

THE CORPORATION OF THE
T O W N O F P E L H A M

BY-LAW #300 (1975)

Being a by-law to authorize the Mayor and Clerk to execute an agreement with Doyle Construction Limited for the installation of a watermain on Sumbler Road.

WHEREAS tenders were called for the installation of a watermain on Sumbler Road,

AND WHEREAS the lowest tender of Doyle Construction Ltd. was accepted for the installation of a watermain on Sumbler Road,

NOW THEREFORE THE COUNCIL OF THE CORPORATION OF THE TOWN OF PELHAM ENACTS AS FOLLOWS:

(1) THAT the agreement hereto attached and made part of this by-law between Doyle Construction Limited and the Corporation of the Town of Pelham be approved.

(2) THAT the Mayor and Clerk be and each of them is hereby authorized and instructed on behalf of the Corporation to execute the said agreement, and the Clerk is hereby authorized to affix the Corporate Seal thereto.

READ A FIRST, SECOND AND THIRD TIME
AND FINALLY PASSED IN COUNCIL THIS
24th. DAY OF February, 1975 A.D.

Douglas C. Bamer Acting Mayor.
MAYOR

[Signature]
CLERK

C O N T R A C T D O C U M E N T S

THE EXTENSION OF
SUNBLER ROAD WATERMAIN IN THE
TOWN OF PELHAM

Project January 1975
E.O. 75114

THE PROCTOR AND REDFERN GROUP
Consulting Engineers and Planners

75 Eglinton Avenue East
Toronto, Ontario
M4P 1H3

GKS:tp

110 James Street
St. Catharines, Ontario
L2R 5C1

LIST OF CONTRACT DOCUMENTS

The following shall form the Contract Documents:

Addenda Numbered ___ to ___	Paper Colour	No. of Pages
List of Contract Documents	Green	
Tendering Information	Pink	1
Form of Tender	Blue	3
Agreement (CD-20)	Yellow	4
Bid Bond (CD-2A)	White	1
Tenderer's Experience in Similar Works (CD-4)	White	1
Tenderer's Senior Staff (CD-5)	White	1
Tenderer's Plant (CD-6)	White	1
Supplementary Conditions	White	1
General Conditions of the Contract (CD-1)	Blue	3
Project Specifications	Blue	8
Section 1A - General	White	3
Section 2A - Watermains	White	1
Standard Specifications for Watermains and Water Service Lines (City of Welland)	White	19

LIST OF DRAWINGS AND STANDARDS

S-21	Typical Thrust Backing for Watermains
S-22	Standard Arrangement for 1" Water Service
S-23	Standard Hydrant Assembly Off Asbestos Cement Watermain
S-26	Standard Bedding and Backfilling of Watermains
B-75114-P1	Sumbler Road Watermain Extension

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,
P.O. Box 400,
FONTHILL, Ontario.
LOS 1E0

Up to 12:00 p.m. Local Time - FRIDAY, FEBRUARY 14TH, 1975

- B. The tenders will be opened publicly shortly thereafter.
- 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, all machinery and such items as furniture, office equipment and window blinds.

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 shall include Federal Sales Tax on taxable items. No refunds will be obtainable for materials supplied under this Contract.

TI.06 PROOF OF ABILITY

- A. The tenderer shall be competent and capable of performing the various items of work. The tenderer shall complete the following statement sheets, which shall form a part of the Contract Documents:

Tenderer's Experience
Tenderer's Senior Staff
Machinery and Plant to be used

The tenderer may be required to furnish additional statements covering other matters, including financial resources.

TI.07 TENDER DEPOSIT

- A. The tender shall be accompanied by a certified cheque or bid bond payable to the Owner in the amount of \$500.00.

Cheques of unsuccessful tenderers will be returned not later than two weeks following the Contract award.

The tender deposit of the successful tenderer will be returned with the first Progress Certificate.

- B. The tenderer shall keep his tender open for acceptance for sixty (60) days after the closing date. Withdrawal during this period will result in enforcement of the tender deposit.

Upon being notified that his tender has been accepted, the Contractor shall execute copies of the Agreement, supply bonds and insurance documents as specified, and start work as specified.

TI.08 ACCEPTANCE OF TENDERS

- A. The lowest or any tender need not necessarily be accepted by the Owner.

TI.09 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 (3) weeks of the award of the Contract.

FORM OF TENDER

FT.01 TENDER PRICE

1. Offer by: NAME - DOYLE CONSTRUCTION (Welland) LIMITED
ADDRESS - R.R. #3, Welland, Ontario
DATE - February 14th, 1975

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: FIVE THOUSAND, FIVE HUNDRED AND FIFTY-ONE

97/00 Dollars (\$ 5,551.97)

FT.02 CONTINGENCIES AND ALLOWANCES

A. We agree that the tender price includes the contingency sum of \$1,000.00 and that no part of this sum shall be expended without the written direction of the Engineer, and any part no so expended shall be deducted from the tender price.

FT.03 QUANTITIES

A. The tender price is compiled from the Schedule of Tender Prices included hereinafter. The quantities in the Schedule being approximate, we agree that the final valuation will be made on the basis of actual quantities measured during and on completion of the work at the prices in the Schedule.

FT.04 ADDITIONS AND DEDUCTIONS

A. We agree that the valuation of additions to, and deductions from the Contract shall be made as follows:

1. The prices in the Schedule of Tender Prices shall apply where appropriate.
2. If the prices in the Schedule of Tender Prices are not appropriate, the prices in the Table of Prices shall apply where appropriate.
3. If the prices in Subsections 1 and 2 are not appropriate, valuation will be made by on 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 \$300.00. Rental rates shall be as set out in the current edition of D.H.O. Form 527.
4. Whenever extra work is being performed under Subsection 3 (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.05 ADDENDA

- A. We agree that we have received Addenda 0 to 0 inclusive, and the tender price includes the provisions set out in such Addenda.

FT.06 COMPLETION

- A. We agree to commence work as specified, to proceed continuously to the completion and to complete all work by

FT.07 SCHEDULE OF TENDER PRICES

- A. This Schedule is referred to above in FT.03.

Item No.	Description	Unit	Quantity	Unit Price	T O T A L
1.	Supply and install 6-inch Asbestos Cement				

Item	No.	Description	Unit	Quantity	Unit Price	TOTAL
		watermain including connection to existing 6-inch watermain (and including all necessary elevation, fittings, tracer wire, plugs, concrete thrust blocks and encasement, Class 'B' bedding, specified backfill and restoration)	Lin.Ft.	525	\$ 7.03	\$ 3,690.75
	2.	Supply and install valve and box	Each	1	\$ 257.59	\$ 257.59
	3.	Supply and install 2-inch blow-off valve	Each	1	\$ 243.63	\$ 243.63
	4.	Supply and install house services to the property line	Each	3	\$ 120.00	\$ 360.00
	5.	Contingency Allowance			Lump Sum	\$ 1,000.00
					TOTAL CONTRACT BID PRICE	\$ 5,551.97

OFFERED ON BEHALF
OF THE CONTRACTOR


Signature


Signature

Contractor's Seal

DOYLE CONSTRUCTION
(Welland) LIMITED
Company Name


Witness

R.R. #3, Welland, Ontario
Address

Feb 21/75
Date

FT.08 TABLE OF ADDITIONAL UNIT PRICES

A. This Table is referred to above in FT.04 A2.

Item No.	Description	Unit	Unit Price
1.	Excavation and backfill to 10 feet deep	Cu.Yd.	\$ 1.80
2.	Granular 'A' (compacted) for trench backfill	Cu.Yd.	\$ 8.30
3.	Supply and place 3,000 p.s.i. concrete	Cu.Yd.	\$ 42.00
4.	Supply and place calcium chloride	Ton	\$170.00
5.	Working Foreman	Hour	\$ 9.60
6.	Labourers	Hour	\$ 7.20
7.	Rock Excavation	Cu.Yd.	\$ 50.00
8.	Supply and install 12-inch CMP Culverts	Lin.Ft.	\$ 14.20
9.	Sodding	Sq.Yd.	\$ 3.10

Proctor and Redfern Limited
Project EO 75114

THE CONSTRUCTION OF WATERMAINS
ALONG SUMBLER ROAD IN THE
TOWN OF PELHAM

AGREEMENT

This Agreement made in triplicate this 14th day of February 1975
between

DOYLE CONSTRUCTION
(WELLAND) LIMITED

hereinafter called 'The Contractor',
and

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 14th day of February 1975 (which shall be deemed to form part of the Contract) to the satisfaction of the Engineer for the total contract price of \$5,551.97 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 *[Signature]*

Date 22-2

EXECUTION BY CONTRACTOR -

Company Name DOYLE CONSTRUCTION
(WELLAND) LIMITED

Signatures *[Signature]*

Witness *[Signature]*

Date Feb 13/75

Seal

Seal

BID BOND

No.

KNOW ALL MEN BY THESE PRESENTS THAT

hereinafter called the Principal, and

as Principal,

hereinafter called the Surety, are held and firmly bound unto

as Surety,

hereinafter called the Obligee, in the amount of

as Obligee,

(\$)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.

Dollars

WHEREAS, the Principal has submitted a written tender to the Obligee, dated the day of 19 , for

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 day of 19 .

LIST OF SUB-CONTRACTORS

SUB-TRADE	NAME OF SUB-CONTRACTOR	ADDRESS OF SUB-CONTRACTOR

TENDERER'S EXPERIENCE IN SIMILAR WORK

YEAR COMPLETED	DESCRIPTION OF CONTRACT	FOR WHOM WORK PERFORMED	VALUE

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

TENDERER'S SENIOR STAFF

NAME	APPOINTMENT	QUALIFICATIONS AND EXPERIENCE

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

TENDERER'S PLANT

The Tenderer shall list the plant, machinery and equipment he proposes to use on the work.

PLANT UNDER TENDERER'S CONTROL:

PLANT TO BE RENTED:

PLANT TO BE PURCHASED:

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

SUPPLEMENTARY CONDITIONS

SC.01 DEFINITIONS

- A. 'Owner' means the person or corporation accepting the tender.
- B. 'Engineer' means Proctor and Redfern Limited.
- C. 'Department of Highways' and 'D.H.O.' means 'The Ministry of Transportation and Communications'.

SC.02 GUARANTEE

- A. The Contractor shall guarantee that the material and work shall for a period of twelve (12) months from the acceptance date, remain in such condition as will meet with the Engineer's approval, and that he will make good in a permanent manner, satisfactory to the Engineer, any imperfections due to materials or workmanship used in the construction, and any damage caused by such imperfections. The decision of the Engineer shall be final as to the nature and cause of such imperfections and the necessity for remedying them.

Should the Contractor fail to comply with the directions of the Engineer, the Engineer may, after giving the Contractor forty-eight (48) hours written notice, perform the necessary work, and the cost may be deducted or collected by the Owner as provided in the Contract.

- B. Notwithstanding the provisions of Subsection A. of this clause, the Engineer may, in cases of danger or public safety make such immediate arrangements for repair as he sees fit, and the Engineer will inform the Contractor of such action. The cost of such emergency work shall be borne by the Contractor.
- C. If the Engineer notifies the Contractor, in writing, of imperfections prior to the termination of the guarantee period, the Contractor shall make good the imperfections as required in Subsection A. above, notwithstanding that such work of making good may commence after or extend beyond the end of the guarantee period.

SC.03 INSURANCE

- A. The Contractor shall insure and maintain insurance against liability for bodily injury and property damage that may arise with respect to the work being performed under the Contract, such insurance shall:

1. Be in the joint names of the Owner, the Contractor, and the Sub-Contractors, and the Engineer, and
2. Include coverage for:
 - (A) Contractual liability, and

- (B) Cross liability, and
 - (C) Contingent employer's liability, and
 - (D) Completed operations liability, and
 - (E) Non-owned automobile liability, and
3. Have an inclusive limit at least equal to \$500,000.00 unless otherwise specified, and
4. Remain in force until the issue by the Engineer of the final payment certificate, except that completed operations liability shall remain in force for the duration of the guarantee period.

SC.04 AUTOMOBILE INSURANCE

- A. The Contractor shall insure and maintain insurance against liability for bodily injury and property damage caused by automobiles owned by the Contractor and used on the work. Such insurance shall have an inclusive limit at least equal to \$500,000.00. An automobile shall be as defined in the Highway Traffic Act.

SC.05 INSURANCE POLICIES

- A. When the successful tenderer is notified that his tender has been accepted, he shall deposit with the Owner, either copies of liability and automobile insurances, or insurance certificates.
- B. Insurance policies shall stay in force and not be amended, cancelled or allowed to lapse without thirty (30) days' prior notice.
- C. The Contractor shall deposit certificates with the Owner indicating that the Contractor has paid assessments under the Workmen's Compensation Act.

SC.06 INSURANCE CLAIMS

- A. Claims or alleged claims received by the Contractor shall be dealt with immediately by the Contractor. If a claim is settled to the satisfaction of the claimant, the Contractor shall submit to the Engineer, a copy of the claimant's release.
- B. If a claim or alleged claim is rejected by the Contractor and/or his insurance company, the Contractor shall report this fact to the Engineer.
- C. Should 30 days elapse after the claim or alleged claim has been received by the Contractor, and the Contractor is not able to report settlement or rejection of the claim, he shall report to the Engineer the steps being taken with respect to the claim.

SC.07 PAYMENTS

- A. As well as monies held back as required by Provincial Statutes, the Owner will retain five percent (5%) of the value of the work done for a period of one year from the acceptance date.
- B. Notwithstanding the General Conditions of Contract, no progress payments will be issued on this project.

SC.08 BONDING

- A. Notwithstanding the General Conditions of Contract, no bonding will be required on this project.

GENERAL CONDITIONS OF THE CONTRACT

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Form CD-1
(Revised July 1970)

PROCTOR & REDFERN LIMITED

CONSULTING ENGINEERS

75 EGLINTON AVENUE EAST, TORONTO, ONT. M4P 1H3

GENERAL CONDITIONS OF THE CONTRACT

G.C. 1

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

1. DEFINITIONS

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

2. DOCUMENTS

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

3. SUB-CONTRACTORS

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

4. NOTICES

- (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

- (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

- (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

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

21.
SHOP
DRAWINGS

- (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. 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.

22.
OWNERSHIP
OF DOCUMENTS

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

23.
LIABILITY

- (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.
- 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.
- (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.
- 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.
- (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 valuation 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.
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.
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.

30.
HOURS
OF WORK31.
VALUATION32.
PROGRESS
CERTIFICATES33.
ACCEPTANCE
CERTIFICATE34.
SUBSTANTIAL
COMPLETION
AND HOLDBACK
RELEASE35.
PAYMENTS36.
FINAL
PAYMENT
CERTIFICATE

APPENDIX 1 OF THE GENERAL CONDITIONS OF THE CONTRACT

APPLICATION FOR RELEASE OF SUBCONTRACTOR'S HOLDBACK

Owner:

Project:

EO:

Subcontract:

Subcontractor:

Contractor:

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:

PROCTOR & REDFERN LIMITED
Consulting Engineers

July, 1970

APPENDIX 2 OF THE GENERAL CONDITIONS OF THE CONTRACT

APPLICATION FOR RELEASE OF CONTRACTOR'S HOLDBACK

Owner:

Project:

EO:

Contractor:

We,
hereby confirm:

the said Contractor,

- (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:

PROCTOR & REDFERN LIMITED
Consulting Engineers

July, 1970

SECTION 1A - GENERAL

PART 1 GENERAL

Part 1.01 DESCRIPTION OF WORK

- A. This Contract is for the construction of approximately 625 feet of watermains and related appurtenances on Sumbler Road in the Town of Pelham.

Part 1.02 LIMITS OF SITE

- A. The limits of site are:

1. The road or street allowances on which work is to be performed.
2. Such areas or private property adjacent to road or street allowances on which the Contractor is directed, in writing, to enter to carry out work.

Part 1.03 SETTING OUT OF THE WORK

- A. The Engineer will set such stakes as are necessary to mark the location, alignment, elevation and grade of the work. Adequate notice shall be given by the Contractor of the need for such setting out.

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.

The Contractor shall provide grade stakes, masts, scaffolds, batter boards, straight edges, templates and other equipment as may be necessary for laying out and inspecting the work.

Wherever necessary, work shall be suspended temporarily to permit the Engineer to inspect and check the line and grade of any portion of the work.

Part 1.04 CONSTRUCTION SCHEDULE

- A. The Contractor shall within two (2) 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.

PART 2 PRODUCTS

Part 2.01 TESTS

- A. Where required by the Engineer, the Contractor shall supply certified copies of all tests upon all materials to be used in the construction of the works, indicating that the materials comply with an approved testing laboratory and

shall be at the Contractor's expense.

Part 2.02 CANADIAN MATERIALS

- A. Unless otherwise specifically approved, the Contractor shall use materials and equipment of Canadian manufacture in constructing the works.

PART 3 EXECUTION

Part 3.01 WORK ON ROADS

- A. No work shall be performed on public rights-of-way without the approval of the road authority.

Part 3.02 TRAFFIC

- A. Traffic control on streets shall be performed in accordance with the rules of the appropriate road authority. Flagmen shall wear fluorescent red or orange safety vests, arm bands and hats.
- B. One lane of traffic shall be maintained at all times.
- C. Reasonable access to adjacent properties shall be maintained for pedestrians and vehicles.
- D. All traffic signs shall be maintained in their original positions, and shall not be obscured.

Part 3.03 NOTIFICATIONS

- A. When traffic is restricted, the appropriate fire and police departments shall be notified, giving at least seven days notice of the restriction.
- B. When restrictions are removed, the fire, police and bus authorities shall again be notified.

Part 3.04 USE OF HYDRANTS

- A. Fire hydrants shall be kept accessible and free of obstructions.
- B. 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.

Part 3.05 INCLEMENT WEATHER

- A. Adequate protection shall be made and precautions taken at times of inclement weather.
- B. Inclement weather or extra work caused by such weather will not be accepted as reason for additional payment.

Part 3.06 MUD AND DUST

- A. Streets and other construction areas shall be kept clean.
- B. Dust shall be laid by the use of water or calcium chloride, or both.

Part 3.07 ADJACENT STRUCTURES AND UTILITIES

- A. 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.
- B. Permanent relocation of underground or overhead utilities will be carried out by others, if necessitated by coincidence of lines or grades, or both.

Part 3.08 INSPECTORS

- A. Inspectors may be present during the construction of the work. They have the power to order the Contractor to stop work if the work, in their opinion, is not being done in accordance with the set lines and grades or to the drawings and specifications.

SECTION 2A - WATERMAINS

PART 1 GENERAL

Part 1.01 MEASUREMENT FOR PAYMENT

- A. Watermains will be measured straight through specials, valves and other appurtenances in the line.
 - B. A hydrant set shall include the hydrant, 6-inch secondary valve, valve box, lead from main, and tee off main, all as shown on the standard drawing.
 - C. All special fittings shall be included in the unit price of the watermain.
- Part 1.02 BASIS FOR PAYMENT
- A. Payment for watermain and appurtenances will be made at the unit or lump sum prices in the Schedule of Tender Prices.
 - B. The unit rates in the Form of Tender for watermain shall include the connection to existing 6-inch watermain.
 - C. The rates in the Form of Tender for watermain and appurtenances shall include the cost of restoration.

PART 2 EXECUTION

Part 2.01 Restoration

- A. All asphalt driveways shall be reinstated with 3 inches of HL3 Hot-Mix asphalt over granular 'A' base. All joints shall be properly cut and painted with bituminous emulsion.
- B. All disturbed lawn areas shall be reinstated with No. 1 nursery sod.
- C. All roadway and shoulder areas will be topped with 12 inches of granular 'A' compacted to 95 percent Standard Proctor Density.
- D. All disturbed surface treated driveways shall be resurfaced with a double application of RSLK emulsion applied at the rate of 1/3 gallon per square yard and 3/8-inch stone chips applied at a rate of 25 pounds per square yard for each application.
- E. Only existing culverts located parallel to and within 5 feet of the watermain will be paid for under the List of Additional Unit Prices. Any other culverts that are damaged shall be reinstated by the Contractor at his own expense.
- F. Restoration shall be completed when weather permits as determined by the Engineer.

CITY OF WELLAND

STANDARD SPECIFICATIONS FOR WATERMAINS

AND

WATER SERVICE LINES

A. WORK TO BE DONE

The contractor shall, unless specified otherwise, furnish all equipment, tools and labour, and all material necessary to do the work required under this contract and unload, haul and distribute all pipe, castings, fittings, valves, hydrants, and accessories. The contractor shall also remove the pavement at the bell holes; excavate the trenches and pits to the required dimensions; excavate, brace and support the adjoining ground or structure where necessary; sheet, lay and test the pipe, castings, fittings, valves, hydrants and warning lights; backfill and consolidate the trenches and pits; restore the roadway surface; unless otherwise stipulated; remove surplus excavated material, clean the site of the work; and maintain the street or other surface over the trenches as specified.

The contractor shall also furnish all equipment, tools, labour and material required to rearrange branch connections to main sewers, or to rearrange sewers, conduits, ducts, pipes or other structures in accordance with the contract drawings and stipulations included herein.

Water for testing mains, and drinking purposes will be made available to the contractor at the existing facilities of the owner at the current rate or charges. The contractor shall furnish all necessary pipe or hose extensions or transportation to the point of use. The contractor shall exercise care in the use of the water. The contractor shall advise the Water Department what hydrant, etc., he proposes to use.

B. GENERAL CLAUSES1. Shop Inspection

All materials furnished by the contractor are subject at the discretion of the City Engineer to inspection and approval at the plant of the manufacturer.

2. Field Inspection

An inspector shall be appointed by the City Engineer and he will have full authority to stop any work if he is not satisfied with the manner in which it is being performed. No work may be proceeded with unless authorized by the inspector and unless he is present. The inspector's approval, whether implied or otherwise, will not remove the responsibility from the contractor.

3. Disposition of Defective Material

All material found during the progress of the work to have cracks, flaws or other defects will be rejected by the Engineer, or his representative. All defective materials furnished by the contractor shall be promptly removed by him from the site.

4. Responsibility for Material

The contractor shall be responsible for all materials furnished by him and shall replace at his own expense all such material found defective in manufacture or damaged in handling after delivery by the manufacturer. This shall include the furnishing of all materials and labour required for the replacement of installed material discovered defective prior to the final acceptance of the work.

5. Responsibility for Safe Storage

The contractor shall be responsible for the safe storage of material furnished by or to him and accepted by him, and intended for the work, until it has been incorporated in the completed project. The interior of all pipe, fittings and other accessories shall be kept free from dirt and foreign matter at all times. Valves and hydrants shall be drained and stored in a manner that will protect them from damage by freezing.

6. Handling

All materials furnished by the contractor shall be delivered and distributed at the site by the contractor.

Pipe, fittings, valves, hydrants and accessories shall be loaded and unloaded by lifting with hoists or skidding so as to avoid shock or damage. Under no circumstances shall such materials be dropped. Pipe handled on skidways shall not be skidded or rolled against pipe already on the ground.

7. At site of Work

In distributing the material at the site of the work, each piece shall be unloaded opposite or near the place where it is to be laid in the trench.

8. Care of Fittings, and Pipe Coating and Lining

Pipe and fittings shall be so handled that the coating and lining will not be damaged. If, however, any part of the coating or lining is damaged, the repair shall be made by the contractor at his expense in a manner satisfactory to the Engineer.

9. Salvaged Materials

All existing pipeline and/or Service line material salvaged during the work shall be delivered to and unloaded at the Water Department service Centre by the Contractor.

C. MATERIALSAcceptable Materials for Watermains

All materials must be new and unused and a type and quality specified by the Water Department.

1. PIPE

All pipe, unless otherwise specified by the City Engineer, shall be asbestos cement and shall be laid with 5'6" minimum of cover below future established finished grade. All sizes up to and including 12" Dia. shall be A.S.A. Cl. 200. All sizes over 12" Dia. shall be A.S.A. Cl. 150. Where cast iron pipe is to be used for connections to existing cast iron mains, or any other location the City Engineer requires, it shall be cement mortar lined A.S.A. Cl. 250 for laying condition "B" for 5'0" cover, as a minimum. Bell and spigot, or Tyton joint may be used. Where Bell and Spigot is used only lead joints are acceptable. Ductile iron pipe may be used in place of cast iron as specified in the A.W.W.A. spec. C151-71.

2. FITTINGS

All fittings shall be cement mortar lined, cast iron with ends specifically manufactured for use with Asbestos Cement pipe, or, if required, with Hub, mechanical joint, flanged, tyton joint ends, or as otherwise specified by the City Engineer. Mechanical joint ends are to be avoided wherever possible.

3. VALVES

All valves shall be "50 Line" Darling Gate Valves with "O" ring stem packing Double disc parallel seats, or approved equal. All valves shall open left hand and shall have 2 inch square operating nuts, unless otherwise specified by the City Engineer. Valve boxes shall be 4½" 65 series as supplied by J.R. Fergusson Ltd., complete with support plate, or approved equal. All valve boxes must be of sufficient length to be at least 12 inches above finished grade when fully extended, unless otherwise specified by the City Engineer. Valve chambers must conform with Standard drawing No. S-25 of the Water Department or approved equal. Pre-Fab type.

4. HYDRANTS

All hydrants shall be Darling Century Compression or approved equal, McAvity M-67-S, type with 2-2½" nozzles (steamer outlet if required) and shall be complete with flanged control valve bolted to the boot, and valve box. All hydrants shall be for 7'0" depth of trench, unless otherwise specified by the City Engineer, including one hydrant extension of one foot length installed below the drain ring. Drain ring bolts and nuts to be stainless steel type 304.

All hydrants shall be painted red with silver dome and caps. Hydrants shall have a 6" diameter flanged boot. The required secondary control valve shall be a 6" Darling with flange to ring-tite. Hydrant branch piping shall be Asbestos Cement unless otherwise specified by the City Engineer.

5. CORROSION PROTECTION

All metallic pipe, fittings, etc., installed underground must be thoroughly coated with pitch base paint and wrapped with 6 mil. polyethylene film taped in place. The polyethylene wrapping must not cover the drain ring on fire hydrants.

6. BRICKS

Bricks shall be approved first quality hard burned clay or concrete - $2\frac{1}{2}$ " x 4" x $8\frac{1}{2}$ " in size.

Clay brick shall have a minimum compression strength of 4,000 p.s.i. and maximum absorption of 10%. Concrete brick shall have minimum compression strength of 3,000 p.s.i. and equal absorption limits.

ACCEPTABLE MATERIALS - 1" to 2" DIAMETER WATER SERVICE LINES

For the installation of one inch (1"), one and one half inch ($1\frac{1}{2}$ "), and two inch (2") diameter water service lines within the City of Welland.

NOTE: The Contractor must supply all materials for the complete installation of the service line. All materials must be new and unused. The materials to be used are as follows:

1. TUBING or PIPE

Tubing or pipe for service line 1" to 2" diameter inclusive shall be Class 160 Polyethylene (PE) tubing, or Class 160 Polyvinyl Chloride (PVC) pipe.

(a) PE TUBING: Shall be 3306 or 2306 SDR-OD-9, manufactured according to CSA standard B 137.1-1970 for copper tube size OD Polyethylen Plastic Tubing, or the equivalent Canadian Standards Association (CSA) Standard, for 160 psi working pressure at 73°F. tubing must be CSA certified, or approved by the National Sanitation Foundation (NSF).

(b) PVC PIPE: Shall be Grade 1 Type 1, Iron Pipe size outside diameter, for 160 psi working pressure at 73° F. Pipe must meet CS-256-63 SDR Type 1120 and ASTM D2241-64T specifications and be CSA certified, or approved by NSF. Joints shall be made with a rubber ring gasket similar or equal to Ring-Tite or Tyton Joint.

Permanent markings on all Plastic Pipe shall include the following at intervals of not more than five feet:

Nominal size.

Type of plastic material, i.e., PE3306, or PVC1120.

Pressure rating at 73° F.

The Manufacturer's name or trademark, and code.

The seal of CSA Certification, or the seal of approval of the NSF.

2. SERVICE SADDLE (if required)

To tap cast iron pipe or Asbestos Cement Pipe, saddles shall be brass with double bronze bales A.W.W.A. Standard thread outlet.

For asbestos cement pipe Canadian Brass Ltd., B-200 or Smith Blair 323.

For cast iron pipe Smith Blair 323 only.

To tap concrete pressure pipe: AWWA standard thread outlet, similar or equal to service saddle as supplied by Canron Ltd. Saddle and "U" bolts must be protected by concrete encasement.

3. CORPORATION FITTINGS

Main Stop: Main stop threaded directly into the watermain shall be one (1) size smaller than the service line, bronze, round way, with AWWA standard thread inlet and increasing compression type outlet similar or equal to Emco Series 22999 Emcotite.

Main stop inserted directly into the watermain (1" diameter service line only shall be the same size as the service line, bronze, round way, threadless type inlet with rubber sealing sleeve and compression joint type outlet, similar or equal to Hays Series 4200.

When a service saddle is required the main stop shall be the same size as the service line, bronze, round way, with AWWA standard thread inlet and female iron pipe thread outlet, similar or equal to Emco Series 15914. A plastic pipe to iron pipe coupling or adaptor will be required.

Curb Stop:

Bronze curb stops shall be the "O" ring type with both ends compression for 1" Tube size polyethylene pipe, similar or equal to Mueller H-15209 or equal. The Emco series 21113 ball valve is acceptable.

All curb stops on the open end must be protected with the use of a plastic cap or plug.

4. COUPLING AND ADAPTORS

(a) For PE Tubing: Bronze with one piece combination nut and tail, compression type with stainless steel insert: (Heat flaring of tubing is not allowed)

PE to PE - to be Emco 22084 or approved equal.

PE to male iron pipe - to be Emco 22185 or approved equal.

PE to female iron pipe - to be Emco 22224 or approved equal.

COUPLING AND ADAPTORS .. cont'd ..

- (b) For PVC Pipe: Bronze, brass or PVC with spigot, bell, compression joint or iron pipe thread ends or any combination of these:

Bell to Bell - Similar or equal to Johns-Manville P VC double bell coupling.

Bell to Male Iron Pipe - Similar or equal to Johns-Manville PVC male adaptor (threaded).

Spigot to Male Iron Pipe - 8" long schedule 80 grade 1 type 1 PVC nipple, one end with standard iron pipe thread, other bevelled 8° x 3/8".

Compression joints for 1½" and 2" PVC, IP. size is acceptable in the following fittings: curb stops, PVC to PVC compression couplings, PVC to L.P. male couplings, and PVC to L.P. female couplings.

NOTE: Couplings and adaptors employing heat fusion on PE tubing or solvent weld on PVC pipe may only be used if factory made.

5. PIPE FITTINGS AND NIPPLES

All pipe fittings and nipples must be brass, bronze or PVC as follows:

Fittings - screwed brass, schedule 40.
 - screwed PVC, Grade 1 type 1, schedule 80.
 - bronze with one piece combination nut and tail, compression type joint with stainless steel insert, class 160.
 - bell and spigot joint PVC, class 160.

Threaded Nipples - brass, schedule 40 pipe.
 PVC, grade 1 type 1, schedule 80 pipe.

NOTE: Cast bronze solder fittings are not acceptable.
 Teflon pipe thread tape must be used on all threaded PVC joints.

6. CURB BOX

Curb boxes shall be the extension type with regular ribbed cover marked "WATER", hexagon plug, operating rod, brass cotter pin and suitable for a five foot (5') to six foot (6') trench.

For one inch (1") curb stops the curb box shall be similar or equal to Emco Series 16200 No. 8.

For one and one half (1½") and two inch (2") curb stops the curb box shall be similar or equal to Emco Series 16320 No. 8.

7. LARGER SERVICE LINES

- Materials for Water service lines larger than 2" dia. shall be in accordance with "Acceptable materials for watermains".
8. All 1" P.E. service connections must have stainless steel inserts of the proper length and they must not extend beyond the coupling nut when properly tightened.
 9. 1" main stops for 1" services when tapped in main must not exceed 15° from horizontal centre line of main.
 10. Saddle clamps and tapping sleeves for 1½" services and larger must be tapped in horizontal the centre line of the main.
 11. When the service lines are installed in a subdivision or any other location where the pipe is not continued past the curb stop into a building the location of the curb box must be indicated.

At each curb box location a six foot (6') long 2" x 4" wooden stake shall be planted and shall have three foot (3') bury. Stakes shall be painted green and each shall bear, on its broad side above the ground, the words "Water Service" painted in white.

The owner is responsible for the preservation of the marker stakes, any damage or displaced stakes being replaced and accurately positioned by him in the above manner, at his own expense.

D. CONSTRUCTION

1. ALIGNMENT AND GRADE

(a) GENERAL

The watermain shall be laid and maintained to the required lines and grades with fittings, valves and hydrants at the required locations; spigots centered in bells; and all valves and hydrant stems plumb.

Before any work commences, location stakes must be planted to show location and elevation of the watermain, valves, fittings, hydrants, service lines, etc.

(b) DEVIATIONS OCCASIONED BY OTHER STRUCTURES

Wherever obstructions not shown on the plans are encountered during the progress of the work and interfere to such an extent that an alteration in the plan is required, the Engineer shall have the authority to change the plans and order a deviation from the line and grade or arrange with the owners of the structures for the removal, relocation or reconstruction of the obstructions. If the change in plans results in a change in the amount of work by the contractor, such altered work shall be done on the basis of payment to the contractor for extra work or credit to the owner for less work.

ALIGNMENT AND GRADE .. cont'd ..(c) CAUTION IN EXCAVATION

The contractor shall proceed with caution in the excavation and preparation of the trench so that the exact location of underground structures, both known and unknown, may be determined, and he shall be held responsible for the repair of such structures when broken or otherwise damaged because of carelessness on his part.

(d) SUB-SURFACE EXPLORATIONS

Whenever, in the opinion of the City Engineer, it is necessary to explore and excavate to determine the location of existing underground structures, the contractor shall make explorations and excavations for such purposes. If the contractor is required to perform additional work in making the explorations and excavations, extra compensation will be allowed for such additional work.

(e) DEPTH OF PIPE

All pipe shall have a minimum cover of 5' - 6" below future established grade unless otherwise shown on the drawings, in which case the indicated depths on the drawings shall take precedence.

2. EXCAVATION AND PREPARATION OF TRENCH(a) DESCRIPTION

The trench shall be dug so that the pipe can be laid to the alignment and depth required, and it shall be excavated only 3 pipe lengths in advance of pipe laying or as permitted by the Engineer. The trench shall be so braced and drained that the workmen may work therein safely and efficiently. It is essential that the discharge of the trench dewatering pumps be conducted to natural drainage channels, drains or sewers.

(b) WIDTH OF TRENCH

The bottom of the trench shall be at least 1' - 2" wider than the nominal pipe diameter with a minimum width of 2 feet. No part of the trench shall have a smaller width than the bottom.

Trenches shall be of such extra width, when required, as will permit the convenient placing of timber supports, sheeting and bracing, and handling of materials.

(c) BELL HOLES

Bell holes shall be provided at each joint to permit the jointing to be made properly.

EXCAVATION AND PREPARATION OF TRENCH .. cont'd ..(d) PIPE CLEARANCE IN ROCKS

Ledge rock, boulders and large stones shall be removed to provide a clearance of at least 12 inches below and on each side of all pipe, valves and fittings for pipes 24 inches in diameter or less, and 18 inches for pipes larger than 24 inches in diameter.

The specified minimum clearances are the minimum clear distances which will be permitted between any part of the pipe and appurtenances being laid and any part, projection or point of such rock, boulder or stone.

(e)

The trench shall be excavated to a subgrade 4" below the grade required for the bottom of the pipe. Approved granular "A" crushed lime stone (fine traffic bound or screenings) shall be placed in the bottom of the trench, compacted to a depth of 4" except at the location of pipe couplings or bells where the granular bed will be omitted to provide a coupling hole. The grade of the granular bed shall be prepared accurately by means of hand tools to provide continuous contact with the pipe between coupling holes.

The Coupling hole shall have sufficient length, width and depth to permit assembly and provide a minimum clearance of 2 inches between coupling and undisturbed trench bottom.

Where the contractor excavates too deep the trench shall be refilled to grade with approved granular material, placed, compacted and finished in accordance with the requirements of the Engineer.

It will be permissible to disturb and otherwise damage the finished pipe bed surface over a maximum length of 18 inches near the middle of each length of pipe by the withdrawal of pipe slings or other lifting tackle.

(f) EXCAVATION IN POOR SOIL AND REFILLING TO GRADE

Where the bottom of the trench at subgrade is found to be unstable or to include ashes, cinders, all types of refuse, vegetable or other organic material, or large pieces or fragments of inorganic material which in the judgment of the Engineer should be removed, the contractor shall excavate and remove such unsuitable material to the width and depth ordered by the Engineer and refill and compact to the grade of the bottom of the pipe with 2" crusher-run crushed stone. All crushed stone so used will be paid for at the unit price quoted which payment shall include all costs of additional excavation, sheeting, bracing, and disposal of surplus materials. The contractor shall provide coupling holes of sufficient length, width and depth to permit assembly and provide a minimum clearance of 2 inches between coupling and trench bottom.

EXCAVATION AND PREPARATION OF TRENCH .. cont'd ..(g) ROCK EXCAVATION

The word "Rock", wherever used as the name of an excavated material shall mean boulders, and pieces of concrete or masonry exceeding 250 lbs. in weight, or solid ledge rock and masonry which, in the opinion of the Engineer, requires for its removal drilling and blasting, wedging, slogging or barring, or breaking up with a power-operated hand tool. No soft or disintegrated rock which can be removed with a hand pick or power-operated excavator or shovel, nor loose, shaken or previously blasted rock or broken stone in rock fillings or elsewhere; and no rock exterior to the minimum limits or measurements allowed, which may fall into the excavation, will be measured or allowed.

Wherever the bottom of the trench is in rock, the Contractor shall excavate to six inches (6") below the bottom of the pipe and shall refill to the grade of the bottom of the pipe with approved Granular material and all costs of such refilling shall be included in the tendered price for rock excavation. The contractor shall provide coupling holes of sufficient length, width and depth to permit assembly and provide a minimum clearance of 2 inches between coupling and trench bottom.

(h) BRACED AND SHEETED TRENCHES

The Contractor shall sheet and shore the trench and perform all trenching work in accordance with the Trench Excavator's Protection Act 1954, Statutes of Ontario, 1954, Chapter 99, as currently amended and regulations made thereunder. The contractor shall notify the Trench Inspector upon commencement of the work. No V trenching will be permitted.

Sheeting and bracing which have been ordered left in place must be removed for a distance of 3 feet below the established street grade or the existing surface of the street, whichever is lower. Trench bracing, except that which must be left in place, may be removed when the back-filling has reached the respective levels of such bracing. Sheeting, except that which has been left in place, may be removed after the backfilling has been completed or has been brought up to such an elevation as to permit its safe removal.

The adequate protection of the completed water structures, adjacent underground or surface structures, and non-disturbance of adjacent ground is guaranteed.

The cost of furnishing, placing and removing the sheeting and bracing and the leaving in place of sheeting and bracing indicated on the plans shall be included in the price bid for the work. When sheeting and bracing have been ordered by the Engineer, or when such sheeting, and bracing have been ordered left in place by the Engineer, the payment for same shall be in accordance with the unit price tendered. Payment for same shall be for only the portions actually ordered left in place.

EXCAVATION AND PREPARATION OF TRENCH .. cont'd ..(1) CARE OF SURFACED MATERIAL FOR RE-USE

All surface materials, which, in the opinion of the Engineer, are suitable for re-use in restoring the surface shall be kept separate from the general excavation material, as directed by the Engineer.

(j) PILING EXCAVATED MATERIAL

All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Hydrants, valve pit covers, valve boxes or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clear or other satisfactory provisions made for street drainage, and natural watercourses shall not be obstructed.

(k) TRENCHING BY HAND OR MACHINE

Hand methods for excavation shall be employed in locations shown on the drawings. In other locations, the contractor may use trench-digging machinery or employ hand methods.

(1) INTERRUPTION OF SERVICE

No valve or other control on the existing system shall be operated for any purpose by the contractor. The Water Department will operate all valves, hydrants, blow-offs and curb stops. This section shall not stop the contractor from charging and pressure testing the new main.

Mains may only be shut off at times designated by the Water Department and the contractor must notify every consumer that will be affected, 1 (one) day in advance with proper notification cards supplied by the water department.

3. LAYING(a) HANDLING OF WATERMAIN MATERIAL INTO TRENCH

Proper implements, tools and facilities satisfactory to the Engineer shall be provided and used by the contractor for the safe and convenient prosecution of the work. All pipe, fittings, valves and hydrants shall be carefully lowered into the trench piece by piece by means of a derrick, ropes or other suitable tools or equipment, in such manner as to prevent damage to watermain materials and protective coatings and linings. Under no circumstances shall watermain materials be dropped or dumped into the trench.

(b) FIELD INSPECTION

The pipe and fittings shall be inspected for defects while suspended above grade.

(c) CLEANING FITTINGS

All lumps, blisters and excess coaltar coating shall be removed from the bell end of each fitting and the inside of the bell be wire-brushed and wiped clean and dry and free from oil and grease before the fitting is laid.

(d) LAYING PIPE

Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the line. If the pipe laying crew cannot put the pipe into the trench and in place without getting earth into it, the Engineer may require that before lowering the pipe into the trench, a heavy, tightly woven canvas bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe.

Pipes shall be lowered singly into the bottom of the trench, made to rest firmly throughout their length on the prepared trench bottom.

After placing a length of pipe in the trench, the spigot shall be centered in the coupling or bell and pipe forced home and brought to correct line and grade. The pipe shall be secured in place with approved backfill material tamped under it except at the joints. Pipe and fittings which do not allow a sufficient and uniform space for joints shall be removed and replaced with pipe and fittings of proper dimensions to insure such uniform space. Precautions shall be taken to prevent dirt from entering the joint space. At any time when pipe laying is not in progress, the open ends of pipe installed shall be closed by a watertight plug or other means approved by the Engineer.

(e) CUTTING PIPE

The cutting of pipe for inserting valves, fittings, or closure pieces shall be done in a neat and workmanlike manner without damage to the pipe so as to leave a smooth end at right angles to the axis of the pipe, all in accordance with the manufacturer's recommendations for the pipe being used.

(f) BELL ENDS TO FACE DIRECTION OF LAYING

Pipe shall be laid with bell or pre-coupled ends facing in the direction of laying, unless directed otherwise by the Engineer. Where pipe is laid on a grade greater than 10% the laying shall proceed up-grade with the bell end up-grade.

(g) PERMISSIBLE DEFLECTION AT JOINTS

Wherever it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstructions or plumb stems, or where long-radius curves are permitted, the amount of deflection allowed shall not exceed that recommended by material manufacturer.

Pipes shall, in general, be jointed in strict conformance with the recommendations of the manufacturer of the pipe in use and as herein specified.

(a) MECHANICAL JOINTS

The entire section of the pipe shall be pushed forward to seat the spigot end in the bell. The gasket shall then be pressed into place within the bell, being careful to have the gasket evenly located around the entire joint. The cast-iron gland shall be moved along the pipe into position for bolting, all of the bolts inserted, and the nuts screwed up tightly with the fingers. All nuts shall be tightened with a suitable (preferably torque limiting) wrench. The torque for various sizes of bolts shall be as follows:

<u>Size in.</u>	<u>Range of torque</u>
	<u>Foot - - Pounds</u>
5/8	40 60
3/4	60 90
1	70 100
1 1/4	90 120

Nuts spaced 180 deg. apart shall be tightened alternately in order to produce in equal pressure on all parts of the gland.

Whenever it is desirable to deflect mechanical-joint pipe in order to form a long-radius curve, the amount of deflection shall not exceed the maximum limits recommended by the manufacturer.

(b) ASBESTOS - CEMENT PIPE

The machined ends of pipe to be jointed, the coupling grooves and rubber rings shall be cleaned immediately before assembly, and assembly shall be made as recommended by the manufacturer. Each pipe joint shall be sealed with a coupling consisting of an asbestos-cement sleeve and two rubber rings. The location of field assembled rings shall be checked with a suitable gauge to verify that rubber rings are in the required position.

Pipe shall not be deflected either vertically or horizontally more than the limits recommended by the manufacturer.

When pipelaying is not in progress, the open ends of installed pipe shall be closed by approved means to prevent entrance of trench water into the line. Whenever water is excluded from the interior of the pipe, enough backfill shall be placed on the pipe to prevent floating. Any pipe that has floated shall be removed from the trench and relaid as directed by the Engineer.

Pipes shall not be laid in wet trench conditions that preclude proper bedding, or when, in the opinion of the Engineer, the trench conditions or the weather are unsuitable for proper installation.

When rigid joints -- that is, those formed by bolts with rubber ring seals -- are used at the fittings, the length of the pipe fitted into the bell of the fitting shall not be more than 3 ft. 3 in. in pipe of 6 inch diameter and smaller, or 6 ft. 6 in. in pipe of 8 inch diameter and larger.

When a rubber ring is used to make the seal, and flexibility is provided by a grooved design profile similar to that of the coupling used to join pipe between fittings, up to a full 13 foot length may be used.

With all the rigid joints named above, the pipe connecting any two valves or fittings shall be in two or more lengths jointed with one or more couplings to provide flexibility. If a flexible seal is used, a single 13 foot or shorter length may be used to connect the two fittings without any intermediate coupling.

5.

SETTING VALVES & FITTINGS

All valves, valve boxes, and specials shall be accurately located as shown on the drawings or as indicated in the field.

Valves shall operate freely prior to installation. Boxes shall be carefully set over the hoods with the shaft truly vertical and the top at the proper elevation. Valve boxes shall be braced to the sides of the trench prior to backfilling in order to maintain their setting. Guide plates shall be used with all boxes.

Valve chambers shall be constructed in the locations indicated and to the dimensions and details shown on Water Department Drawing No. S-25, (Standard Valve Chamber) or prefab approved Chamber by the City Engineer, I.E. Oakes, Precast Chambers.

Dead ends shall be closed with plugs or caps manufactured for the pipe in use.

6.

SETTING HYDRANTS

Hydrants shall be located as shown or as directed and in a manner to provide complete accessibility, and also in such a manner that the possibility of damage from vehicles or injury to pedestrians will be minimized.

All hydrants shall stand plumb and shall have their nozzles parallel with the road. Hydrants shall be set with the ground line flange 3" above the future established finished grade, as shown or as directed by the Engineer.

Where hydrants are set in a bank the slopes shall be graded within a 6' radius from 3" below the ground flange not steeper than 1:2. This area has to be sodded.

Each hydrant shall be connected to the main with a 6 inch asbestos cement branch controlled by an independent 6 inch gate valve in box, except as otherwise directed.

Hydrants shall be set as shown on Water Department drawing No. S-23 or S-23.1 or as otherwise shown or specified.

7. ANCHORAGE

All plugs, caps, tees and bends deflecting $22\frac{1}{2}$ deg. or more on mains, unless otherwise indicated, be anchored to prevent movement by providing suitable reaction backing or metal harness therefore, as shown on Water Department Drawing S-21, typical thrust backing.

Backing shall be placed between solid ground and the fitting to be anchored; the area of bearing on the pipe and on the ground in each instance shall be that shown or directed by the Engineer. The backing shall, unless otherwise shown or directed, be so placed that the pipe and fittings joints will be accessible for repair.

Metal harness to tie rods or clamps of adequate strength to prevent movement may be used instead of concrete backing, as directed by the Engineer. Steel rods or clamps shall be galvanized or otherwise rustproof treated, thoroughly coated with pitch base paint and wrapped with 6 mil. polyethylene film taped in place.

8. BEDDING AND BACKFILLING

(Refer to Welland Water Department Drawing No. S-26)

(a) BEDDING

Bedding material shall be lime stone screening, (except where water conditions are encountered $\frac{3}{4}$ " clear crushed stone may be substituted as directed by the inspector) not frozen and free from rock, lumps of clay, large stones, boulders or other unsuitable substances.

The bedding material shall be deposited in the trench uniformly at both sides of the pipeline for the full width of the trench up to 12 inches above the top of the pipeline. This bedding material shall be tamped in layers 6 inches thick after compaction and shall be sufficiently damp to permit thorough compaction under and on each side of the pipe to provide support free from voids.

(b) BACKFILLING

Backfilling shall be completed in strict accordance with the City of Welland "Standard Backfilling Specifications" as soon as possible after the work of laying, jointing and bedding has been inspected and approved by the inspector.

The Contractor shall not permit the excavation to be used for the disposal of refuse.

Any deficiency in the quantity of material for backfilling the trenches or filling depressions caused by settlement shall be supplied by the contractor at his expense.

All excavated material in sections requiring granular backfill is to be loaded directly in trucks and hauled away. Only rubber tired equipment shall be operated on the roadway.

9.

REMOVAL, RESTORATION AND MAINTENANCE OF SURFACE

The contractor shall remove pavement and road surfaces as a part of the trench excavation, and the amount removed shall depend upon the width of the trench specified for the installation of the pipe and the width and length of the pavement area required to be removed for the installation of gate valves, specials, manholes or other structures. The width of pavement removed along the width of the normal trench for the installation of gate shall exceed the width of the trench specified by more than 6 inches on each side of the trench. The width and lengths of the area of pavement removed for the installation of gate valves, specials, manholes, or other structures shall not exceed the maximum lineal dimensions of such structures by more than 6 inches on each side. Wherever, in the opinion of the City Engineer, existing conditions make it necessary or advisable to remove additional pavement, the contractor shall remove it only as directed by the City Engineer. The Contractor shall use such methods, either drilling, chipping, or with compressor tools, as will assure the breaking of the pavement along straight lines. The face of the remaining pavement shall be approximately vertical.

Where any pavement, culverts, trees, shrubbery, fences, poles or other property and surface structures have been damaged, removed or disturbed by the contractor, whether deliberately or through failure to carry out the requirements of the contract documents, municipal ordinances or the specific direction of the City Engineer, or through failure to employ usual and reasonable safeguards such property and surface structures shall be replaced or repaired at the expense of the contractor.

The contractor shall restore (unless otherwise stipulated) all pavement, sidewalks, curbing, gutters, shrubbery, fences, poles, sod or other property and surface structures removed or disturbed as a part of the work to a condition equal to that before the work began, furnishing all labour and materials incidental thereto. No permanent pavement shall be restored unless and until, in the opinion of the City Engineer, the condition of the backfill is such as to properly support the pavement.

All surplus watermain materials furnished by the contractor and all tools and temporary structures shall be removed from the site by the contractor. All dirt, rubbish and excess earth from the excavation shall be hauled to a dump provided by the contractor and the construction site left clean to a satisfaction of the City Engineer.

11. MAINTENANCE OF SURFACE

Following the certification of completion by the City Engineer, the contractor shall maintain the surface of the unpaved trenches, curbs, sidewalks, gutters, shrubbery, fences, sod and other surfaces disturbed and shall maintain the repaved area (if paved by the contractor) and curbs, gutters and sidewalks for one year after said certification.

All material and labour required for the maintenance of the trenches and adjacent structures shall be supplied by the contractor and the work shall be done in a manner satisfactory to the City Engineer.

12. HYDROSTATIC TESTS

After the pipeline has been laid it shall be filled with water for a minimum of 24 hours and then subjected to separate Pressure and Leakage tests. The pressure test shall be made before the leakage test.

The tests shall be made only after a part or all backfilling has been completed and before placement of pavement and at least 36 hours after the last concrete thrust or reaction backing has been cast with high-early-strength cement, or at least 7 days after the last concrete thrust or reaction backing has been cast with standard cement.

Before applying the specified test pressures, all air shall be expelled from the pipes.

The specified test pressures, based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gaugo, shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Inspector.

The contractor will supply the pressure pump, pipe, connections and all other apparatus and shall furnish the necessary assistance to conduct the tests. The Water Department will furnish the pressure gauge and the measuring device for the leakage test.

The installation will not be accepted until the pressure test has been successfully completed and the measured leakage is within the allowable limits.

A. PRESSURE TEST

The duration of the pressure test must be at least one (1) hour at a constant pressure of 150 psig.

B. LEAKAGE TEST

The duration of the leakage test must be at least two (2) hours at a constant pressure of 100 psig.

Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe or any valved section thereof, to maintain the specified leakage test pressure.

The measured leakage must be less than the number of Imperial Gallons per hour as determined by the following formulas:

Asbestos cement pipe joints -

$$L - N \times D \over 956$$

Rubber gasket type joints other than A.C. such as mechanical joint, Tyton joints, etc. -

$$\text{Caulked} \quad L - N \times D \over 445$$

Bell and spigot joints -

$$L - N \times D \over 223$$

Where L - Limit of allowable leakage, in Imperial Gallons per hour.
N - Number of Joints, (Note: Each A.C. coupling is equivalent to 2 joints.)

D - Nominal diameter of joint, in inches.

13. DISINFECTING WATER LINES

Before the pipeline is placed in service all new water systems, extensions to existing systems, valved sections of extensions, replacements and any exposed section of the existing system shall be disinfected in accordance with AMWA standard C601 "Disinfection of Watermains", or to the satisfaction of the City Engineer.

14. UTILITIES

When laying watermains on existing streets and road allowances, utilities such as sewers, gas mains, telephone cables and watermains are liable to be encountered. The contractor is responsible for any breakage or damage to such utilities and must pay the total cost of any repairs resulting from damage to cables, pipes, etc. forthwith on demand.

The contractor assumes full responsibility for obtaining information as to the location of existing utilities from the respective companies or commissions. The City Engineer will furnish such information as is in his possession but can assume no responsibility for the accuracy of this information.

15. CHARGING AND FLUSHING OF MAINS

The contractor shall charge and flush the new mains when so instructed by the City Engineer. Mains shall only be charged under the supervision of the Inspector. The contractor shall be responsible for satisfactory disposal of all water used in flushing.

16. INSTALLING SERVICE MATERIALS

Excavation and backfilling shall be carried out with the same care, and using the same materials as specified for watermain. Excavation shall provide for a minimum of 5'-6" cover from the future finished grade over all parts of each service. The bid price per service shall include the cost of compacting the backfilled trench where necessary. The Contractor will be held responsible for any and all damage to existing concrete sidewalks or to existing underground utilities, house drains or culverts caused by his forces in connection with the installation of water service connections.

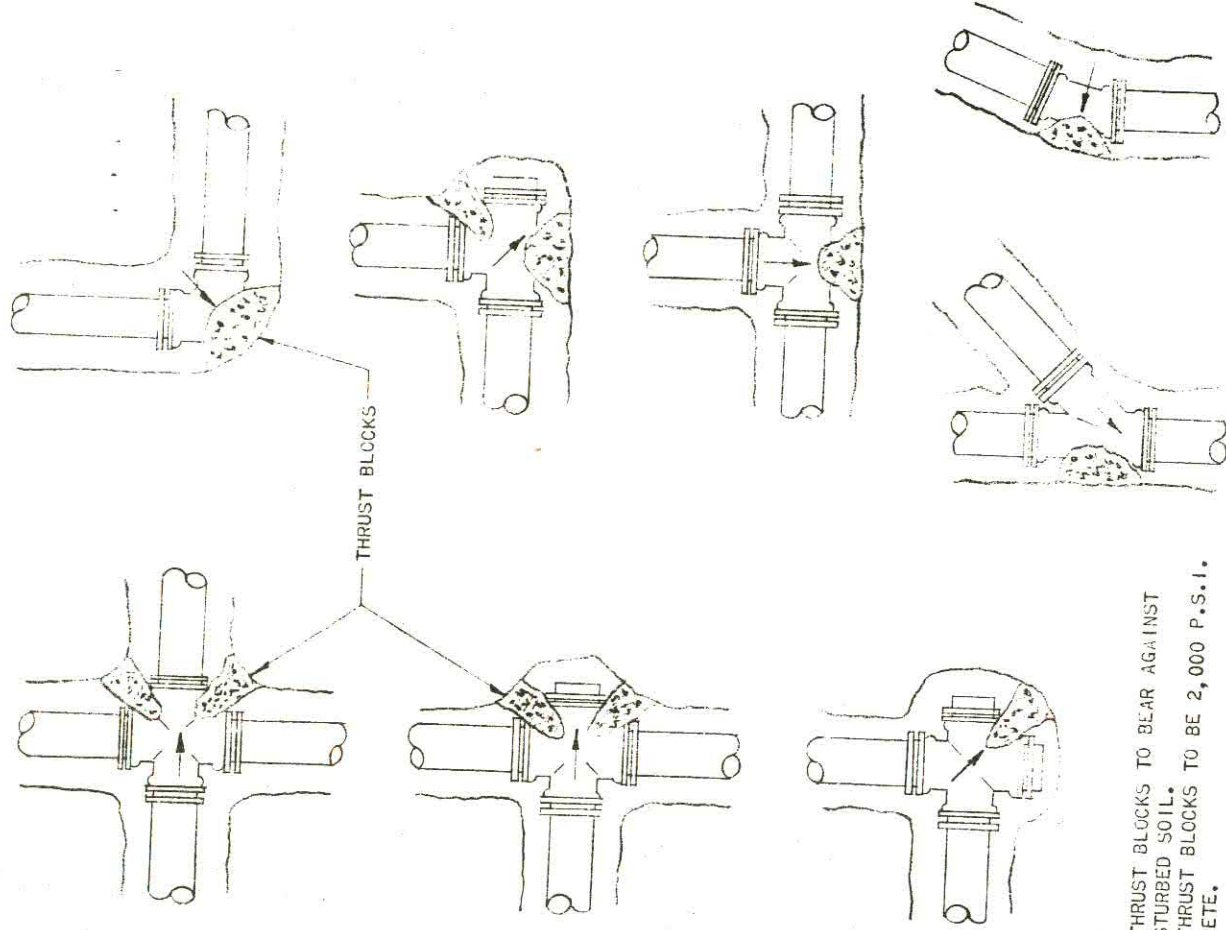
After the service line is installed and connected to the watermain, the curb box set in place, and the service line is connected to the consumer's water line at the road limit, the installation must be inspected by the Water Department's inspector before the trench is backfilled. Where services have been installed by means of boring or tunnelling, the contractor shall expose both ends of each to enable its length to be measured.

The trench bottom shall be levelled with a minimum of four inches (4") of lime stone screenings or fine traffic bound free of stones and frozen lumps, and well tamped in place, the service line laid in workmanlike manner and covered with a minimum of 12 inches (12") of screening or fine traffic bound, free of stones and frozen lumps and well tamped in place.

Backfilling and finish for trenches within 6' of edge of existing highway pavement and across driveway entrances shall be done with approved crushed stone granular material.

The Contractor shall restore all disturbed ground to its original condition. Drainage, natural water courses, culverts, etc., must be restored in a neat and workman like manner. Flow of water in ditches, culverts and natural water courses shall be maintained at all times.

1" Service line connections shall be installed as shown on Water Department Drawing No. S-22 and S-28.



NOTE
ALL THRUST BLOCKS TO BEAR AGAINST
UNDISTURBED SOIL.
ALL THRUST BLOCKS TO BE 2,000 P.S.I.
CONCRETE.

FOR COMPLETE DETAILS SEE WATER
DEPARTMENT DWGS. B-22 AND B-22.1.

CITY OF WFT BLDG
WATER DEPARTMENT

TYPICAL THRUST BACKING
FOR WATERMAINS

DATE FEBRUARY 23, 1970 SCALE N. T. S.
DRAWN BY M. BOSETTI
APPROVED *A. Smith* S-21
DRAWING NO. FILE NO.

STANDARD ARRANGEMENT
FOR 1" WATER SERVICE

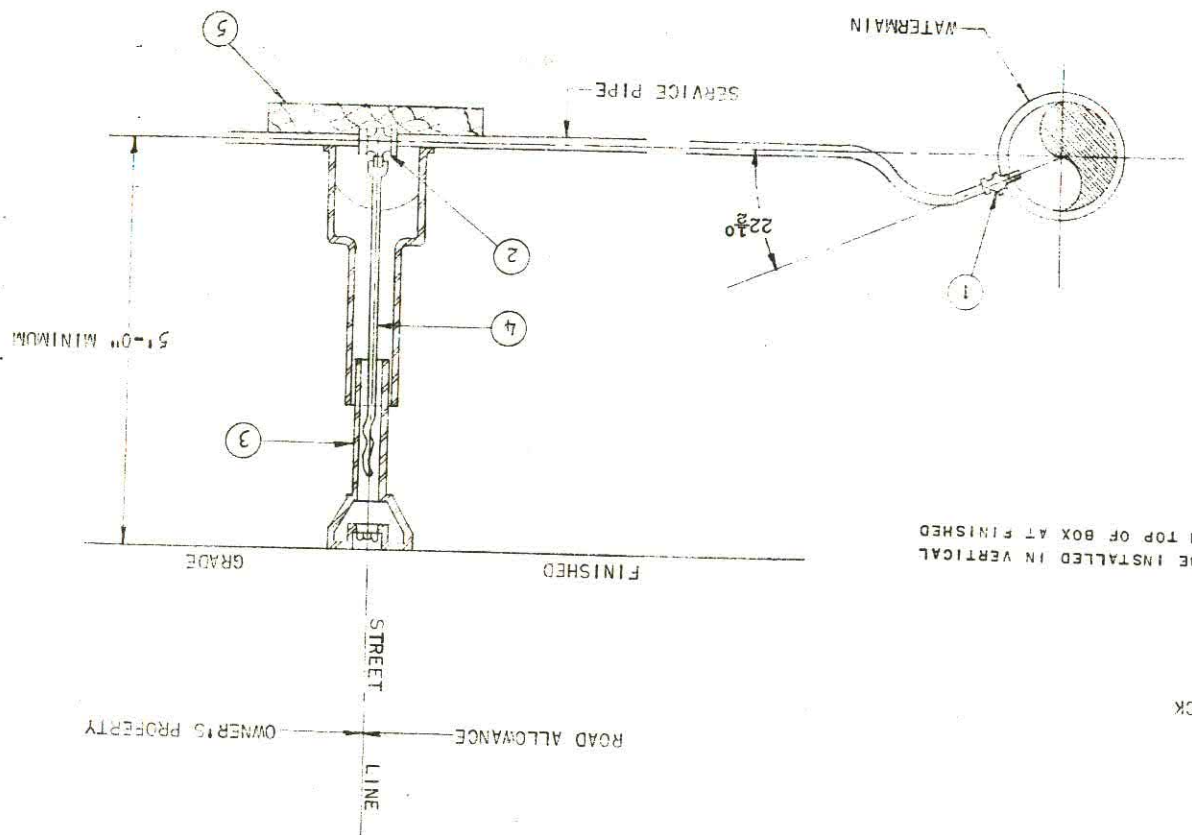
STANDARD ARRANGEMENT FOR 1" WATER SERVICE

FEBRUARY 23, 1970 N. T. S.
M. BOSETTI
AL SMITH

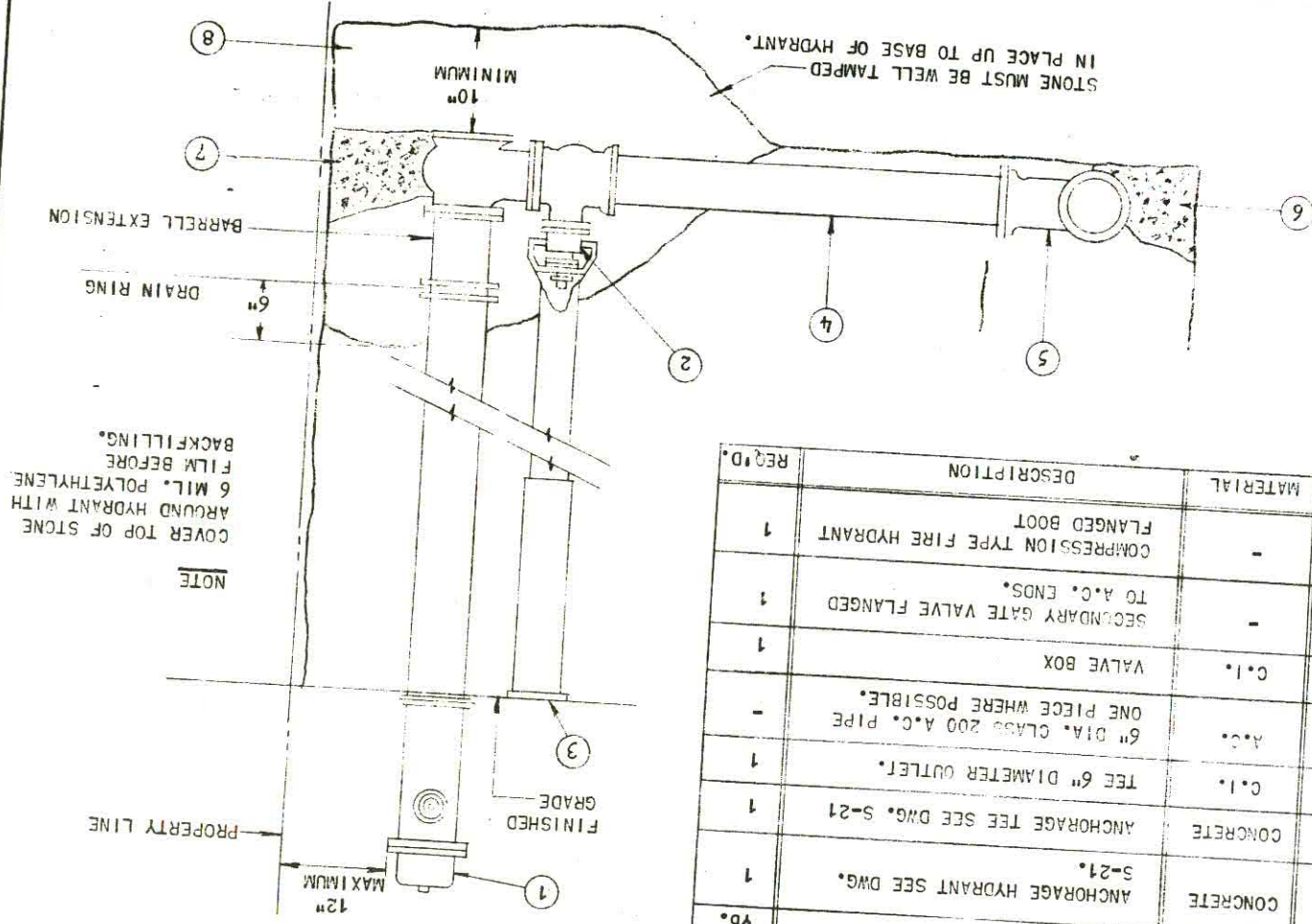
S-22

- 1 - MAIN STOP AND COUPLING
- 2 - CURB STOP AND COUPLING
- 3 - CURB BOX
- 4 - ROD
- 5 - WOOD BLOCK

NOTE:
CURB BOX TO BE INSTALLED IN VERTICAL
POSITION WITH TOP OF BOX AT FINISHED
GRADE LEVEL.



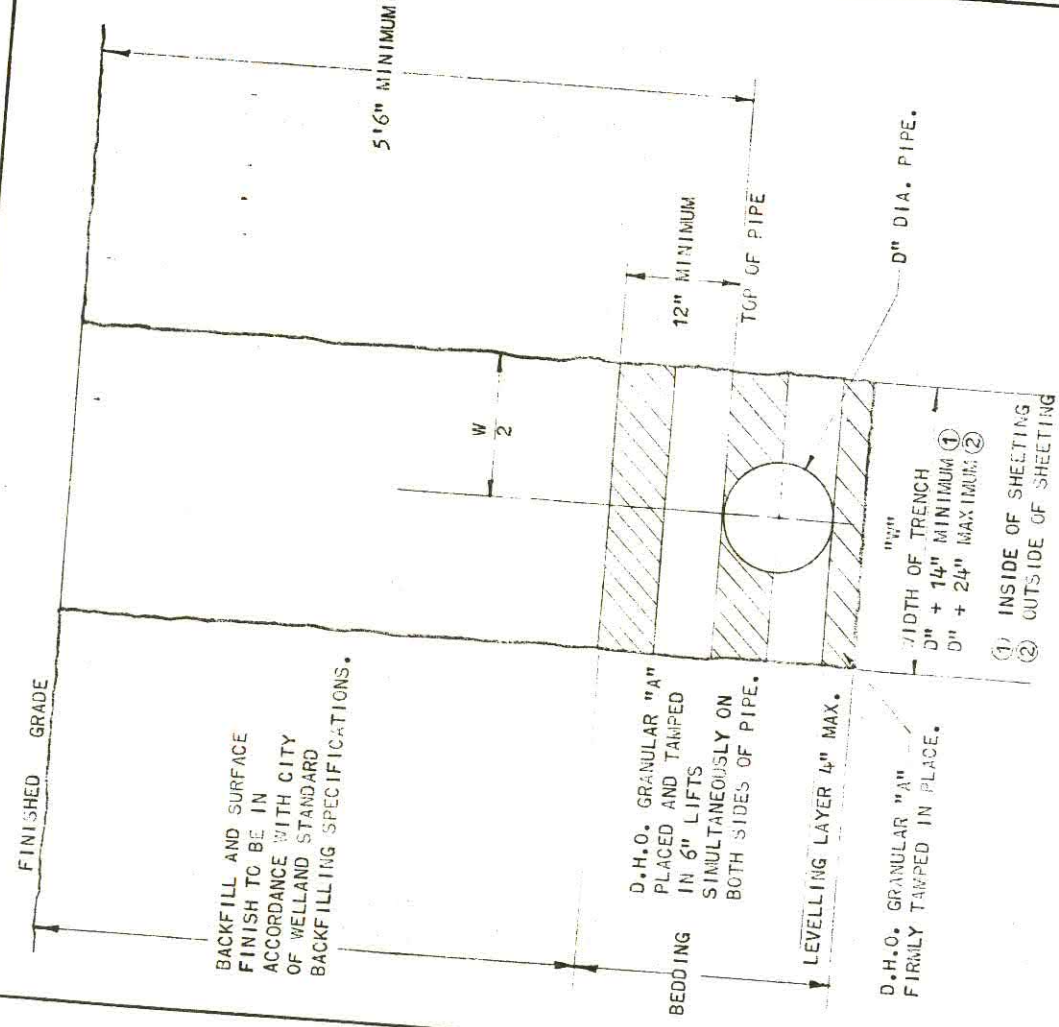
ITEM	MATERIAL	DESCRIPTION	REQ'D.
8	STONE	COARSE GRAVEL OR STONE FOR DRAINAGE.	1/2 Yd.
7	CONCRETE	ANCHORAGE HYDRANT SEE DWG. S-21.	1
6	CONCRETE	ANCHORAGE TEE SEE DWG. S-21	1
5	C.I.	TEE 6" DIAMETER OUTLET.	1
4	A.C.	6" DIA. CLASS 200 A.C. PIPE ONE PIECE WHERE POSSIBLE.	-
3	C.I.	VALVE BOX	1
2	-	SECONDARY GATE VALVE FLANGED TO A.C. ENDS.	1
1	-	FLANGED BOOT	1



CITY OF WELLES
WATER DEPARTMENT

STANDARD HYDRANT ASSEMBLY
OFF
ASBESTOS CEMENT WATERMAIN

DATE FEBRUARY 23, 1970
DRAWN BY M. BOSETTI
APPROVED *[Signature]* S-23



NOTE

- (1) GRANULAR MATERIAL SHALL MEET D.H.O. GRANULAR "A" SPECIFICATIONS (FINE TRAFFIC BOUND OR SCREENINGS) THROUGHOUT EXCEPT WHERE WATER IS ENCOUNTERED 1/4" CLEAR CRUSHED STONE SHALL BE SUBSTITUTED.
- (2) WHERE THE BOTTOM OF THE TRENCH IS FOUND TO BE UNSTABLE OR OTHERWISE UNACCEPTABLE IT SHALL BE EXCAVATED TO THE WIDTH AND DEPTH ORDERED BY THE INSPECTOR AND REFILLED AND COMPACTED TO THE BOTTOM OF THE PIPE WITH 2" CRUSHER RUN CRUSHED STONE.
- (3) ALL EXCESS MATERIAL TO BE REMOVED FROM SITE.
- (4) IN NO CASE SHALL FROZEN MATERIAL BE USED FOR BEDDING OR BACKFILLING.

WATER DEPARTMENT

STANDARD BEDDING AND BACKFILLING OF WATERMAINS

DATE FEBRUARY 24, 1970

DESIGNED BY M. BOSETTI

APPROVED

N. T. S.

S-26