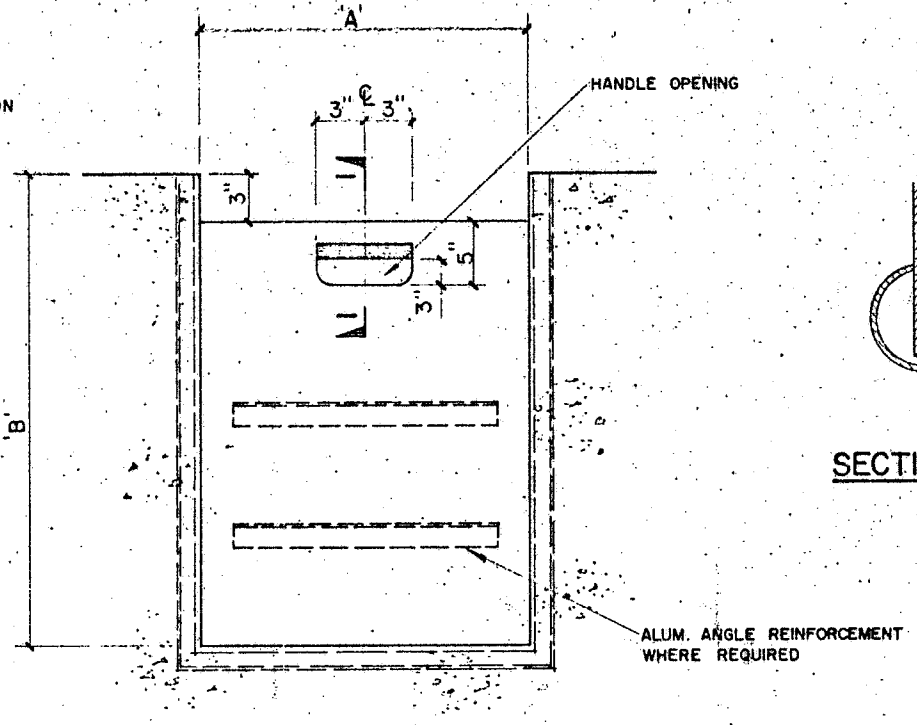
The solenoid valves shall be installed in seal water lines specified in Section 15A.02."

4. Drawings

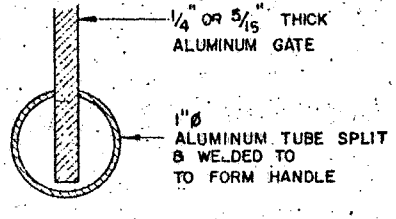
Insert E-STD.8-17 Handstop Gate Details.



GROOVE DETAIL



FRONT ELEVATION



SECTION '1-1'

LOCATION	A	B	No. OF GATES	No. OF FRAMES
INLET CHAMBER (BY-PASS CHANNEL)	2'-0"	2'-0"	ONE	ONE
COMMINUTOR CHANNEL	1'-7 1/2"	2'-0"	TWO	TWO

HANDSTOP GATE DETAILS

N.T.S.

REV. 1

E - STD - 8 - 17

CONTRACT DOCUMENTS

TOWN OF PELHAM, ONTARIO
PELHAM URBAN SEWAGE WORKS AREA

STAGE 2A

HURRICANE ROAD AND PARK LANE
SEWAGE PUMPING STATIONS

Project EO 69581 January, 1972

PROCTOR & REDFERN LIMITED
Consulting Engineers

75 Eglinton Avenue East
Toronto 12, Ontario

39 Queen Street
St. Catharines, Ontario

RH/DRF

LIST OF CONTRACT DOCUMENTS

The following shall form the Contract Documents:

	Paper Colour	Pages
Addenda Numbered 1 to 2	Green	
List of Contract Documents	Pink	2
Tendering Information	Blue	2
Form of Tender	Yellow	5
Agreement (CD-20)	White	1
Agreement to Bond (CD-22)	White	1
Performance Bond (CD-2)	White	1
Bid Bond (CD-2A)	White	1
Labour and Material Payment Bond (CD-2B)	White	1
List of Sub-contractors (CD-3)	White	1
Supplementary Conditions	Blue	1
General Conditions (CD-1)	Blue	8
Project Specifications		
Section 01010 - General	White	2
Section 2A - Excavation, Backfill and Rough Grading	White	5
Section 2B - Fine Grading and Sodding	White	2
Section 2C - Access Road	White	2
Section 03300 - Cast-in-Place Concrete for Structures	White	6
Section 3B - Precast Concrete	White	2
Section 4A - Masonry	White	4
Section 5A - Miscellaneous Metalwork	White	5
Section 6A - Rough Carpentry	White	2
Section 7A - Roofing	White	2
Section 7B - Building Caulking	White	2
Section 8A - Doors and Hollow Metal Frames	White	2
Section 9A - Painting	White	4
Section 10A - Finish Hardware	White	2
Section 11A - Selected Equipment	White	5
Section 11B - Miscellaneous Equipment	White	2
Section 15A - Pipelaying and Installation	White	3
Section 16A - Electrical General Requirements	White	2
Section 16B - Distribution and Control	White	12
Section 16C - Park Lane Pumping Station	White	2
Appendix A - Specifications for Pre-selected Equipment	White	7

Drawings:

B-69581-G3	Hurricane Road Pumping Station - Piping, Structural and Site Plan
B-69581-G4	Hurricane Road Pumping Station - Piping, Structural and Miscellaneous Details
B-69581-G5	Hurricane Road Pumping Station - Architectural
B-69581-G6	Hurricane Road Pumping Station - Electrical and Mechanical
B-69581-G7	Park Lane Pumping Station - General and Electrical
B-69581-G8	Park Lane Pumping Station - Overflow Structure

E-STD-5-2	Aluminum Safety Ladder Rungs
E-STD-8-7	Typical Grating Sealing Detail
E-STD-8-10	Typical Checker Plate Detail
E-STD-9-R2	Standard Roof Flashing Detail
E-STD-9-R6	Opening Through Roof
E-STD-11-1	Construction Joints
E-STD-11-4	Anchor Bolt Details
E-STD-11-5	Equipment Pads

TENDERING INFORMATION

TI.01 DELIVERY AND OPENING OF TENDERS

A. SEALED TENDERS, MARKED WITH THE NAME OF THE PROJECT, WILL BE RECEIVED BY -

MR. L. C. HUNT, CLERK-TREASURER

TOWN OF PELHAM

43 SOUTH PELHAM STREET

FONTHILL, ONTARIO

UP TO NOON, LOCAL TIME -

Monday, Feb. 28/72

B. THE TENDERS WILL BE OPENED PUBLICLY AS SOON AFTER THE CLOSING TIME AS POSSIBLE.

C. TENDERS SHALL BE MADE ON THE FORM OF TENDER WHICH SHALL NOT BE DETACHED FROM THE OTHER DOCUMENTS.

TI.02 DISCREPANCIES

A. IF A TENDERER FINDS DISCREPANCIES IN, OR OMISSIONS FROM THE CONTRACT DOCUMENTS, OR IF HE IS IN DOUBT AS TO THEIR MEANING, HE SHALL NOTIFY THE ENGINEER, WHO MAY ISSUE A WRITTEN ADDENDUM. NEITHER THE OWNER NOR THE ENGINEER WILL MAKE ORAL INTERPRETATIONS OF THE MEANING OF THE CONTRACT DOCUMENTS.

B. ADDENDA ISSUED DURING THE TENDERING PERIOD SHALL BE ALLOWED FOR BY THE TENDERER.

TI.03 EXAMINATION OF SITE

A. THE TENDERER SHALL VISIT THE SITE OF THE WORK BEFORE SUBMITTING HIS TENDER AND SHALL BY PERSONAL EXAMINATION SATISFY HIMSELF AS TO THE LOCAL CONDITIONS THAT MAY BE ENCOUNTERED DURING CONSTRUCTION OF THE WORK. HE SHALL MAKE HIS OWN ESTIMATE OF THE FACILITIES AND DIFFICULTIES THAT MAY BE ENCOUNTERED AND THE NATURE OF THE SUBSURFACE MATERIALS AND CONDITIONS.

B. HE SHALL NOT CLAIM AT ANY TIME AFTER SUBMISSION OF HIS TENDER THAT THERE WAS ANY MISUNDERSTANDING OF THE TERMS AND CONDITIONS OF THE CONTRACT RELATING TO SITE CONDITIONS.

TI.04 PROVINCIAL SALES TAX

A. ALL PRICES SHALL EXCLUDE PROVINCIAL SALES TAX ON ALL BUILDING MATERIALS TO BE INCORPORATED INTO THE WORK, EXCEPT FOR READY-MIX CONCRETE, ASPHALTIC CONCRETE, AND ALL MACHINERY.

EXCEPT AS NOTED ABOVE, THE CONTRACTOR WILL BE REQUIRED TO OBTAIN A SPECIAL PERMIT FROM THE RETAIL SALES TAX BRANCH AND MAY PURCHASE MATERIALS EXEMPT FROM PROVINCIAL SALES TAX BY SUPPLYING WITH HIS ORDERS, A PURCHASE EXEMPTION CERTIFICATE. THIS PROCEDURE SHALL COMPLY WITH RULING 21 OF THE RETAIL SALES TAX BRANCH.

THE CONTRACTOR MAY BE REQUIRED TO SUBMIT TO THE OWNER, STATEMENTS CERTIFYING QUANTITIES AND STRENGTHS OF READY-MIX AND ASPHALTIC CONCRETES, SO THAT THE OWNER MAY APPLY FOR REFUND OF TAXES.

TI.05 FEDERAL SALES TAX

A. ALL PRICES TENDERED FOR THE WORK SHALL EXCLUDE FEDERAL SALES TAX ON MATERIAL AND EQUIPMENT TO BE INCORPORATED INTO THE WORK.

THE CONTRACTOR MAY BE REQUIRED TO PAY FEDERAL SALES TAX ON PURCHASES OF MATERIAL AND EQUIPMENT TO BE INCORPORATED INTO THE WORK BUT CAN RECOVER SUCH TAX BY APPLICATION TO THE FEDERAL EXCISE DIVISION. SHOULD THE CONTRACTOR'S CLAIM FOR REFUND BE DISALLOWED BY THE EXCISE DIVISION, THE OWNER WILL PAY TO THE CONTRACTOR A SUM EQUAL TO THE DISALLOWED AMOUNT.

TI.06 PROOF OF ABILITY

A. THE TENDERER SHALL BE COMPETENT AND CAPABLE OF PERFORMING THE VARIOUS ITEMS OF WORK. THE TENDERER MAY BE REQUIRED TO FURNISH STATEMENTS COVERING EXPERIENCE ON SIMILAR WORK, LIST OF PLANT AVAILABLE, SENIOR PERSONNEL TO BE USED ON THE WORK, AND SUCH STATEMENTS OF HIS FINANCIAL RESOURCES AS MAY BE FOUND NECESSARY.

TI.07 TENDER DEPOSIT

A. EVERY TENDER SHALL BE ACCOMPANIED BY A BID BOND IN AN AMOUNT EQUAL TO 10 PERCENT OF THE TENDER PRICE.

THE BID BOND SHALL BE IN ACCORDANCE WITH THE ATTACHED FORM.

TI.08 AGREEMENT TO BOND

A. EVERY TENDER SHALL BE ACCOMPANIED BY AN 'AGREEMENT TO BOND' IN THE FORM ATTACHED, AND SHALL BE COMPLETED BY A SURETY COMPANY LAWFULLY DOING BUSINESS IN THE PROVINCE.

TI.09 ACCEPTANCE OF TENDERS

A. THE LOWEST OR ANY TENDER NEED NOT NECESSARILY BE ACCEPTED BY THE OWNER.

TI.10 EQUIVALENTS

A. WHEN AN ARTICLE IS SPECIFIED BY ITS TRADE OR OTHER NAME (WHETHER SUCH NAME IS FOLLOWED BY THE PHRASE 'OR APPROVED EQUAL' OR NOT), THE TENDERER SHALL BASE HIS TENDER PRICE ON THE SUPPLY OF THE NAMED ARTICLE AND NO OTHER.

AFTER AWARD OF THE CONTRACT, THE CONTRACTOR MAY SUBMIT REQUESTS TO THE ENGINEER FOR SUBSTITUTION OF EQUIVALENT MATERIAL. SUCH SUBMISSIONS SHALL BE ACCOMPANIED BY COMPLETE INFORMATION ON THE MATERIAL PROPOSED FOR USE, TOGETHER WITH REVISIONS OF COST THAT WOULD RESULT.

THE CONTRACTOR SHALL SUBMIT REQUESTS FOR SUBSTITUTION WITHIN THREE WEEKS OF THE AWARD OF THE CONTRACT.

TI.11 TEST BORINGS

A. TEST BORINGS HAVE BEEN MADE AT THE SITE OF THE WORK AND INFORMATION FROM THEM IS SHOWN ON THE DRAWINGS.

THE BORINGS WERE MADE TO DETERMINE THE CHARACTER OF THE SUBSOIL FOR DESIGN PURPOSES. NO RESPONSIBILITY IS ASSUMED FOR THE ACCURACY OR COMPLETENESS OF THE INFORMATION SO PRESENTED.

TENDERERS SHALL MAKE SUCH ADDITIONAL EXAMINATION OF THE SOIL AS THEY MAY FEEL NECESSARY TO SATISFY THEMSELVES AS TO THE CONDITIONS THAT MAY BE ENCOUNTERED.

FORM OF TENDER

FT.01 TENDER PRICE

1. OFFER BY - NAME - DIXHILL CORPORATION LIMITED

ADDRESS - 2401 Royal Windsor Drive
Oakville, Ontario

DATE - February 28th, 1972

2. TO THE CORPORATION OF THE TOWN OF PELHAM

A. WE, THE UNDERSIGNED, HAVING EXAMINED THE SITE OF THE WORK, HAVING CAREFULLY INVESTIGATED THE CONDITIONS PERTAINING TO THE WORK AND HAVING SECURED ALL THE INFORMATION NECESSARY TO ENABLE US TO SUBMIT A BONA FIDE TENDER, AND HAVING INSPECTED ALL THE CONTRACT DOCUMENTS, HEREBY AGREE TO ENTER INTO A CONTRACT AND TO PERFORM ALL THE WORK IN A GOOD AND WORKMANLIKE MANNER IN ACCORDANCE WITH THE CONTRACT DOCUMENTS TO THE SATISFACTION OF THE ENGINEER FOR THE TOTAL TENDER PRICE OF ONE HUNDRED AND THIRTY-ONE THOUSAND, NINE HUNDRED AND EIGHTY-SIX

DOLLARS ($ 131,986.00)

FT.02 CONTINGENCIES AND ALLOWANCES

A. WE AGREE THAT THE TENDER PRICE INCLUDES THE CONTINGENCY SUM OF $4,000.00 AND THAT NO PART OF THIS SUM SHALL BE EXPENDED WITHOUT THE WRITTEN DIRECTION OF THE ENGINEER, AND ANY PART NOT SO EXPENDED SHALL BE DEDUCTED FROM THE TENDER PRICE.

FT.03 ADDITIONS AND DEDUCTIONS

A. WE AGREE THAT THE VALUATION OF ADDITIONS AND DEDUCTIONS FROM, THE CONTRACT SHALL BE MADE AS FOLLOWS -

1. THE PRICES IN THE TABLE OF PRICES SHALL APPLY WHERE APPROPRIATE.

2. IF THE PRICES IN SUBSECTION 1 ARE NOT APPROPRIATE, VALUATION WILL BE MADE BY ONE OF THE FOLLOWING METHODS -

(A) THE ENGINEER MAY ASK THE CONTRACTOR FOR A QUOTATION FOR THE PROPOSED WORK.

(B) IF THE QUOTATION REFERRED TO IN (A) ABOVE IS NOT ACCEPTED BY THE ENGINEER, THE ACTUAL COST OF THE WORK WILL BE DETERMINED AS THE TOTAL OF ONLY THE FOLLOWING -

(1) ACTUAL COST OF LABOUR, INCLUDING SUCH ITEMS AS WORKMEN'S COMPENSATION AND UNEMPLOYMENT INSURANCE.

(2) ACTUAL COST OF MATERIALS TO BE INCORPORATED INTO THE WORK, INCLUDING SUCH ITEMS AS FREIGHT AND TAXES.

(3) FOR WORK DONE BY THE CONTRACTOR, AN AMOUNT EQUAL TO 15 PERCENT OF THE TOTALS FROM SUBSECTIONS (1) AND (2) ABOVE, WHICH SHALL CONSTITUTE OVERHEAD AND PROFIT OF THE CONTRACTOR.

(4) FOR WORK DONE BY SUB-CONTRACTORS, AN AMOUNT EQUAL TO 20 PERCENT OF THE TOTALS FROM SUBSECTIONS (1) AND (2) ABOVE, WHICH SHALL CONSTITUTE OVERHEAD AND PROFIT OF THE CONTRACTOR AND SUB-CONTRACTORS.

(5) RENTAL OF EQUIPMENT AND PLANT HAVING A NEW VALUE GREATER THAN $300. RENTAL RATES SHALL BE AS SET OUT IN THE CURRENT EDITION OF DHO FORM 527.

3. WHENEVER EXTRA WORK IS BEING PERFORMED UNDER SUBSECTION 2(B) ABOVE, WE AGREE TO SUBMIT DAILY REPORTS IN WRITING, INDICATING THE TOTAL CHARGEABLE COSTS INCURRED FOR THE DAY. VALUATION OF THE EXTRA WORK BEING SO PERFORMED WILL BE MADE ONLY ON THE BASIS OF THE APPROVED DAILY REPORTS.

FT.04 ADDENDA

A. WE AGREE THAT WE HAVE RECEIVED ADDENDA 1 TO 2 INCLUSIVE, AND THE TENDER PRICE INCLUDES THE PROVISIONS SET OUT IN SUCH ADDENDA.

FT.05 COMPLETION

A. WE AGREE TO COMMENCE WORK AS SPECIFIED, TO PROCEED CONTINUOUSLY TO THE COMPLETION AND TO COMPLETE ALL WORK WITHIN 25 WEEKS FROM THE DATE OF ISSUE OF THE WRITTEN ORDER TO START WORK.

NOTE - TENDERER TO INDICATE TIME FOR COMPLETION.

FT.06 TABLE OF PRICES

Item No.	Description	Unit	Unit Price for Additions and Deductions
1	Earth excavation and backfilling in trenches 0' to 10' deep	c.y.	$ 2.90
2	Earth excavation and backfilling in trenches 10' to 20' deep	c.y.	$ 5.90
3	Mass excavation for structures including disposal in any material except rock	c.y.	$ 3.75
4	Earth excavation by hand	c.y.	$ 14.00
5	Supply, place and compact granular backfill, Granular "A"	c.y.	$ 3.75
6	Supply, place and compact granular backfill, Granular "B"	c.y.	$ 3.25
7	Supply, haul and place topsoil 4" deep including fertilizer from an outside source	s.y.	$ 0.75
8	Supply and place 2" thick sod as specified	s.y.	$ 0.60
9	4000 psi concrete supplied in place	c.y.	$ 45.00
10	3000 psi concrete supplied in place	c.y.	$ 43.00
11	2000 psi concrete supplied in place	c.y.	$ 40.00
12	Formwork in place, including stripping and finishing concrete:		
	(a) for footings and floor slabs	s.f.	$ 2.00
	(b) for walls	s.f.	$ 1.25
	(c) for underside of slabs	s.f.	$ 2.10
13	Reinforcing steel supplied in place	lb.	$ 0.22
14	Timber left in place on written order of Engineer	MBF	$ 345.00
15	Supply and install PVC pressure pipe not including excavation or back-filling	ft.	$ 10.50

Item No.	Description	Unit	Unit Price for Additions and Deductions
16	Supply and install 125# Cast Iron Pipe for use with flanges	lb.	$ 0.50
17	Supply and install A.S.A. 125# flanges including nuts, bolts and gaskets	lb.	$ 0.85

Applicable taxes shall be included in the above unit prices.

FT.07 SCHEDULE OF SELECTED EQUIPMENT

The Tenderer is required to enter herein the actual prices quoted to him by the suppliers for the items listed. The quotations for the following items are required for the purpose of checking against quotations already received.

ALL PRICES SHALL BE FEDERAL SALES TAX EXCLUDED AND PROVINCIAL SALES TAX INCLUDED, F.O.B. WORKSITE

Item No.	Description	Qty.	Supplier's Price $	Amount* $	Delivery Period *
1	Vertical Pumping Units	2	3,002.50	6,005.00	16 weeks
2	Diesel generator	1		7,319.00	12-14 weeks
3	Comminutor	1		5,546.00	12-14 weeks
4	Hydroflush Pumping Station	1	5,500.00	5,500.00	8 weeks

*From approved drawings

* This price shall include for field inspection, as specified.

OFFERED ON BEHALF
OF THE CONTRACTOR

Signature

Contractor's Seal

Signature

DIXHILL CORPORATION LTD.
Company Name

Witness

2401 Royal Windsor Drive, Oakville
Address

MAR. 10 /72
Date

Proctor & Redfern Limited
Project EO 69581

HURRICANE ROAD AND PARK LANE SEWAGE PUMPING STATIONS

AGREEMENT

This Agreement made in triplicate this 10th day of MARCH, 1972, between

DIXHILL CORPORATION LIMITED hereinafter called "The Contractor",

AND

CORPORATION OF THE TOWN OF PELHAM hereinafter called "The Owner".

WITNESSETH, that the Contractor agrees with the Owner to perform all the work in accordance with the contract documents referred to in the tender of the Contractor dated the 28th day of Feb. 1972 (which shall be deemed to form part of this Contract) to the satisfaction of the Engineer for the total contract price of $131,986.00 which contract documents are attached hereto and which are hereby expressly made part of this Contract.

The Owner hereby agrees with the Contractor, that in consideration of the work being performed by the Contractor as specified, the Owner shall pay the Contractor for said work in accordance with the prices set out in the Form of Tender attached hereto, and in accordance with the provisions set out in the attached contract documents.

IN WITNESS WHEREOF the parties hereto have set their hands and seals the day and year first written above.

EXECUTION BY OWNER -

Name THE TOWN OF PELHAM

Officers

Date APRIL 4th 1972

Seal

EXECUTION BY CONTRACTOR -

Company Name DIXHILL CORPORATION LIMITED

Signatures

Witness

Date MAR. 10/72

Seal

Form CD-20 June 1970

The Canadian Surety Company
Suite 402,
101 Richmond Street West,
TORONTO, Ontario

AGREEMENT TO BOND NO. 7242376

\+

Date February 25 1972

Project EO 69581

Gentlemen:

Construction of Hurricane Road and Park Lane
Sewage Pumping Stations - Town of Pelham, Ontario

In consideration of the Owner accepting the tender of and executing an Agreement with

(hereinafter referred to as "The Tenderer") for the construction of the Hurricane Road and Park Lane Sewage Pumping Stations in the Town of Pelham, Ontario, subject to the express condition that the Owner receive the Performance Bond and the Payment Bond in accordance with the said tender, we the undersigned hereby agree with the Owner to become bound to the Owner as surety for the Tenderer in a performance bond and a payment bond in an amount equal to 100% and 50% (respectively) of the tender price, in the forms of Performance Bond and Payment Bond bound herein and in accordance with the said tender; and we agree to furnish the Owner with the said bonds within seven (7) days after notification of the acceptance of the said tender and execution of the said Agreement by the Owner has been mailed to us.

Yours very truly,
THE CANADIAN SURETY COMPANY

BY: M. E. Wright, Attorney-in-Fact.

Note: This Agreement must be executed on behalf of the surety company by its authorized officers under the company's corporate seal.

\+ Enter name and address of surety company at the top of the page.

Form CD-2

PERFORMANCE BOND

No. 7242402

KNOW ALL MEN BY THESE PRESENTS THAT

DIXHILL CORPORATION LIMITED as Principal,

hereinafter called the Principal, and

THE CANADIAN SURETY COMPANY as Surety,

hereinafter called the Surety, are held and firmly bound unto

CORPORATION OF THE TOWN OF PELHAM as Obligee,

hereinafter called the Obligee, in the amount of

ONE HUNDRED AND THIRTY-ONE THOUSAND, NINE HUNDRED AND EIGHTY-SIX--00/100 Dollars ($131,986.00) lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has entered into a written contract with the Obligee, dated the 10th day of March 19 71 , for Pelham Urban Sewage Works Area Stage 2A - Hurricane Road and Park Lane Sewage Pumping Stations Project EO 69581

in accordance with the plans and specifications submitted therefor which contract, plans and specifications and amendments thereto, to the extent herein provided for, are by reference made part hereof and are hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if Principal shall promptly and faithfully perform said Contract then this obligation shall be null and void; otherwise it shall remain in full force and effect.

Whenever Principal shall be, and declared by Obligee to be, in default under the Contract, the Obligee having performed Obligee's obligations thereunder, the Surety may promptly remedy the default, or shall promptly

(1) Complete the Contract in accordance with its terms and conditions, or

(2) Obtain a bid or bids for submission to Obligee for completing the Contract in accordance with its terms and conditions, and upon determination by Obligee and Surety of the lowest responsible bidder, arrange for a contract between such bidder and Obligee and make available as work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completion arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the contract price", as used in this paragraph, shall mean the total amount payable by Obligee to Principal under the Contract, less the amount properly paid by Obligee to Principal.

Any suit under this Bond must be instituted before the expiration of one (1) year from date on which final payment under the Contract falls due.

The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

No right of action shall accrue on this Bond to or for the use of any person or corporation other than the Obligee named herein or the heirs, executors, administrators, or successors of Obligee.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its Attorney-in-fact, this 13th day of March 1972 .

DIXHILL CORPORATION LIMITED

BY: _____

THE CANADIAN SURETY COMPANY

BY: _____

M. E. Wright, Attorney-in-Fact.

BID BOND

No. 7242376

KNOW ALL MEN BY THESE PRESENTS THAT

DIXHILL CORPORATION LIMITED as Principal,
hereinafter called the Principal, and

THE CANADIAN SURETY COMPANY as Surety,
hereinafter called the Surety, are held and firmly bound unto

CORPORATION OF THE TOWN OF PELHAM as Obligee,
hereinafter called the Obligee, in the amount of

SEVENTEEN THOUSAND, FIVE HUNDRED----------00/100 Dollars
($ 17,500.00)lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS, the Principal has submitted a written tender to the Obligee, dated the 28th day of February 19 72 , for Construction of Hurricane Road and Park Lane Sewage Pumping Stations - Town of Pelham, Ontario as per Project EO 69581

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the aforesaid Principal shall have the tender accepted within sixty (60) days from the closing date of tender and the said Principal will, within the time required, enter into a formal contract and give a good and sufficient bond to secure the performance of the terms and conditions of the contract, then this obligation shall be null and void; otherwise the Principal and Surety will pay unto the Obligee the difference in money between the amount of the bid of the said Principal and the amount for which the Obligee legally contracts with another party to perform the work if the latter amount be in excess of the former.

The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

Any suit under this Bond must be instituted before the expiration of six months from the date of this Bond.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its Attorney-in-fact, this 25th day of February 19 72 .

DIXHILL CORPORATION LIMITED

BY: _____

THE CANADIAN SURETY COMPANY

BY: _____
M. E. Wright, Attorney-in-Fact.

Procter & Redfern Limited, Form CD-2A, April 1971

LABOUR AND MATERIAL PAYMENT BOND NO. 7242403

(Private Contracts - Trustee Form)

NOTE: This Bond is issued simultaneously with another Bond in favour of the Obligee conditioned for the full and faithful performance of the Contract.

KNOW ALL MEN BY THESE PRESENTS THAT

DIXHILL CORPORATION LIMITED

hereinafter called the Principal, and as Principal,

THE CANADIAN SURETY COMPANY

hereinafter called the Surety, are, subject to the conditions hereinafter contained, held and firmly bound unto as Surety,

CORPORATION OF THE TOWN OF PELHAM

hereinafter called the Obligee, for the use and benefit of the Claimants, their and each of their heirs, executors, administrators, successors and assigns in the amount of as Trustee,

SIXTY-FIVE THOUSAND, NINE HUNDRED AND NINETY-THREE------00/100 Dollars, ($65,993.00) of lawful money of Canada for the payment of which sum well and truly to be made the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns jointly and severally, firmly by these presents.

SIGNED AND SEALED this 13th day of March 19 72.

WHEREAS the Principal has entered into a written contract with the Obligee dated the 10th day of March 19 72, for Pelham Urban Sewage Works Area Stage 2A - Hurricane Road and Park Lane Sewage Pumping Stations Project No. EO 69581

which contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that, if the Principal shall make payment to all Claimants for all labour and material used or reasonably required for use in the performance of the Contract, then this obligation shall be null and void; otherwise it shall remain in full force and effect, subject, however, to the following conditions:

(1) A Claimant for the purpose of this Bond is defined as one having a direct contract with the principal for labour, material, or both, used or reasonably required for use in the performance of the Contract, labour and material being construed to include that part of water, gas, power, light, heat, oil, gasoline, telephone service or rental equipment directly applicable to the contract provided that a person, firm or corporation who rents equipment to the Principal to be used in the performance of the Contract under a contract which provides that all or any part of the rent is to be applied towards the purchase price thereof shall only be a Claimant to the extent of the prevailing industrial rental value of such equipment for the period during which the equipment was used in the performance of the Contract. The prevailing industrial rental value of equipment shall be determined, insofar as it is practical to do so, in accordance with and in the manner provided for in the latest revised edition of the publication of the Candian Construction Association entitled 'Rental Rates on Contractors' Equipment" published prior to the period during which the equipment was used in the performance of the Contract.

(2) The Principal, and the Surety hereby jointly and severally agree with the Obligee as Trustee that every Claimant who has not been paid as provided for under the terms of his contract with the Principal before the expiration of a period of ninety (90) days after the date on which the last of such Claimant's work or labour was done or performed or materials were furnished by such Claimant, may as a beneficiary of the trust herein provided for, sue on this bond, prosecute the suit to final judgement for such sum or sums as may be justly due to such Claimant under the terms of his said contract with the Principal and have execution thereon. Provided that the Obligee is not obliged to do or take any act, action or proceeding against the Surety on behalf of the Claimants or any of them to enforce the provisions of this Bond. If any act, action or proceeding is taken either in the name of the Obligee or by joining the Obligee as a party to such proceedings then such act, action or proceeding shall be taken on the understanding and basis that the Claimants or any of them who take such act, action or proceeding shall indemnify and save harmless the Obligee against all costs, charges and expenses or liabilities incurred thereon and any loss or damage resulting to the Obligee by reason thereof. Provided still further that, subject to the foregoing terms and conditions, the Claimants or any of them may use the name of the Obligee to sue on and enforce the provisions of this Bond.

(3) No suit or action shall be commenced herunder by any Claimant:

(a) unless such Claimant shall have given written notice with the time limits hereinafter set forth to each of the Principal, surety and Obligee, stating with substantial accuracy the amount claimed. Such notice shall be served by mailing the same by registered mail to the Principal,

Surety and Obligee at any place where an office is regularly maintained for the transaction of business by such persons or served in any manner in which legal process may be served in the Province or other part of Canada in which the subject matter of the contract is located. Such notice shall be given (I) in respect of any claim for the amount or any portion thereof required to be held back from the Claimant by the Principal under either the terms of the Claimant's contract with the Principal or under the Mechanics' Liens legislation applicable to the Claimant's contract with the Principal whichever is the greater within one hundred and twenty (120) days after such Claimant should have been paid in full under the Claimant's contract with the Principal; (II) in respect of any claim other than for the holdback or portion thereof referred to above within one hundred and twenty (120) days after the date upon which such Claimant did or performed the last of the work or labour or furnished the last of the materials for which such claim is made under the Claimant's contract with the Principal.

(b) After the expiration of one (1) year following the date on which Principal ceased work on the Contract including work performed under the guarantees provided in the Contract.

(c) Other than in a court of competent jurisdiction in the Province or District of Canada in which the subject matter of the Contract or any part hereof is situated and not elsewhere, and the parties hereto agree to submit to the jurisdiction of such court.

(4) The amount of this Bond shall be reduced by and to the extent of any payment or payments made in good faith and in accordance with the provisions hereof, inclusive of the payment by the Surety of Mechanics' Liens which may be filed of record against the subject matter of the Contract, whether or not claim for the amount of such lien be presented under and against this Bond.

(5) The Surety shall not be liable for a greater sum than the specified penalty of this Bond.

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal, and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its Attorney-in-fact the day and year first above written.

DIXHILL CORPORATION LIMITED

BY: _____

THE CANADIAN SURETY COMPANY

BY: _____

M. E. Wright, Attorney-in-Fact.

Form
CD-3

LIST OF SUB-CONTRACTORS

SUB-TRADE	NAME OF SUB-CONTRACTOR	ADDRESS OF SUB-CONTRACTOR
Electrical	Own Forces	

Proctor & Redfern Limited
Consulting Engineers
June 11, 1969
AS:hs

GENERAL CONDITIONS OF THE CONTRACT

SUBJECT INDEX

PROCTOR & REDFERN LIMITED

CONSULTING ENGINEERS

75 EGLINTON AVENUE EAST, TORONTO 315, ONTARIO

GENERAL CONDITIONS OF THE CONTRACT

1. DEFINITIONS

1. Wherever used in these General Conditions, contract documents, drawings, or any other document forming part of the Contract:

   (a) the word "CONTRACT" means: the Contract to do the work, the Bonds or Securities, the Addenda (if any), the Specifications, the General and Special Conditions, the Tendering Information, the List of Contract Documents, the Drawings, and all other documents referred to or connected with the agreement.

   (b) the word "OWNER" means the person or corporation accepting the Tender.

   (c) the word "CONTRACTOR" means the person or corporation to whom the Contract for the work has been awarded.

   (d) the word "SUBCONTRACTOR" means the person or corporation having a contract with the Contractor (or with another subcontractor) for the execution of a part or parts of the work included in the Contract, or for the supplying of material for the Contract and worked to a special design according to the plans and specifications.

   (e) the word "ENGINEER" means PROCTOR & REDFERN or PROCTOR & REDFERN LIMITED, Consulting Engineers, and their duly authorized agents.

   (f) the word "WORK" means all labour, materials and other things required to be done, that are shown, described or implied in the contract documents, and includes all extra and additional work and material that may be ordered by the Engineer.

2. DOCUMENTS

2. (a) The Contract documents shall be signed and sealed, in triplicate, by the Owner and the Contractor.

   (b) The Contract documents are complementary and what is called for by any one shall be as binding as if called for by all. The intention of the documents is to include all plant, labour and materials (except as specifically excepted) necessary for the complete and proper execution of the work.

   (c) Plans and specifications shall be read and interpreted together. Work and materials not specifically described, but obviously necessary for the satisfactory completion of the work for the purpose intended shall be supplied and performed by the Contractor as though it had been described and shown in the plans and specifications.

   (d) Reference to published standard specifications shall be to the edition current at the time of the signing of the Contract documents.

3. SUB-CONTRACTORS

3. (a) Without the written approval of the Engineer, the Contractor shall not change the subcontractors named in the Contract.

   (b) The Contractor shall be held as fully responsible to the Owner for the acts and omissions of his subcontractors (and of persons directly and indirectly employed by them) as for the acts and omissions of persons directly employed by the Contractor.

   (c) The Contractor shall bind every subcontractor to the terms of the Contract documents, as far as applicable to the subcontractor's work.

   (d) Nothing in the Contract documents shall create any contractual relation between any subcontractor and the Owner.

   (e) Any division of the specifications into sections or subsections shall be only for clarity of reading and reference, and shall not be taken to be a division into trades, sub-trades or sections of work of any kind.

4. NOTICES

4. (a) Any notice or communication to the Contractor shall be deemed to be legally well and sufficiently given and served, if:

   (i) handed to the Contractor or any of his clerks or agents, or

   (ii) posted or sent to the address given in the Tender, or,

   (iii) posted or sent to the Contractor's domicile or usual place of business, or

   (iv) posted or sent to the place where the work is, or is to be, carried on, or

   (v) posted to or left at his last known address.

(b) If the work is closed, suspended or stopped for the winter (or for any other approved reason), the Contractor shall remove all material from streets, sidewalks, boulevards and other public property.

(c) The Contractor shall ensure that the charges of explosives used, and the time at which they are exploded, shall be such as not to cause suffering, inconvenience or injury to persons nor damage to property.

(d) Explosives shall be properly housed and protected, and no explosives that have deteriorated shall be used. Approved methods of handling and thawing frozen explosives shall be followed. In blasting operations, the Contractor shall exercise the greatest care at all times.

(e) The Contractor shall provide, erect and maintain all necessary barriers, fences and other proper protection, and shall provide and maintain watchmen and lights as may be necessary to ensure the safety of the public and others. Unless otherwise specified, the Contractor shall keep all streets and sidewalks open for use by the public, for such width as the Engineer may direct. The Contractor shall provide, erect and maintain a sufficient number of detour signs, and other proper notices, wherever the use of any street or sidewalk is dangerous due to the Contractor's operations.

(f) When work is carried on at night, the Contractor shall provide, erect and operate a sufficient number of lights to enable the work to be performed satisfactorily.

11. PROSECUTION OF THE WORK

11. (a) The Contractor shall complete all the work in accordance with a schedule set down in co-operation with the Engineer at the time of the award of the Contract. Amendments to this schedule may be made by the Engineer, on application by the Contractor.

(b) Should the Engineer be of the opinion that the quantity or quality of labour or plant supplied by the Contractor is not sufficient, or that the methods being employed are not such as will ensure that the work will be completed within the specified time, the Contractor shall forthwith improve the quality and increase the number of men employed, shall make revisions to the plant, and shall employ work methods satisfactory to the Engineer.

(c) Should the Contractor leave the site of the work (either permanently or temporarily), he shall provide and leave a competent and reliable agent or superintendent in charge. Such person shall act in place of the Contractor.

12. OPERATIONAL RISKS

12. (a) All damage, loss, expense and delay incurred or experienced by the Contractor in the prosecution of the work, by reason of unanticipated difficulties, bad weather, strikes, wars, acts of God, or other mischances, shall be borne by the Contractor and shall not be the subject of a claim for additional compensation.

(b) The position of pole lines, conduits, watermains, sewers and other underground and overground utilities and structures is not necessarily shown on the Contract drawings, and, where shown, the accuracy of the position of such utilities and structures is not guaranteed. Before starting work, the Contractor shall inform himself of the exact location of all such utilities and structures, and shall assume all liability for damage to them. Unless otherwise specified, the Contractor shall support all such utilities and structures, or temporarily remove them, and restore them, to the satisfaction of the owners of the utilities and structures.

13. WORKMANSHIP AND MATERIALS

13. (a) All workmanship shall be first-class and material new and of best quality, all to the approval of the Engineer. The Contractor shall pay due regard to the neat and attractive appearance of the finished work.

(b) If ordered by the Engineer, the Contractor shall make such openings in the work as are needed to re-examine the work, and shall forthwith make the work good again. Should the Engineer find the work so opened up to be faulty in any respect, the whole of the expense of opening, inspecting and making good shall be borne by the Contractor. Should the Engineer find the work opened up to be in an acceptable condition, such expense will be borne by the Owner.

(c) The Contractor shall remove and make good all defective work and materials, and the entire cost of such removal and making good shall be borne by the Contractor.

20. THE ENGINEER

20. (a) The Engineer will make such decisions as are necessary with respect to:

(i) Discrepancies in the Contract documents, or

(ii) Differences of opinion or misunderstanding that may arise as to the meaning of the Contract, or

(iii) Omissions or misstatements in the Contract documents, or

(iv) Quality, dimensions and sufficiency of plant, materials or work, or

(v) The due and proper execution of the work, or

(vi) The measurement, quantity or valuation of the work, including additional work and deductions, or

(vii) Any other questions or matters arising out of the Contract.

The Engineer's decision as to any matter referred to in this clause shall be binding upon the parties concerned.

(b) When the Engineer makes a decision under this clause, the Contractor shall immediately proceed with all work affected by the decision. Additions to or deductions from the Contract price shall be made only as provided for in the Contract, and no revisions to the completion time shall be made, unless approved by the Engineer.

(c) The Engineer may at all reasonable times visit, enter and make inspections at any building, factory, workshop, work or site wherever materials are being prepared, made or treated, or where other work is being done in connection with the Contract. The Engineer may also take such samples as he may consider necessary.

21. SHOP DRAWINGS

21. (a) Shop drawings will be examined only to check conformance with the design concept of the project and compliance with the Contract Documents.

(b) Where the Engineer requires shop and setting drawings, the Contractor shall submit them in sufficient time to allow for examination by the Engineer and for any corrections that he may require to be made. The Contractor shall not commence work on items covered by shop drawings (where such drawings have been requested) before the Engineer's approval.

(c) The Contractor shall make changes in shop and setting drawings as the Engineer requires consistent with the Contract and shall submit revised prints to the Engineer. When submitting shop and setting drawings, the Contractor shall notify the Engineer of every change made from the Contract Documents.

(d) Approval of shop drawings by the Engineer shall not relieve the Contractor from compliance with requirements of the Contract Drawings and Specifications, nor relieve him of responsibility for errors made in the shop drawings.

(e) The Contractor shall be responsible for confirming and correlating quantities and dimensions; selecting fabrication processes and techniques of construction; and coordinating the work of all trades.

22. OWNERSHIP OF DOCUMENTS

22. All Contract documents, including all drawings, specifications, models and similar items supplied by the Engineer are his property. Such documents are not to be used on other work and, with the exception of the signed Contract documents, shall be returned by the Contractor to the Engineer on the completion of the work.

23. LIABILITY

23. The Contractor shall assume the defence of and shall indemnify and save harmless the Owner from all claims:

(a) resulting from the prosecution of the work, or

(b) resulting from any of the Contractor's operations, or

(c) caused by reason of the existence, location or condition of the work, or

(d) caused by reason of any material, plant or labour used in the work, or

(e) arising from any act of commission or omission on the part of the Contractor, or

(f) relating to inventions, copyrights, trademarks, patents (and rights to them) used in doing the work, or in the use and operation of work on completion, unless otherwise specified.

30. The Engineer may prohibit the Contractor from carrying on operations during any hour or hours of the day in which the Engineer, in his judgment, deems such operations to be a disturbance or nuisance to the public.

30. HOURS OF WORK

Such prohibition may be made notwithstanding any prior consent, order, agreement or requirement in the Contract that stipulates maximum or minimum hours of work.

31. (a) At monthly intervals, the Contractor and the Engineer shall make a valuation of the work constructed and material supplied under the Contract. Should the Engineer wish to measure any of the work or material, the Contractor shall assist in such measurements and furnish all particulars required.

31. VALUATION

(b) The monthly valuations described in subsection (a) above shall not bind the Owner, the Contractor or the Engineer to any final valuation of the work to be done under the Contract, but shall be construed as approximations only for the purpose of Progress Certificates.

(c) The final valuation of the work shall be prepared as soon as possible after the whole of the works has been completed.

32. The Contractor shall be entitled to receive partial payments upon the certificate of the Engineer of the value of work done and materials supplied.

32. PROGRESS CERTIFICATES

Unless otherwise specified, eighty-five per cent (85%) of the estimated value of the completed work and material supplied will be certified, less any amounts retained under Clause 35.

For Progress Certificates, the Engineer's decision as to the estimated value of completed work and material supplied shall be final, but shall not be binding on him, the Contractor or the Owner in the establishing of the final value of the work, nor shall it be taken as evidence as to ownership of, or payment for the work.

33. (a) When the work required to be done under the Contract has been completed in every respect and is acceptable to the Engineer, a final valuation of the Contract will be prepared by the Contractor and the Engineer.

33. ACCEPTANCE CERTIFICATE

(b) The Contractor shall submit to the Engineer a statement indicating the Contractor's valuation of the work according to records available to the Contractor. The Engineer will review this statement and either approve it or submit detail reasons for revisions that, in his opinion, should be made.

(c) Should the Engineer consider it advisable, the Engineer will prepare a final valuation of the work and submit it to the Contractor who shall either approve it or submit detail reasons for revisions that, in his opinion, should be made.

(d) When the Engineer and Contractor have reached agreement as to the final value of the work, the Engineer will issue an Acceptance Certificate, detailing the valuation of the Contract, and certifying its acceptance at a certain specific date, referred to as the "acceptance date."

(e) Should the Engineer and Contractor be unable to reach agreement as to the final value of the work within a reasonable period, the Engineer will issue his Acceptance Certificate detailing his valuation of the Contract and certifying acceptance of the work at a certain specific date, referred to as the "acceptance date."

34. Holdbacks held under the provision of the Mechanics' Lien Act will be released upon application by the Contractor, and will be subject to the requirements of the Act. The Contractor's applications shall be made in the forms included as Appendices 1 and 2 to these General Conditions.

34. SUBSTANTIAL COMPLETION AND HOLDBACK RELEASE

35. As well as monies held back as required by Provincial Statutes, the Owner may retain a percentage of the value of the completed work under terms set out in the Special Conditions of Contract.

35. PAYMENTS

36. Provided all the provisions of the Contract have been fully met, the Engineer will issue a Final Payment Certificate one year after the acceptance date, unless otherwise specified. The Final Payment Certificate will entitle the Contractor to receive the full amount due under the Contract.

36. FINAL PAYMENT CERTIFICATE

APPLICATION FOR RELEASE OF SUBCONTRACTOR'S HOLDBACK

Owner:

Project:

EO: Contractor:

Subcontract:

Subcontractor:

1. We, the said subcontractor hereby confirm that the work under the said subcontract was completed on , that the subcontract price was $, and hereby request the issue of a certificate that such subcontract work has been completed.

Date:_____ Signature:_____

SEAL:

2. We, the said contractor hereby confirm that the work of the above subcontract has been completed in accordance with the specifications and that the subcontract price was $, and hereby apply for a reduction in holdback with respect to the subcontract, all in accordance with the provisions of the Mechanics' Lien Act.

Date:_____ Signature:_____

SEAL:

APPENDIX 2 OF THE GENERAL CONDITIONS OF THE CONTRACT

APPLICATION FOR RELEASE OF CONTRACTOR'S HOLDBACK

Owner:

Project:

EO: Contractor:

We, the said Contractor,
hereby confirm:

(i) that the work under the above contract is "substantially complete" as defined in the Mechanics' Lien Act, and

(ii) that there are no outstanding liens, garnishees, attachments or other charges affecting the work, and

(iii) that the value of work done to the date of substantial completion is $
and

(iv) that the value of work remaining to be done is $

and hereby apply for release of holdback monies in accordance with the provisions of the Mechanics' Lien Act.

Date:_____ Signature:_____

SEAL:

SECTION 01010 - GENERAL

01010.01 GENERAL

A. DESCRIPTION OF WORK

1. THIS CONTRACT IS FOR THE FOLLOWING WORKS IN THE TOWN OF PELHAM, ONTARIO -

   (A) CONSTRUCTION OF A RAW SEWAGE PUMPING STATION ON HURRICANE ROAD, FONTHILL.

   (B) SUPPLY AND INSTALLATION OF A PACKAGE TYPE RAW SEWAGE PUMPING STATION AND OVERFLOW STRUCTURE OFF PARK LANE, FONTHILL.

B. LIMITS OF SITE

1. THE LIMITS OF THE SITE ARE SHOWN ON THE CONTRACT DRAWINGS. ALL OPERATIONS SHALL BE CONFINED WITHIN THESE LIMITS, UNLESS WRITTEN APPROVAL IS OBTAINED FROM THE ENGINEER AND FROM THE PROPERTY OWNERS CONCERNED.

C. PROJECT SIGNBOARD

1. A PROJECT SIGNBOARD SHALL BE SUPPLIED, HAVING DIMENSIONS OF 6 FT. X 4 FT. WITH PORTABLE AND SUFFICIENT FRAMEWORK TO SUPPORT THE SIGN WHICH SHALL BE PROMINENTLY DISPLAYED IN AN APPROVED LOCATION.

2. BEFORE CONSTRUCTION OF THE SIGN, APPROVAL OF THE WORDING SHALL BE OBTAINED.

3. THE SIGN SHALL BE COMPLETE AND IN PLACE WITHIN TWO WEEKS OF THE START OF THE WORK.

D. LOCAL LABOUR

1. PREFERENCE SHALL BE GIVEN TO THE HIRING OF LOCAL LABOUR. THE LABOUR FORCE SHALL BE MAINTAINED TO AT LEAST 50 PERCENT LOCAL LABOUR, PROVIDED THE LABOUR IS AVAILABLE LOCALLY AND IS PHYSICALLY FIT AND PROPERLY QUALIFIED BY TRAINING AND EXPERIENCE TO MEET THE CONTRACTOR'S REQUIREMENTS.

2. THE FOREGOING SHALL NOT APPLY TO SUPERINTENDENT, TIMEKEEPER, FOREMAN, MACHINE OPERATORS NOR SHALL IT APPLY UNTIL TEN DAYS AFTER THE CONTRACTOR HAS ACTUALLY COMMENCED OPERATIONS.

3. THE CONTRACTOR'S LABOUR ROLLS SHALL AT ALL TIMES BE AVAILABLE FOR EXAMINATION BY THE ENGINEER IN ORDER THAT HE MAY DETERMINE THE DOMICILE OF ANY OR ALL OF THE CONTRACTOR'S EMPLOYEES, AND THE CONTRACTOR SHALL GIVE ASSISTANCE THAT MAY BE NECESSARY FOR SUCH PURPOSE.

E. PHOTOGRAPHS

1. PROFESSIONAL PHOTOGRAPHS SHALL BE TAKEN OF THE WORK AT MONTHLY INTERVALS. AT LEAST SIX DIFFERENT VIEWS SHALL BE TAKEN EACH MONTH AND TWO SETS OF 8 INCH BY 10 INCH PRINTS SUPPLIED TO THE ENGINEER.

F. SETTING OUT OF THE WORK

1. ALL SETTING OUT SHALL BE PERFORMED BY THE CONTRACTOR, WORKING FROM BENCH MARKS AND POINTS OF REFERENCE SUPPLIED BY THE ENGINEER.

   SETTING OUT SHALL INCLUDE THE PREPARATION OF GRADE SHEETS, INSTALLATION OF STAKES, OFFSETS, SITE RAILS AND SIMILAR OPERATIONS.

   THE CONTRACTOR WILL BE HELD RESPONSIBLE FOR THE CORRECTNESS OF THE POSITION, LEVELS, DIMENSIONS AND ALIGNMENT OF ALL PARTS OF THE WORKS, AND FOR THE PROVISION OF ALL NECESSARY INSTRUMENTS AND LABOUR IN CONNECTION THEREWITH. CHECKING OF THE SETTING OUT OF ANY LINE OR LEVEL BY THE ENGINEER SHALL NOT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITY FOR THE CORRECTNESS THEREOF.

   ALL STAKES, LOT PINS, MARKS AND REFERENCE POINTS SHALL BE CAREFULLY PROTECTED AND PRESERVED AND, IF DESTROYED OR REMOVED BY THE CONTRACTOR, SHALL BE REPLACED AT HIS EXPENSE.

G. CONSTRUCTION SCHEDULE

1. THE CONTRACTOR SHALL WITHIN TWO WEEKS AFTER BEING AWARDED THE CONTRACT, SUBMIT HIS PROPOSED CONSTRUCTION SCHEDULE TO THE ENGINEER FOR APPROVAL. THE SCHEDULE SHALL SHOW PROPOSED PROGRESS IN WEEKLY STAGES FOR THE MAIN SECTIONS AND SUBSECTIONS OF THE WORK.

H. COST BREAKDOWN

1. WITHIN TWO WEEKS OF CONTRACT AWARD, THE CONTRACTOR SHALL SUBMIT HIS BREAKDOWN OF THE COST OF THE WORK. THE FORM OF THE BREAKDOWN SHALL GIVE THE COSTS OF THE VARIOUS STRUCTURES, AND THE COST OF SITE WORK APPLICABLE TO THE OVERALL JOB. IN ADDITION, THE COST OF THE TOTAL MECHANICAL AND TOTAL ELECTRICAL TRADES SHALL BE GIVEN WITH THE MECHANICAL COST TOTAL SHOWING SEPARATE COSTS AGAINST PROCESS PIPING AND PROCESS EQUIPMENT.

01010.02 PRODUCTS

A. TESTS

1. WHERE REQUIRED BY THE ENGINEER, THE CONTRACTOR SHALL SUPPLY FOR TESTING, SAMPLES OF ALL MATERIALS TO BE USED IN THE CONSTRUCTION OF OF THE WORKS, AND SHALL NOT USE ANY MATERIAL UNTIL IT HAS BEEN SO APPROVED.

01010.03 EXECUTION

A. WORK ON ROADS

1. NO WORK SHALL BE PERFORMED ON PUBLIC RIGHTS-OF-WAY WITHOUT THE APPROVAL OF THE ROAD AUTHORITY.

B. USE OF HYDRANTS

1. FIRE HYDRANTS SHALL BE KEPT ACCESSIBLE AND FREE OF OBSTRUCTIONS.

2. FIRE HYDRANTS MAY BE USED AS A SOURCE OF WATER ONLY WITH THE APPROVAL OF THE WATER AUTHORITY, AND SUBJECT TO ITS RULES AND CONDITIONS.

C. INCLEMENT WEATHER

1. ADEQUATE PROTECTION SHALL BE MADE AND PRECAUTIONS TAKEN AT TIMES OF INCLEMENT WEATHER.

2. INCLEMENT WEATHER OR EXTRA WORK CAUSED BY SUCH WEATHER WILL NOT BE ACCEPTED AS REASON FOR ADDITIONAL PAYMENT.

D. MUD AND DUST

1. STREETS AND OTHER CONSTRUCTION AREAS SHALL BE KEPT CLEAN. IF IT IS NECESSARY TO HAUL WET MATERIAL, SUITABLE WATERTIGHT TRUCKS SHALL BE USED.

2. DUST SHALL BE LAID BY THE USE OF WATER OR CALCIUM CHLORIDE, OR BOTH.

E. OTHER CONSTRUCTION

1. OTHER CONSTRUCTION MAY BE PROCEEDING AT THE SAME TIME NEAR THE WORK OF THIS CONTRACT. COOPERATION AND FREE ACCESS SHALL BE EXTENDED TO ALL OTHER COMPANIES AND EMPLOYEES WHO MAY BE WORKING IN THE AREA.

F. RAILWAYS

1. ALL WORK ON OR NEAR RAILWAY PROPERTY SHALL BE CARRIED OUT TO THE SATISFACTION AND REQUIREMENTS OF THE RAILWAY AUTHORITY AND SHALL CONFORM TO THE REGULATIONS OF THE CANADIAN TRANSPORT COMMISSION. ALL RAILWAY COSTS AND CHARGES SHALL BE PAID BY THE CONTRACTOR.

G. ADJACENT STRUCTURES AND UTILITIES

1. TEMPORARY AND PERMANENT SUPPORT AND TEMPORARY RELOCATION AND REPLACEMENT OF UNDERGROUND OR OVERHEAD UTILITIES SHALL BE PERFORMED AS PART OF THE CONTRACT AND AS DETAILED IN THE GENERAL CONDITIONS.

2. PERMANENT RELOCATION OF UNDERGROUND OR OVERHEAD UTILITIES WILL BE CARRIED OUT BY OTHERS, IF NECESSITATED BY COINCIDENCE OF LINES OR GRADES, OR BOTH.

SECTION 2A - EXCAVATION, BACKFILL AND ROUGH GRADING

2A.01 GENERAL

A. Intent of Section

1. This section covers:

(A) Stripping and storage of topsoil

(B) Excavation in all materials

(C) Dewatering

(D) Fill and backfill

(E) Rough grading

(F) Sheeting, shoring and bracing

(G) Disposal of unwanted materials.

B. Excavation, Sheeting and Shoring

1. All excavation work, sheeting, shoring etc. shall comply with the requirements of the current edition of the Trench Excavators' Protection Act and Regulations, and the Contractor shall be responsible for the adequacy and safety of the excavations, shoring, bracing, sheeting and temporary bridgings.

2. Sheeting, shoring and bracing shall be designed by qualified engineers and stamped drawings shall be submitted to the Engineer for review.

C. Temporary Walkways

1. Suitable temporary walkways and bridges required for the accommodation of travel during construction shall be provided.

D. Computation of Quantities

1. The Contractor shall make his own computation of the amount and nature of excavation required.

2A.02 PRODUCTS

A. Granular Backfill

1. Granular backfill shall be Class "A" granular material, in accordance with DHO Form 314.

B. General Site Fill

1. Material for general site fill shall be approved material from site excavations. If acceptable material of sufficient quantity is not available on site, the Contractor shall import such material at his own expense.

2. Fill material shall be free from rocks larger than 6" diameter, organic or frozen material, debris, water or other unsuitable material.

C. Pipe Bedding

1. Granular bedding material shall conform to the gradation for granular backfill.

2. Concrete bedding material shall be as specified in Section 03300.

2A.03 EXECUTION

A. Clearing and Grubbing

1. The construction area shall be cleared of logs, stumps, brush, vegetation and other perishable or objectionable matter.

Stumps or roots under road or building sites shall be removed to a depth of 18 inches below subgrade. Spoiled material shall be removed from the site.

2. All topsoil, leaf mould, roots, weeds, grass and other surface vegetation and material shall be removed from areas to be paved, excavated or filled.

3. Topsoil and organic material, approved by the Engineer for reuse in fine grading shall be stored separately from subsoil, in stockpiles on site in locations approved by the Engineer. Spreading and disposing of surplus topsoil is covered in another section.

B. Dewatering and Thawing of Excavation

1. The Contractor's attention is drawn to the perched groundwater conditions shown in the Soils Report at the Hurricane Road site.

2. The Contractor shall supply and maintain suitable and approved type pumping equipment, and shall keep the excavations free of all water so that the placing of all pipes and concrete may be done in the "dry". Pumping equipment shall be capable of continuous operation without interruption. Water removed shall not interfere with the work.

3. All such equipment shall be operated until, in the opinion of the Engineer, the necessity for same is eliminated.

4. The Contractor shall provide, all labour and equipment necessary for thawing out frozen ground, and shall obtain the prior approval of the Engineer before proceeding with any thawing operation.

C. Sheeting, Shoring and Bracing

1. The Contractor shall provide and set all shoring and bracing necessary, or wherever ordered by the Engineer to prevent caving in of banks and excavations. Shoring shall be placed so as to be independent of all footings and shall remain in position until forms have been removed, waterproofing completed, drains in place, and approval given to proceed with backfilling.

2. All sheeting and bracing shall be removed as the trenches and excavations are backfilled and in such a manner as to avoid caving in of the work and settlement of, or injury to structures. All voids left by the withdrawal of the sheeting or bracing shall be carefully filled with approved backfill material and thoroughly compacted with a suitable rammer or as otherwise directed by the Engineer.

D. Excavation

1. Excavations shall be carried down to the depths and elevations of foundations shown on the drawings.

2. The sides of the excavation shall be sloped or shored in accordance with local bylaws and regulations.

3. All foundations shall be placed on undisturbed soil, and in no case shall any foundation be placed on frozen soil or softened subgrade.

4. Bottoms of excavations shall be smooth and cleared of all loose material and debris before concrete is poured.

5. Should conditions arise necessitating that excavations be carried down to a greater depth than shown on the drawings, or as specified herein, the Contractor shall do such work under the direction of, and only after first obtaining the written authority of the Engineer. Such work shall be classified as additional work and the cost determined on the basis of the Table of Prices for variation in the work.

6. Where foundation excavations are carried below the levels shown on the drawings, or as specified herein, without the Engineer's written approval, the over-excavation shall be backfilled with 2,000 psi concrete to the specified neat lines of the foundations or base course.

7. Excavated materials which are to be used for backfilling shall be stockpiled so as not to interfere with construction. Excavated material shall not be placed so as to cause pressure on newly placed concrete, or pipe, or where it might cause soil slippage.

8. No heavy plant or heavy earth-moving equipment shall be positioned or operated within three feet of the excavation lines.

9. Foundation material which in its natural state has good bearing strength and which has had its characteristics changed by reason of the Contractor's operations, shall be removed and replaced with 2,000 psi fill concrete as directed by the Engineer.

10. Ground adjacent to all excavations shall be graded to prevent ingress of water into excavated areas.

11. Surplus and unsuitable material from the excavation shall be disposed of, off the site, by the Contractor.

12. Where footings at different elevations occur adjacent to each other, the Contractor shall employ the necessary means to ensure that each foundation is constructed on properly compacted material extending to undisturbed ground.

13. Trenching

    (A) Trenches shall be dug to the alignments and depths required.

    (B) Minimum trench width shall be 1 foot greater than the outside diameter of the pipes or 2'-6", whichever is greater, plus allowance for shoring where necessary.

    (C) The excavation shall be dug to a level below the bottom of the pipe as shown on the drawings.

    (D) Where, in the opinion of the Engineer, the subgrade is too soft to support the pipe, the Engineer will instruct the Contractor as to the required procedure, and any extra work so ordered will be paid for as an addition to the Tender Price.

E. Unconsolidated Ground

1. Soft, wet or unconsolidated ground, quicksand and organic material encountered in the subgrade shall be removed and the void refilled with well compacted, clean dry DHO Granular "B" fill. Under or near footings or foundations, the voids shall be filled with 2,000 psi fill concrete. Such work shall be paid for as an extra only on written instruction from the Engineer. Material that is firm in its natural state and which has become unsuitable due to the actions of the Contractor shall be removed and replaced with Granular "B" fill, or concrete as directed and at the expense of the Contractor.

F. Pipe Bedding

1. All pipes shall be bedded as carefully as possible in order to ensure uniform bearing of the pipe throughout its entire length.

2. Granular bedding shall be placed for the full width of the trench, and to the extent below and above the pipe as shown on the drawings.

3. Granular bedding shall be hand-placed, tamped and consolidated throughout as for backfill.

4. Concrete cradle bedding shall conform to Section 03300.

G. Backfilling

1. Fill behind foundation walls to rough grade elevation shall be a 1'-6" thick continuous vertical pervious wall of Granular "A" material, placed and compacted to 95% Standard Proctor density.

2. Backfill material around the granular wall shall be approved inorganic material from the excavation or imported, suitable for compaction to the degree required. The material shall be placed and compacted as specified in paragraph (3) below to form a homogeneous mass of uniform density.

3. Backfill and fill materials shall be placed in continuous horizontal layers not greater than 6" in thickness and compacted by approved mechanical means to not less than 95% Standard Proctor density at optimum moisture content as determined by the Standard Proctor Density Test (ASTM D698-58T). The material shall be wetted by sprinkling, if necessary, and the moisture content maintained as wet as practical for compaction.

4. All imported fill material shall be free from boulders, organic or frozen material, timbers or other unsuitable material.

H. Rough Grading

1. The site shall be rough graded, compacted and formed to within a tolerance of 1" to receive fine grading and landscaping. Soft areas shall be removed and replaced with suitable material.

2. Rough grades, including slopes and ditches, shall be formed and maintained to provide proper drainage.

SECTION 2B - FINE GRADING & SODDING

2B.01 GENERAL

A. Intent of Section

1. This section covers the following:

(A) Finish Grading

(B) Topsoiling

(C) Fertilizer

(D) Sodding

B. Handling and Storage

1. Sod shall be brought to the site at the time of planting and if stored overnight shall be stacked and wetted down to prevent drying out.

2. Fertilizer shall be stored clear of the ground and protected from the weather.

C. Quality Assurance

1. The sodding shall be done in the fall during September. Spring working will be accepted providing the date of commencement is early enough that full advantage shall be taken of the spring growing season.

D. Areas for Sodding

1. All areas inside the property limits at the Hurricane Road site shall be sodded. At the Park Lane site, all areas disturbed by the Contractor's operations shall be restored to their original condition.

E. Watering

1. Water and the means of providing the same for the work described shall be the responsibility of the Contractor.

2B.02 PRODUCTS

A. Materials

1. Fertilizer shall be 7-7-7 chemical fertilizer.

2. Sod shall be nursery grade. It shall be 1-1/2" thick permeated with roots free from weeds, even in texture, be in healthy condition with no sign of decay.

3. Topsoil shall be material stockpiled on site during the work of the Contract or sandy loam brought from another source if there is a deficiency on site.

2B.03 EXECUTION

A. Sodding Preparation

1. (A) The areas to be sodded shall be graded to an elevation 4" below the final grades as indicated on the drawings.

(B) All weeds, roots, stones and other similar material shall be removed and the area tilled with plough, harrows, discs and scarifier or roto tilled to a depth of 9" and the surface rolled to a smooth even surface.

(C) A 4" thickness of topsoil shall be placed on the area prepared as above described together with the fertilizer applied at the rate of 30 lbs./1,000 sq.ft. The topsoil and fertilizer shall then be thoroughly disced and harrowed and rolled to a smooth even compacted surface.

B. Sodding

1. The sod shall be laid with an even and close knit level surface.

C. Top Dressing

1. The top dressing shall consist of 20 cubic feet of topsoil mixed with 1/2 lb. of seed distributed evenly over sodded area at the rate of the above proportion to 1,000 square feet of sod.

D. Cutting and Watering

1. The growth shall be cut when 3" high down to 1-1/2" and cut at regular intervals to maintain as near as possible an average height of 2" until the work is accepted by the Engineer.

SECTION 2C - ACCESS ROAD

2C.01 GENERAL

A. Intent of Section

1. The work to be done under this section shall consist of the subgrade and base compaction and placing, compacting and binding of all granular material to form the access road shown on the drawing at the Hurricane Road Pumping Station.

2C.02 PRODUCTS

A. Materials

1. The base course shall be Class "B" granular material, in accordance with DHO Form 314.

2. The top course shall be of Class "A" granular Material, in accordance with DHO Form 314.

3. Granular material shall be treated with DHO asphalt primer.

4. Only materials approved by the Engineer shall be used in the work. Any material of a quality or nature not suitable for its intended use will be rejected.

2C.03 EXECUTION

A. Road Section

1. The following construction shall be used for the road:

(A) Compacted subgrade by the 6-inch layer compaction method.

(B) 6-inch base course of Class "B" granular material.

(C) 6-inch top course of Class "A" granular material.

B. Compaction of Subgrade

1. The road subgrade preparation shall extend 3 feet over and above the nominal road width on either side where possible, and be formed to the required lines, grades and cross-sections.

2. The upper 6" of the subgrade shall be watered and aerated until the material is at its optimum moisture content, and shall then be compacted by rolling with a 3 wheel power roller of 10 tons weight. Compaction shall be continued until there is no creeping or weaving of the subgrade ahead of the roller and until a smooth even surface is obtained. Places inaccessible to the roller shall be compacted with mechanically operated hand tampers.

SECTION 03300 - CAST-IN-PLACE CONCRETE FOR STRUCTURES

03300.01 GENERAL

A. Intent of Section

1. This section covers cast-in-place concrete work shown on or inferable from the drawings and certain related work including:

(A) Waterstops

(B) Joints

(C) Setting of anchor bolts and inserts.

2. Watertightness test.

B. Standards

1. All concrete work shall comply with the National Building Code of Canada (NBC).

2. Recognized authority shall be the application publications of:

Canadian Standards Association A23 (CSA)
Local Building Bylaws
American Concrete Institute (ACI)
Concrete Reinforcing Steel Institute (CRSI)
American Society for Testing Materials (ASTM)

C. Tolerances

1. Tolerances for formwork shall comply with ACI 347.

2. Tolerances for placing of reinforcement shall comply with CRSI recommended practice for placing reinforcing bars.

D. Cold and Hot Weather Work

1. Comply with ACI 306, recommended practice for cold weather concreting.

2. Comply with ACI 605, recommended practice for hot weather concreting.

E. Inspection and Testing

1. Routine testing of materials, of proposed mix designs, and of resulting concrete for compliance with the technical requirements of the specifications shall be the duty of a testing agency selected by the Engineer and paid for by the Owner.

2. Testing required because of changes in materials or proportions of the mix requested by the Contractor, as well as any extra testing of concrete or materials occasioned by their failure to meet the specification requirements, shall be at the Contractor's expense.

3. The use of testing services shall not relieve the Contractor of his responsibility to furnish materials and construction in compliance with the plans and specifications.

4. To facilitate testing services, the Contractor shall:

   (A) secure and deliver to the testing agency, preliminary representative samples of the materials he proposes to use and which are required to be tested.

   (B) Submit through the testing agency to the Engineer the concrete mix design he proposes to use, and make written request for approval.

   (C) Furnish such casual labour as is necessary to obtain and handle samples at the project or at other sources of materials.

   (D) Advise the testing agency sufficiently in advance of operations to allow for the desired quality tests and for the assignment of personnel.

   (E) Provide and maintain for the sole use of the testing agency adequate facilities for safe storage and proper curing of concrete test cylinders on the project site as required by CSA A23.2.14.

F. Watertightness

1. All concrete liquid retaining structures shall be tested for watertightness.

G. Shop Drawings

1. Shop drawings shall be submitted for the Engineer's examination.

   (A) Layout drawings will be checked for bar sizes, location and spacing, and for concrete dimensions, and stamped and initialled "approved" - authority to fabricate, "approved as noted" - authority to fabricate as noted, or "not approved" - require resubmission.

   (B) Bar bending schedules will be reviewed but not stamped or initialled.

H. Standard Details

1. Attached applicable standard detail sheets are as follows:

Anchor bolt details	E-STD-11-4
Construction joint	E-STD-11-1
Equipment pads	E-STD-11-5

03300.02 PRODUCTS

A. Materials

1. Cement

(A) Unless otherwise specified herein, cement shall be normal portland cement. High early strength cement may be used with the Engineer's approval.

2. Aggregates

(A) Fine aggregate shall be natural sand.

(B) Coarse aggregate shall be gravel or crushed stone.

3. Additives

(A) Air-entraining agents shall be used in all but fill concrete. Percentage of air entrained in slabs shall be limited to 3 percent.

(B) Water reducing agents shall be used in all concrete.

(C) Admixtures shall be compatible with each other and with all construction materials used in contact with concrete.

4. Reinforcement

(A) Reinforcement shall be deformed hard grade rail or billet steel complying with CSA G30.1 and G30.2.

5. Joints

(A) Unless indicated otherwise on the drawings, construction joints and waterstops shall conform to the standard detail sheet attached.

6. Curing

(A) A curing compound may be used as an alternative to wet curing except for those surfaces where specified finishing is not compatible with the membrane.

7. Floor Hardener shall be Emery Aggregate.

B. Mixes

1. Concrete shall be proportioned in accordance with CSA A23, Section 9.1.1 (B) Alternate No. 2.

2. Maximum aggregate size shall be 3/4 inch.

3. Concrete strength at 28 days shall be:

(A) Lean and fill concrete including concrete in skim slabs	2000 psi
(B) All other concrete	4000 psi

4. Grout for the bottom of wall forms shall consist of the wall mix minus the coarse aggregate.

5. Grout for bases, anchors and similar items shall be non-shrink. Where grout is of such a nature as to cause discolouration of staining on exposure, it shall be left 1/2 inch shy of finished surface and parged with cement mortar to match the surrounding material.

03300.03 EXECUTION.

A. Standard Specification

1. Work shall comply with CSA Standards A23.1 "Concrete Materials and Methods of Construction".

B. Finishing

1. Slab surfaces shall receive a steel trowel finish.

2. Where slabs are to bear foot traffic, they shall receive an Emery shake finish.

3. Floor finishing shall be done by an experienced floor contractor specializing in this type of work and approved by the Engineer.

(A) Plain Concrete

(1) Where not otherwise specified, the final surface of the concrete shall be finished by screeding and floating, and followed by trowelling with a steel trowel or finishing machine.

(B) Emery Shake

(1) The final surface of the concrete shall be floated with a disc type power float and compacted to a smooth surface, free of voids, and shall receive a monolithic Emery Shake topping consisting of a dry mixture of portland cement and Emery aggregate in the proportion by weight of 1 cement to 2 aggregate.

The mixture shall be evenly distributed over the floor at the rate of 60 pounds of aggregate per 100 square feet of floor, in two applications, and mechanically compacted after each application.

When the surface has hardened sufficiently so that excess fines will not be brought to the surface, the floor shall be trowelled using an approved type mechanical trowel, and finished by hand trowelling to a smooth, hard, dense surface, free from lines, bulges and blemishes.

4. Formed Surfaces

(A) All Formed Surfaces

(1) Upon obtaining the approval of the Engineer to remove forms, the concrete surfaces shall be inspected, defective areas shall be chipped out to a depth of not less than one inch or as required by the Engineer, and re-inspected. The area shall be chipped out to clean neat lines and patched to watch the existing concrete. All defect not requiring chipping out shall be repaired. All ties, bolts, nails or other metal shall be removed and tie holes filled. All fins and other projections shall be neatly chipped off.

(B) All Formed Surfaces Exposed to View

(1) Upon satisfactory completion of the work of (A) above, surface roughness shall be machine-ground down until the whole surface is of a smooth texture. The whole surface shall then be rubbed down with abrasive. A slurry of one part cement to two parts of mortar sand shall then be rubbed over the entire surface with a wood float and rubbed off to present a final surface of smooth texture.

(C) Fillets and Chamfers

(1) Unless noted otherwise, all edges and corners shall have a 1/2 inch fillet or chamfer.

C. Watertightness Test

1. The Contractor shall, in the presence of the Engineer, conduct leakage tests on completion of the watertight structures prior to backfilling. The cost of testing and any remedial works shall be borne by the Contractor.

2. The tanks shall be filled to the maximum liquid level shown on the drawings and shall remain so filled by additions as required for a period of 7 days. Any leaks observed shall be repaired to the satisfaction of the Engineer.

At the expiration of the 7-day period, the level of the surface of the water shall be recorded and further measurements made at intervals of 24 hours for 7 days, and the differences recorded.

For the purposes of this test, the structures will be deemed to be watertight and will be accepted in this respect by the Engineer if, after due account has been taken of evaporation and/or rainfall, the total drop in surface level does not exceed 1/2 inch in 7 days. Should the loss of water exceed the foregoing stipulated maximum permissible amount. The Contractor shall take measures approved by the Engineer, including waterproofing, sealing, and/or replacement of concrete, to produce a watertight structure. The test for watertightness shall be repeated until a satisfactory test result is obtained.

D. Bonding to Hardened Concrete

1. Grout shall be placed evenly on the hardened surface before normal concreting is commenced.

SECTION 3B - PRECAST CONCRETE

3B.01 GENERAL

A. Intent of Section

1. This section covers:

(A) Precast concrete roof slabs

(B) Precast paving slabs

B. Standards

1. All work shall conform to the National Building Code of Canada (NBC) and Canadian Standards Association (CSA) A135.

C. Shop Drawings

1. Shop drawings shall be submitted to the Engineer for approval.

2. Shop drawings shall show a setting out plan, reinforcing, and details.

3. Each slab shall be identified by a standard mark listed in the Schedule shown on the manufacturer's erection plan and placed legibly on each unit.

D. Inspection

1. A qualified Testing and Inspection Laboratory shall be employed to certify the compliance of the precast roof slabs to the requirements of these specifications.

3B.02 PRODUCTS

A. Concrete

1. Concrete shall conform to Section 03300

2. Concrete strength shall be 5000 psi.

B. Precast Roof Slabs

1. Precast roof slabs shall be 6"Flexicore roof slabs with round voids running lengthwise, as fabricated by a licensee of the Flexicore Company Inc., Dayton, Ohio, and shall conform in all applicable details to the manufacturer's published recommended specifications.

2. The roof shall be capable of carrying a superimposed load of 55 pounds per square foot.

C. Precast Paving Slabs

1. The precast concrete paving slabs shall be 2 inches thick x 2'-6" x 2'-0" as manufactured by PreCon Murray Ltd., Beer Precast Ltd., or other approved manufacture.

3B.03 EXECUTION

A. Damaged Units

1. Any precast units damaged in any way by transportation, fabrication, or erection, shall be replaced with undamaged units.

B. Precast Roof Slabs

1. The Contractor shall form in the slabs all holes as located on the drawings, whether they be formed in a single unit or not. The Contractor shall provide any additional special framing required over and above that shown on the drawings, to maintain design of the slabs.

2. The erection of the precast roof units shall be in accordance with the manufacturer's recommendations. The units shall be aligned and levelled, tight, and grouted by a mixture of not less than 1 part cement to 3 parts fine sand. All work shall be neatly and fully finished. Roof ceiling, walls and floor below shall be hosed down to remove grout that may have seeped through.

C. Precast Paving Slabs

1. The units shall be dense, hard concrete with 6" x 6" - 2/2 mesh reinforcement. The surface shall be indented in a neat linen pattern across the total surface of the slabs without border.

2. The area to which the units are to be laid shall receive 4 inches of pit run gravel, 3 inches of clean sharp sand and a layer of 8mm. thick polyethylene sheet lapped 6 inches at the joints. Units shall be laid on, on a solid bed; hollow spots shall be made good.

3. The Contractor shall supply slabs necessary to complete the work. Such slabs shall be laid in place on the site in the locations directed by the Engineer.

4. The units shall be carefully cleaned upon completion of the Contract. No acid shall be used. All units that cannot be cleaned by detergent and water shall be replaced.

5. No chipped or cracked slabs shall be laid, and all slabs damaged during the contract period shall be replaced.

SECTION 4A - MASONRY

4A.01 GENERAL

A. Intent of Section

1. This section covers the work necessary to complete the masonry work of the Contract including all cutting and building in as necessary.

B. Handling and Storage

1. Proprietary materials shall be delivered to the site in their original containers with the makers' seals and labels unbroken.

2. Sand, cement and lime shall be stored on raised platforms, clear of the ground. Cement and lime shall be stored under cover and fully protected from the weather.

3. Care shall be exercised in the handling of the bricks and blocks. No damaged units shall be used and bats used only where required to obtain bond. Should damaged units be placed in the work, they shall be cut out and replaced to the satisfaction of the Engineer.

4A.02 PRODUCTS

A. Materials

1. (A) The facing bricks shall be Chestnut Old Dutch as supplied and manufactured by the Domtar Company Ltd.

(B) The bricks shall be Type 1 as CSA Specification A82-1 and conform to ASTM C216.

(C) The bricks shall be subjected to testing as described in CSA A82.2. The bricks shall be modular in size.

2. (A) Blocks shall be hollow lightweight slag units, modular in size, as supplied by General Concrete Ltd.

(B) The blocks shall be autoclaved, high pressure, steam cured at 140 to 150 psi at 355° to 365° F. for a minimum of 5 hours.

Linear shrinkage and moisture movement shall be as determined by the British Standards Institution and shall not exceed 0.035 per cent.

(C) In addition to the above, the blocks shall conform to CSA A165.1, 1964.

3. Cement shall be Type 1 as ASTM C150.

4. Sand shall be clean, sharp natural sand as ASTM C144.62T.

5. Water shall be potable.

6. Mortar waterproofer shall be Medusa Stearate.

7. Lime shall be hydrated, Type N as ASTM C207 and CSA A82.43.

8. Masonry wall flashings shall be 2 oz. copper Fibreen.

9. Metal cavity bonding ties shall be Duro-Wall rectangular adjustable wall ties of 3/16" diameter steel rod galvanized at the rate of 1-1/4 ozs. per square foot surface area.

10. Cavity brick vents shall be aluminum as 11 Ex supplied by Lawson Taylor.

11. Anchors shall be steel hot galvanized.

12. Metal weepholes shall be N.20 Cadmium Plated Steel as supplied by Guy Guenelte Ltd., Montreal.

13. Cavity wall insulation shall be Purlboard rigid urethane with factory applied aluminum skin bonded to both faces with permeability rating not exceeding 0.03 perms.

14. Insulation adhesive shall be Glidden DW 24.

15. Joint sealing tape shall be .002" soft aluminum tape, 2" wide.

16. Caulking shall be as specified in Section 7B.

B. Mortar

1. Mortar for above grade work shall be as ASTM C270, Type N, 1 part Portland Cement to 1 part Hydrated Lime to 6 parts sand, all materials measured by volume, the sand in a loose damp condition.

2. Mortar for below grade work shall be mixed in the proportions, 1 part Portland Cement to 1/4 part Hydrated Lime to 3 parts sand. All parts measured as in B.1 above.

3. (A) The mortar shall be mixed dry then wetted using no more than six gallons of water per bag of cement, the stearate waterproofer being added as per the manufacturer's instructions.

(B) All mortar shall be used within one hour after mixing with water.

4A.03 EXECUTION

A. Workmanship

1. All masonry units shall be set out and built to the respective dimensions called for on the drawings, in the mortar, as described.

2. The masonry work shall be laid up with all horizontal and vertical joints uniform in thickness, the horizontal joints truly level and the vertical joints in bond and truly plumb, one above the other.

3. All angles and reveals shall be kept strictly true, square and plumb.

4. The joints of all masonry work, both interior and exterior, shall be finished with a concave jointing tool, the face of the joint being worked with the tool to produce a smooth, dense, watertight joint.

5. All walls and the exterior facings and interior masonry units shall be constructed simultaneously and in a uniform manner, no one portion being raised more than four feet above another at one time and shall be raked back and not toothed up, the cavity ties being built into the joints of the work as the work proceeds. The ties shall not under any circumstances be inserted into a joint later.

6. The work, both interior and exterior wythes of the cavity wall, shall be laid up in stretcher bond, the two wythes being tied together with the cavity ties. The ties shall be set not more than 3'-0" apart horizontally, or 1'-6" vertically on centres and staggered.

7. At the base of the wall, weep holes shall be provided through alternate vertical joints of the exterior wythe. The weep holes shall be the diameter of the thickness of the joint and be set directly above the D.P.C. in the lowest course of the work.

8. In freezing or near freezing weather, the work shall be protected against frost by means satisfactory to the Engineer. Masonry units shall be completely free from ice and frost. Mortar materials shall be preheated and mortar shall be used from heated mortar boards. No pointing shall be carried out in freezing weather, or if the masonry contains frost.

B. Insulation

1. The insulation shall be set against the face of the inner wythe of the cavity and be fixed by adhesive to the face of the masonry. The adhesive shall be applied to the back of the insulation in 2" diameter slabs at 16" centres, the boards being tightly butted and fixed with staggered joints. Joints shall be covered with the 2" wide foil bedding solidly in adhesive.

2. The boards when fixed shall leave a clear cavity space between the face of the insulation and the inner face of the exterior wythe of masonry which shall be kept free of all mortar droppings, broken units or other similar debris.

C. Masonry Flashings

1. At the base of all external walls and over lintels to doors, windows and other openings in external walls and to the full thickness of masonry walls, place and build in copper flashings as described, in positions shown on the drawings. The flashings shall be to the full width of the lintels plus 6" at either end and shall be lapped at least 8" at all joints, in continuous lengths.

D. Other Work

1. All joints for setting roofing flashings shall be raked out to a depth of 1 inch. All loose lintels and other items as required by the Contract such as door and louvre frames, pipes and other fittings shall be allowed for or built in as required and the masonry shall be cut and fitted around steelwork and next to other work. All lintels shall be painted with 2 coats of bitumen paint before fixing and all aluminum work back painted prior to building in.

E. Cleaning

1. Masonry shall be cleaned down thoroughly upon completion. All loose mortar, streaks and stains shall be removed by scrubbing with soap and water. No acid of any kind shall be used.

SECTION 5A - MISCELLANEOUS METALWORK

5A.01 GENERAL

A. Intent of Section

1. This section of the specification covers the supply and installation of miscellaneous metalwork including, but not limited to, the following:

(A) Aluminum Handrailing & Gate Chains

(B) Aluminum Grating

(C) Aluminum Checker Plate

(D) Anchor Bolts

(E) Ladder Rungs and Cages

(F) Access Ladders

(G) Insect Screens

(H) Bar Screen

(I) Aluminum louvres shall be as specified in Section 16.

(J) Weirs and Stop Gates

5A.02 PRODUCTS

A. Mild Steel

1. Mild steel shall conform to the current Canadian Standards Association Specification for Mild Structural Steel G40.3.

B. Steel Pipe

1. Steel pipe shall conform to the current Standard Specifications for Welded and Seamless Steel Pipe, serial designation A-53 of the American Society for Testing Materials.

C. Cast Iron

1. Cast iron shall conform to ASTM Specification A-126 Class C or A-48 Class 40.

D. Galvanizing

1. Galvanizing where indicated shall conform to the current Standard Specifications for Zinc Coatings on Structural Steel Shapes, serial designation A-123 of the American Society for Testing Materials.

E. Nuts and Bolts

1. Brass for nuts and bolts shall conform to the current Standard Specifications for Naval Brass Rods for Structural Purposes, serial designation B-21 of the American Society for Testing Materials.

2. Stainless steel nuts and bolts shall conform to the current Standard Specifications for Hot Rolled and Cold Finished Corrosion-Resisting Steel Bars, serial designation A-276 Type 304 of the American Society for Testing Materials.

F. Aluminum Work

1. Aluminum work shall be fabricated of plates and rolled or extruded shapes or castings conforming (unless otherwise approved) to the following alloy designation of the Aluminum Company of Canada:

- Regular Shapes - Structural	- 50-S
- Extruded Shapes - Structural	- 65-ST-6
- Smooth Plates	- D-54 S (H-34 Temper)
- Rivets and Bolts	- 65 ST-6
- Checkered or Tread Plates	- 65.ST-6
- Castings	- 135 T 22
- Grating & Bearing Angles	- 6063 T6
- Ladder Rungs	- 65 ST-4
- Handrailing, Posts & Rails	- B51.P6

2. All fixings shall be stainless steel.

G. Aluminum grating shall be as Type TBX, I Section grating as manufactured by the Borden Company, or approved equal.

H. The aluminum checker plate shall be raised oval pattern plate.

5A.03 EXECUTION

A. Aluminum Grating

1. The Contractor shall furnish the aluminum grating wherever called for on the drawings. Aluminum grating shall be of the type previously specified and shall support a uniform safe load of not less than 200 lbs. per square foot with a maximum deflection of 1/240 of the span, based on a minimum safety factor of 2.5 and an allowable fibre stress of 12,000 lbs. per square inch.

2. The tread surfaces of all bearing bars shall be scored so as to provide a non-slip surface. Bearing bars in each panel shall be interconnected at ends with banding bars connected to each bearing bar. Banding bars shall be of the same height as the main bearing bar and shall have a minimum thickness of 3/16". All openings in the grating which require cutting of more than three main bars, or a side and end bar, shall be finished in the same manner as the ends of the grating panels. The panels shall be fabricated in such a manner that where a number of panels are to be laid side by side the carrier or spacer bars, running at right angles to the bearing bars, shall line up so as to preserve a continuous appearance.

3. Panels shall be clipped together with sufficient purpose made clips to prevent differential movement panel to panel when subjected to moving loads.

4. Where appropriate, gratings shall be supported on aluminum framing angles set into concrete. The minimum thickness of metal in a framing angle shall 1/4".

5. All openings for valve bonnets, stems, etc. shall be banded and a minimum clearance of one inch left all round.

6. All grating dimensions are to be obtained at the plant site before fabricating.

B. Aluminum Checker Plate

1. Covers and frames shall be of aluminum, unless otherwise shown. The checker plate shall be framed as shown on the drawings. The frames shall consist of angles, mitred at the corners, complete with anchor lugs. All covers shall be fitted with lifting handles, unless otherwise indicated. (Refer to Standard Detail E-STD-8-10).

C. Ladder Rungs

1. The ladder rungs and cages shall be of aluminum alloy to the dimensions given on the drawings. (Refer to Standard Detail E-STD-5-2).

D. Access Ladders

1. Access ladders shall be fabricated of aluminum to the dimensions and details shown on the drawings.

E. Insect Screen

1. Aluminum insect screens shall be provided for all louvres and vents, as specified. In addition, all exhaust vents and drainage vents in roofs and walls shall be provided with aluminum insect screens.

F. Bar Screens

1. Coarse bar screens including support members shall be provided as detailed on the drawings.

2. The entire screens and support members shall be hot dip galvanized after fabrication.

3. A suitable rake having tangs spaced to mate with the screen bars shall be provided. The rake handle shall be 6' long.

G. Painting

1. All items not fabricated from aluminum, stainless steel or galvanized shall be thoroughly cleaned and given one shop coat of an approved primer in accordance with Section 9A before shipment. The portions of steelwork which are to be built into concrete shall not be primed except for one inch adjacent to the exposed portions. Where shop paint has been removed or chipped during erection or transportation such abrasion marks shall be painted using the same paint as specified for shop painting.

2. All aluminum in contact with concrete or steel shall be painted with two coats of bitumen prior to fixing.

H. Handrailing

1. The aluminum handrailing shall be all welded. The posts and rails shall be 1-1/2" diameter Schedule 40 pipe with a clear anodized satin finish.

2. The top rails shall be continuous across the posts, the intermediate rail welded between the posts, all members being fitted and cut accurately to suit the curvature of the members.

3. All welds shall be continuous and ground off to a neat smooth finish.

4. The vertical standards shall be set into 4" deep x 2" diameter sleeves set into the concrete floor.

5. At the base of the posts a 4" diameter flange shall be welded to the post and set in caulking tight to the floor.

6. The posts shall be grouted into the sleeves using Porok as manufactured by the Sterling Dray Co. Ltd.

7. All rails shall be precisely straight in all planes and the posts properly vertical when the installation is complete.

8. Safety chains shall be stainless steel, 3/16" proof coil chain (1/2" x 1 1/8"c/c) oval shaped link.

I. Anchor Bolts

1. Anchor bolts shall be of the sizes shown on the manufacturer's drawings and shall be set during the concreting where possible.

2. Anchors and inserts required to be fixed after concrete has been poured shall be set by means of cinch anchors, or approved equal, according to manufacturer's instructions.

J. Weirs and Stop Gates

1. Weirs and stop gates where shown on the drawings shall be fabricated from 5/16" aluminum plate.

K. Shop Drawings

1. Shop drawings of all miscellaneous metalwork shall be issued to the office of the Engineer, showing clearly the methods of fabrication, fixing and dimensions of units.

SECTION 6A - ROUGH CARPENTRY

6A.01 GENERAL

A. Intent of Section

1. This section covers the rough carpentry work including all necessary hardware and temporary work.

B. Handling and Storage

1. The materials shall be stacked on site and separated according to function. The work to be built into the permanent work of the Contract shall be under cover, fully protected from the weather and clear of the ground.

2. The wood for temporary work may be stacked in the open.

6A.02 PRODUCTS

A. Materials

1. Wood except as noted below shall be Eastern or Sitka Spruce conforming to CSA 0.141, 1965. Moisture content shall not be greater than 19% at the time of installation.

2. Exposed woodwork in fascias and similar work shall be White Pine.

3. (A) All fixing hardware in permanent work shall be galvanized.

(B) Fixings wood to wood shall be by spiral nails.

(C) Fixings to concrete shall be by rawlbolts or cinch anchors.

(D) Fixing wood to steel shall be by bolting.

4. Wood preservative for buried work shall be Pentox Copper Napthalate, or other approved.

5. Primer/sealer shall be white lead.

6A.03 EXECUTION

A. Temporary Work

1. All temporary shoring, enclosures, guard rails, barriers and doors shall be provided as necessary for the safe construction of the work, in accordance with the National Building Code of Canada, Part 8, Construction Safety Measures and to conform to the relevant Provincial and local Safety Regulations in force at the time.

B. Preservative

1. All woodwork completely built into other work such as cants, blockings, strapping, studding and other like work shall be treated by twice soaking in a bath of the wood preservative. The wood shall be treated prior to fixing and after site cutting. The wood shall be left in the preservative for a minimum of one minute for each soaking.

C. Installation

1. The woodwork shall be installed to the details shown on the drawings.

2. All intersecting members shall be mitred accurately to suit the angles required and all joints in lengths shall be shiplapped.

3. All fixings shall be set flush in buried work and shall be countersunk and punched in for filling in exposed work.

4. All surfaces exposed shall be finished to a smooth, even surface, suitable for the designated preparation and finish.

5. Untreated or unprimed carpentry items or materials shall be primed immediately upon delivery to site or soaked in the preservative.

6. Woodwork visible upon completion but built permanently against other work shall be back painted with one coat of primer/sealer.

SECTION 7A - ROOFING

7A.01 GENERAL

A. Intent of Section

1. This section covers the roofing work of the Contract including roof insulation and roofing flashings.

2. Masonry flashings shall be as described in Section 4A, Masonry.

B. Handling and Storage

1. All materials except gravel shall arrive on the site as packaged by the manufacturer.

2. The felts, asphalt and insulation shall be stored in position recommended by the manufacturers, in a heated weatherproof enclosure at a minimum temperature of 45 degrees F.

3. Do not store gravel on roof ahead of demand, bring gravel to roof only as it is required for spreading, spread on roof as work proceeds.

7A.02 PRODUCTS

A. Materials

1. Materials shall conform in general to the requirements of the Canadian Roofing Contractors' Association Roofing Specifications.

2. Felts shall be No. 15 asphalt impregnated felt as CSA A123.6.

3. Asphalt shall be Type 1 roofing asphalt as CSA A123.7.

4. Asphalt primer shall be as CGSB 37-GP-9(a).

5. Insulation shall be asphalt impregnated fibreboard roofing insulation as CGSB 11-GP-2.

6. Roof vapour retardant shall be as ASTM Standard A71 with a permeability no more than 0.10 perms.

7. Gravel shall be white dolomite graded from 1/4" to 5/8".

8. Metal flashings shall be 26 gauge copper bearing galvanized steel sheet.

9. Caulking shall be black thiokol based material as Lasto-Meric supplied by the Tremco Company.

7A.03 EXECUTION

A. Preparation

1. The roof deck shall be swept completely free of all dust, dirt or debris. The roof deck shall be dry, smooth and free from frost and all foreign matter prior to the commencement of the vapour barrier application.

B. Vapour Retardant & Insulation

1. The vapour retardant and insulation shall be installed in accordance with Canadian Roofing Contractors' Association Specification CVR-2.

C. Built Up Roofing

1. Built up roofing shall be Class A in accordance with CRCA Specification C1-1.

D. Metal Flashings, Counterflashings, Roof Drains and Drips

1. All metal flashings shall be installed in positions and to details indicated on the drawings. Loose slip expansion joints filled with caulking shall be provided at 20'-0" minimum centres, in long lengths of flashings and positioned symmetrically on the building where visible and arranged with drips as indicated.

2. Roof drains shall be flashed into the roof using the recommended method of flashing as detailed by the roof drain manufacturer.

3. Provide positive counterflashings around all exhaust fans and vents and at all other projecting through roof surface. Co-operate with the work of other Divisions and seal all to ensure completely watertight connections between the roofing and items carried through.

E. Cleaning

1. Wipe and wash joints clean after welding on completed work. Remove bitumen and other foreign matter from metal flashings. Wash with soap and hot water and leave work in first class condition.

F. Inspections

1. Roofing inspections shall be arranged and paid for as part of the Contract.

2. (A) The inspection shall be to ensure that the installation is in accordance with this specification by daily visits of at least one hour whilst the roofing is being placed.

(B) A report shall be proposed after each visit and copies of the report forwarded to the Engineer within three days.

G. Guarantee

1. The roofer shall be a member in good standing of the Canadian Roofing Contractors' Association and shall, on completion of the work, provide the Association's guarantee covering the built up roofing and membrane flashing for a period of two years, and the related sheetmetal work for a period of one year.

SECTION 7B - BUILDING CAULKING

7B.01 GENERAL

A. Intent of Section

1. This section covers the work required to complete the building caulking work at external joints between materials where jointed one to another as required by the Contract. Caulking shall be applied to internal joints except where finishes provide the seal.

B. Other Work

1. The caulking for roofing purposes shall be as described in Section 7A of these specifications.

C. Quality Assurance

1. The caulking material shall be delivered to the site in the manufacturer's original containers, all seals intact.

D. Storage and Handling

1. Keep caulking materials absolutely dry, remove only as much from storage as can be applied in sequence of operations.

7B.02 PRODUCTS

A. Materials

1. Caulking shall be Lasto-Meric supplied by the Tremco Company, conforming to ASA A116.1 - 1960 for polysulphide sealants.

2. Primer shall be Lasto-Meric as supplied by the Tremco Company.

3. Cleaning material shall be xylol.

B. Mixing

1. The caulking material is of two part component polysulphide requiring mixing on site. The manufacturer's mixing instructions are to be followed rigidly concerning pot life of material mixed and application.

7B.03 EXECUTION

A. Preparation

1. The surfaces of the joints shall be clean and dry, all loose materials must be removed and the surfaces thoroughly cleaned prior to commencing work.

B. Caulking

1. The caulking material shall be applied by a pressure gun, hand or mechanically operated. The nozzle shall be of size to suit the width of the joint to be caulked, the joint being filled completely in a single pass with the gun.

The finished joint shall be smooth and even and slightly convex when completed.

C. Cleaning

1. All surplus sealant and all sealant adhering to material not intended to receive it shall be cleaned off carefully, using a solvent supplied by the manufacturer of the sealant. Care shall be taken not to damage other work. Materials which cannot be cleaned of sealant shall be removed and replaced.

D. Guarantee

1. The building caulking, and all the building caulking work included in this Section, shall be subject to a written guarantee that the workmanship and material shall be free of defects of any kind for two years from the date of issue of the final certificate.

2. The caulking hardness shall be not less than 20 and not greater than 35 (Shore A) hardness.

SECTION 8A - DOORS & HOLLOW METAL FRAMES

8A.01 GENERAL

A. Intent of Section

1. This section covers the supply and installation of the hollow metal doors and hollow metal frames.

B. Handling and Storage

1. The doors and frames shall be stored on site under cover in positions to ensure that no bending or warping of the doors and frames shall take place.

8A.02 PRODUCTS

A. Materials

1. The steel for hollow metal doors shall be 18 gauge.

2. Steel for hollow metal frames shall be 16 gauge.

3. Fiberglass shall be heavy density slab preformed to suit the doors, Type AF454, 3 to 5 lbs. per cubic foot.

4. Glue shall be waterproof as CSA No. 0112.7.

8A.03 EXECUTION

A. Hollow Metal Doors & Panels

1. The hollow metal doors and panels shall be made up of a honeycomb core of 20 gauge stiffness at 6" o.c., 16 gauge channel edging and preformed fiberglass filling the core with 18 gauge steel facing. The hinge side of the door shall receive 10 gauge continuous reinforcement and the lock side 14 gauge channel similarly.

2. The cores and edging shall be all welded, the facing lock sealed and soldered at seams, all seams being hidden when the doors are hung.

B. Hollow Metal Frames

1. The frames shall be mitred and all welded, the welds at the back of the frame to provide an invisible joint.

2. The frames shall be heavily reinforced to suit the hinges, latch and lock strike cut outs and closers and shall be fitted with adjustable anchors at 2'-0" vert. centres. The anchors shall be 8" minimum in tail length.

Channel floor spreaders shall be provided. Rubber bumpers shall be inserted three per jamb to receive the clashing edge of the doors.

D. General

1. All doors and frames shall be manufactured to suit the sizes indicated on the detail drawings.

2. The doors and frames shall be truly flat without warp or twist; bowing of the metal from the cores shall not take place under any circumstances.

E. Hanging

1. The doors shall be hung and fitted with the hardware shown in the schedule on the drawings.

2. Clearance at head and jambs shall be 1/16" and the clearance at the floor to suit thresholds and floor finishes.

3. The doors shall remain open in any position.

F. Cleaning and Painting

1. All doors and frames shall be shop cleaned, phosphatized and primed with priming paint compatible to the finish paint described in Section 9A, Painting. After fixing the door and frames shall be touched up, sanded and reprimed ready for the finish coatings.

SECTION 9A - PAINTING

9A.01 GENERAL

A. Intent of Section

1. This Section covers the work required to complete the paint coatings necessary to complete the work of the Contract.

2. The following surfaces shall be painted:

(A) All internal concrete block.

(B) All ferrous metals both internal and external.

(C) All exposed to view woodwork.

(D) All insulated and wrapped piping.

(E) Machinery and electrical boxes shall be included whether painted in the shop or not.

3. (A) Brass, copper and aluminum shall not be painted.

(B) The concrete of the wet well shall not be painted.

(C) The Park Lane package station shall not be painted.

B. Handling and Storage

1. The paint shall be received in the sealed containers packaged at the factory It shall be stored clear of the ground in a heated enclosure fully protected from the elements.

2. The temperature of the enclosure shall not fall below 50 degrees Fahrenheit.

9A.02 PRODUCTS

A. Materials

1. The paint shall be the product of Glidden Co., Inertol Ltd., CIL or Mobil (Valdura Division) and shall be applied in strict accordance with the manufacturer's instructions.

2. The paint coatings for internal concrete and masonry shall be chlorinated rubber enamel flat finish.

3. The paint coatings for woodwork shall be alkyd enamel.

4. The paint coatings for ferrous metalwork shall be alkyd enamel, gloss finish. Machinery enamelled in the shop such as pumps, motors, and electrical panels shall be included in the above.

5. The paint coatings for the ferrous metals in the wet well shall be Quigley's AAA.111 black paint.

6. The paint coatings for galvanized metal shall be alkyd enamel.

9A.03 EXECUTION

A. Site Inspection

1. The painting operations of the Contract shall be the subject of inspections by the manufacturer of the paint.

2. The representative of the paint manufacturer shall inspect the prepared surfaces prior to painting. No paint shall be applied prior to the approval of the representative in writing.

3. The work shall be further inspected during the initial phases of the priming and thereon at 3 to 4 day intervals depending on the progress of the work.

4. The paint company representative shall provide written reports of his findings at each inspection; one copy to the Engineer and the other one to the Contractor.

5. No work shall proceed that is not in accordance with the instructions of the manufacturer and/or the inspecting representative of the manufacturer.

B. Preparation of Surfaces

1. All metalwork shall be thoroughly cleaned. Grease, mill scale and other rust shall be removed completely down to bare metal. Oils and other deleterious matter shall be cleaned off thoroughly with solvents to leave a surface satisfactory to receive the priming coats.

2. (A) Metalwork such as pumps and electrical panels, which are enamelled in the shop, shall be flatted with fine sand or garnet paper. Chipped edges shall be sanded to feather edges and all loose and otherwise defective paint removed. The areas so cleaned shall be spot primed ready to receive the finish coats.

(B) During all local preparation work pumps and moving machinery parts shall be adequately screened and/or covered to prevent dust penetration.

3. The internal concrete block and concrete work shall be washed down thoroughly in clean water and shall be then further cleaned free of all dirt, grease, oils and other matter that may affect the finished work. The surface shall be thoroughly dry before painting.

4. The woodwork shall be sanded carefully to a smooth even surface and then filled with a plastic wood filler as necessary to fill all voids and open grain areas. The filling then sanded to match the wood sanded surfaces.

5. Galvanized metal shall be cleaned of grease and the like using mineral spirits such as xylol and rid of chemical contamination with mild soap and water.

C. Prime Coatings

1. Metalwork shall be painted with priming paint at the shop with the materials as specified herein. Before the application of the finish paint those areas where shop painting has been damaged or removed during handling or erection, or has deteriorated to such an extent that it is unsuitable to receive finish coats of paint, shall be repainted with the shop coat material. Such painting shall be done on surfaces from which all deleterious material has been removed.

2. (A) The prime coating for galvanized metalwork shall be oil primer as Glidden No. 5229. The galvanized metal primer shall be used as shop and field priming coat.

   (B) The thickness per coat shall be 1.5 dry mil thickness.

3. Piping and items which are shop coated with bitumen or similar coatings shall receive two coats of pigmented tar-stop. Other priming coats may then be neglected.

4. The coatings specified for internal concrete and concrete block do not require prime coating for those surfaces.

5. (A) The prime coating for metalwork shall be phenolic alkyd primer as Glidden No. 585. The primer No. 585 shall be used as the shop priming coat and as the field coat.

   (B) The thickness per coat shall be 1.5 dry mil thickness.

6. Metalwork specified to receive Quigley's AAA.111 does not require a priming coat.

7. Insulated pipe surfaces shall be brushed to remove powder and surplus adhesive and size and shall then receive a coating of primer sealer.

8. The prime coating for woodwork shall be alkyd primers as Glidden No. 585. The primer shall be used for the interior and exterior surfaces. The finished thickness shall be 1.5 dry mil per coat. After the primer is thoroughly dry, a coating of shellac, reduced with equal parts of methyl-hydrate shall be applied to all knots, pitch and sapwood.

D. Finish Coatings

1. The finish coats to the interior concrete and masonry shall be two coats of Glidden chlorinated rubber flat No. TGL 19346 applied at the rate of 300 square feet per gallon of paint. A primer is not required for this work.

2. The finish coat for ferrous metalwork other than that in the wet well above water level shall be two coats of alkyd Rustmaster enamel as supplied by the Glidden Company. The paint shall be applied to a dry mil thickness per coat of 2.0 mils. The paint applied at the rate of 340 square feet per gallon.

   The finish coat for galvanized metalwork shall be as that specified for ferrous metalwork.

   Metalwork in the wet well shall receive two coats of Quigley's AAA.111, each coating applied to a dry mil thickness of 1.5 mils.

3. (A) The finish coats for woodwork shall be Rustmaster enamel as supplied by the Glidden Company.

   (B) The Rustmaster enamel shall be used for the interior and exterior surfaces.

   (C) The paint shall be applied to a finished dry mil thickness of 2 mils per coat. The paint applied at the rate of 340 square feet per gallon.

E. Application

1. The paint shall be applied by competent tradesmen using proper tools and application techniques for the different aspects of the work. Care shall be taken to protect machinery, electrical panels and motors, couplings and other equipment that may be damaged by paint, and paint spots and splashes on areas not designated to receive that paint shall be cleaned off as the work proceeds.

2. Brushes, spray equipment and rollers shall be clean and in condition and of type to suit the exigencies of the Contract.

3. All materials shall be evenly applied so as to be free from sags, runs, crawls, holidays, pinholing or other defects. All coats shall be of proper consistency and well brushed out, except enamel which shall be uniformly flowed on.

4. No painting shall be done under conditions that are unsuitable for the production of good results, and no paint shall be applied if the air temperature is below 50° F.

5. All coats shall be thoroughly dry before the succeeding coats are applied. Allow at least 24 hours between coats unless the particular paint requires more or less time to dry, according to the manufacturer's instructions.

6. Paint shall not be applied when the temperature falls below 50° F. and when relative humidity exceeds 85%.

7. Paint coats as specified are intended to cover surfaces perfectly. If surfaces are not adequately covered by the specified number of coats, further coats shall be applied as necessary.

8. Clean drop cloths shall be provided to protect floors, machinery, windows and electrical fixtures from stain or injury during the progress of the work.

F. Colour Schedules

1. It shall be noted that the areas will be the subject of a colour schedule which may list several colours as well as a colour code for piping. This colour schedule shall be issued later by the Engineer.

G. Finish Surfaces

1. Painted surfaces shall be uniform as to texture, colour and sheen, without curtaining, runs, pinholing or other defects. Paint shall be applied to the thickness designated.

SECTION 10A - FINISH HARDWARE

10A.01 GENERAL

A. Intent of Section

1. This Section covers the supply and installation of the finish hardware necessary to complete the work of the Contract and as shown in the hardware schedule on the drawings.

B. Handling and Storage

1. The hardware shall arrive on site in the containers as packaged at the factory. The hardware shall be stored under cover and clear of the ground.

10A.02 PRODUCTS

A. Materials

1. The hardware shall be cast aluminum, satin finish as supplied by the Russwin Company, Belleville, Ontario.

2. Butts shall be ball bearing steel primed for painting.

3. The butts shall be half surface or full surface as required to suit the work.

4. The closers shall be arranged to suit the condition of the job without corner brackets.

5. Special arm application or top jamb installation shall be arranged.

6. Kickplates shall be 1/16" thick x 8" high x the door width minus 1-1/2", satin aluminum with bevelled edges.

7. Weatherstripping foamed plastic.

10A.03 EXECUTION

A. Installation

1. The hardware shall be fixed into place fully in accordance with the templates and other instructions of the manufacturers.

2. The kickplates shall be fixed opposite hinge side stainless steel screws with half-domed heads. The screws shall be set at close centres to prevent wave or buckle.

3. The thresholds shall be set in a bed of caulking compound and bolted into lead shields in the flooring.

4. The external hollow metal doors shall be fitted with a foamed plastic weather-stripping. The weatherstripping shall be fixed to jambs and head with an adhesive provided by the same manufacturer as the weatherstripping.

B. Keys

1. Three keys shall be provided.

C. Inspection

1. The hardware supplier shall check all hardware when it has been installed and shall notify the Engineer of any cases where it has not been properly installed, is defective or is not as specified. Replace defective hardware.

SECTION 11A - SELECTED EQUIPMENT

11A.01 GENERAL

A. Intent of Section

1. The work to be done under this section shall consist of the supply and installation of the following equipment:

   (A) 2 vertical raw sewage pumps

   (B) Standby diesel generator unit

   (C) 1 comminutor

   (D) 1 "Hydroflush" package sewage pumping station

2. Items (A), (B) and (C) in Paragraph 1 are to be installed in the Hurricane Road Pumping Station. Item (D) comprises the Park Lane Pumping Station.

B. Pre-selection of Equipment

1. The equipment has been pre-selected by previous quotation and no alternatives will be considered.

11A.02 PRODUCTS

A. Pumping Equipment, Hurricane Road

1. The pumping equipment to be supplied shall include the following items:

   (A) Two Crane-Deming Fig. 7196 size 4 x 4 x 12 x 2 1/2 vertical centrifugal sewage pumps complete with double mechanical seals.

   (B) Two 40 HP 1750 maximum RPM vertical wound rotor CGE electric motors.

2. All equipment shall be supplied by Crane Canada Limited of 12 Vulcan Street, Rexdale 604, Ontario, in accordance with their quotation No. D71-0091-B of September 1,1971.

3. Each unit shall be capable of pumping 750 USGPM at 115 ft. total head.

B. Standby Diesel Generator

1. The standby diesel generator unit shall consist of one (1) only Deutz Diesel Generating Set, model FGL 912, continuous rating 50 KW, 62.5 KVA with Vulcan battery charger K260-HL12 and appurtenant equipment as specified in Section 16B.02.

2. All equipment shall be supplied by Deutz Diesel (Canada) Ltd., of 2740 Slough Street, Malton, Ontario, in accordance with their quotation No. 0I-0238 of November 9, 1971.

3. The generator set shall be capable of starting and operating one 40 HP sewage pump with a wound rotor motor together with an additional load of 5 KVA for lighting and small motors.

C. Comminutor

1. The comminutor shall be Worthington Model 12C-5 comminutor, with 1/2 HP, close coupled gear motor driver, of the vertical, squirrel cage induction, 575 volt, 60 cycle, 3 phase, totally enclosed fan cooled type suitable for outdoor installation with Class B insulation, complete with comminutor soleplate and anchor bolts and one set of spare cutters.

2. The comminutor shall be supplied by Worthington (Canada) Ltd. of 4180 Dundas Street West, Toronto 590, Ontario, in accordance with their quotation No. T-701-71 of November 19, 1971.

3. The comminutor shall be designed for a maximum flow rate of 1.40 USMGD, and shall operate continuously and automatically screen and cut or shred coarse solids directly in the floating raw sewage without requiring removal of the screenings from the channel.

D. Package Sewage Pumping Station

1. The unit to be supplied shall include the following items:

(A) One (1) only Myers Hydroflush sewage station complete with 52" x 144" Hydroflush unit, 2 only SP100 MH 575 volt, 3 phase, 60 cycle pumps, 1 only Nema I control panel, 4 only level controls and 2 only 17 lb. magnesium anodes.

2. All equipment shall be supplied by the F.E. Myers & Bros. Co. (Canada) Ltd. of 808 Courtland Avenue East, Kitchener, Ontario in accordance with their quotation No. 1377 of November 22, 1971 and subsequent amendments.

3. The unit shall be capable of pumping 60 USGPM at 44 ft. total head.

11A.03 EXECUTION

A. Installation of Equipment

1. Any appurtenant fittings, and materials not herein or elsewhere specifically mentioned or included, but necessary for the operation of the equipment shall

be furnished by the Contractor without additional payment. Accordingly, the Contractor shall ensure that equipment suppliers are aware of the duty required of the equipment and the associated appurtenances shown on the drawings or required by any section of the specifications.

B. Handling and Storage

1. The Contractor shall provide all machinery and means of properly handling the equipment, during off-loading, storing and erection. The Contractor shall be responsible for the rectification of any damage to equipment. Any such repairs shall be approved by the Engineer and equipment supplier so that the guarantees are not invalidated. All equipment, if not required for immediate use, shall be adequately packaged and stored and protected against weather, damage and theft. Particular care shall be applied to any corrodible items and electrical equipment. Mechanical equipment shall be stored in an area heated to a minimum of 50°F.

C. Manufacturer's Drawings

1. Before any equipment or part thereof is fabricated or installed in the works, the Contractor shall submit for approval to the Engineer shop drawings, circuit diagrams, specifications and installation requirements and instructions. The Engineer will retain two copies of each, but will mark up as many other copies as the Contractor or manufacturer require. It is the responsibility of the Contractor to ensure that submitted information complies with information in the Contract Documents unless changes are requested or required.

2. Towards the end of the Contract, the Engineer will require more copies of all shop drawings, diagrams, specifications, instruction books, lubrication charts, maintenance instructions and spare parts lists for inclusion in a combined "Operating Manual" for the Owner.

D. Guarantee

1. All equipment shall be guaranteed for one year commencing from the date of the Acceptance Certificate.

2. Such guarantee shall protect the Owner against any failure of the equipment due to faulty design, workmanship or material, and, in addition, shall guarantee the performance of the equipment to the specified operating conditions and other conditions implied by approval of drawings and data by the Engineer.

E. Time of Completion

1. Failure or delay in delivery of equipment shall not relieve the Contractor of his responsibility to complete the Contract as stated in the Form of Tender.

F. Installation

1. The Contractor shall provide all materials, labour and equipment to install complete and in full operational and guaranteed condition, all the equipment referred to above.

2. The equipment shall be installed in strict accordance with the manufacturer's instructions and to the satisfaction of the Engineer.

3. In making up his construction schedule, and in determining the time required to complete the work, the Contractor shall allow for the erection of all equipment.

4. The Contractor shall fully acquaint himself with all work involved in the complete installation of all equipment. He shall at no time make any claim that any misunderstanding existed in regard to the nature or amount of work to be done.

G. Manufacturer's Services and Certification of Installation

1. The Contractor shall allow in his tender for the services and expenses of trained personnel representing the manufacturers of the various pieces of equipment to ensure correctness of installation.

2. The Contractor shall provide all materials, labour and equipment, at his expense, to make any adjustments to the installation as required by the manufacturer, to effect correct performance.

3. On completion of installation and testing, the Contractor shall obtain from the manufacturers concerned, certification of the correctness of the installation, such certification to be submitted to the Engineer.

H. Temporary Supports

1. The Contractor shall provide all necessary temporary supports and bracings to prevent the overloading of floors and walls, while equipment is being installed. The weights of all pieces of equipment shall be ascertained from the manufacturer, and equipment shall be moved into position in a manner and at a time approved by the Engineer.

I. Lubricants

1. The complete initial lubrication of all equipment in accordance with the manufacturer's recommendations shall be provided by the Contractor.

J. Small Piping

1. All small connecting pipework, fittings and valves whether shown on the drawings or not, shall be supplied and installed by the Contractor. All such work shall be strictly in accordance with the instructions of the manufacturer whose equipment is being installed or connected, or with requirements of the Contract Documents as they apply.

K. Anchor Bolts

1. Unless specified otherwise, the Contractor shall supply all anchor bolts, such anchor bolts being of a type, diameter and size recommended by the manufacturers of equipment and machinery. Generally, expansive type anchorages shall be used for setting small equipment. Large pumps shall be set by means of bolts with sleeves cast into the concrete. Elsewhere, cast in place anchor bolts may be used subject to the approval of the Engineer; these must be properly positioned by means of substantial templates.

L. Pump and Machinery Bases

1. Final setting of machinery bases shall be on cement grout, or as otherwise suggested by equipment supplier. All grout shall be as specified in Section 03300. Anchor bolts shall be provided for all bases. (A concrete platform shall be provided for the motor control centre as shown on the drawing.)

2. The final shape and dimensions and anchor bolt locations for the bases where not already finalized, will be determined by the Engineer after receipt of the equipment manufacturer's detail drawings.

3. Where applicable, the thickness of such concrete bases and platforms shall be compatible with the depth of the covering tile to the finished floor. Such concrete bases and platforms shall be reinforced and shall be firmly fixed to the parent concrete slab by adequate dowels.

SECTION 11B - MISCELLANEOUS EQUIPMENT

11B.01 GENERAL

A. Intent of Section

1. The work to be done under this section includes the supply and installation of miscellaneous equipment not covered under other sections. These items include, but are not necessarily limited to:-

   (A) Sluice Gates

   (B) Sump and Overflow Pumps

   (C) Monorails

   (D) Gauges

11B.02 PRODUCTS

A. Sluice gates shall be as follows:

1. Inlet gates shall be Armco aluminum fabricated slide gates, Model 10-00, flat back frame and flush bottom closure. Stems and fixings shall be stainless steel. The gate lift shall allow for the rising gate stem to be contained within a pipe frame extension, as shown on the drawings.

2. The wet well gate shall be Armco Model 55-10 Cast Iron gate with flanges back frame and flush bottom closure. Stem shall be bronze, non rising.

3. Extension stems, valve boxes and stem guides for all gates shall be located as shown on the drawings.

B. Sump and Overflow Pumps

1. Sump pump in the Hurricane Road Station shall be Crane Deming Fig. 4661 or approved equal. Power supply shall be 110/1/60.

2. The pump in the overflow chamber at the Park Lane Station shall be Flygt Model CS3065, complete with the following:

   (A) 1 1/3 HP 575 volt, 3 phase, 60 cycle, 3400 RPM motor.

   (B) 50 feet of 4 conductor size 14 neoprene jacketted type SO cabtire cable.

   (C) Two Model CNP-10 Flygt Level Regulators, each with 50 feet of cable and adjustable support channel with squeeze connectors.

(D) Automatic Simplex Motor Control, 575volt, 3 phase, 60 cycle complete with circuit breaker, across-the-line magnetic starter, three phase overload protection and reset push button, control transformer for 115 volts and "Hand-Off-Auto" selector switch. A time delay relay shall be included so that the pump will start after an adjustable delay after call of the start float. Time delay shall be adjustable 1-20 minutes.

(E) Threaded discharge suitable for connection to 4 inch diameter reinforced flexible hose discharge lines.

C. 1. The hoist at the Hurricane Road Pumping Station shall be manually operated 1-ton geared travelling triple-gear chain hoists with a lift of 35 feet. Hook to top of runway rail shall not exceed 3 feet. The chains for operating the lift and geared travel shall be level with the hook in its lowest position. The trolley shall fit G10I 25.4# beam.

D. 1. Pressure gauges shall be installed complete with isolating valves on the suction and discharge piping of the two main pumping units. The gauges shall be 3 1/2 inch diameter with 1/4 inch NPT connections and rated 0 to 100 psi.

E. 1. Sewage surge relief valve shall be Golden-Anderson Fig. No. 525-RD for 125 ASA Std., valve size 3 inches.

11B.03 EXECUTION

A. 1. Sluice gates shall be installed in a truly vertical position with the flange backs set on a mortar bed. After installation of the anchor bolts the gate frame shall be drawn up into the mortar bed enough to seat the frame at all points. The spare mortar shall be removed and the bed allowed to set. The gates shall then be drawn up tight on the anchor bolts.

2. A recess shall be provided in the concrete floors to receive the bottom part of the frame. Gate inverts shall be set flush with floor. After installation the floor pits shall be filled with asphalt.

B. 1. The sump pump at the Hurricane Road Station shall be installed in the location shown. Discharge piping, check and gate valves and union shall be all as shown on the detail drawings.

2. The submersible pump on the overflow chamber at the Park Lane Station shall be installed with flexible hose connections as shown on the detail drawings. Electrical installation is covered in Section 16.

C. The pressure gauges shall be installed with 3/4 inch NPT pipe nipples threaded into the cast iron piping, 3/4 inch isolating valves and 3/4 inch x 1/4 inch bushings to receive the gauge.

D. The sewage pressure relief valve shall be set for an opening pressure of 100 psi.

SECTION 15A - PIPELAYING AND INSTALLATION

15A.01 GENERAL

A. Intent of Section

1. The work to be carried out under this section consists of:

(A) The supply and installation of all cast iron piping and valves.

(B) The supply and installation of sewer pipe.

(C) The supply and installation of PVC pressure pipe forcemain.

(D) The supply and installation of all miscellaneous small piping.

15A.02 PRODUCTS

A. PVC Pipe and Joints

1. PVC shall mean rigid polyvinyl chloride pressure pipe and fittings. Forcemain pipe shall be PVC 100 psi pipe (SDR41) and shall conform in all respects to the requirements of CSA Standard B137.3. Joints shall be rubber ring bell joints which shall be an integral and homogeneous part of the pipe barrel.

B. Cast Iron Pipe

1. Cast iron pipe shall conform to ASA Specification A21.6 for Grey Iron Cast Pipe designed for a test pressure of 150 psi.

C. AC Pipe

1. Asbestos-cement non-pressure sewer pipe shall conform to ASTM Specification C-428.

D. Valves

1. Gate valves shall be Jenkins Fig. 402 or approved equal.

2. Check valves shall be Jenkins Fig. 477-L, lever operated or approved equal.

E. Fittings

1. All fittings and specials in the pumping station shall be Grey Iron to the same standard as cast iron pipe.

F. Flexible Couplings

1. Flexible coupling shall be Dresser Style 62 Reducing Coupling.

G. Flanged Joints

1. All iron pipe shall be jointed using flanges.

2. Cast iron flanges shall conform to ASA Specification B16.1.

3. All drilling shall be ASA 125# standard.

4. Gaskets shall be one-eight (1/8) inch thick, full face, red rubber with punched holes.

5. Nuts and bolts shall be bright carbon steel conforming to ASA B18.2 and shall have hexagonal heads and nuts.

H. Small Piping and Fittings

1. Water piping shall be Type L, hard drawn copper tubing. Fittings shall be the solder joint cast bronze type.

2. Roof drains shall be equal to Wade W-3220-DE.

3. Floor drains shall be equal to Wade W-1200. Tunnel floor drains shall have 4" round nickel bronze funnels in place of regular strainers.

I. Seal Water System Fittings

1. The water seals for each raw sewage pump shall be supplied with seal water through the following fittings:

(A) Bronze body strainer with stainless steel heavy wire mesh screen equal to Watts #27, of size shown.

(B) Bronze body backflow preventer, atmospheric type with two double seated soft disc check members separated by an intermediate air break chamber and suitable for continuous line pressure, all equal to Watts #9. Hoods shall be provided where necessary to protect the atmospheric parts against dirt and dripping.

(C) Rotometer type of flow meter with plastic or glass tube and brass fittings and a flow range of 0.3 to 3.6 USGPM, equal to Dwyer RMC-143.

15A.03 EXECUTION

A. Piping

1. Pipe supports shall be provided to support the piping systems inside the pumping station. Supports shall not be more than 8 feet apart and shall be concrete piers or hangers.

2. All flange faces shall be thoroughly cleaned before jointing and bolts shall be drawn up uniformly.

3. Concrete thrust blocks shall be placed behind all bends, tees and plugs on pressure lines. The blocks shall be of 2,000 psi concrete. All thrust blocks shall be poured to undisturbed ground and shall be approved by the Engineer. The Engineer's decision as to the need of a thrust block shall be final.

4. All pipes shall be bedded in Class "B" granular bedding.

5. Sewer joints shall conform to ASTM C443.

B. Testing

1. All piping within the pumping station shall be drop tight at a test pressure of 150 psi.

C. Small Piping

1. All exposed pipe shall be arranged in space provided, run close to walls, columns or other piping to present a neat and orderly appearance.

SECTION 16A - ELECTRICAL GENERAL REQUIREMENTS

16A.01 GENERAL

A. Intent of Section

1. This Section covers the General requirements for the installation of all the electrical equipment specified herein and/or detailed on the Drawings.

B. Material and Equipment

1. All material and equipment shall be new and shall have C.S.A. approval or shall be approved by special inspection of H.E.P.C. of Ontario.

C. Codes, Permits and Inspection

1. Materials and work shall meet the requirements of the Ontario Electrical Code and all local, municipal, provincial and federal by-laws and regulations.

2. All necessary permits shall be obtained and all fees for the work of this Division shall be paid.

3. On completion of the work, all certificates of approval shall be presented to the Engineer.

D. Drawings

1. The electrical drawings are diagrammatic, intended to convey the scope of work and indicate general arrangement of equipment, conduits and approximate sizes and locations of equipment and outlets.

2. The electrical drawings shall be followed in laying out the work. The electrical drawings do not show all structural and architectural details which may affect the installation. Structural and architectural drawings shall be checked before proceeding with electrical work. The Contractor shall make, without additional expense to the Owner any changes to the electrical work to accommodate structural conditions.

E. Shop Drawings

1. Shop Drawings shall be submitted for:

(A) Motor Control Centre, complete with layout and wiring diagrams.

(B) Level Control Panel.

(C) Lighting Fixtures.

F. Excavation and Backfill

1. All excavation and backfill for work of this Division shall be provided in accordance with Division 2.

G. Painting

1. Unless otherwise noted, all equipment supplied under this Section shall be thoroughly cleaned and factory painted with two approved primer coats, and two approved finish coats inside and outside. The colour of the finish coats shall be semi-gloss white as No. 513-201 of the standard paint colour system of the Canadian Government Specifications Board. The type of enamel shall be at the manufacturer's discretion. All conduit, supports, etc. will be painted as described under Division 9. One extra quart of touch-up paint shall be provided.

H. Tests

1. All equipment and electrical systems shall be tested and operated to the satisfaction of the Engineer prior to acceptance.

SECTION 16B - DISTRIBUTION AND CONTROL

16B.01 GENERAL

A. Intent of Section

1. This Section covers:

(A) Incoming Service.

(B) 600 Volt Motor Control Centres.

(C) Control Stations.

(D) Level Control Panel.

(E) Wire and Cable

(F) Conduit and Fittings

(G) Lighting Fixtures

(H) Wiring Devices

(I) Electrical Heating & Ventilating

(J) Remote Alarm Panel

(K) Fuel Oil Tank

(L) Diesel Engine Generator Set

(M) Louvres, Automatic Dampers and Ductwork

(N) Fuel Oil System.

B. Service

1. The H.E.P.C. of Ontario will provide 575 V., 3 phase, 60 cycle power at their terminal pole.

2. The incoming 600 V power shall be supplied and installed from the terminal pole to the Motor Control Centre in the building.

3. All arrangements shall be made with the H.E.P.C. of Ontario for bringing in the electrical services to the project. All charges to be paid to H.E.P.C. of Ontario for bringing in of the electrical service shall be included in the contract price.

C. Metering

1. Hydro metering shall be located in the Motor Control Centre.

16B.02 PRODUCTS

A. 600V Motor Control Centre

1. The motor control centre shall meet the following requirements:

(A) The equipment shall conform to the applicable requirements of CEMA, Industrial Control Standards No. 5 E-3 and shall meet the test conditions specified therein.

(B) The control centre shall consist of vertical sections fabricated of Code gauge steel, shaped and reinforced to form a continuous rigid, free-standing, enclosed, completely dead front CEMA Type 1A assembly.

(C) The panels shall be Type "B" construction with all units having individual line and control leads brought out to terminal boards suitably located in each starter, and wiring shall conform to CEMA Class 1 requirements.

(D) The complete panels shall have adequate ventilation to limit the internal temperature rise to 55 degrees C. and there shall be a continuous ground bus with accessible external connection for bonding to the station ground.

(E) All necessary control transformers, switches, indicating lights, wiring, fuses, interlocks, terminal boards, etc., shall be included to suit the power and control requirements specified herein and/or indicated on the drawings.

(F) The motor control centre shall be equal to Canadian Westinghouse, C.G.E., Cutler Hammer, Canadian Controllers, Allen-Bradley or Square 'D' manufacture.

(G) For paint finish of Motor Control Centres see 16A.01.G.

2. Starters

(A) Starters shall be of the combination full voltage starting type as indicated on the Drawing. Connection to the bus shall be a free floating self-aligning construction which will ensure positive silver-to-silver contact at all times. Contactors shall be rated for repetitive operation over a prolonged period for minimum maintenance.

(B) The starters shall be provided with a 600/120 volt adequately rated control transformer taking into account all auxiliary loads, as indicated in control diagrams and shall have suitably rated primary and/or secondary fuses.

(C) The combination starter shall be provided with 3-pole moulded case air circuit breaker having adjustable instantaneous magnetic trips properly related to motor FL current and with the specified interrupting rating. All contactors used to control motors shall have three (3) bimetallic or eutectic alloy isothermic overload relays, the element of which shall be correctly related to the nameplate full load rating and temperature rise of the motor.

(D) The external handle of all circuit breakers shall be interlocked with the door so that the handle must be in the "OFF" position before the door can be opened and shall have provision for padlocking.

(E) The starters shall be provided with a red indicating light in the cover to indicate motor running or "ON".

3. Lighting Panel

(A) A lighting panelboard shall be located in the motor control centre. The panel shall be three phase, 4 wire, 120/208 volt panels and the number of branch circuits shall be as indicated.

(B) The lighting panel shall comply with C.S. A. Specification C.22.2 No. 29 and shall have a high quality finish to match the motor control centre with cadmium or chrome plated hardware. A directory under plastic shall be provided on the inside of the door.

4. A three phase 600/120/208 volt dry type transformer having a continuous rating as indicated shall be supplied and installed in the motor control centre as shown on the Drawing. The transformer shall comply with C.S.A. Specification C22.2 No. 47. Insulation shall be Class B or H.

5. Space, mounting and wiring to the requirements of the H.E.P.C. of Ontario shall be provided in the Motor Control Centre for all metering transformers to be supplied by H.E.P.C. of Ontario.

6. The Hydro meter will mount on the front face of the motor control centre.

7. A lightning arrester shall be mounted in the motor control centre and shall be connected to the incoming side of the main breaker and grounded to a 10 ft. x 3/4 inch diameter ground rod by a No. 2 bare copper wire. The lightning arrester shall be equal to C.G.E. 9L15BAL008 manufacture.

8. A suitable fuse ground indication lamp shall be provided for each phase in the motor control centre.

9. Individual Circuit Breakers

(A) Where indicated on the drawings, circuit breakers not combined in motor starters shall be of the moulded case type, having the specified number of poles, voltage and current ratings.

(B) Breaker interrupting rating shall not be less than 15,000 amps., asymmetrical. Such breakers shall have overcurrent protection combining thermal time delay and instantaneous magnetic trip. The rating of the thermal elements shall be as indicated on the drawings. The quick-make, quick-break trip-free mechanism shall have an operating handle which will visually indicate "ON", "OFF" or "TRIPPED" positions.

B. Control Stations

1. Where specified herein and/or indicated on the drawings, push-buttons or selector switches shall be supplied and installed under this Section. They shall be the double break silver contact unitized type having readily interchangeable operators, contact blocks and legend plates.

2. Control stations shall be equal to Square 'D' Class 9001.

C. Level Control Panel

1. General

The control panel shall be equal to a Telcon Model C16502VS and shall form the nucleus of a CSA approved, variable speed, factory prewired control system to automatically control the operation and speed of two 40 H.P., 575 volt, 3 phase, 60 cycle, raw sewage lift pumps. Only one pump will operate at one time. The speed control concept shall be completely electric in operation and shall not require any external appurtenances other than wiring to pump motors, remote alarm devices, etc., and wet well air bubbler lines. The panel shall contain prewired and preconnected components to monitor the wet well level, to indicate alarm conditions, and to vary the operation and speed of a pump in accordance with the control functions hereinafter specified.

2. Control Functions

(A) This system shall automatically control the operation of one variable speed raw sewage pump. This pump shall be controlled over a 33-inch (Elev. 602.5 to 605.25) variation in wet well levels by means of an air bubbler arrangement to sense the sewage levels in either wet well, so as to vary the total output of the pump, in direct proportion to the flow of raw sewage into the wet wells. One bubbler tube shall function at one time with a manual changeover arrangement.

(B) Assuming a pump is not operating and an increasing wet well level, the preselected "lead" pump shall start at minimum speed at the designated level and increase in speed (and pump output) in proportion to wet well level increase (sewage inflow) up to maximum speed. The pump will operate at minimum speed (75%) between the start elevation of 603.50 and stop elevation of 602.50, with a start every 24 minutes and running about 6 to 7 minutes per start. The maximum speed (100%) range is between 603.50 and 605.25.

(C) Panel circuitry shall be capable of automatic switchover to the non-operating pump in case of pump failure with an alarm indicating that this has happened.

(D) This system shall also include independently adjustable low wet well level lockout and reset sensors to monitor a low level alarm condition. Coincident with the initiation of the low level alarm, the pump on automatic control shall be stopped and remain out of operation until satisfactory levels have been re-established in the well, at which time the control shall start a pump at minimum speed.

3. Panel Components

(A) This control panel shall include alarms for the following:

(1) High Level (One Telcon Vigitrol diaphragm-type sensor shall be supplied).

(2) Low Level Lockout.

(3) Diesel Failure (from a remote signal).

(4) Failure of 1st Duty Pump.

Alarm points shall be backlighted and engraved with manual reset, lamp test pushbutton and internally mounted audible alarm with silencing pushbutton. A common alarm signal shall be provided for a future remote alarm.

(B) A Bubbltrol system shall be provided to monitor sewage levels in the wet wells. The system shall include a heavy duty, long life air compressor, receiver, pressure switch, unloader, filter and muffler. In addition, a pressure regulator with gauge, air flow meter, level simulator needle-type bleed and sensor shut-off valves and a 4½" diameter 0-23 ft. semi-flush mounted wet well level indicator shall be included. Needle-type shut-off valves and internally mounted, pre-connected alarm and control sensors shall be provided.

(C) The autosensory control section shall include a PRS (Proportional Range Sensor) capable of translating the sump level range into variable speed pump start and stop values and variable speed electrical signals which, through an amplifier, shall vary the speed of the pumps. The PRS, consisting of cam stack driven sequence switches and potentiometer circuitry, shall include F.R.O.A. (Forward-Reverse-Off-Automatic) level simulator test switch, and anti-hunt speed-of-response control dial.

(D) A manual speed control dial in the front of the panel shall permit manual speed testing of any variable speed pump selected to operate on manual test control and Hand-Off-Auto selector switches shall be interlocked with the speed control dial to prevent inadvertent starting of a variable speed pump when on "Hand" control at any speed other than minimum speed. A speed indicator calibrated in RPM shall be flush mounted in the control panel and shall indicate the speed of the variable speed pump in service.

(E) Integrally prewired combination across-the-line magnetic starters shall be provided for each variable speed pump with three phase overload protection and individual control transformers and circuit breakers disconnects with mechanical handles for padlocking in the "off" position. Each starter compartment shall also include "Pump Running" light, elapsed time meter, and externally operable reset pushbutton. Terminals on each starter shall be tagged for connections to remote Lock-out Stops.

(F) An auxiliary control transformer with two-pole primary breaker and mechanical handle shall be included and sized for the control/amplifier circuitry. Branch pulfuze disconnects shall be included for the compressor and control sections.

(G) Each of the two (2) pumps shall be provided with a hand-off-automatic selector switch in a group arrangement with a "Pump Running" light above each switch.

4. Panel Construction and Internal Wiring

(A) The aforementioned controls and components shall be installed in a floor-mounted, compartmentalized steel enclosure, employing standard motor control centre type construction with a total overall width not exceeding 56 inches, 90 inches high and 20 inches deep. A 1½-inch high channel base and hinged access doors shall be provided.

(B) Engraved "white-on-black" lamicoid-type nameplates shall identify all face-mounted components. Size and nomenclature shall be submitted to the Engineer for approval. All significant interior subassemblies shall be identified. Coded subassemblies and wiring bundles shall terminate at master coded terminal strips.

(C) The panel shall provide for bottom entry of wiring conduits and air bubbler tubing.

5. External Connections

The complete panel shall be prewired and preconnected requiring the Contractor to arrange with the various trades for installation and connection of, but not necessarily limited to, the following:

(A) 575 volt, 3 phase, 60 cycle incoming power supply.

(B) Wiring connections to the Primary and Secondary terminals at each of the wound rotor motors.

(C) Wiring connections to remote Lock-Out-Stops for each of the pumps.

(D) Wiring connections to a remote alarm.

(E) Wiring connections to 2 difference alarm sensors.

(F) Two (2) 1/4-inch O.D. copper air bubbler lines from panel to bottom of each wet well.

The bottom 3 feet of each line shall be increased to 1/2-inch diameter and fitted with 1/2-inch stainless steel bubbler guards (furnished by the Level Control Panel Supplier).

6. Liaison

The Panel manufacturer shall carry out all necessary liaison with the manufacturers of the variable speed motors and pumps.

7. Supervision

The services of a qualified factory-trained technician shall be furnished by the panel manufacturer to check the final installation, supervise start-up, finalize on-site adjustments and at a later date, to instruct the Corporation's operating personnel on proper operating procedures. One trip to the site will be necessary consisting of two normal working days. The date of visit shall be subject to the approval of the Engineer and arranged through the pump manufacturer. The panel manufacturer shall submit a complete report of the visit to the Engineer.

8. Manuals

The Supplier shall furnish three (3) copies of a comprehensive operation and maintenance manual for the above equipment, including all accessory items. These manuals shall be directed to the General Contractor for compilation and submission to the Engineer prior to the commencement of operation.

D. Wire and Cable

1. All conductors shall be copper with insulation rated at 600V unless otherwise noted.

2. All conductors above grade shall be Type RW90, cross-link polyethylene.

3. All conductors below grade shall be RWU90 cross-link polyethylene.

4. Motor or branch circuit feeder sizes shall be as noted on the Drawings and in no case shall be smaller than No. 12 AWG. Control wiring shall be of minimum size No. 14.

5. All feeders shall be run in continuous length between power supply point and the load. No splices will be allowed in feeder cable.

6. All branch circuit wiring and all systems wiring shall be identified at all panels and terminal boxes with Electrovert Type Z markers, Electrovert Strap-on markers or approved equal.

7. All necessary power and control wiring to all equipment shall be supplied and installed to suit the power and control requirements noted on the Drawing. It shall be noted that the Drawings do not necessarily indicate the location of each individual feeder, but these shall be located to best suit the site conditions.

8. All wiring connections, if required, shall be made with a C.S.A. approved compression tool with a nylon cap equal to Buchanan "Pres-Sure".

E. Conduit, Fittings and Outlets

1. All conduit above grade shall be rigid steel unless otherwise noted and be minimum size 3/4".

2. All conduits or ducts below grade or encased in concrete shall be rigid PVC equal to C.G.E. "Scepter".

3. Steel tile boxes shall be used for recessed outlet boxes in exposed block or brickwork.

4. Ganged boxes shall be used in locations where more than one device is to be mounted.

5. All outlet boxes for weatherproof outdoor use or surface mounted indoors shall be cast type with threaded hubs equal to F.S. Series.

F. Lighting Fixtures

1. The lighting fixtures shall be in accordance with the Schedule listed on the Drawing. Alternative fixtures by other manufacturers may only be submitted upon written approval from the Engineer.

2. The Cat. No. of all fixtures shall be verified with the description prior to ordering.

3. Fluorescent fixtures shall have high power factor, rapid start ballasts with automatic reset thermal protection. The ballasts shall be equal to the C.G. E. Gold Label and have an "A" sound rating.

4. All ballasts shall meet the Certified Ballast Manufacturers' Association Specifications.

5. All incandescent lamps shall be 120V., inside frosted, extended service filament lamps, rated 2500 hours with wattages as indicated in the fixture schedule.

6. All fluorescent lamps shall be 40 watt rapid start, cool white, rated 12,000 hours, 3200 lumens equal to Sylvania.

G. Wiring Devices

1. Wiring Devices shall be as follows:

(A) 15 Ampere, 120 volt duplex 'U' ground receptacle, Smith and Stone Cat. No. 1-1144.

(B) 15 Ampere, 120 volt weatherproof duplex 'U' ground receptacles shall consist of receptacles Smith and Stone Cat. No. 1-1144 complete with Crouse-Hinds Cat. No. DS-70-G gasketted cover plate. Mount in horizontal plane.

(C) 20 Ampere, 120 volt toggle switch, Mutac Cat. No. S-3701 for single operation.

(D) All single phase motors shall be protected by manual starter switches incorporating thermal type delay protection and the bimetallic or eutectic alloy elements shall be correctly related to the motor full load current. These switches shall include a red pilot light where shown and shall have weatherproof enclosures where indicated in the drawings.

H. Electrical Heating and Ventilating

1. Electric Unit Heater

Electrical unit heater shall be Chromalox Cat. No. BUH-41, 4 KW, 575 Volt, 3 phase, 60 cycle. The unit shall be complete with wall mounting bracket, mounting height shall be 6'-6" from finished floor to the underside of the unit heaters. Unit shall be complete with built-in contactor and 575/120V control transformer. A T-473B wall mounted electric thermostat shall be provided to control the heater.

2. Exhaust Air Louvre

Exhaust louvre shall be Construction Specialties Limited Model 4100, complete with aluminum bird screen. Louvre shall be finished in black Kynar/Fluropon. Louvre size as shown on drawings.

3. Inlet Air Louvre

Inlet air louvre shall be Construction Specialties Limited Model 4110, complete with aluminum bird screen, Louvre shall be finished in black Kynar/Fluropon. Louvre size as shown on drawings.

4. Motorized Dampers

Motorized dampers shall be tight closing, multi-blade type complete with 120 volt "power to close - spring return" electric motors and linkages.

I. Remote Alarm Panel

1. The Remote Alarm Panel shall provide for 2 alarms servicing off-normal operating conditions at each of two sewage pumping stations. Provision shall be made for three future alarms.

2. The Remote Alarm Panel shall be equal to No. 1365 with 5 alarm point as manufactured by Edwards of Canada Limited.

3. A N/O alarm contact will be made available at each of the two pumping stations. An end-of-line resistor shall be provided at each of the above locations to ensure telephone line compatibility with the remote alarm panel.

J. Fuel Oil Tank

1. Oil tank shall be Ferro, 23" x 47" x 36", 120 Imperial Gallons, Underwriters approved indoor oil storage tank. Tank shall be complete with 2" fill, 2" vent, 1-1/2" gauge and 1/2" outlet openings. Strainer shall be Cuno simplex basket type, tank shall be complete with float level gauge and mechanism. Legs shall be of a height determined by the diesel generator manufacturer.

16B.03 EXECUTION

A. Tests

1. Insulation tests shall be performed for all wiring and equipment installed under this Division. Insulation tests shall be performed with a 1000V "Megger" insulation tester. Lighting and power circuit feeders shall be meggered and if resistance to ground is less than 0.5 megohms on any lighting or power circuit, such circuit shall be considered defective and shall be replaced.

2. Single phase loads shall be connected so that there is the least possible imbalance of the supply.

B. Service

1. Terminate standpipe on pole with a weatherhead at a height acceptable to H.E.P.C. of Ontario.

C. Grounding

1. The ground system shall be suitably connected from the Motor Control Centre ground bus to ground rods as shown on the Drawings. All grounding shall meet the requirements of the H.E.P.C. of Ontario.

D. Bell Telephone Conduit System

1. The Bell Telephone equipment and wiring shall be installed by the Bell Telephone Company.

2. A 2" conduit shall be terminated and capped at the property line. Inside the building the 2" conduit shall terminate in a junction box. A 3/4" conduit shall run to the level control panel.

E. Ducts

1. All ducts shall be laid in straight lines to avoid low lying pockets.

2. All ducts shall be a minimum of 3'-0" below grade.

3. All ducts shall have an "A.B. Chance Company" cable marker tape installed over the ducts 6" below grade.

4. All duct lines shall be rodded before installing cables or pull wires into the duct lines to ensure that all ducts are free from obstruction and debris.

5. Pull wires shall be installed in each duct. Pull wires shall be copper weld, stainless steel or non-metallic of 1100 lbs. minimum breaking strength.

6. Where ducts turn up above grade level, all bends shall be made of galvanized steel conduit, having the same size and bending radius as the ducts. Fabricated duct bends may be used for turn ups, provided they are protected by concrete and not in hazardous areas.

F. Outlet Boxes, Conduit and Wiring

1. Conduits shall be exposed or concealed as indicated. Where not indicated conduit shall be concealed in walls, floors or ceilings wherever possible and practical.

2. All conduit shall be supported at intervals as required by Code, with approved type corrosion resisting clamps, one hole clips, hanger rods with channel iron and clips or fasteners. Proposed fasteners shall be submitted for approval prior to installation. Perforated strap, hay wire, etc. will not be accepted.

3. Lead anchors, toggle bolts or expansion bolts shall be used to attach clamps, clips, etc., to masonry walls. The use of powder activated type studs will not be permitted unless authorized by the Engineer.

4. Conduit terminations at motors shall be made with watertight flexible conduit with liquid-tight connectors.

5. The use of running threads is prohibited.

6. Any conduit, which is not, in the opinion of the Engineers, installed as good workmanship would call for, shall be taken out and replaced with no charge to the contract price. Also, additional hangers, clips, etc., shall be installed if so directed by the Engineer.

7. Where hazardous areas are indicated on the drawings, the wiring shall be installed to conform to the Code requirements for the specific type of hazard present.

8. Where outlets, switches, panels, etc. are recess mounted in exposed block walls, mounting heights shall be adjusted to suit the block courses.

9. All boxes shall be securely fastened and not dependent upon the conduit fastening.

10. Wire shall be placed in conduit without excessive strain or kink and fish paper will be provided where required to prevent cables from resting against metal enclosures. Prior to using lubricant check with the cable manufacturer as to what type of lubricant is approved for the specific cables in use.

G. Identification

1. All starters, remote control stations and disconnect switches shall be identified with lamicoid plastic plates. Designations shall be approved by the Engineers.

2. The lighting panel legend shall be typewritten in to agree with the circuitry as installed, not as indicated on the drawing.

H. Lighting Fixtures

1. All lighting fixtures shall be installed as indicated on the drawings, complete with lamps of wattage indicated, bases, glass ware, hangers to provide a complete working installation.

2. A ground wire shall be connected to the body of all fluorescent fixtures.

3. All fixtures shall be securely mounted and shall be installed accurately in line and level. Any fixtures which are not, in the opinion of the Engineer, installed properly, shall be taken down and reinstalled to his satisfaction at no change to the contract sum.

I. Louvres

1. Louvres shall be supplied and installed as indicated on the Drawing.

J. Automatic Dampers

1. Adapt and connect dampers to louvres.

K. Duct Work

1. Sheet Metal work shall be comprised of galvanized sheet steel constructed and installed in accordance with the latest Standards and recommendations of the ASHRAE.

L. Fuel Oil System

1. Fuel Oil suction and return piping shall be 1/2" type 'K' soft copper tubing. Tubing shall be protected with 1-1/2" flexible polyethylene pipe under the floor.

2. Oil fill and vent piping shall be Schedule 40, black steel pipe.

3. Suction and return piping shall be coiled, sufficient to absorb vibration, at the diesel location.

M. Diesel Engine Generator Set

1. A diesel-generator set will be supplied under Division 11. This section covers the complete electrical and mechanical connection of the set.

2. The following electrical equipment will be supplied as part of the Diesel-Generator Set:

   (A) 1800 RPM Generator and Engine.

   (B) Battery with trickle charger.

   (C) 120 volt engine Block Heater.

   (D) Engine control wiring to a Unit mounted junction box.

   (E) Auto Start control panel with 4 alarm annunciator panel engine start and stop controls all with wiring terminating at terminal blocks.

   (F) Automatic Transfer in a wall mounted control panel.

   (G) Generator Control and Transfer Panel complete with the following equipment:

      (1) Automatic Transfer Switch.

      (2) Generator circuit breaker.

      (3) Ammeter with switch

      (4) Voltmeter with switch.

      (5) Frequency meter.

      (6) Running time meter.

3. Start up shall be carried out under the supervision of the Equipment Supplier in the Pre-selected Equipment Section. The services of qualified technician will be provided for start up and Owner instruction under Section 15 A.

N. Level Control Panel

1. The level control panel shall be installed complete with all electrical connections as indicated on the Drawings.

2. The bubbler piping shall be installed under another Division.

SECTION 16C - PARK LANE PUMPING STATION

16C.01 GENERAL

A. Intent of Section

1. This Section covers:

(A) Incoming Service

(B) Equipment Enclosure.

B. Incoming Service

1. The Fonthill H.E.C. will provide 600V, 3 phase, 60 cycle power at their terminal pole.

2. The incoming 600V power shall be supplied and installed from the terminal pole to the main switch in the equipment enclosure.

3. All arrangements shall be made with the Fonthill H.E.C. for bringing in the electrical services to the project. All charges to be paid to Fonthill H.E.C. for bringing in of the electrical service shall be included in the Contract price.

16C.02 PRODUCTS

A. Equipment Enclosure

1. An equipment enclosure shall be provided at the Park Lane pumping station.

2. The construction of the panel shall be as follows:

(A) The enclosure shall be vandalproof and weatherproof, mounted outdoors on a concrete pad without additional housings, fences or other types of enclosures. There shall be no exposed screws, bolts or other fastening devices which are externally removable. There shall be no opening through which foreign objects, such as sticks, rods, or wires might be inserted to contact live parts. Suitable means for padlocking the enclosure door(s) shall be provided.

(B) Where a bolted-on cover of any kind is used, construction shall be such as to make this cover tamperproof.

(C) Doors shall be hinged and easily removable for convenience during installation and removal of equipment. The two doors shall have 2-point latching for positive locking.

(D) End panels shall be removable so that maintenance can be performed on housed equipment. Panels and doors shall be interchangeable for additional access.

(E) Cover shall be domed to shed water.

(F) Ventilation panels (optional) shall be constructed so as to allow circulation of air, yet prevent entry of foreign objects.

(G) The enclosure shall be a minimum of 12 gauge steel with weather and corrosion-resistant finish.

(H) A #12 gauge steel barrier shall be provided within the panel separating the metering section from the electrical equipment. A 1/8" thick removable backplate shall be mounted on the barrier for mounting hydro equipment.

(I) The electrical equipment shall consist of a lightning arrester, service entrance switch and starters with controls in CEMA 1 enclosures supplied under another section of this contract.

(J) The enclosure shall be equal to McGraw-Edison CSE 500 series with dimensions as indicated on the Drawing.

B. Lightning Arrester

1. A lightning arrester shall be mounted in the equipment enclosure and connected to the incoming side of the main switch and grounded to a 10' x 3/4" dia. ground rod by a #4 bare copper wire. The arrester shall be equal to C.G.E. 9L15BCC003.

C. Main Disconnect Switch

1. A disconnect switch shall be supplied equal to a Type 'A' industrial duty, fusible with handle interlocked and cover. Fuses shall be HRC type with ratings as indicated on the drawings.

16C.03 EXECUTION

A. Service

1. Terminate standpipe on pole with a weatherhead at a height acceptable to Fonthill H.E.C.

B. Bell Telephone Conduit System

1. The Bell Telephone equipment and wiring shall be installed by the Bell Telephone Company.

2. A 1" conduit shall be terminated 2'-0" above grade outside the equipment enclosures. Inside the enclosure wiring shall terminate in the control panel for a remote alarm over a leased telephone line.

C. All electrical equipment installed at the Park Lane Pumping Station shall meet the requirements under Section 16B.

APPENDIX A - SPECIFICATIONS FOR PRE-SELECTED EQUIPMENT

1. RAW SEWAGE PUMPS

A. General

These specifications are for the design, manufacture and supply of two (2) vertical frame mounted dry well raw sewage pumps complete with electric drive motors and appurtenances. Workmanship shall be of the highest quality throughout.

B. Hydraulic Operating Conditions

1. The pumps shall each be designed for the following duty:

   750 USGPM at 115 feet total head.

2. The pumps will be driven by a variable speed drive of a type to be determined later. Each of the pumps shall be capable of operating smoothly down to 100 USGPM at reduced speed. The manufacturer must ensure that the radial shaft stresses are well within safe limits with the pumps operating at the low flows.

C. Pump Construction

Each pump shall comply with the following:

1. The pump shall be suitable for dry well vertical operation on raw sewage from a sanitary sewer system.

2. The pump shall be heavy duty centrifugal suitable for continuous operation.

3. The pump shall be capable of passing a solid of 2 inches in diameter.

4. The direction of rotation may be clockwise to counter clockwise, to be determined later.

5. The pump speed shall not be greater than 1800 rpm for ultimate duty requirements.

6. The pump shall have horizontal suction through an integral elbow, which is part of a rugged cast iron base. A handhole shall be provided in the suction elbow.

7. Volute Casing: The volute casing shall be made of close grained cast iron of sufficient thickness to withstand all stresses and strains of service at full operating pressure. A hydrostatic pressure test of 100 lbs. per sq. inch shall be applied. Necessary eye bolts for lifting shall be provided.

8. The minimum discharge size shall be 4 inch diameter.

9. Impellers: The impeller shall be made of close grained cast iron and of the enclosed non-clog mixed flow type. It shall be cast in one piece and shall be balanced. The impeller shall be keyed to the shaft and held firmly in place by a threaded stainless steel locknut.

10. Wearing Rings: Renewable hardened chrome steel wearing rings shall be provided on both the impeller and suction casing with a Brinell Hardness of 275 - 300.

11. Glands: The pump gland shall be designed for a double type mechanical seal as manufactured by Crane Ltd. A water sealing connection shall be provided for sealing the back faces of the seal from an external supply.

12. Shafts: The shaft shall be made of alloy steel, SPS-245 or approved equal, ground and polished and key seated for mounting the impeller and coupling. It shall be protected by a corrosion and water-resistant hardened stainless steel shaft sleeve where it passes through the mechanical seal.

13. Bearings: The pump shall be provided with an inner roller bearing of the heavy duty, grease lubricated, anti-friction type, capable of carrying safely all radial loads imposed upon it, within the entire working range of the pump. The entire pump thrust load shall be carried by a heavy duty, grease or oil lubricated ball thrust bearing located in the upper end of the frame.

14. Frames: The motor supporting frame shall be of rugged construction to safely carry all axial and torsional loads imposed on it. The frame shall be so arranged as to provide easy removal of the bearings and access to the seals.

15. Coupling: The pumps shall be connected to the motors with a pin and rubber bushed type flexible coupling or approved equal.

D. Motor

Alternate prices shall be given for:

1. Squirrel Cage Induction Motor and

2. Wound Rotor Induction Motor, with suitable base and extension for mounting on and connecting to the pump.

The BHP output of the motor shall be such that it will never be exceeded by the requirements of the pump at any point on the pump head discharge curve for required initial duty. The speed of the motor shall be in accordance with the pump requirements. The motor shall be NEMA design B, Class B epoxy encapsulated floodproof insulation, 60 degree C rise with open drip-proof enclosure, anti-friction bearings, suitable to withstand thrust on motor starting, complete with grease fitting and grease drain plug in the bearing housings. The motor shall be suitable for connection to a 575 volt, 3 phase, 60 cycle power supply. The motor shall be equipped with a cast iron junction box with gasketted cover and threaded for rigid galvanized steel conduit.

E. Painting

All unfinished ferrous metal parts of the pumps, frames and appurtenances shall be painted as follows:

1. The surfaces shall be prepared by power wire brushing followed by scraping and vacuuming.

2. The metal parts shall then be primed one coat with Inertol 621 Rustinhibitive primer or approved equal.

3. All finished surfaces shall be cell coated with grease or anti-rust compound before shipment.

2. DIESEL GENERATOR SET

A. General

These specifications are for the design, manufacture and supply of a Standby Diesel Generator Set complete with all necessary accessories. The Diesel Generator Set shall be designed to start and operate one 40 HP sewage pump with a wound rotor motor. In addition, there will be a load of about 5 KVA for lighting and small motors.

B. Engine

Engine shall be an air cooled diesel engine, four stroke cycle, minimum of 6 cylinders, not less than 380 cubic inch displacement, and rated not less than 81 HP for continuous service, at 85 degrees F. ambient temperature, 500 feet elevation, and 1800 rpm. Included with the engine will be the following accessories:

- Dry type air cleaner.
- Replaceable fuel oil filter.
- Engine driven fuel transfer pump, and pair of flexible fuel connectors.
- Lubricating oil filters.
- Engine mounted instrument panel, containing lubricating oil pressure gauge, lubricating oil temperature gauge, and exhaust temperature gauge.
- Residential type exhaust silencer, and at least two feet of bellows type flexible exhaust hose with suitable flanges.
- 12 volt electric starting system, including Exide Hycap 8D-210 ampere hour, lead acid, battery, or approved equal, battery rack, cables and hydrometer.
- Vulcan Model FA24/6, or approved equal, automatic battery trickle charger, including wall mounting enclosure, voltage sensing relay to protect against overcharging, ammeter, overload protection, and manual equalizing charge by constant-automatic switch. Battery charger supply voltage shall be 120 volts, 60 Hertz ac.
- Fuel rack solenoid.
- Low lubricating oil pressure, high temperature, and overspeed safety monitors.

- Hydraulic Govenor to control speed with 2% from no load to full load and from full load to no load.

- Thermostatically controlled in 1 KW block heater.

- Standard set of engine tools in metal container.

- Lubricating oil cooler.

- Cooling air duct adapter flange.

C. Generator

Generator shall be rated at least 45 KW, 56.4 KVA 0.8 power factor, 600 volts, 3 phase, 3 wire, 60 Hertz, 1800 rpm continuous duty. It shall be oversized, if necessary, to provide the motor starting requirements as outlined above, and it shall be of the single bearing type, flanged mounted directly to engine flywheel housing, and driven through a semi-flexible coupling. It shall be of the brushless type, and a solid state type automatic voltage regulator shall be mounted either in the generator or in the control panel as further described below, to provide voltage regulation within plus or minus 2%. Adequate shielding and filtering shall be included to minimize radio interference in standard broadcast bands. The generator shall bear CSA approval, and temperature rise shall be within NEMA standard.

D. Mounting

The generator set shall be mounted on a heavy duty, fabricated steel base. High efficiency spring type vibration isolators with neoprene pad type sound isolating pads shall be supplied loose for mounting between this base and the floor.

E. Generator Control and Transfer Panel

The Generator Control and Transfer Panel shall be free standing floor mounting type with hinged front door and bearing the manufacturer's CSA label. The panel shall be finished with two approved primer coats and two approved finished coats inside and outside.

The finished coats shall be semi-gloss No. 513-201 of the Standard paint colour system of the Canadian Government Specification Board. The type of enamel shall be at the manufacturer's discretion.

The panel shall be 24 inches wide x 20 inches deep x 90 inches high.

The Generator Control and Transfer Panel shall contain the following equipment:

- Suitable main moulded case circuit breaker. Thermal/magnetic trips in Robonic transfer switch will not be acceptable, nor will a generator field breaker be acceptable, (in lieu of this device).

- Voltmeter and phase selector switch.

- Ammeter and phase selector switch.

- Combined frequency meter and running time meter.

- Manual voltage adjusting device, to provide plus or minus 5% adjustment.

- Automatic "start-stop" system, to operate unit upon closing of remote contact in automatic transfer switch as further described below.

- Safety shut-down in event of overcrank, low lubricating oil pressure, high cooling water temperature, and overspeed, complete with individual Mechron annunciators to provide visual indication of which fault has occurred. Also included with these annunciators shall be additional "dry" contacts for connection to remote alarm system by others.

- "Automatic-Test-Off" function selector switch.

- Necessary relays, terminal blocks, wiring, nameplates etc.

- Automatic transfer switch, Westinghouse Robonic Model LRO 58, or approved equal, rated 70 amperes, 600 volts, 3 phase, 3 wire, 60 cycle. It shall be of the mechanically held type, and shall include the following accessories:

  1. Full phase failure protection, 70% drop-out, 90% return.

  2. Electrical and mechanical interlocks.

  3. Five minute adjustable time delay on engine start, set for 3 seconds.

  4. Five minute adjustable time delay on return to normal, set for 5 minutes.

  5. Five minute adjustable engine over run timer, set for five minutes.

  6. 2 N/C auxiliary contacts to open on transfer for cutting out heaters.

F. Miscellaneous

All material and equipment shall be new of current manufacture. The plant and accessories shall be performance certified and cover the manufacturer's warranty against defective parts and workmanship for a period of one year from date of acceptance by the Engineer.

The complete diesel generating set and its control panel shall be tested by the manufacturer, under full load, and this test may be witnessed by the Engineer's representative, or if requested, certified test results shall be submitted in writing.

Included with the generating plant shall be the services of a trained diesel-electric technician, to perform site testing of the unit, in co-operation with the Contractor, upon completion of installation. It shall be assumed that all equipment shall be completely and properly installed upon arrival of this technican, and that one normal working day at the site will be sufficient to check out the installation, test the equipment, and instruct the Owner's operating personnel.

Complete outline and wiring diagrams shall be submitted to the Engineer for approval.

Two complete handbooks, each under one cover, shall be provided for the unit, containing parts and instruction manuals, and actual and schematic wiring diagrams covering all equipment.

3. COMMINUTOR

A. General

These specifications are for the supply, delivery and supervision of the installation of one (1) comminutor for the proposed sewage pumping station in the Town of Pelham, Ontario.

B. Design Criteria

The comminutor shall be capable of accepting a peak flow of 1.1 USMGD.

C. Comminutor

The comminutor shall be a motor driven unit of the type suitable for installation in a straight rectangular channel.

The comminutor shall not be of the Barminutor or U-Tube type.

The comminutor shall be equal to the Worthington size 12-5, Type C close-coupled.

The comminutor shall operate continuously and automatically screen and cut or shred coarse solids directly in the flowing raw sewage without requiring removal of the screenings from the channel.

D. Comminutor Motor

The comminutor shall be driven by a vertical, squirrel cage, induction motor of suitable size to operate the machine under all conditions. The motor shall be suitable for 575 volts, 3 phase, 60 cycle A.C. operation.

The motor shall be T.E.F.C. waterproof with Class B insulation suitable for an ambient temperature of 65°C.

E. Starter

The starter for the comminutor will be provided by others.

F. Inspection

The manufacturer shall provide a factory trained service representative to inspect the installation of the above equipment and to be present at initial operation. The quotation shall include for this service. The supplier shall specify the number of visits to site that are included in the quotation. A rate per diem shall also be quoted.

4. UCH HYDR-O-FLUSH SYSTEM FOR OUTSIDE INSTALLATION BELOW GROUND

A. General

The UCH Hydr-o-Flush sewage system as manufactured by the Hydr-o-Matic Pump Company, Hayesville, Ohio, shall include a sewage receiver chamber in which the Hydr-o-Flush system is installed. The Hydr-o-Flush unit shall prevent solids from entering pumps.

The general equipment shall include Hydr-o-Flush unit, pumps, discharge check valve and gate valve, mercury switch level controls, Nema 4 connection box for pumps and controls, and electrical control panel all as per drawing 1902C.

B. Operating Conditions

Each pump shall have a capacity of 55 GPM at a total head of 45 feet. Pump shall operate at 3450 RPM and motor shall be rated 1 H.P. All solids shall bypass pumps and be flushed to sewer main.

C. Receiver Chamber

The receiver chamber shall be of fabricated steel and have an inside diameter of 52" and a depth of 144".

D. Pumps

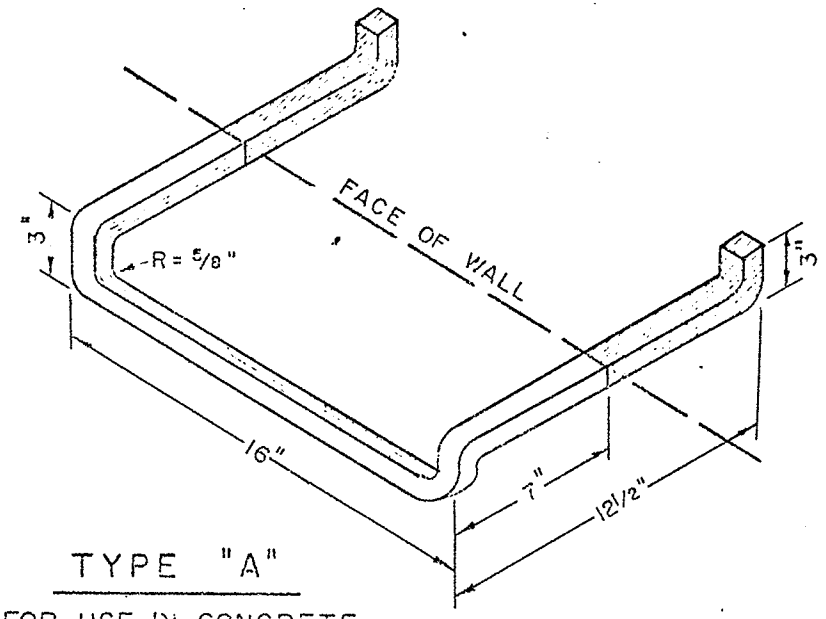
Pumps shall be of the submersible type with oil filled construction.

E. Motor

1 H.P., 3450 RPM, 3 Phase, 575 volt, 60 cycles.

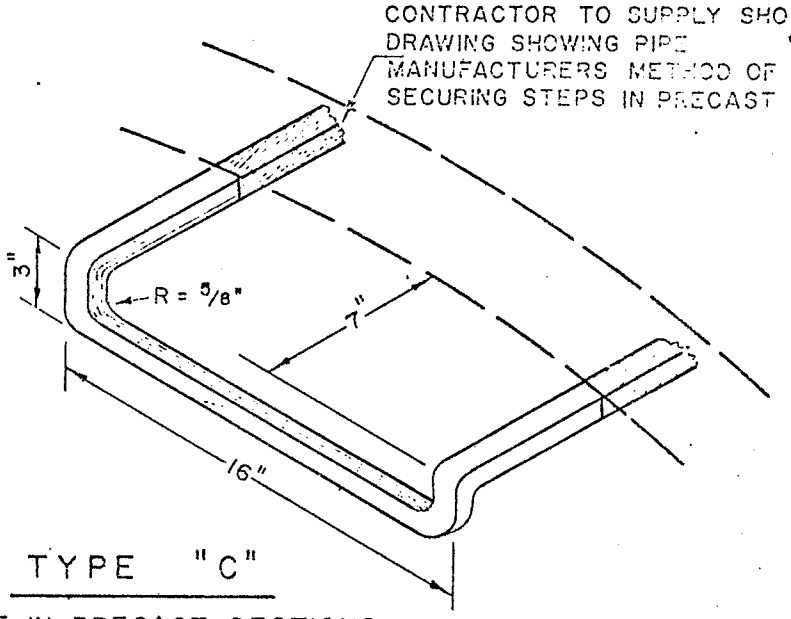
F. Electrical Control Panel

Control panel shall have a Nema I enclosure and shall be dead front with separate removable inside panel to protect electrical equipment. A circuit breaker shall be provided for each pump and a magnetic starter with 3 leg overload protection shall be supplied for each pump. An alternating relay shall be provided to alternate pumps on each successive cycle of operation. Only one pump shall operate at one time. In case of pump overload, the second pump shall operate on the level controls and the overload shall be indicated by a separate pilot light on the control panel and by dry NO and NC contacts for connection into a remote alarm circuit. An interlock relay shall be provided to automatically re-connect the control circuit in case of circuit breaker trip on one pump. H-O-A switches and run lights shall be provided for each pump. Terminal strip shall be provided for connecting pump and control wires. Additional terminals shall be provided to connect to a remote alarm transmitted over Bell telephone lines. The control circuit shall operate on 120 volt single phase. The control circuit transformer shall be suitable to provide an additional 100 watts at a standard fused receptacle in the panel face.



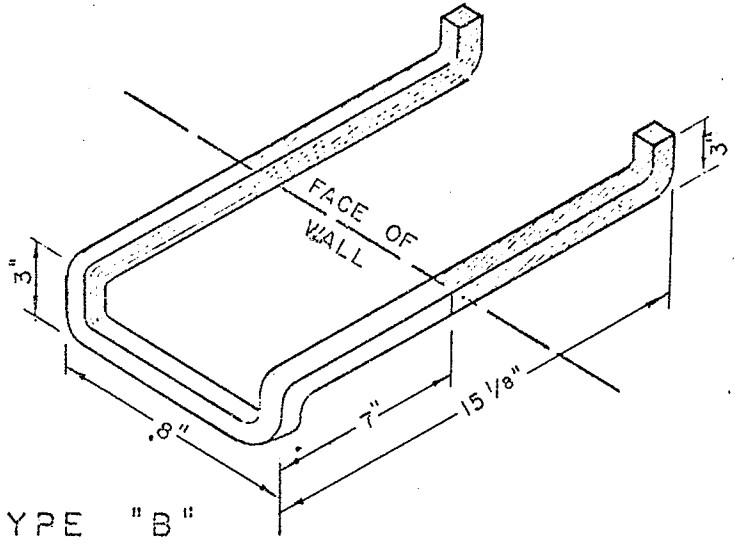
TYPE "A"

FOR USE IN CONCRETE



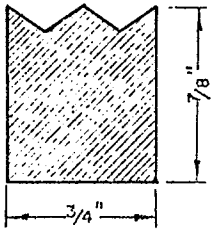
TYPE "C"

FOR USE IN PRECAST SECTIONS



TYPE "B"

FOR USE IN BRICKWORK



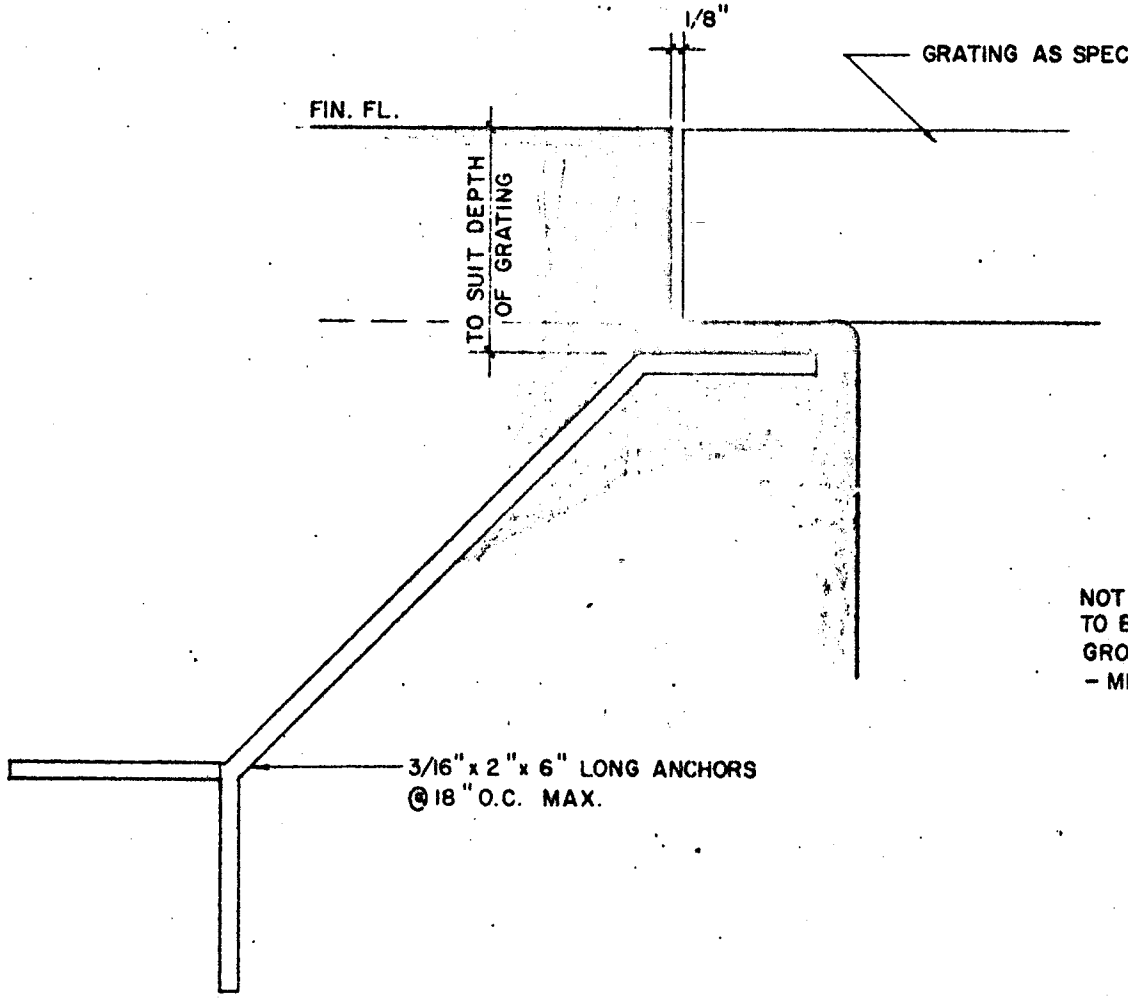
SECTION THROUGH ALUMINUM STEPS

NOTE

1. MATERIAL FOR STEPS TO BE ALUMINUM ALLOY 65 ST 4 (ALUMINUM CO. OF CANADA SPECIFICATION).
2. ALL ALUMINUM IN CONTACT WITH CONCRETE OR BRICKWORK TO HAVE 2 COATS FLINTKOTE C-12 STATIC ASPHALT PAINT OR APPROVED EQUAL.

ALUMINUM SAFETY LADDER RUNGS

E-STD.5-2

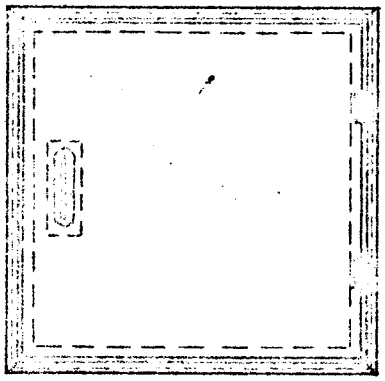


NOTE: ∠ FRAME CORNERS ARE TO BE MITRED, WELDED & GROUND SMOOTH
– MIN. SEATING ∠ THICKNESS 1/4"

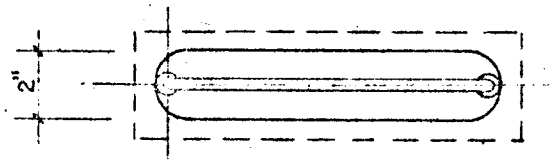
TYPICAL GRATING SEATING DETAIL

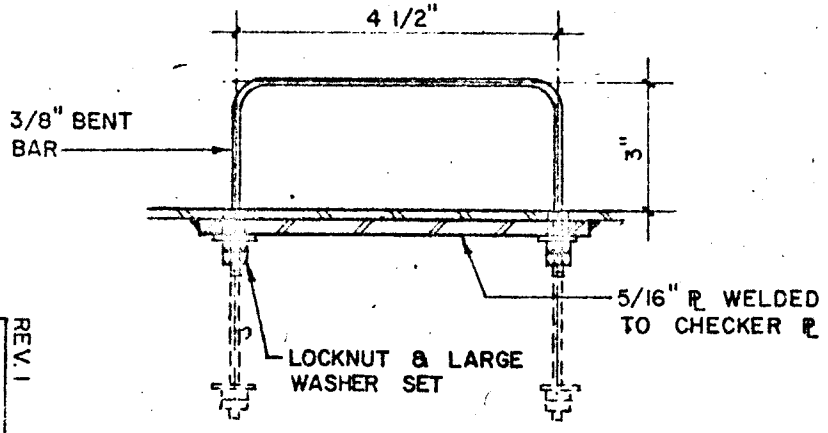
N.T.S.

REV.1
E-STM-8-7

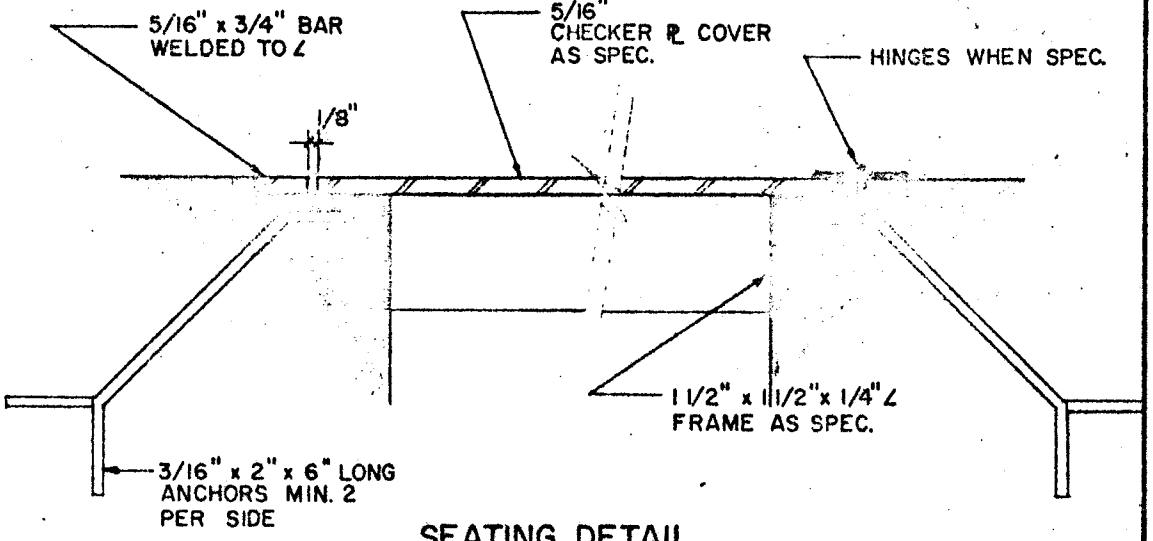


PLAN





LIFTING HANDLE



SEATING DETAIL

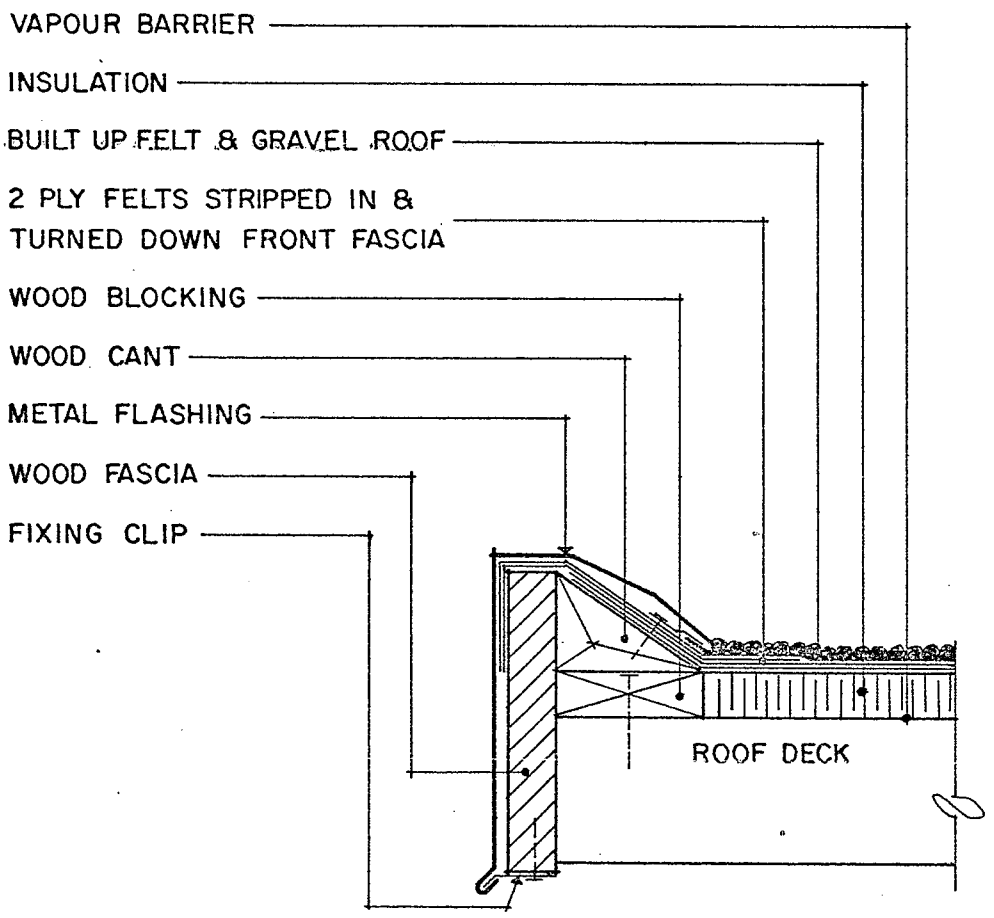
NOTE: CHECKER ℄ & BAR CORNERS ARE TO BE MITRED WELDED & GROUND SMOOTH

REV. 1

E-[illegible]-8-10

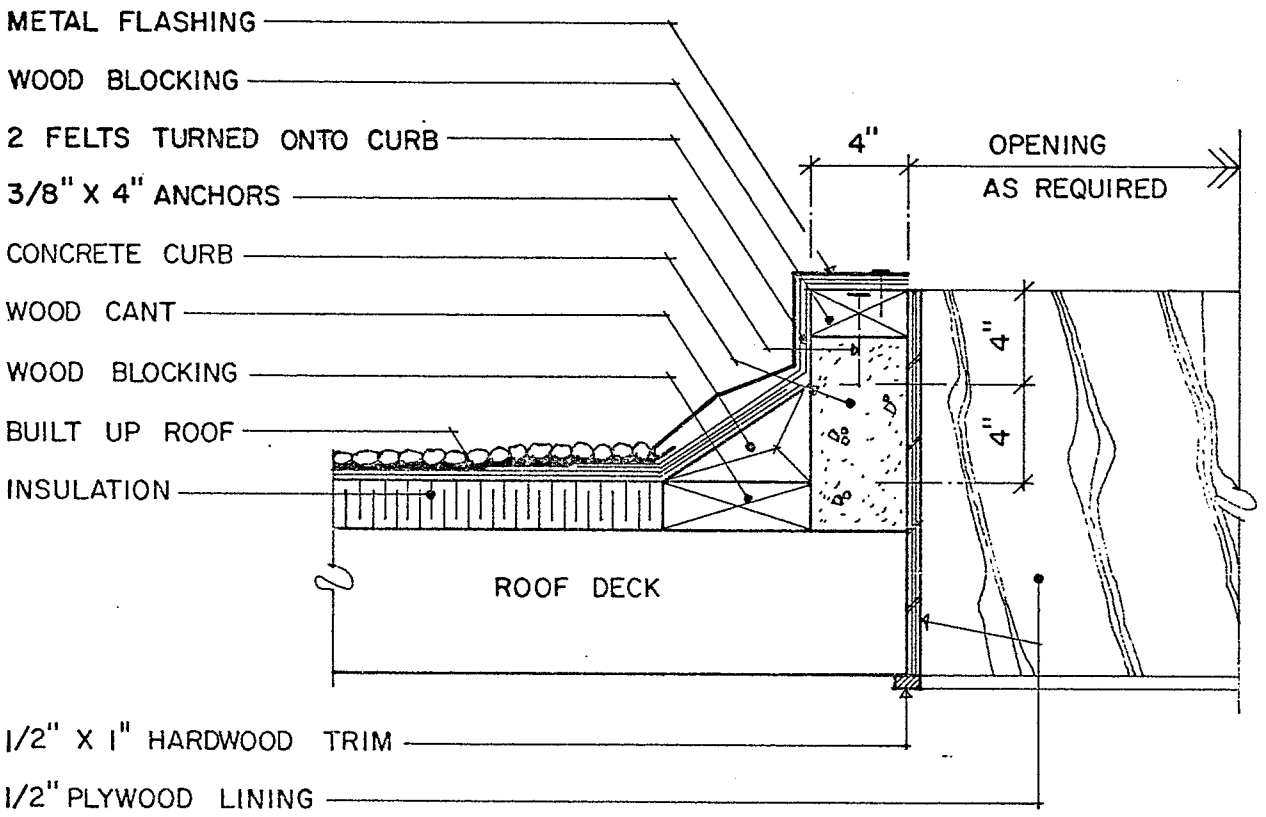
TYPICAL CHECKER PLATE DETAIL

N.T.S.



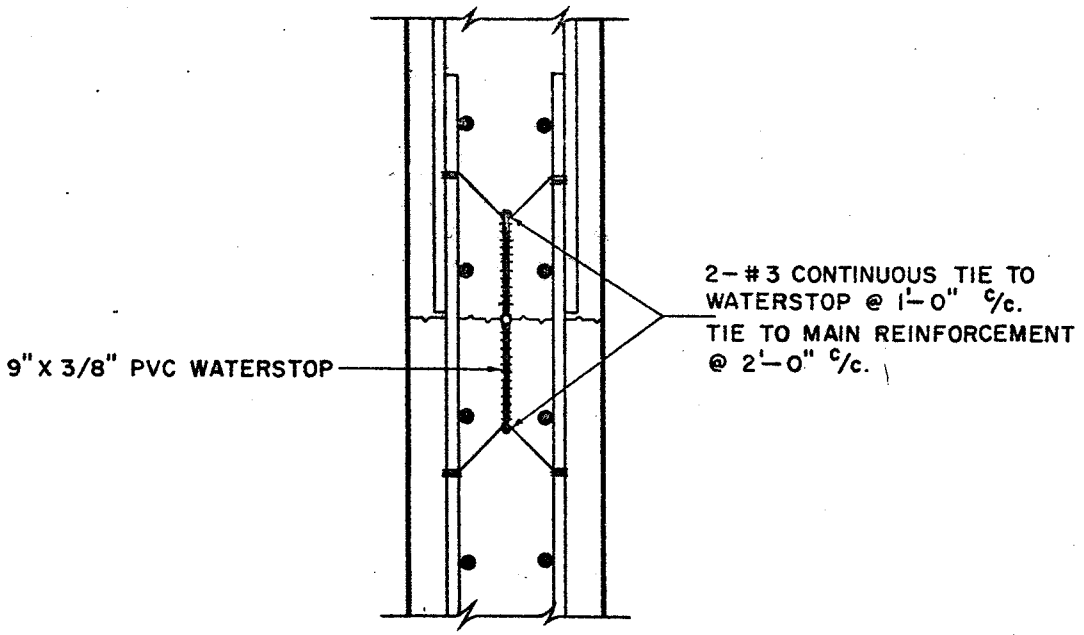
STANDARD ROOF FLASHING DETAIL

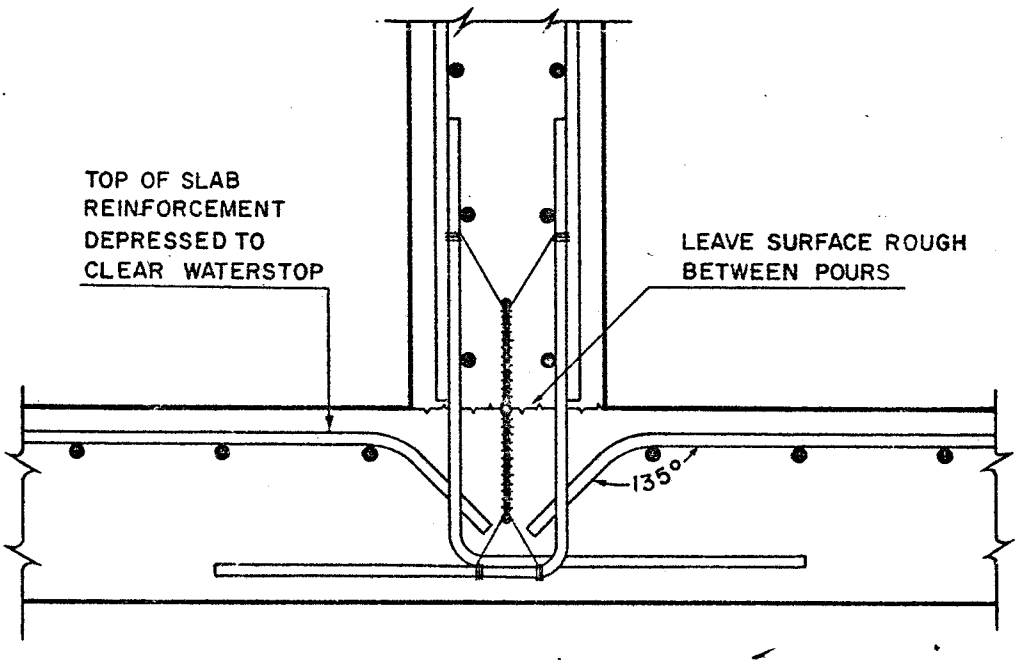
E-STD-9-R2



OPENING THROUGH ROOF

E-STD-9-R6





WATERSTOPPED JOINTS

CONSTRUCTION JOINTS

Proctor & Redfern Limited
Consulting Engineers
Toronto

Drawing No. E — STD.— 11 — 1

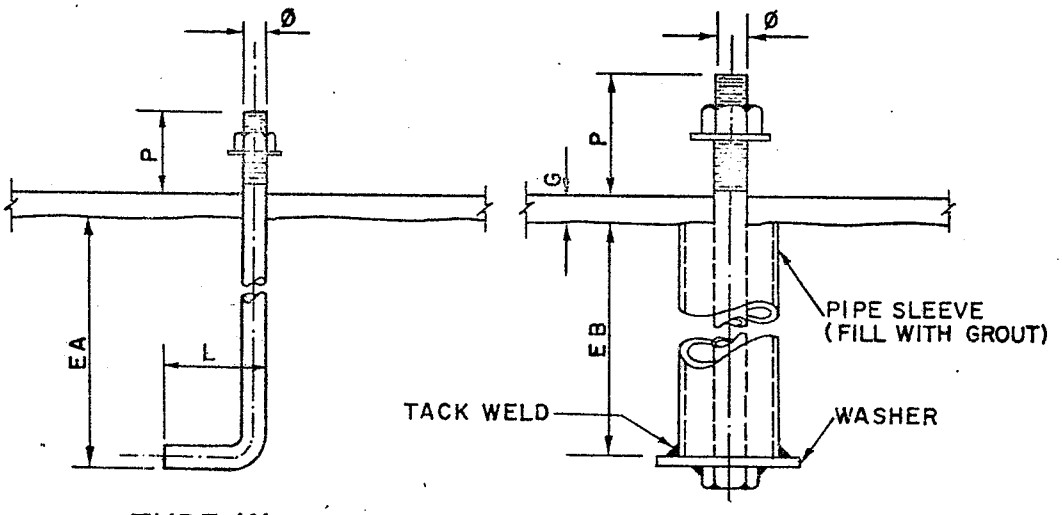


TABLE OF BOLT & FITTING DIMENSIONS

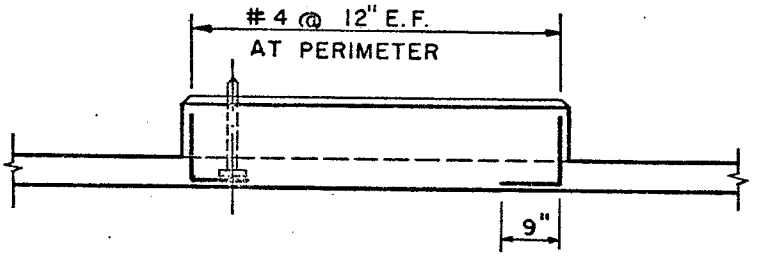
BOLT Ø	TYPE 'A'		TYPE 'B'		
	E A	L	SLEEVE	WASHER	E B
1/2"	9"	3"	1½"	3½" x 3½" x ¼"	8"
5/8"	1'-1"	3"	2"	4½" x 4½" x ⅜"	10"
¾"	1'-4"	3"	2"	5" x 5" x ⅜"	1'-2"
7/8"	1'-7"	4"	2"	6" x 6" x ½"	1'-4"
1"	1'-10"	4"	2½"	6¾" x 6¾" x ½"	1'-7"
1 1/8"	2'-2"	4"	2½"	7½" x 7½" x ⅝"	1'-9"
1 ¼"	2'-4"	6"	3"	8½" x 8½" x ⅝"	2'-0"
1 3/8"	2'-6"	6"	3"	9¼" x 9¼" x ¾"	2'-5"
1½"	3'-0"	6"	3"	10" x 10" x ¾"	2'-7"
1 5/8"			3"	11" x 11" x 7/8"	2'-7"
1 ¾"			4"	12" x 12" x 7/8"	2'-9"
1 7/8"			4"	12¾" x 12¾" x 1"	3'-0"
2"			4"	13½" x 13½" x 1"	3'-3"

GROUT THICKNESS 'G' AND BOLT PROJECTION 'P' AS SHOWN ON THE DRAWING OR
P = BASE ℄ + 2"
THREADED LENGTH TO EQUAL PROJECTION 'P'

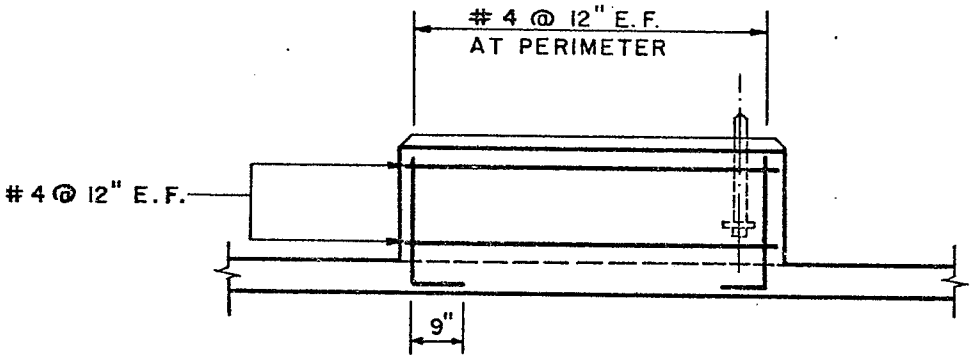
ANCHOR BOLT DETAILS

Proctor & Redfern Limited
Consulting Engineers
Toronto

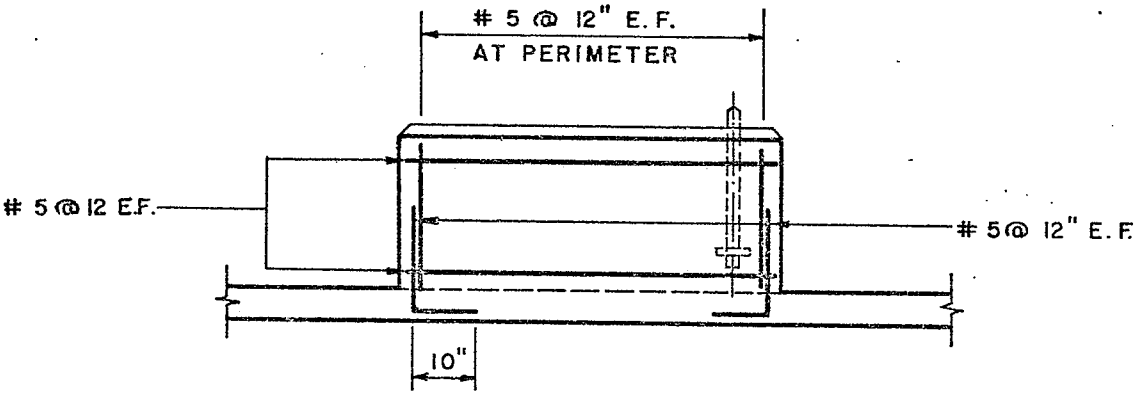
Drawing No E-STD.-11-4



PADS NOT HIGHER THAN 1'-3"



PADS OVER 1'-3" HIGH BUT LESS THAN 3'-0" HIGH



PADS 3'-0" HIGH AND OVER

LEAVE FLOOR SLAB ROUGH BETWEEN POURS.
FINISHED EL. TOP OF PAD AND GROUT FROM LAYOUTS, GENERALLY 1" GROUT.
WHERE ANCHOR BOLTS TYPE 'B' ARE USED, SLEVES DO NOT PROJECT ABOVE TOP OF ROUGH CONCRETE.
ANCHOR BOLT TYPE, LOCATION, & PROJECTION, FROM LAYOUT.

EQUIPMENT PAD REINFORCEMENT

Proctor & Redfern Limited
Consulting Engineers
Toronto

Drawing No. E-STD.-11-5

BASIC MULTI PERIL POLICY

The Canadian Surety Company

HEAD OFFICE — TORONTO

(HEREINAFTER CALLED THE INSURER)

AGENCY AT	Toronto, Ontario.	AGENCY NO.	BRANCH
AGENT	E.T. Alberts Ltd.	7529	25

WHEN WRITING PLEASE REFER TO **POLICY No. 4-038-461**

REPLACING PREVIOUS POLICY NO. NEW [x]

FROM NOON (STANDARD TIME) DAY	MONTH	YEAR	UNTIL NOON (STANDARD TIME) DAY	MONTH	YEAR	TERM
13	March	1972	13	Sept.	1972	6

NAME AND ADDRESS OF INSURED (SURNAME FIRST)

DIXHILL CORPORATION LIMITED A/O CORPORATION OF THE TOWN OF PELHAM A/O PROCTOR REDFERN LTD A/O ALL SUB CONTRACTORS.

(HERINAFTER CALLED THE INSURED)

AMOUNT OF INSURANCE	RATE	PREMIUM
$ 131,986.00	.15	$198.00 (Min.)

PLEASE READ YOUR POLICY CAREFULLY

WHEREAS the Insured having paid or agreed to pay the Insurer the amount of the premium above stated, the Insurer in consideration of the premium stated herein and subject to the terms and conditions hereof, if the property described in the Rider(s) attached hereto, or any part thereof, shall be lost, destroyed or damaged by a peril as provided in the terms of the Rider(s) attached hereto, will indemnify the Insured to an amount not exceeding the sum set opposite the applicable item.

LOSS PAYABLE TO ..... Insured. .....

(SEE INSIDE PAGE FOR POLICY WORDING FORM)

GENERAL EXCLUSIONS

This Policy does not cover:

(a) loss or damage caused by war, invasion, act of foreign enemy, hostilities (whether war be declared or not), civil war, rebellion, revolution, insurrection or military power;

(b) loss or damage caused by contamination by radioactive material.

THIS POLICY IS MADE AND ACCEPTED SUBJECT TO THE FOREGOING PROVISIONS, AND TO THE FOLLOWING PROVISIONS, STIPULATIONS AND CONDITIONS PRINTED ON BACK HEREOF, WHICH ARE HEREBY SPECIALLY REFERRED TO AND MADE A PART OF THIS POLICY, together with such other provisions, agreements, or conditions as may be endorsed hereon or added hereto. No term or condition of this Policy shall be deemed to be waived by the Insurer in whole or in part unless the waiver is clearly expressed in writing signed by a person authorized for that purpose by the Insurer. Neither the Insurer nor the Insured shall be deemed to have waived any term or condition of this Policy by any act relating to the appraisal of the amount of loss or to the delivery and completion of proofs, or to the investigation or adjustment of any claim under the Policy.

IN WITNESS WHEREOF, the Insurer has duly executed this Policy; PROVIDED, however, that this Policy shall not be valid or binding unless countersigned on its behalf.

Countersigned by

EDGAR T. ALBERTS LIMITED

AUTHORIZED REPRESENTATIVE

SECRETARY

PRESIDENT AND GENERAL MANAGER

V. 8-66 R&S.

Conditions

All of the Conditions set forth under the titles Statutory Conditions and Additional Conditions apply with respect to all of the perils insured by this Policy except as these Conditions may be modified or supplemented by the Riders or Endorsements attached.

Statutory Conditions

1. Misrepresentation — If any person applying for insurance falsely describes the property to the prejudice of the insurer, or misrepresents or fraudulently omits to communicate any circumstance which is material to be made known to the insurer in order to enable it to judge of the risk to be undertaken, the contract shall be void as to any property in relation to which the misrepresentation or omission is material.

2. Property of Others — Unless otherwise specifically stated in the contract, the insurer is not liable for loss or damage to property owned by any person other than the insured, unless the interest of the insured therein is stated in the contract.

3. Change of Interest — The insurer shall be liable for loss or damage occurring after an authorized assignment under the **Bankruptcy Act** or change of title by succession, by operation of law, or by death.

4. Material Change — Any change material to the risk and within the control and knowledge of the insured shall avoid the contract as to the part affected thereby, unless the change is promptly notified in writing to the insurer or its local agent; and the insurer when so notified may return the unearned portion, if any, of the premium paid and cancel the contract, or may notify the insured in writing that, if he desires the contract to continue in force, he must, within fifteen days of the receipt of the notice, pay to the insurer an additional premium, and in default of such payment the contract shall no longer be in force and the insurer shall return the unearned portion, if any, of the premium paid.

5. Termination of Insurance — (1) The insurance may be terminated:

(a) subject to the statutory provision relating to cases where loss under the contract has, with the consent of the insurer, been made payable to some person other than the insured, by the insurer giving to the insured at any time fifteen days notice of cancellation by registered mail, or five days notice of cancellation personally delivered, and, if the insurance is on the cash plan, by refunding the excess of premium actually paid by the insured beyond the pro rata premium for the expired time;

(b) if on the cash plan, by the insured giving written notice of termination to the insurer, in which case the insurer shall, upon surrender of this policy, refund the excess of premium actually paid by the insured beyond the customary short rate for the expired time.

(2) Repayment of the excess premium may be made by money, postal or express company money order, or by cheque payable at par.

(3) If the notice is given by registered letter the repayment shall accompany the notice.

(4) The fifteen days mentioned in clause (a) of sub-paragraph 1 of this condition shall commence to run from the day following the receipt of the registered letter at the post office to which it is addressed.

6. Requirements After Loss — (1) Upon the occurrence of any loss of or damage to the insured property, the insured shall, if such loss or damage is covered by the contract, in addition to observing the requirements of conditions 9, 10 and 11,

(a) forthwith give notice thereof in writing to the insurer;

(b) deliver as soon as practicable to the insurer a proof of loss verified by a statutory declaration,

(i) giving a complete inventory of the destroyed and damaged property and showing in detail quantities, costs, actual cash value and particulars of amount of loss claimed,

(ii) stating when and how the loss occurred, and if caused by fire or explosion due to ignition, how the fire or explosion originated, so far as the insured knows or believes,

(iii) stating that the loss did not occur through any wilful act or neglect or the procurement, means or connivance of the insured,

(iv) showing the amount of other insurances and the names of other insurers,

(v) showing the interest of the insured and of all others in the property with particulars of all liens, encumbrances and other charges upon the property,

(vi) showing any changes in title, use, occupation, location, possession or exposures of the property since the issue of the contract,

(vii) showing the place where the property insured was at the time of loss;

(c) if required give a complete inventory of undamaged property and showing in detail quantities, cost, actual cash value;

(d) if required and if practicable, produce books of account, warehouse receipts and stock lists, and furnish invoices and other vouchers verified by statutory declaration and furnish a copy of the written portion of any other contract.

(2) The evidence furnished under clauses (c) and (d) of sub-paragraph (1) of this condition shall not to be considered proofs of loss within the meaning of conditions 12 and 13.

7. Fraud — Any fraud or wilfully false statement in a statutory declaration in relation to any of the above particulars, shall vitiate the claim of the person making the declaration.

8. Who may give notice and proof — Notice of loss may be given, and proof of loss may be made, by the agent of the insured named in the contract in case of absence or inability of the insured to give the notice or make the proof, and absence or inability being satisfactorily accounted for, or in the like case, or if the insured refuses to do so, by a person to whom any part of the insurance money is payable.

9. Salvage — (1) The insured, in the event of any loss or damage to any property insured under the contract, shall take all reasonable steps to prevent further damage to any such property so damaged and to prevent damage to other property insured hereunder including, if necessary, its removal to prevent damage or further damage thereto.

(2) The insurer shall contribute pro rata towards any reasonable and proper expenses in connection with steps taken by the insured and required under sub-paragraph (1) of this condition according to the respective interests of the parties.

10. Entry, Control, Abandonment — After any loss or damage to insured property, the insurer shall have an immediate right of access and entry by accredited agents sufficient to enable them to survey and examine the property, and to make an estimate of the loss or damage, and, after the insured has secured the property, a further right of access and entry sufficient to enable them to make appraisement or particular estimate of the loss or damage, but the insurer shall not be entitled to the control or possession of the insured property, and without the consent of the insurer there can be no abandonment to it of insured property.

11. Appraisal — (1) If any difference arises as to the value of the property insured, the property saved or the amount of the loss, that value and amount shall, whether the right to recover on the contract is disputed or not, be ascertained by two competent and disinterested appraisers, the insured and the insurer each selecting one, and the two so chosen then selecting a competent and disinterested umpire.

(2) The appraisers together shall then estimate and appraise the loss or damage; stating separately the sound values and damage and, failing to agree, shall submit their differences to the umpire; and the finding in writing of any two shall determine the value of the property insured, the property saved and the amount of loss.

(3) The parties thereto shall pay the appraisers respectively selected by them, and shall bear equally the expense of the appraisal and umpire.

12. When Loss Payable — The loss shall be payable within sixty days after completion of the proof of loss, unless the contract provides for a shorter period.

13. Replacement — (1) The insurer, instead of making payment, may repair, rebuild, or replace the property damaged or lost, giving written notice of its intention so to do within thirty days after receipt of the proofs of loss.

(2) In that event the insurer shall commence to so repair, rebuild, or replace the property within forty-five days after receipt of the proofs of loss, and shall thereafter proceed with all due diligence to the completion thereof.

14. Action — Every action or proceeding against the insurer for the recovery of any claim under or by virtue of this contract shall be absolutely barred unless commenced within one year next after the loss or damage occurs.

15. Notice — (1) Any written notice to the insurer may be delivered at, or sent by registered post to, the chief agency or office of the insurer in the Province or delivered or so sent to any authorized agent of the insurer therein.

(2) Written notice may be given to the insured by letter personally delivered to him or by registered letter addressed to him at his latest post office address notified to the insurer, or, where no address is notified and the address is not known, addressed to him at the post office of the agency, if any, from which the application was received.

Additional Conditions

16. Exclusions — This Policy does not cover: (a) loss or damage caused by war, invasion, act of foreign enemy, hostilities (whether war be declared or not), civil war, rebellion, revolution, insurrection or military power;

(b) loss or damage caused by contamination by radioactive material directly or indirectly resulting from an insured peril under this Policy.

17. Notice to Authorities — Where loss is claimed to be due to theft, burglary, robbery, malicious mischief or disappearance the Insured shall give immediate notice thereof to the police or other authorities having jurisdiction.

18. Sue and Labour — It is the duty of the Insured in the event that any property insured hereunder is lost to take all reasonable steps in and about the recovery of such property. The Insurer shall contribute pro rata towards any reasonable and proper expenses in connection with the foregoing according to the respective interests of the parties.

19. Subrogation — (a) The Insurer, upon making any payment or assuming liability therefor under this Policy shall be subrogated to all rights of recovery of the Insured against any person, and may bring action in the name of the Insured to enforce such rights;

(b) Where the net amount recovered after deducting the costs of recovery is not sufficient to provide a complete indemnity for the loss or damage suffered, that amount shall be divided between the Insurer and the Insured in the proportion in which the loss or damage has been borne by them respectively.

20. No Benefit to Bailee — It is warranted by the Insured that this insurance shall in no wise inure directly or indirectly to the benefit of any carrier or other bailee.

21. Basis of Settlement — Unless otherwise provided, the Insurer shall not be liable beyond the actual cash value of the property at the time any loss or damage occurs and the loss or damage shall be ascertained or estimated according to such actual cash value with proper deduction for depreciation, however caused, and shall in no event exceed what it would then cost to repair or replace the same with material of like kind and quality.

22. Pairs, Sets and Parts — (a) In the case of loss of or damage to any article or articles, whether scheduled or unscheduled, which are a part of a set, the measure of loss of or damage to such article or articles shall be a reasonable and fair proportion of the total value of the set, but in no event shall such loss or damage be construed to mean total loss of set;

(b) In the case of loss of or damage to any part of the insured property whether scheduled or unscheduled, consisting, when complete for use, of several parts, the Insurer shall only be liable for the value of the part lost or damaged including the cost of installation.

23. Other Insurance — Unless otherwise provided if, at the time of a loss covered by this Policy, there is any other insurance (other than against the peril of fire) which would attach if this insurance had not been effected, the Insurer under this Policy shall be liable only for the excess, if any, of loss over the applicable limit of the other policy covering such loss.

1. TO PAY, WITHIN THE LIMITS OF LIABILITY EXPRESSED HEREIN, ALL LOSS OF OR DAMAGE TO PROPERTY, INTEREST OR ITEMS INCLUDED IN PARAGRAPH 2 - COVERAGE CLAUSE - RESULTING FROM ANY CAUSE SET FORTH IN PARAGRAPH 4 - PERILS CLAUSE - OF THIS POLICY.

2. COVERAGE CLAUSE: ON ALL PROPERTY REQUIRED TO BE INSURED BY THE TERMS OF THE CONTRACT BETWEEN THE INSURED (EXCEPT AS HEREINAFTER SPECIFICALLY EXCLUDED) CONSISTING PRINCIPALLY OF, BUT WITHOUT LIMITING THE GENERALITY OF THE FOREGOING, CONSTRUCTION Hurricane Road and Park Lane Sewage Pumping Stations, Pelham, Ontario. (Project No. EO 69581)

INCLUDING ALL MATERIALS AND SUPPLIES USUAL, NECESSARY OR CONVENIENT TO THE WORK UNDERTAKEN AT THE SITE, ALL THE PROPERTY OF THE INSURED OR FOR WHICH THEY ARE LEGALLY RESPONSIBLE OR FOR WHICH THEY HAVE ASSUMED RESPONSIBILITY WHETHER HELD BY THEM OR OTHERS.

3. PROPERTY NOT INSURED: IT IS UNDERSTOOD AND AGREED HOWEVER, THAT THIS POLICY DOES NOT INSURE:
   (A) ACCOUNTS, BILLS, CURRENCY, DEBTS, EVIDENCE OF DEBTS, MONEY, NOTES SECURITIES, STAMPS OR AIRCRAFT; OR,
   (B) AUTOMOBILES, OR OTHER MOTOR VEHICLES WHICH ARE LICENSED FOR USE ON PUBLIC ROADS AND/OR HIGHWAYS;
   (C) CONTRACTORS AND EMPLOYEES TOOLS AND EQUIPMENT (OTHER THAN FORM-WORK) SCAFFOLDING OR TARPAULING IN CONNECTION WITH THE RISK UNDER CONSTRUCTION.

4. PERILS INSURED: THIS POLICY INSURES AGAINST ALL RISKS OF DIRECT LOSS OR DAMAGE TO THE INSURED PROPERTY FROM ANY CAUSE WHATSOEVER EXCEPT AS HEREINAFTER SPECIFICALLY EXCLUDED, WHILE AT THE RISK OF THE INSUREDS FROM THE TIME LEAVING THE WAREHOUSE OR PLANT OF THE SUPPLIERS CONTINUOUSLY THEREAFTER WHILE IN TRANSIT AND WHILE IN COURSE OF CONSTRUCTION, INSTALLATION, COMPLETED AND/OR IN USE, UNTIL SAID CONSTRUCTION HAS BEEN FULLY COMPLETED AND ACCEPTED BY THE OWNER, OR THE EXPIRATION OF THIS POLICY WHICHEVER FIRST SHALL OCCUR.

5. TERRITORIAL LIMITS: CANADA AND THE UNITED STATES OF AMERICA.

6. LIMIT OF LIABILITY: THE LIMIT OF LIABILITY UNDER THIS POLICY SHALL NOT EXCEED THE SUM OF One Hundred & Thirty One Thousand, Nine Hundred & Eighty Six Dollars ($131,986.00)

7. EXCLUSIONS: IT IS UNDERSTOOD AND AGREED THAT THIS POLICY DOES NOT INSURE AGAINST:
   (A) LOSS OR DAMAGE OR EXPENSE NECESSITATING REPLACEMENT OR RECONSTRUCTION OF ANY PART OR PARTS OF ANY PROPERTY WHERE SUCH LOSS OR DAMAGE OR EXPENSE IS DUE TO (1) FAULTY WORKMANSHIP AND/OR ERROR IN DESIGN;

NOTE: This Endorsement should be inserted in the Policy immediately after the Rider No. to which it relates.

ENDORSEMENT NO. 14

This endorsement is attached to and hereby made a part of the undernoted policy, effective as of the date stated hereunder, and effective in consideration of the premium named below.

Name of Company (Insurer)	Policy No.	
THE ROYAL INSURANCE COMPANY LIMITED	5509989	
Agent	Agency No.	
EDGAR T. ALBERTS LIMITED	4501	
Name of Insured	Premium	
DIXHILL CORPORATION LIMITED	Additional Premium	Return Premium
Effective Date		
MARCH 13th, 1972	$170.00	$

In consideration of an Additional Premium of $170.00, it is understood and agreed that with respect to the Insured's operations for the construction of Pelham Urban Sewage Works Area Stage 2A - Hurricane Road and Park Lane Sewage Pumping Stations Project EO 69581, for The Corporation of the Town of Pelham, the following conditions shall apply:-

1. The Corporation of the Town of Pelham, All Sub-Contractors and Proctor and Redfern are added as named Insureds.

2. The Limit of the Company's Liability is amended to read as follows and not as heretofore and Item 5 of the Declarations is amended to read accordingly:-

Bodily Injury and Property Damage Liability Inclusive Limits	$500,000.00 each occurrence or accident	
	$500,000.00 aggregate products	

3. That the insurance afforded by this policy shall apply in the same manner and to the same extent to each named Insured as though separate policies had been issued to each, but, the inclusion herein of more than one named Insured shall not operate to increase the Limits of the Company's Liability as stated in Paragraph (2) of this endorsement.

4. That with respect to the operations described under Paragraph (1) of this endorsement and covered by this policy the Insurance Company hereby agrees subject to the terms and conditions of the policy, to give 30 days prior written notice of change, amendment or cancellation of the coverage to The Corporation of the Town of Pelham.

Except as otherwise provided in this endorsement, all terms, provisions and conditions of the policy shall have full force and effect.

Not valid unless signed by an Authorized Representative of the Insurer.

EDGAR T. ALBERTS LIMITED

PER

Signed by .....

AUTHORIZED REPRESENTATIVE

Form 5138-39 (Rev. 66)

CERTIFICATE OF INSURANCE

ROYAL INSURANCE GROUP

ROYAL DIVISION
WESTERN-BRITISH AMERICA DIVISION

DATE: March 13th, 1972

HEAD OFFICE — CANADA
40 SCOTT STREET
TORONTO, ONTARIO

INSURER: ROYAL INSURANCE COMPANY LIMITED

BRANCH ADDRESS: TORONTO, ONTARIO

This is to Certify to:

THE CORPORATION OF THE TOWN OF PELHAM
c/o Proctor & Redfern Limited,
75 Eglinton Ave. East,
TORONTO 12, Ontario

that Policies of insurance as herein described have been issued to the Insured named below and are in force at this date.

Fold *Fold*

INSURED— NAME: DIXHILL CORPORATION LIMITED
ADDRESS: 2401 Royal Windsor Drive, OAKVILLE, Ontario

LOCATION AND OPERATIONS TO WHICH THIS CERTIFICATE APPLIES:

This Certificate is issued as a matter of information only and confers no rights on the holder and imposes no liability upon the Insurer.

KIND OF POLICY	POLICY NUMBER	EXPIRY DATE D	M	Y	LIMITS OF LIABILITY — BODILY INJURY EACH PERSON	BODILY INJURY EACH OCCURRENCE	BODILY INJURY PRODUCTS AGGREGATE	PROPERTY DAMAGE EACH ACCIDENT	PROPERTY DAMAGE PRODUCTS AGGREGATE
PUBLIC LIABILITY (Except Automobile) Protective {Included [X] / Excluded [ ]} Products and/or Completed Operations {Included [X] / Excluded [ ]}	★ 5509989	31	12	72	$500,000.00	Inclusive	Limits Bodily Injury and Property Damage All Sub-Contractors and		
EMPLOYERS' LIABILITY ★							NOT APPLICABLE	NOT APPLICABLE	NOT APPLICABLE
AUTOMOBILE LIABILITY ★ All owned vehicles [ ] All hired vehicles [X] All other non-owned vehicles [X] Specific vehicles only [ ] [ ] [ ]	8562633	31	12	72	$500,000.00	Inclusive Limits Bodily Injury and Property Damage.	NOT APPLICABLE		NOT APPLICABLE

(a) The Corporation of the Town of Pelham, Proctor and Redfern are added as named Insureds.
(b) Cross Liability Included
(c) If the policy is changed or cancelled before expiry date, we agree to give 30 days prior written notice mailed to The Corporation of the Town of Pelham.

★ ABSENCE OF AN ENTRY IN THESE SPACES MEANS THAT INSURANCE IS NOT IN FORCE IN RESPECT OF THE COVERAGES OPPOSITE THERETO.

THE INSURANCE AFFORDED IS SUBJECT TO THE TERMS, CONDITIONS AND EXCLUSIONS OF THE APPLICABLE POLICY.

EDGAR T. ALBERTS LIMITED

PER _____

Authorized Representative

Form 8259(70)