

**VILLE DE SHEDIAC**

**TOWN OF SHEDIAC**



***DEVIS NORMALISÉ***

***Pour***

***TRAVAUX MUNICIPAUX***

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***STANDARD MUNICIPAL SPECIFICATIONS***

**Révisé / Revised**

**Avril / April 2013**



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**INSTRUCTIONS TO TENDERERS**

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**1. TENDER DOCUMENTS**

- 1.1 Only those tenders submitted by persons or firms who have been listed either individually or jointly as having received tender documents will be considered.
- 1.2 Addenda to the tender documents will be issued only to those persons listed in accordance with subsection 1.1.
- 1.3 It is the responsibility of all tenderers to ensure that they are listed as having received tender documents.
- 1.4 Tender documents may only be obtained from the location named in the public notice of tender.
- 1.5 All requests for additional information, clarifications or instructions concerning the Tender must be sent IN WRITING (facsimile, e-mail or letter) and received by the Town no later than four (4) working days prior to the public Tender opening. Requests shall be submitted to the individuals designated on the Tender Data Sheet. Oral information provided by any staff other than designated will not be binding.

All relevant questions deemed by the Engineer to be appropriate for general interest to all potential Bidders and the Engineer's response to each question shall be issued to all Bidders in the form of an Addendum or a Clarification.

**2. TENDER DEPOSIT**

- 2.1 A person submitting a tender shall deposit it in the tender box at the location and within the time stipulated in the public notice of tender.
- 2.2 Responsibility for deposit of a tender or amendment thereto, in the tender box in the proper location within the proper time, is that of the person submitting the tender. The Town assumes no responsibility for those tender submissions which have been mailed or left with employees of the Town.
- 2.3 Only those tenders deposited in the tender box will be considered.
- 2.4 A person submitting a tender may amend the tender subsequent to the deposit of the tender in the tender box and prior to the time of opening the tenders by:
  - 2.4.1 letter, telegram, telex or facsimile (fax) sent by the person(s) signing the original tender deposit; and
  - 2.4.2 depositing the amendment in the tender box prior or the close of tenders; and
  - 2.4.3 clearly identifying the project being tendered and the tender being amended on the face of amending letter, telegram, telex or facsimile (fax).
- 2.5 An amendment of tender shall not disclose the amended total tender price but shall show:
  - 2.5.1 the revised bid price per items to be amended in the case of a unit price contract;  
or

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**INSTRUCTIONS TO TENDERERS**

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- 2.5.2 the amount to be added to or subtracted from the contract price in the case of a lump sum contract; or
  - 2.5.3 the information that is missing from the tender on deposit.
- 2.6 Subsection 2.2 also applies to a letter, telegram, telex or facsimile (fax) of amendment of tender.
- 2.7 If the tender deposit and amendment is found to be a valid submission of tender and amendment, then the contract price shall be amended to reflect the original tender deposit as amended by the tender amendment.

**3. TENDER SUBMISSION**

- 3.1 Tenders may be deposited in the tender box up until the time stipulated in the notice of tender.
- 3.2 The Town Clerk or his designate shall, at the time specified for tender opening in the notice of tender, declare:
- 3.2.1 that no further tenders will be accepted, whereupon no further tenders may be deposited;
  - 3.2.2 that any person wishing to withdraw their tender shall do so immediately, whereupon the tenders of those persons wishing to withdraw shall be delivered up to those persons unopened; and
  - 3.2.3 that no further tenders may be withdrawn, whereupon the tender opening procedure shall be followed and no person shall be allowed to withdraw their tender.

**4. TENDER REJECTION**

- 4.1 A tender submitted for a proposed contract to which the tender regulations apply shall be rejected and the tender not considered if the tender:
- 4.1.1 is not accompanied by the required security deposit or Bid Bond in the stated amount and valid for a minimum of sixty (60) working days (Note: a Bid Bond amount expressed as a percentage of the bid, contract or tendered price is not acceptable);
  - 4.1.2 is not accompanied by a letter from a resident agent or broker of a Surety company licensed to do business in the Province of New Brunswick stating that the Bid Bond, where required, has been negotiated for, procured from and the premium paid to that agent or broker;
  - 4.1.3 is not "Properly Signed" by the tenderer. "Properly Signed" shall mean that the signature of a representative of your Company with lawful signing authority be placed in all areas required on the tender form and/or addendum.
  - 4.1.4. does not contain the unit prices or fixed price written in words;



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**INSTRUCTIONS TO TENDERERS**

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- 4.1.5 does not have the words "dollars" and, where applicable, "cents" set out in the written item bid;
  - 4.1.6 contains any form of qualification of, or unless the tender documents otherwise provide, any unsolicited alternative to the tender;
  - 4.1.7 does not contain a bid for each item required to be bid;
  - 4.1.8 does contain a bid on an item not included in the bid form;
  - 4.1.9 is not contained in an envelope having on the face of it the name of the tenderer and identification of the contract for which the tender is submitted;
  - 4.1.10 does not contain all addenda issued to prospective tenderers, each "Properly Signed" by the tenderer;
  - 4.1.11 is the second one submitted by the same tenderer in which case all tenders submitted by that tenderer shall be rejected;
  - 4.1.12 is made by a tenderer not listed or by a consortium which or each member of which is not listed by the Town as having received tender documents;
  - 4.1.13 contains a change in a written bid price not initialed by the tenderer;
  - 4.1.14 omits any document or information required by or fails to comply with any provision of the tender form;
  - 4.1.15 otherwise materially deviates from accepted tendering practices, including but not limited to an unbalanced bid;
  - 4.1.16 does not contain the construction schedule; if so required in the Tender Form;
  - 4.1.17 submission for contracts valued over \$50,000 (HST not included), is not followed within two (2) working days by a current Letter of Good Standing (LoGS) under the Certificate of Recognition (COR) Program issued by the New Brunswick Construction Safety Association (NBCSA) or an acceptable equivalent. (Note: this is mandatory as a condition of award);
  - 4.1.18 submission is not followed within two (2) working days by an up-to-date clearance certificate from WorkSafe NB.
- 4.2 For the purpose of Item 4.1.15, an unbalanced bid is a tender containing a unit price, which deviates substantially from, or does not fairly represent reasonable and proper compensation for the unit of work bid. (The Engineer may use tenders submitted in response to this invitation to tender or for like or similar work as guidelines in determining if a bid is unbalanced.) Tenders that contain prices which appear to be so unbalanced as to likely adversely affect the interests of the Town may be rejected at any point during the review process.
- 4.3 Subject to subsection 4.1, a tender submitted for a proposed contract to which the tender regulations apply may be accepted, notwithstanding that it contains:

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**INSTRUCTIONS TO TENDERERS**

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- 4.3.1 errors in mathematics, in which case proper computation will be carried out and the resultant total used in determining the tender value;
  - 4.3.2 a conflict between the written bid price and the bid price in numbers in which case the bid is corrected to reflect the written bid price;
  - 4.3.3 omission of a "provisional sum" specified by the Town in which case the required "provisional sum" will be inserted and the tender corrected to reflect its inclusion.
  - 4.3.4 "Security Deposit" for an amount greater than the stated or advertised amount.
- 4.4 The Town reserves the right to accept a tender other than the lowest tender based on, but not limited to, factors including quality, delivery date and service capability, past experience with the tenderer (or lack thereof), results of reference checks, information relating to the financial state of the tenderer (however obtained), other relevant criteria and price. Information requested in the Tender Form will be an integral part of a tender evaluation process; the Town of Shediac reserves the right to check references listed and may perform background checks. No act of the Town, other than a signed notice in writing, shall constitute an acceptance of the tender.

**5. PRICES WRITTEN OUT**

- 5.1 Persons submitting tenders must submit their tenders with unit prices written out and lump sum prices written out.
- 5.2 The total tender price in a unit price tender need not be written out.
- 5.3 The written figures in a total tender shall govern and be binding on the tenderer even though totals arrived at disagree with figures or totals given in figures.

**6. PUBLIC TENDER OPENING**

- 6.1 All tenders shall be opened in public at the location specified in the public notice of tender.
- 6.2 Each tender shall be opened individually and checked for completeness and where it is apparent that the tenderer has failed to comply with the requirements of these specifications, the tender shall be rejected forthwith.
- 6.3 If the tender is rejected, the tender will be returned to the person submitting the tender.
- 6.4 If the tender is not rejected, the bid price and the name of the persons or firm submitting the tender will be posted. Posting of bid does not constitute acceptance of the tender submission.
- 6.5 The award of the contract will not take place at the time of the tender opening. If the Town discovers, after subsequent analysis, that a tenderer has failed to comply with all conditions outlined in the tender package, the tender shall be rejected and the tenderer, upon request, shall be notified as to the reason for rejection.

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**INSTRUCTIONS TO TENDERERS**

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**7. SECURITY DEPOSIT OPTION**

7.1 Where the Town elects to require a security deposit other than a bid bond, the tender documents shall stipulate the type and amount of deposit.

**8. PERFORMANCE BOND AND LABOUR & MATERIAL PAYMENT BOND**

8.1 Where a bid bond is required in the submission of tenders for the award of a contract to which these tender regulations apply, a labour and material payment bond and a performance bond shall be supplied by the successful tenderer within the time stipulated in subsection 10.2.

8.2 The labour and material payment bond and performance bond required by subsection 8.1 shall be in an amount, for each bond, equal to 50% of the value of the awarded price before HST.

8.3 All bonds shall be procured from, and the premiums paid to, a resident agent of an insurance company or to a general insurance broker, licensed to do business in the province of New Brunswick. Such bonds shall also be satisfactory to the Town as to form and issuer.

8.4 The labour and material payment bond and performance bond shall remain in force and effect for the duration of the contract and maintenance period and until issuance of the Certificate of Final Acceptance.

**9. REFUND OF SECURITY DEPOSITS**

9.1 Where the Town elects to require a security deposit under section 7 the security deposit of the successful tenderer shall, if a contract is entered into with that person, be held by the Town as security for the due performance of the work by the Contractor and shall be returned without interest upon issuance of the first release of holdback.

9.2 The certified cheque, bank draft or money order of the successful tenderer may be cashed and the proceeds deposited with interest at any chartered bank pending deposition under the terms of the contract and any such interest shall be deemed to be and treated as an increment to an part of the security deposit and shall not be refunded upon return of the security deposit.

9.3 Security deposits will be returned without interest to unsuccessful tenderers within two (2) days following the award of the contract.

**10. TENDER VALID FOR**

10.1 The Town shall, within sixty (60) working days of the public tender opening for the contract, notify the successful tenderer by mail delivery that they are the successful tenderer and call on them to enter into a formal contract for construction of the work.

10.2 The successful tenderer notified in accordance with subsection 10.1 shall, within ten (10) working days of notification;

10.2.1 where required by section 8, provide a performance bond and labour & material bond in the amount stipulated;

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**INSTRUCTIONS TO TENDERERS**

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10.2.2 provide proof of insurance coverage of the type and in the amount stipulated in the General Conditions; and

10.2.3 execute the formal document.

10.3 The quantities shown on the Tender Form are approximate. The Town reserves the right to increase or decrease quantities and award a contract for more or less than the total bid price based on the unit bid prices.

**11. REFUSAL TO ENTER CONTRACT**

11.1 If a successful tenderer does not comply with the provisions of section 10 within the time stipulated, they shall be considered to have refused to enter into the contract and section 11.3 applies.

11.2 Where default under subsection 11.1 occurs, the Town may call upon the next suitable tenderer to enter into the contract in accordance with the provisions of section 10.

11.3 Where the successful tenderer has been called upon to enter into a formal contract by the Town and refuses to do so within the time limit stipulated, the Town will:

11.3.1 cash or negotiate the bid deposit and retain a sum equal to the difference between the value of their tender and the value of the next lowest tender and shall return an amount equal to the surplus, if any, to the tenderer whose bid deposit was so forfeited; or

11.3.2 notify the Surety Company where a bid bond was submitted.

**12. TENDER BINDING**

12.1 A tender is binding upon the person(s) submitting the tender until such time as they receive formal notification by telegram, telex, facsimile (fax) or mail of the rejection of their tender but in no case unless, as successful tenderer, they have received notification under subsection 10.1 shall it be binding upon them for more than sixty (60) working days, from the date of public tender opening, unless requested by the Town and agreed to by the tenderer in writing.

**13. CROWN CONSTRUCTION CONTRACTS ACT**

13.1 Tenders issued under the provisions of the Crown Construction Contracts Act will be so identified in the Notice of Tender, and if so, will be governed by the latest revision of the Statute's regulations.

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**GENERAL CONDITIONS**

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**1. DEFINITIONS**

In this specification, the following words and expressions shall have the meanings hereinafter assigned to them, except where the context otherwise requires.

- 1.1 "Approved", "Authorized", "Directed", "Ordered", "Requested", "Required", "Sanctioned", "Satisfactory", etc. shall unless some other meaning is obvious from the context mean to or by the Engineer.
- 1.2 "The Town" or the "Town of Shediac" or "The Owner" shall mean the Town Council of the Town of Shediac, New Brunswick and includes the Town's personal representatives, agents or successors.
- 1.3 "The Consultant" shall mean the consulting engineering firm or individual currently licensed to practice in the Province of New Brunswick, assigned or approved by the Town Engineer to carry out the various engineering services required to complete the project.
- 1.4 "The Contract" shall mean the Agreement between the Town and the selected tenderer governing the execution of the work.
- 1.5 "The Contractor" shall mean the party or parties, person or persons, firm or company, whose tender for the execution of the work has been accepted by the Town and includes the contractor's personal representatives, successors and permitted assigns.
- 1.6 "The Engineer" shall mean the Town Engineer of the Town of Shediac or the Project Engineer, Project Manager, Consultant or any other authorized person as may be appointed to supervise the carrying out of the Contract.
- 1.7 "The Plans" shall mean and include the plans, sections and other delineations which accompany or are referred to in the specifications and any modification of such plans approved in writing for the purpose of the contract and any additional plans prepared by the Engineer to facilitate the work.
- 1.8 "The Site" shall mean the lands and other places, on, under, in or through which the works are to be executed or carried out.
- 1.9 "The Specifications" shall mean all sections included in this document including the form of tender, instructions to tenderers, general conditions of contract, plans and technical specifications contained herein and on the plans and all supplementary specifications issued for a particular tender.
- 1.10 "Working Day" shall mean any day from Monday to Friday, from sunrise to sunset, of any week excluding statutory holidays.
- 1.11 "Day" shall mean any calendar day from Sunday to Saturday including statutory holidays.
- 1.12 "The Work" shall mean all the work as set out and described in "The Plans" and "The Specifications" to be executed in accordance with the contract document.
- 1.13 Where reference is made to standard documents published by such agencies as the Canadian Standards Association (CAN/CSA), American Water Works Association

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**GENERAL CONDITIONS**

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(AWWA) or American Society for Testing and Materials (ASTM), the reference shall be understood to mean the revision of such standard document which is current at the time of closing of tenders.

- 1.14 "Incidental items" shall be any item or work, material, labour or equipment necessary to complete a specified item of work in accordance with these specifications, supplementary general or technical specifications, contract drawings or as otherwise required by either a manufacturer or in accordance with recognized standard practice and procedures, for which there is no particularly identified or specified item under any other part of the Town's specifications and for which no payment will be made.
- 1.15 "Excess Material" shall be any material not to be re-incorporated into the work.
- 1.16 An "*unbalanced bid*" is a tender containing a unit price which deviates substantially from or does not fairly represent reasonable and proper compensation for the unit of work bid (the Town may use tenders submitted in response to this invitation to tender or for like or similar work as guidelines in determining if a bid is unbalanced).

**2. ADHERENCE TO PLANS AND SPECIFICATIONS**

The Contractor shall execute the works strictly in accordance with the plans and specifications, or with any Supplementary directions, details or Change Orders ordered by the Engineer, as required for the proper completion of the contract.

**3. MEASUREMENTS, PRECEDENCE AND DISCREPANCIES**

Figured dimensions shown on the drawings will take precedence over scaled measurements. The Contractor will report any discrepancy to the Engineer.

The specifications are intended to indicate the qualitative aspects of the work and will take precedence in this respect. The drawings are intended to show the location and quantitative aspects of the work and will take precedence in this respect.

If there is any inconsistency or conflict between the provisions of the *Contract Documents* then:

The *Contract Documents* shall govern and take precedence in the following order with the Agreement taking precedence over all other *Contract Documents*:

- I) Agreement
- II) Addenda
- III) Supplementary General Conditions
- IV) General Conditions
- V) Supplementary Technical Specifications
- VI) Technical Specifications
- VII) Drawings listed in Article A-3 of the Agreement
- VIII) Supplementary Detail Drawings
- IX) Standard Detail Drawings
- X) Executed Form of Tender
- XI) Instructions to Tenderers
- XII) All other *Contract Documents*

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**GENERAL CONDITIONS**

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**4. CUSTODY OF PLANS AND SPECIFICATIONS**

The original plans and specifications shall remain in the sole custody of the Engineer. Two (2) copies of the construction drawings shall be given to the Contractor before commencement of construction or ordering of materials. It is the responsibility of the Contractor to ensure that they are in possession of drawings "Approved for Construction" and a copy of the latest edition of the Town of Shediac Standard Municipal Specifications before commencement of any work. A copy of the plan shall be kept on the works and be open at any time for inspection or reference by the Engineer. Additional copies of the plans or specifications or any working plans will be provided at the contractor's expense.

The Engineer may furnish additional drawings to assist with the proper execution of the work. These drawings will be issued for clarification purposes only. Such drawings shall have the same meaning and intent as if they were included with the plans referred to in the contract.

**5. NOTICES**

All notices to be served on the Town must be served on the Town Clerk, Town Hall, Shediac, NB. All other notices to be given under the Contract may be served personally upon the person by registered letter to them at their principal place of business or at their last known place of residence.

**6. INTERPRETATION**

In case of any actual or alleged disagreement or discrepancy between the Contract and these specifications and/or the plans of the work on file in the office of the Engineer, as to the true intent and meaning thereof, the same shall be referred to the Engineer, whose decision shall be final.

Where the Contractor and Engineer fail to agree, the Contractor is required to notify the Engineer in writing before proceeding with the disputed work.

**7. DISPUTES-ARBITRATION**

Any claim which the Contractor may have against the Town based on any dispute or difference of any kind whatsoever arising out of the Contract or work, shall not be grounds for delay in the work but shall be referred by the Contractor in writing to the Engineer not later than ten (10) working days after the occurrence giving rise to such disputed difference. Correspondence shall contain a concise statement of the relevant facts.

The claim shall be settled by the Engineer who shall communicate the decision in writing within ten (10) days of the date of receiving written notification. The Contractor shall proceed with the works with all due diligence in accordance with the Contract whether or not such claim shall be referred to arbitration as hereinafter provided.

Except in those circumstances where it is provided in the contract the decision of the Engineer shall be final. Any dispute or difference persisting after delivery of the Engineer's decision, shall, be referred to arbitration in accordance with the Arbitration Act and action must be taken within thirty (30) days.

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**GENERAL CONDITIONS**

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An application for arbitration shall be accompanied by security in the amount of One thousand Dollars (\$1,000.00) to apply to the cost of arbitration. The arbitration shall be by a Board of three (3) members. Both parties shall notify the other party in writing of its desire to submit the dispute or difference to arbitration and a notice shall contain the name of the first party's appointee to the Arbitration Board. The recipient of the Notice shall, within seven (7) days, inform the other party of the name of its appointee to the Arbitration Board. The two members, so selected, shall within five (5) days of the appointment of the second of them appoint a third person who shall be Chairman.

The Arbitration Board shall determine responsibility for costs and shall include recommendation for payment in the award decision.

Either party may appeal the arbitration award.

Reference to arbitration by the Contractor as herein provided shall be a condition precedent to any legal action with respect to any dispute or difference of any kind whatsoever which the Contractor may have with the Town arising out of the contract or works.

**8. FORFEITURE**

The Town may enter upon the site and works and expel the Contractor therefrom and may itself use the materials, equipment, tools or plant upon the premises for the completion of the works, and employ any other Contractor to complete, or may itself complete the works, and upon such entry the contract shall be determined safe as to the rights and powers conferred upon the Town and Engineer thereby, in the event of forfeiture of the contract as evidenced by:

- 8.1. the bankruptcy of the Contractor;
- 8.2. the contractor having a receiving order made against them;
- 8.3. the contractor presenting a petition in bankruptcy;
- 8.4. the contractor assigning this contract;
- 8.5. the contractor making an arrangement with or an assignment in favour of their creditors;
- 8.6. an execution being levied on the Contractor's goods;
- 8.7. the Engineer certifying to the Corporation that the Contractor;
  - 8.7.1 has abandoned the Contract, or
  - 8.7.2 after receiving written notice to proceed, has suspended the progress of the works for one (1) day without any lawful excuse under the contract or
  - 8.7.3 has failed to make proper progress with the works for three (3) days after receiving written notice to employ more persons and/or equipment upon them, or
  - 8.7.4 has failed to remove materials from the site or to pull down and rebuild work, for three (3) days after receiving written notice that the materials or works are condemned or rejected, or



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**GENERAL CONDITIONS**

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- 8.7.5 has failed to provide proper facilities for inspecting the works or any part of them for one (1) day after receiving written notice demanding same, or
- 8.7.6 has failed to submit any work or materials to specified tests for one (1) day after receiving written notice requiring same, or
- 8.7.7 has failed to complete all or part of the works by the time or extended time for completion, or
- 8.7.8 has failed to provide a Schedule of Work acceptable to the Engineer as stipulated in General Condition 37, or
- 8.7.9 has failed to provide a revised Schedule of Work within 3 days after receiving written notice from the Engineer demanding same.

The Engineer's Certificate under (8.7) above, shall be conclusive proof as between the Contractor and Town of statements contained in it.

**9. CERTIFICATE AFTER FORFEITURE**

In the event the Town expels the Contractor under Clause "8", "Forfeiture", no right or action for work done under the Contract or for materials, equipment, tools or plant of which the Town may have taken possession, or in any other respect, shall arise until the works have been satisfactorily completed and the cost of completion and the damages due for delay in completion, if any, and the advances which have been made to the Contractor have been ascertained and the amount thereof certified by the Engineer in writing. If such amount is less than the Contract price, then the Town shall pay the balance to the Contractor within seven (7) days after the issue of such Certificate and if such amount is more than the contract price, then the balance shall be a debt due from the Contractor to the Town.

**10. ALTERATIONS TO CONTRACT**

No alterations in the plans and/or contract documents, however made, shall have effect unless supported by specific written approval of the Engineer.

**11. ASSIGNMENT SUBLETTING AND SUBCONTRACTORS**

The Contractor shall not assign the contract or any part thereof or any benefit or interest therein without the written consent of the Engineer.

Notwithstanding the provision of the foregoing, the Contractor shall, where it is so listed in the Form of Tender, employ Subcontractors for execution of those parts of the work requiring specialist skills. Any change to the list of Subcontractors submitted in the Form of Tender must be submitted in writing to the Engineer, whose written approval must be received prior to them commencing any work.

The Contractor agrees to preserve and protect the rights of the Owner under the Contract with respect to any work to be performed under subcontract.

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**GENERAL CONDITIONS**

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The Contractor shall:

- a) require all Subcontractors to perform work in accordance with and subject to the terms and conditions of the Contract documents, and
- b) be fully responsible to the Owner for acts and omissions of all Subcontractors and of persons directly or indirectly employed by them, the same as for acts and omissions of persons directly employed.

The Contractor, therefore agrees, that all terms and conditions of the Contract documents are incorporated into all Subcontract Agreements that are entered into with his Subcontractors. The Contractor shall have a supervisor on site at all times to oversee the work of the Subcontractor.

All directions, clarifications, orders and notices given by the Engineer with respect to the execution of any part of the works (whether executed by the subcontractor or not) will be given to the Contractor who shall, where applicable, be entirely responsible for the compliance of the Subcontractors therewith.

### **Superintendence**

The Contractor shall employ a competent Superintendent and/or Foreman who shall be in attendance at the work site (or promptly available on site when required) at all times during the work period.

The Superintendent shall be satisfactory to the Engineer and shall not be changed except for good reason and only then after consultation with and agreement by the Engineer. The Superintendent shall represent the Contractor at the work site and directions given to him by the Engineer shall be perceived as being given to the Contractor. Important directions shall be confirmed to the Contractor in writing; other directions may also be confirmed if requested.

## **12. AUTHORITY OF THE ENGINEER**

The Engineer shall have full authority to define the meanings of the drawings and other contract documents. The Engineer either personally or through delegation of authority to representatives such as Project Engineers, Field Chief, Consultants, Inspectors, etc. shall be the sole judge of the workmanship and materials in respect of both quality and quantity and shall have full powers to examine, inspect and approve or reject materials, methods of procedure and workmanship furnished or used in the execution of the contract and to determine whether or not materials and workmanship are of the character required by the intent and meaning of the drawings and other contract documents.

Appendix 'K' details the minimum testing required for general construction practices. The Engineer or his designate has full authority to request any further tests he deems to be required for proper methods and proof of quality materials and workmanship.

The Engineer's decision of all questions in dispute with regard to the foregoing matters shall be final and binding both on the Contractor and the Town except as provided elsewhere in these documents concerning settlement of disputes.

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**GENERAL CONDITIONS**

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**13. INSURANCE AND INDEMNITY**

The Contractor shall supply an insurance policy naming the Town (and Consultant, when applicable) as co-insured, and which is satisfactory to the Town to indemnify and save harmless the Town, its officers or agents, from all suits, or actions arising out of or in connection with the works, whether such actions are brought by members of the public, or persons employed on the works. The Contractor shall assume all liability for and give to the Town complete indemnity against all such suits or actions and shall be fully responsible for payment of all deductibility portions of any claims.

Certificates of such insurance shall be filed with the Town and shall be subject to approval but such approval shall in no way relieve the Contractor from any larger responsibility under the contract.

Such insurance shall name the Contractor, the Subcontractors, the Town Engineer, the Town and Consultant (where required), as additional insured, where applicable.

**The comprehensive general liability insurance required shall be for an inclusive limit of not less than Two Million Dollars (\$2,000,000.00) for each occurrence.**

The Contractor shall pay for and maintain Builders All Risks Insurance during the term of the contract. Such insurance shall incorporate at least the following features:

- The Town, the Consultant, the Contractor and all sub-contractors as named assureds, and incorporating the Insurer's Waiver of Subrogation against any such named assureds.
- A debris removal clause.
- Loss by vandalism clause.
- Automatic reinstatement clause
- A deductible of no more than \$1,000.00. The cost of this deductible shall be borne by the Contractor
- Loss payable shall be made to the Town and the Contractor as their interests may appear.

Insurance contracts shall be procured from and the premiums paid to, a resident agent of an insurance company or a general insurance broker, licensed to do business in the Province of New Brunswick.

Written notification of any cancellation or changes in the insurance policy, insurance company, etc. must be given to the Town with copy to the Engineer thirty (30) days prior to the date the change will take effect.

**ALL INSURANCES SHALL REMAIN IN EFFECT UNTIL ISSUANCE OF THE "CERTIFICATE OF FINAL ACCEPTANCE".**

**A SEPARATE POLICY ENDORSEMENT SHALL BE PROVIDED IF ANY BLASTING IS TO BE CARRIED OUT UNDER THE CONTRACT.**

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**GENERAL CONDITIONS**

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**14. BONDS**

- 14.1 The Contractor shall furnish a Performance Bond and a Labour and Material Payment Bond according to the requirements and time limits set out in the Instructions to Tenderers.
- 14.2 The Town shall require a performance bond covering the faithful performance of the contract, including the period of maintenance, satisfactory to it as to form and issuer. The performance bond will be fifty percent (50%) of the awarded contract price, and issued by a Surety Company authorized to do business in the Province of New Brunswick. If a performance bond is accepted, the Town will return such cheques or bid bond comprising the initial deposit on receipt of the Performance Bond and approval of same.
- 14.3 The Contractor, along with a Surety Company authorized, by law, to do business in the Province of New Brunswick, shall furnish a labour and materials payment bond to the owner, in the amount of fifty percent (50%) of the awarded contract price before HST.
- 14.4 All bonds shall remain in effect until issuance of the Certificate of Final Acceptance.

**15. PERMITS AND LICENSES**

The Contractor shall obtain and pay for all licenses and permits which may be required to comply fully with laws, ordinances and regulations of the proper public authorities, in connection with the performance of this work. The Contractor shall be responsible for all damages and shall indemnify and save the Town harmless from and against all damages and liability, which may arise out of the failure of the Contractor to obtain and pay for such licenses and permits and to comply fully with any and all applicable laws, ordinances and regulations.

**PROOF OF CONTRACTOR'S OR SUBCONTRACTOR'S LICENSE OR QUALIFICATIONS, (I.E. ELECTRICAL, PLUMBING AND REFRIGERATION) SHALL BE PROVIDED UPON DEMAND BY AN AUTHORIZED PERSON OR AGENCY.**

The Engineer will provide the Contractor with a copy of the Certificate of Approval for Construction, if applicable, by the Department of Environment and Local Government, under Regulation 82-126, Water Quality Regulation of the Clean Water Act. A copy of this Approval must be available on the job site (in the ownership of the Project Superintendent) for the duration of the project.

**16. NIGHT, SATURDAY, SUNDAY AND HOLIDAY WORK**

The Engineer may order or the Contractor may request work to proceed in whole or in part at night, on Saturdays, Sundays or holidays if it is deemed necessary or expedient in order to preserve and maintain traffic over or on any street or road or to complete any works that are of an urgent nature. Such night or overtime work shall be performed by the Contractor without additional or extra cost to the Town beyond the price bid for the work.

No Sunday work will be permitted, except in the case of emergency and then only with the written permission of the Engineer and to such extent as may be necessary.

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**GENERAL CONDITIONS**

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The Contractor shall, as far as possible, refrain from work on statutory holidays in the Province of New Brunswick. If work must be carried out on such a holiday written notification must be submitted to the Engineer at least four (4) days in advance of such holiday stating those places where work will be conducted and what Engineering assistance may be required. If the Contractor fails to give such notice in advance of any holiday, such failure shall be considered as an indication that no work requiring the presence of an Engineer or Inspector is to be done by the Contractor on such a holiday.

**17. INTERIM PAYMENT CERTIFICATES AND HOLDBACK**

At the end of each month during the progress of the work; the Engineer will prepare a payment certificate for the estimated value of the work, satisfactorily completed and materials actually used, in the execution of the work during the month or since the last payment.

Prior to any payment, except the first, the Contractor must submit a completed Statutory Declaration (See Appendix C).

Prior to any payment, the Contractor must also submit a Certificate of Clearance from WorksafeNB.

Payment will be made within ten (10) working days after receipt of the Certificate by the Finance and Administration Department.

Fifteen percent (15%) of all monies due to the Contractor in accordance with the payment certificate shall be retained by the Town and shall be termed the Holdback.

Should the Contractor have claims of any description which he considers are not included in the Interim Payment Certificates, such claims must be made in writing to the Engineer within sixty (60) days from the date of the completion of the portion of the work to which such claims apply. In default of the presentation of such claims within the time stipulated such claims will not be considered.

The Town reserves the right to refuse to process any Interim Payment Certificate if the progress of the works or the conduct of the Contractor is not satisfactory or the Contractor has in any other way done or neglected to do anything so as to make it doubtful whether the works will be completed in accordance with the Contract.

No Interim Payment Certificate shall be held to bind the Engineer in the evaluation of the works for the purposes of the Certificate of Final Acceptance and the Engineer may, by any Interim Payment Certificate, make corrections or modifications to any previous Payment Certificate which may have been issued.

A certificate issued under this clause is neither to be considered an approval of the works or materials nor a waiver of any rights of the Town arising under the Contract against the Contractor or his authorities.

**18. RELEASE OF HOLDBACK MONIES**

Before any holdback amount will be released, the Contractor must provide the Town a duly and legally signed Statutory Declaration (as supplied by the Town) stating that all persons who have been employed on the contract or who have furnished equipment and materials for the works or

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**GENERAL CONDITIONS**

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persons entitled to a lien under the Mechanics' Lien Act, have been fully paid and that the firm has not further claims against the Town of Shediac with respect to this contract (except for this progress claim and any retained holdbacks). The Contractor must also enclose with the statutory declaration, a written Certificate from Worksafe/NB certifying that all payments required under the contract have been made and a release from all further claims against the Town.

After producing such declarations and certificates, the Contractor shall become eligible to receive two-thirds (2/3) of the holdback amount sixty (60) days after the date of Provisional Acceptance or the date of Substantial Completion.

The remaining one-third (1/3) of the holdback amount will be retained by the Town for a minimum period of twelve (12) months after the date of Provisional Acceptance and will only be released after issuance of the Certificate of Final Acceptance.

Liquidated damages, if applicable, will be calculated and deducted from the first Release of Holdback payment.

**19. CERTIFICATE OF SUBSTANTIAL COMPLETION**

The intent of this certificate is to facilitate the release of holdback where major works are substantially completed; such as, the installation of sewer or water lines, roadbed gravels, asphalt base and seal, curb and sidewalk, landscaping and driveway re-instatement, but final clean-up activities such as minor deficiencies, which may extend over several months or into a new construction season are still outstanding.

As soon as the works have been substantially completed and have satisfactorily passed any final tests required under the Contract; and, the Contractor has given a written undertaking to complete any outstanding work expeditiously, the Engineer may issue the Certificate of Substantial Completion of the works.

**20. CERTIFICATE OF PROVISIONAL ACCEPTANCE**

When all works and tests have been satisfactorily completed, the Contractor shall then advise the Engineer in writing. Within ten (10) working days following the receipt of this letter, the Engineer shall arrange for an inspection of the work with appropriate Town staff and the Contractor. A list of any noted deficiencies will be prepared and the Contractor shall then promptly carry out all the works so named. When these works have been completed and accepted, the Engineer shall issue the "Certificate of Provisional Acceptance".

**21. CERTIFICATE OF FINAL ACCEPTANCE**

Eleven (11) months after the date declared in the Certificate of Provisional Acceptance, the Contractor shall advise in writing that the works are fully completed and are ready for final inspection. Within ten (10) working days following receipt of this letter the Engineer shall make arrangements for this final inspection of the work with appropriate Town staff and the Contractor.

The Contractor shall promptly correct all defects, deficiencies, etc. which are identified during the final inspection.

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**GENERAL CONDITIONS**

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When this work has been completed, the Engineer shall then prepare the "Certificate of Final Acceptance". The Contractor shall sign the certificate, affixing the corporate seal thereto declaring that the Contractor has no further claims against the Town of Shediac whatsoever with respect to the contract. The final holdback amount, less any monies owing, shall then be paid to the Contractor.

**22. WARRANTY AND MAINTENANCE PERIOD**

The warranty and maintenance period shall commence on the date declared in the Certificate of Provisional Acceptance and remain in effect for a minimum of twelve (12) months and until issuance of the "Certificate of Final Acceptance". The Contractor at his own cost shall be responsible to inspect, audit and maintain the works and remedy any omissions or defects and deficiencies discovered or appearing in the works from the first day of construction and the Contractor further agrees to correct or pay for any damages to other work resulting from the said defects or the correction thereof.

Deficiencies of a non-emergency nature must be repaired within one (1) week of observation or after receipt of instructions in writing to do so.

Deficiencies of an urgent or emergency nature must be repaired immediately upon observation or upon receipt of notification from the Engineer or an Official of the Town Engineering and Public Works Department. Every effort possible must be made by the Contractor to repair such deficiencies immediately. Failure to make the necessary repairs or corrections due to lack of equipment, material, labour or any reason whatsoever, will result in the Town causing the works to be done at the expense of the Contractor.

All costs and expenses incurred in correcting any defects that appear prior to and during the warranty and maintenance period, whether performed by the Contractor, his representative, or the Owner or its representatives, shall be borne by the Contractor. The Contractor shall, in addition, be liable to the Town for all expenses, losses, or damage incurred by the Town as a result of any faulty materials and defective workmanship, or as a result of the Contractor's failure to correct any defects as observed or as notified, including but not restricted to all engineering costs, inspection and testing the work.

The Contractor's failure to resolve the defects or deficiencies shall permit (the Town's) access to the Contractor's performance bond to resolve such defects or deficiencies.

Neither the Certificate of Substantial Completion, the Certificate of Provisional Acceptance, the Certificate of Final Acceptance, nor any payment made thereunder by the Town, shall relieve the Contractor of his responsibilities for faulty materials or defective workmanship. Notwithstanding the provisions of this article, if any statute in force in the jurisdiction where the product was manufactured or if manufacturer's warranty extends the liability for faulty products or workmanship beyond the scope of this Contract, then the provisions such statute or manufacturer's warranty shall apply.

**23. USE OF MONIES RETAINED**

If, after issuance of the "Certificate of Provisional Acceptance", and during the "Warranty and Maintenance Period" the works are found to be in an unsatisfactory condition and the Contractor fails to remedy the work, the Town may use monies retained to remedy the works. The balance, if any, will be paid to the Contractor after issuance of the "Certificate of Final Acceptance".

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**GENERAL CONDITIONS**

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**24. DETERMINATION OF COMPLETION DATE**

The whole of the works shall be completed within the time stated in the Tender or as calculated from the date of award of tender by Town Council, using the number of working days as originally provided for.

The Town will consider requests for extension to the completion date of the contract, due to adverse weather conditions, extra or additional work, disasters or delay in delivery of equipment or material, on the following basis:

- 24.1 The Contractor shall give notice in writing to the Engineer within ten (10) working days after any such delay has first arisen stating the reason and requesting a stated extension of time.
- 24.2 Providing the Contractor commences the work in accordance with an approved schedule of work, additional working days will be granted for each and every working day lost due to weather conditions if the number of hours lost during any one day exceeds fifty percent (50%) of the normal working hours. Working days lost due to weather conditions will be determined by the Engineer and this information will be given to the Contractor at the end of each week.
- 24.3 Additional working days will be granted for extra or additional work performed, provided the Contractor can show the additional or extra work could not be carried out without interfering with the original Schedule of Work.
- 24.4 Additional working days may be granted for delay in delivery of equipment or material provided the Contractor can furnish documentation attesting to the delay being claimed.
- 24.5 If the Contractor does not agree with the figures compiled by the Engineer, the Contractor must make his objections with reasons, in writing, within ten (10) days of receipt of the Engineer's notification, after which, the figures compiled by the Engineer shall be binding.

**25. LIQUIDATED DAMAGES FOR LATE COMPLETION**

If the Contractor fails to complete and hand over the works to the Town on the day fixed, as stipulated in Section 1.3 of the Agreement (Appendix "J"), or on such other days to which the time for completion may be extended by the Engineer under the powers herein contained, then for every "Working Day" which elapses between such days and the time when the works shall be completed and handed over, the Contractor shall forfeit and pay to the Town by way of liquidated damages.

The amount of damages shall be identified in each individual tender. In addition, all Engineering and Administration costs including Consultants fees incurred as a result of late completion shall be totaled and deducted from any monies due the Contractor.

The deduction of such sums shall not relieve the Contractor from the obligation to complete the works or from other obligations and liabilities under the contract.

The Contractor shall carry out the work in compliance with the various federal, provincial and municipal acts, regulations and policies involving protection of the environment, and any approvals or permits issued to the Town of Shediac, or the Contractor in accordance therewith.



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**GENERAL CONDITIONS**

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**26. ENVIRONMENTAL AND ARCHAEOLOGICAL REQUIREMENTS**

The Contractor shall carry out the work in compliance with the various federal, provincial and municipal acts, regulations and policies involving protection of the environment and any approvals or permits issued to the Town of Shediac or the Contractor therewith.

The Contractor shall take all precautions necessary as determined by the appropriate regulating authorities for the protection of watercourse affected directed or indirectly by the work on the contract.

The Contractor must provide for erosion and sediment control on the construction site. The Contractor shall ensure that sediment control fences or erosion control structures are properly located for the effective runoff control. The selection of appropriate erosion and sediment control measures is site specific and should be selected on project-by-project basis.

All sediment and erosion control work shall be in accordance with NBDOT Standard Specifications Division 600, Item 946 "Work Progression", 948 "Environment Requirements", the NBDOT Environmental Protection Plan and the NBDOT Environmental Field Guide.

The Contractor shall ensure that any water running off any exposed soils created as a result of the project, or pumped from any excavation to a watercourse, or a ditch leading to a watercourse, is pumped to a settling pond or filtered through a vegetated area or through a sediment control system as per Section 4 (Construction Activities) of the New Brunswick Department of Transportation Environmental Protection Plan.

Sediment control fence shall be installed as indicated on Standard drawings and prefabricated sediment control fence shall be installed as per manufacturer's instructions.

The Contractor shall ensure that at no time during his construction activities, or warranty and maintenance period, will his activities create conditions conducive to mosquito breeding, through the formation of ground depression, holes, ruts, ponds, swales and ditches other than those intended by virtue of the approved construction and drainage plans. Any natural drainage will not be altered so as to cause water accumulation on vacant or adjacent lands.

The Contractor shall take all precautions necessary to prevent undue damage to trees on construction work sites. The following should be observed when working near trees:

- 26.1 When trenching is necessary it should be done as far away from the trunk of the tree as possible. Trench boxes may be required. If excavating around roots, do not cut or remove the anchor roots, which prevent the tree from toppling over during high winds.
- 26.2 Roots should not be left exposed for periods longer than four (4) hours. If the work requires longer exposed periods, the roots shall be wrapped with wet burlap and kept moist until backfilled.
- 26.3 All roots over 25mm which require cutting shall be cleanly cut.
- 26.4 When working within the dripline of trees, low branches that cause an obstruction should be raised by using a hose covered wire or rope. Necessary removal of low branches must follow proper pruning techniques. The tree trunk must be wrapped with burlap and then several layers of snow fence to prevent bark damage from machinery working within the dripline.

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**GENERAL CONDITIONS**

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If, at any time during construction, objects of potential historical or archaeological value are uncovered by the Contractor, all work shall cease and shall not continue until the site has been reviewed by appropriate representatives and the Engineer has approved resumption of the work.

**27. ANTICIPATED PROFITS/ADDITIONALS AND DELETIONS**

If any alteration in, change, or omission from the works is made by which the amount of work to be done or materials to be supplied shall be changed, or if the execution and completion of the whole or any portion of the works from whatever cause be dispensed with or abandoned, no compensation shall be claimable by the Contractor for any loss of anticipated profits in respect thereof.

The Town reserves the right to increase or decrease quantities or the extent of the work scheduled or to vary in any way the work contracted for. The Contractor shall not be compensated for any work deleted.

**28. DELAYS**

The Contractor shall neither be entitled to any claim nor bring any action or suit against the Corporation for any damage which may be sustained by reason of any delay in the progress of the work, apart from the provisions specifically addressed in these General Conditions.

**29. TAXES - HST**

A single line entry is provided in the Form of Tender indicating the total Harmonized Sales Tax (HST) applied to the overall bid price. Unit prices for goods and materials, etc. shall not include any Provincial Sales Tax or Goods and Services Tax.

**30. VARIATIONS AND EXTRAS**

In executing the works, the Contractor shall make such variations as the Engineer may direct in writing and the works with such variations shall be taken to be the works to be executed under the contract and all provisions contained therein shall apply. All such works shall be valued at the scheduled rates and prices if the prices are applicable.

No compensation for extra work or materials shall be allowed unless so ordered, in writing. If the contract does not contain unit prices applicable to the extra or additional work, then reasonable prices shall be fixed by the Engineer. These prices shall be based on the sum of the following three items:

- 30.1 the actual costs of the material required for the work, as furnished by the Contractor and delivered to the site, and incorporated in the works plus a mark-up of ten percent (10%) to cover all expenses and profit; and
- 30.2 labour at rates in Regulation 2007-34 under the Employment Standards Act, latest revision, or on an hourly payroll wage basis plus thirty-five percent (35%) with the exception of drivers and operators. No payment shall be made for personnel beyond the class of Foreman.

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**GENERAL CONDITIONS**

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30.3 rental of construction equipment, other than small tools, at rates in Regulation 82-113 under the Crown's Construction Contracts Act, latest revision.

In lieu of the above, the Engineer may approve payment for extra work based on an acceptable quotation received in writing from the Contractor.

When the extra or additional work which cannot be valued at the Schedule of Quantities and Prices is carried out by the Contractor's approved Subcontractor, the price for this shall be based on the Subcontractor's approved invoice calculated as above plus five percent (5%) mark-up covering all Contractor's expenses and profit.

Whenever any extra work is in progress, the Contractor shall each working day provide in writing a detailed account of the amount and costs of the labour and materials used in carrying out each order for extra work. No claim for compensation will be considered unless such detailed account has been received. No payment or compensation for the costs or repairs to equipment or for construction equipment standing idle on the site will be considered. Payment for extra work involving equipment will be based on the manufacturer's original specifications.

No claim for compensation for room and board will be considered for payment.

Time limitation for submission of claims shall be as outlined in clause 17, Interim Payment Certificates and Holdback.

### **31. BOOKS AND RECORDS OF THE CONTRACTOR AND SUBCONTRACTORS**

The Contractor shall keep proper books and records, showing names, trades and addresses of all workers employed, and wages paid to them, including the time worked, expenditures, payments, settlements, receipts and balances in connection with the construction of the works.

All records of the Contractor relevant to the valuation of the works including payrolls, time books of account, invoices and statements, shall be maintained and shall be open at all reasonable times for inspection by the Engineer. The Contractor shall in every way assist such inspection for the purpose of establishing and determining labour costs, the cost of extra work and progress payments to be made, or for any other justifiable cause.

### **32. EXAMINATION OF SITE/SUFFICIENCY OF TENDER**

It is the sole responsibility of the Contractor to become familiar with and understand the nature and extent of the work to be executed, the nature of the soil, surface water drainage, the general form of the surface of the ground, and generally of all matters which can in any way influence the tender, in so far as possible. Information on any matter derived from the plans and specifications or obtained from the Engineer or from test pits, etc. shall not in any way relieve the Contractor from risk or from fulfilling the terms of the Contract. All details and incidental items not particularly mentioned in the specifications but which, whether in temporary or permanent works, must evidently be required by the nature of the works shall be considered included in the contract. On submission of the bid, it shall be understood that this has been done and provision for all risks, incidental items and contingencies are included in the contract price.

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**GENERAL CONDITIONS**

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**33. POSSESSION OF SITE AND ACCESS ROAD / USE OF PRIVATE PROPERTY**

The Town will, on or before the commencement date specified, give the Contractor possession of the site, but if it fails to do so, then the time for completion shall be extended by such period as shall be equal to the time which lapses between the commencement date and the date when the Town gives the Contractor possession, unless the Town's failure to give the Contractor possession arises through the misbehaviour or default of the Contractor, in which case no alteration shall be made on this account. The job sites are generally accessible from existing streets in the area, but it is the responsibility of the Contractor to construct all access roads required to reach the job site.

The Owner shall have the right to take possession of and any use any completed or partially completed portions of the work. Such taking possession and use shall not be construed as relieving the Contractor of any of his responsibilities under the terms of the Contract.

It is the Contractor's responsibility to obtain approval relative to use of privately owned properties for the purpose of construction activities related to this or any other contract. Any costs, damages, compensation or risk resulting from the use of private property shall be borne by the Contractor.

**34. LABOUR, MATERIALS, WORKMANSHIP AND TESTING**

The Contractor must employ qualified personnel and pay wages in accordance with all Federal and Provincial minimum wage requirements.

The Contractor must use New Brunswick materials with second preference being given to Atlantic area materials and thirdly, to Canadian materials, in so far as possible.

All equipment, materials and workmanship shall be the best of the respective kinds described in the specifications and in accordance with the manufacturer's instructions shall be subjected from time to time to such standard tests as the Engineer may direct at the place of manufacture or fabrication, on the site, or at an independent Testing Laboratory.

The use of any such materials may be forbidden if they are found to be defective or if they are considered unsuitable for the incorporation in the works. The Contractor shall provide such assistance, instruments, machines, labour and materials as are normally required for examining, measuring and testing the works and the quality, weight or quantity of any materials used and shall supply samples of materials before incorporation in the works for testing as may be selected and required. The cost of this shall be deemed to be incidental and included in the contract price.

The Contractor shall have no claims against the Town in respect of any financial loss from the rejection of such materials and shall also bear the cost of removing them from the site, replacing with sound material and retesting.

The Contractor shall keep the Engineer advised of orders and delivery dates of materials.

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**GENERAL CONDITIONS**

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**35. QUALITY OF MATERIALS AND WORKMANSHIP**

The Engineer's decision as to whether the materials supplied and the work done under this Contract comply with the requirements of these specifications will be conclusive and final. In all matters of detail not specifically covered by the specifications, the work shall be well and skillfully done in accordance with the best trade customs and standards for work of like character and purpose and in full compliance with manufacturer's specifications and instructions, where applicable.

When the work completed or being done or the kind or quality of the equipment or materials supplied or being supplied does not meet specifications or is not satisfactory, notice will be given verbally or in writing and the Contractor shall immediately, upon receipt of such notice, reconstruct the work and replace the equipment all in accordance with the specifications. All such reconstruction, replacement and repair shall be done at the expense of the Contractor.

Should the Contractor refuse or neglect to comply with the Engineer's requirements within three (3) working days from the receipt of such notice, the Town will consider the Contractor to have forfeited the contract. The provisions of General Condition 8, "Forfeiture" will then be exercised.

The Engineer's failure to disapprove of, or reject, any part or parts of the work or any of the materials or equipment supplied in connection therewith at the time of making any Interim Payment hereunder, or at any other time during the continuance of this contract, shall not be construed to be an acceptance of any such part or parts of the work or any such material. The removal of work and re-execution thereof shall be at the expense of the Contractor; this includes all costs involved in replacing the work (including all materials destroyed or damaged by the removal of the rejected)

SHOULD THE CONTRACTOR HAVE ANY DOUBT ABOUT ANYTHING TO BE CONSTRUCTED, DONE OR SUPPLIED, OR AS TO ANY OTHER ISSUE, THE MATTER SHALL BE CLARIFIED WITH THE ENGINEER BEFORE SUCH ITEM IS COMMENCED OR DELIVERED.

**36. MATERIALS, EQUIPMENT, TOOLS AND PLANT**

All materials, equipment, tools or plant brought by the Contractor upon the site or land occupied by the Contractor in connection with the execution and carrying out of the works shall upon arrival on the site be deemed to be the property of the Town; and shall not be removed from the site except on the completion of the works or with the permission of the Engineer. This clause shall not in any way diminish the liability of the Contractor under clause titled "Insurance and Indemnity" nor shall the Town be in any way accountable for any loss or damage which may happen to or in respect of any such materials, equipment, tools, plant or work, either by the same being lost, stolen, injured or destroyed by fire, tempest or otherwise. Unless otherwise noted, it is the Contractor's responsibility to order and arrange for delivery of all materials necessary for the completion of this contract. Failure to have any materials on the site at the time that they are required for construction will be the Contractor's responsibility and will not be considered for an extension to the completion date.

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**GENERAL CONDITIONS**

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**37. SCHEDULE OF WORKS**

A complete Schedule of Works based on the number of days between the stipulated start and completion dates shall be submitted with the tender if so required in the Form of Tender. If the Schedule is not called for at the time of bidding, the Contractor shall submit a Schedule of Works showing the completion dates of any and all phases of the work before the commencement of the work.

Time is of the essence. Failure to provide or follow the Schedule of Work shall be dealt with as per General Condition 8.

**38. ORDER AND PROGRESS OF THE WORK**

The work under this contract shall be carried out in such sections and with such forces as will secure its completion within the stipulated time in accordance with the order of works. The extent of the job site to be torn up, obstructed or closed to travel at any one time shall be kept to a minimum as stated in these specifications or as directed. Public convenience and safety is of the essence.

**39. INSPECTION**

The Engineer may conduct testing and inspection by Assistants, Inspectors or Consultants for all materials used and all work done under this contract. The Contractor shall furnish the Engineer all information regarding the work and the materials deemed necessary or pertinent and with such samples as may be required.

Any work done in the absence of the Inspector shall be opened up for thorough examination and must be rebuilt or replaced as directed, at the contractor's expense. No approval by an Inspector shall be taken as, or construed into, an acceptance of defective or improper work or material, which must, in every case be removed and properly replaced whenever discovered at any stage of the work.

The Town may appoint a consulting firm to conduct testing and inspection of materials, equipment, the work or any aspect thereof in whole or in part to insure conformity with the Specifications.

**40. INSPECTOR'S AUTHORITY**

Inspectors are required to ensure that all provisions of the contract are adhered to and that quality materials and workmanship are provided and constructed at all times. Inspectors shall have the authority to have removed from the job site indefinitely any workman, foreman, supplier, etc. for any justifiable cause such as impairment, negligence, inability to produce quality workmanship or disregard of orders.

Inspectors shall have the authority to stop the works, or any portion thereof, entirely if there is not a sufficient quantity of suitable and approved material on site to carry out the works properly or if weather conditions will have an adverse effect on the quality of work, or for any other good and sufficient cause.

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**GENERAL CONDITIONS**

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Orders given by Inspectors relating to the quality of the material and workmanship or safety matters of any nature must be obeyed at once by the Contractor.

**41. CONTRACTOR'S FOREMAN AND JOB SUPERINTENDENT**

The Contractor shall, during all working hours, keep upon the site the foreman as identified in the Form of Tender. All orders, directions and notices given to this person shall be as binding on the Contractor as though they had been given to the Contractor in person. The Job Superintendent shall continuously monitor the work and liaise with the Engineer. Neither the Foreman nor Job Superintendent shall differ from those identified in the Form of Tender without written request by the Contractor and approval of the Engineer.

**42. WEIGHING OF MATERIALS**

Where contract unit prices are for weight measure of material, the Contractor shall provide, install and maintain approved scales for the measurement of such materials. The scale shall be of sufficient capacity and dimension to fully contain the loaded vehicle. The scale platform and mechanism shall be kept clean and in good working order at all times. The approach roadway shall be on a flat grade, level with the scale platform for at least one truck length.

The scale shall be tested at the beginning of each construction season in accordance with the requirements of the Government of Canada prior to being used. The Certificate issued by the testing authority shall be displayed at the scales at all times.

If the scales are moved, repaired or altered in any way, they shall again be tested and certified in accordance with Government of Canada requirements before additional use. Only original weight certificates from the quarry or pit of material origin will be accepted and used as basis for payment. Copies of weight certificates will not be accepted. Weight certificates are to be original digitally printed vouchers. Hand-written weight certificates and certificates other than those approved will not be accepted.

Anytime there is a discrepancy in the daily totals for materials, the Contractor shall submit daily summary sheets tallying the total material deliveries for each work day. (The Inspector's Quantity Sheets may be given to the Contractor's Foreman and require his signature/approval; any discrepancies shall be noted within 2 working days of the foreman's receipt of these daily Quantity Sheets.) The daily summary sheet shall record each weight certificate; the type and size of each material, the weight of material delivered to the site, and shall correspond to the weight certificates that the Engineer receives from each material delivery. Failure to supply these daily summary sheets within specified time limits shall result in non-payment for materials delivered.

**43. WEIGHING OF TRUCKS – VERIFICATION OF SCALES**

The Town reserves the right to periodically and randomly spot check truck weights by requiring the truck or trucks to be weighed at another Government inspected scale within the Greater Shediac area. The Contractor is hereby advised that no payment will be made for this requirement, it shall be considered incidental to the work.

If it is determined that the gross vehicle weight as indicated on the weight slip is incorrect, the Contractor's scale shall be immediately closed until such time as it is again certified in

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**GENERAL CONDITIONS**

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accordance with Government of Canada requirements. An appropriate adjustment to all weights accepted prior to the time of closure will be made.

The Town hereby reserves the right to place an Inspector at any and all scale sites during times when materials are being weighed for used on Town of Shediac projects. The cost of this Inspector will be borne by the Town.

Any material hauled and/or placed in violation of the maximum weights provision of the Motor Vehicle Act of the Province of New Brunswick will not be measured for payment. The Contractor must ensure that all motor vehicles are registered for the gross weights they intend to haul.

**44. EXCESS AND/OR UNSUITABLE MATERIALS**

Unless a disposal site is designated, all excess and/or unsuitable materials found upon or excavated from the site shall become the property of the contractor and shall be disposed of in accordance with all Federal, Provincial and Municipal regulations and requirements, including acquisition of permits, etc. The excess and/or unsuitable materials shall remain in the custody of the Contractor until delivery at the designated place. All related costs shall be incidental to the work. The Contractor must indicate by letter, prior to start of contract, where excess materials will be disposed of and provide written documentation showing that the owner of the disposal site has granted approval, and that all environmental approvals, and any other required permits as may be necessary from regulatory agencies within the Province have been obtained.

When insufficient space is available to allow placing of excavated material on the right-of-way, the Contractor shall load, haul and stockpile such excavated material at an off-site location arranged for by, and at the sole expense of, the Contractor. When all excavation work is complete, the Contractor shall, at his own expense, bring back as much acceptable material as may be required to properly refill all excavations or trenches, or for general backfilling purposes.

**45. PAYMENT BY TRUCK RATES**

Truck measurement will only be allowed by written permission from the Engineer. Where excavation quantities are measured by truckload instead of sectional measure in place, the excavation quantities will be reduced by thirty percent (30%).

Trucks that are not adequately loaded will not be counted on the tally sheet or Inspector's report. The Contractor is responsible to see that trucks are properly loaded. No additional allowance of volume will be considered for heaped loads.

**46. CONTRACTOR'S WORK FORCE**

The Contractor shall employ as many and such persons as necessary to complete the works within the contract time and shall cease to employ on the works any foreman or person who, in the opinion of the Engineer, has not demonstrated ability or is negligent and shall not re-employ any such foreman or person on the works without the written consent of the Engineer.



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**GENERAL CONDITIONS**

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**47. INCLEMENT WEATHER**

During unsuitable weather, when in the opinion of the Engineer, the conditions are unfavourable for good work, construction shall cease. All work must be protected by the Contractor at his own expense. Allowances for work days missed due to inclement weather will be as per paragraph 24, "Determination of Completion Date".

**48. LAYOUT AND GRADES**

Unless otherwise noted, the Engineer shall furnish and set control, line and grade stakes, and any marks sufficient for the Contractor to establish any further lines and grades for the completion of the works. The Engineer shall furnish data once. Before commencing work, the Contractor (or his survey crew) shall satisfy himself as to the meaning of all stakes, marks and measurements. The Contractor shall provide help (manpower) when required by the Town's surveyor or crew. Claims will not be considered because of alleged inaccuracies unless the Contractor notifies the Engineer, in writing, and in sufficient time to allow for verification or checking of said inaccuracies.

The Contractor shall notify the Engineer in writing, of his requirements for initial stakes and/or marks a minimum of five (5) working days in advance of starting each operation requiring them. Preservation and replacement of stakes shall be the responsibility of the Contractor. Initial stakes or marks carelessly or willfully destroyed or disturbed by the Contractor will be replaced by the Engineer; all costs for replacement or restoring will be deducted from any holdback monies owed to the Contractor. Any additional reference points or marks necessary for proper location of any part of the work shall be provided by the Contractor.

The Contractor shall furnish, set and paint barricades or protections around stakes and marks when and as required, while ensuring that access is provided for the Engineer's control and checking of them. If the Contractor finds that the location of control points or stakes would interfere with his operations, he shall notify the Engineer, in writing, in advance (keeping in mind that times can differ depending on project work involved) of starting the work which is in conflict with the points or stakes previously set. If it is determined by the Engineer that these stakes or marks are in conflict, he shall have them relocated as identified by the Contractor.

The Contractor is responsible to retain a Land Surveyor, acceptable to the Town, currently licensed to practice in the Province of New Brunswick, to replace any property marker or monument that is disturbed by the Contractor. Failure to do so within two (2) weeks of receiving notice from the Town shall result in the Town having the work done with costs deducted from any holdback monies owed to the Contractor.

**49. SAFETY - NEW BRUNSWICK OCCUPATIONAL HEALTH AND SAFETY ACT**

The Contractor shall be registered with, and shall notify the WorksafeNB prior to starting any work under a Town contract.

All work done under Town contract must comply with New Brunswick Regulation 91-191 under the Occupational Health and Safety Act.

Low bidders on the Town contracts valued at over \$50,000 (not including HST) will need to provide a Letter of Good Standing (LoGS) under the Certificate of Recognition Program (COR) issued by the New Brunswick Construction Safety Association (NBCSA) or an acceptable

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**GENERAL CONDITIONS**

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equivalent. A current status of 'Certificate of Recognition' or Audit Pending' is mandatory as a condition of award.

The Engineer will require copies of the Contractor's regular program documentation applicable to the Town's job once the contract is signed and in progress. (eg. Safety Policy with respect to subcontractors, Safety Policy with respect to Toolbox meetings, Traffic control plan(s), Project Site Hazard Assessment (relative to each job site), name of First Aid provider on each site, Policy Statement and process of formal inspections, etc...).

**50. TRAFFIC, BARRICADES, SIGNS AND SIGNALLERS**

The work shall be done in a manner which creates the least interference with traffic, consistent with the safe performance of the work. At the discretion of the Engineer normal traffic may be diverted from a street undergoing major construction, but safe and convenient access to existing private entrances shall be maintained in so far as practicable.

The Contractor shall install and maintain such barriers, signs, lights and signalers as may be necessary for the safety and convenience of the public and work area, as per the Department of Transportation and Infrastructure "Work Area Traffic Control Manual", latest revision, and the Transportation Association of Canada Part D – Temporary Conditions. All work associated with the signage of the Contract shall be the sole responsibility of the Contractor. No work shall begin on any site until all signs and barricades, etc... are properly installed.

The Contractor shall arrange with the Engineer for all detours three (3) working days in advance of any street closure. No streets can be closed without prior written request and subject to approval. The construction, maintenance and removal of such detours shall be the responsibility of the contractor.

All barricades used on construction sites shall be constructed in accordance with these specifications and shall incorporate approved reflective material meeting the minimum requirements and shall indicate the contractors company's name or logo thereon. Continuous barricades must be provided around all excavations for the prevention of entry by unauthorized persons. Where necessary, barricades may be supplemented by approved fencing material to further restrict entry to construction sites or excavated areas.

All signs must be **BILINGUAL**, and in conformance with Part D – Temporary Conditions (Division 2 TEMPORARY CONDITIONS SIGNS) of the Manual of Uniform Traffic Control Devices for Canada.

If requested, specialty signs may be supplied to the Contractor at the Town of Shediac Public Works garage. The signs shall remain the property of the Town of Shediac and must be returned in good condition to the public Works garage after completion of the Contract.

The Contractor will be charged at the rate of \$100.00 per sign if not returned in good condition and this amount will be deducted from the first release of holdback.

Signs must be maintained in such a manner that they are clearly visible to the traveling public at all times. Transportation, erection, maintenance and dismantling and returning the signs will not be included for payment, but shall be considered as incidental to the work.

One signaler at each end of the project and one signaler per crew are required unless otherwise directed. Each signaler must use the TC-65 Traffic Control Paddle, 450mm by 450mm, as

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**GENERAL CONDITIONS**

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specified in the MUTCDC, Part D, Division 3 TEMPORARY CONDITIONS DEVICES, and wear a reflectorized vest or jacket. Persons performing signalers duties shall have successfully completed the New Brunswick Safety Council "Highway Signalers Course" and possess a Certificate of Completion.

**51. PUBLIC CONVENIENCE**

During the progress of the works, the convenience of the public and of the residents along streets affected by construction activities must be provided for as far as practicable. Convenient access to driveways, houses and buildings along the street must be maintained wherever possible. Access to commercial and specifically designated properties shall be maintained at all times.

No material or other obstruction shall be placed within ten (10) metres of fire hydrants, which must at all times be readily accessible to the Fire Department.

**52. CLEAN-UP**

Upon the completion of the job, or any portion of it in a specific area, all surplus construction materials, tools, equipment and temporary structures will be removed from the site by the Contractor. All rubbish, trash, excess material, etc., will be removed and disposed of as in accordance with General Conditions 44.

The Site, as much as possible, must be kept clean and orderly and free from excess material. As the work progresses, the Contractor, must clean up the site periodically and keep it graded level.

**53. FIRST-AID STATION**

During the progress of the works, the Contractor shall at all times provide and maintain, in an easily accessible location on the work site, a First-Aid Box equal to that required by Regulation 91-121 under the Occupational Health and Safety Act for the free use as necessary of all persons on the site.

THE CONTRACTOR MUST ENSURE EACH JOB SITE HAS A DESIGNATED, RESPONSIBLE FIRST AID PROVIDER.

**54. DUST CONTROL**

The Contractor shall furnish and apply calcium chloride to control dust, as the Engineer may direct. Application shall be by means of an approved spreader or equal. The surface shall be thoroughly dampened by sprinkling with water immediately preceding the application of flake calcium chloride.

Calcium chloride shall be in the form of loose, dry flakes or pellets and fine enough to feed readily through the common form spreaders used in roadwork. Liquid calcium chloride is an approved alternate which shall be spread using a mechanical sprinkler. All calcium chloride used shall meet the requirements of the Standard Specification for Calcium Chloride, A.S.T.M. D-98.

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**GENERAL CONDITIONS**

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The calcium chloride shall be delivered in original manufacturer's containers each plainly showing the manufacturer's name, the net weight and the percentage of calcium chloride guaranteed by the manufacturer.

Flake calcium chloride and liquid calcium chloride shall be spread at a coverage of 300 grams per square meter. The liquid shall contain a concentration of 35% calcium chloride. Subsequent applications shall be reduced to half of the previous rate, unless otherwise directed by the Engineer.

No calcium chloride shall be placed within the two (2) weeks prior to asphalt placement.

Water truck (s) shall be available to apply water to prevent the creation of (or maintain moisture level to minimize) dust pollutants which occur any time the Contractor is hauling or the works site is open to public access over dusty surfaces. The Contractor shall be prepared to apply water on a seven-day-per-week basis as required and/or at the request of the Engineer.

Water to be used for dust control shall be contaminant-free and obtained from a source approved by the appropriate regulatory agency. The Contractor shall submit, upon request, certification of the approval of the source and method of withdrawal.

Water shall be applied by equipment capable of applying the water at a uniform and evenly distributed rate in amounts as required and/or as directed.

The supply and application of water and/or calcium chloride for Control of dust pollutants shall be considered as incidental to the work; failure to comply will result in the Town having the work carried out whenever necessary, with the costs of such being deducted from the first release of holdback.

**55. USE OF TOWN HYDRANTS AND VALVES**

The use of Town hydrants to obtain water and tampering with or the use of water main valves is **strictly prohibited**. The purpose of this policy is intended to minimize risk and maintain the integrity of the water distribution system.

Failure to comply with these requirements may result in prosecution by the Town under the law.

**56. BLASTING**

Prior to any blasting operations being undertaken, the Contractor shall furnish a separate General Liability Insurance Policy or Rider satisfactory to the Town covering all aspects of the intended blasting activities, and obtain a written approval from the Engineer.

No explosives shall be stored on the site nor shall any blasting be done without prior approval in writing and then only in such places and at such times as the Engineer may permit. Such approval shall not relieve the Contractor of the sole responsibility for any damage or accident to adjoining utilities, properties, structures and persons as a result of blasting operations.

The supplying, hauling, handling and storing of all explosives and accessories shall be done in accordance with the rules and regulations of the Explosives Division, Department of Energy Mines and Resources, Ottawa and the Mining Act.

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**GENERAL CONDITIONS**

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The control, general safety, handling, record keeping, and conducting of blasting operations shall be carried out in accordance with the latest version of New Brunswick Regulation 91-191 under the Occupational Health and Safety Act. The Contractor shall inspect buildings in the immediate vicinity before commencing blasting operations and record condition of buildings with special reference to size and location of cracks, etc. This record must be witnessed by the Property Owner, his Agent or a Third Party and shall be made available to the Town on request. Areas to be blasted shall be covered with proper mats and shields adequate to prevent flying rock and debris.

Notwithstanding any permission or authorization, the Contractor shall take full responsibility for all claims whatsoever arising from the hauling, handling and storing of explosives and all effects arising from blasts, including vibration, concussion, flying material, movement of silt, interruption of groundwater supplies, etc.

**57. LAWS, ACTS, REGULATIONS, BYLAWS AND CODES**

The Contractor shall be responsible for carrying out the works in strict accordance with all Federal, Provincial and Municipal Laws, Acts, Regulations, Bylaws, Codes, etc. These requirements may affect methods of installation, construction methods, disposal of materials and may require written notifications and/or permits of the appropriate authority prior to commencement of the contract. Where written notification and/or permit of the above authorities is required a copy of the said notification and/or permit shall be submitted to the Engineer, prior to commencement of work.

**58. TRUCK ROUTES**

All heavy equipment, including trucks hauling imported material or excavated material or empty, shall proceed to and from the work site by taking the shortest route to and from the nearest Town truck route and then the shortest truck route to and from the origins and destination of the required trip.

**59. UTILITY INSTALLATIONS**

Various underground and above ground facilities such as water and sewer pipes, gas mains, culverts, conduits, telephone, cable and electric power lines, etc. may be located along the construction route. The approximate location of known facilities may be shown on the plans in so far as possible and based on the best available information at the time; however, the Town accepts no responsibility for the accuracy or completeness of this information.

It is the responsibility of the Contractor to contact the appropriate representative of the various utilities to advise them at least two (2) working days prior to any work being started. This is to allow sufficient time to identify and locate any facility that may be affected by, damaged or disturbed by construction activities.

Any damage caused to any water and sewer pipes, pipes from catch basins, culverts, etc. will be immediately repaired by the Contractor, in a workmanlike manner. The Contractor will bear the cost of all repairs to any item that is shown on the drawings or is readily visible or is marked out on the site.

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**GENERAL CONDITIONS**

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No claim will be entertained for any damage or any slowdown of work due to any involvement with the aforementioned utilities.

**60. SPECIAL EXCAVATION**

The Contractor shall carry out special excavation required for the construction of the work when ordered by the Engineer. The work shall include the digging of test pits to determine the location or elevation of pipes, sewers, conduits, structures or other objects or to ascertain underground conditions. Compensation for such exploratory work shall be negotiated or paid for under force account.

**61. SITE IDENTIFICATION OF CONTRACTOR**

To aid the general public in recognizing the contractor responsible for the work, all construction equipment, including trucks and barricades shall bear the name of the Contractor.

The Town may circulate a notification to all homes, businesses, etc. affected by construction activities identifying the Contractor and Foreman in charge by name, address and telephone number, as well as, the Project Engineer in charge.

**62. CLOSING OF STREETS**

Prior to a street being closed to the public, whether by Town Forces or by agents of the Town, the person or persons affecting the street closure must contact the Public Works Department giving the nearest house civic number affected by the closure and that the Public Works Department relay the message to the Emergency Services immediately.

The Contractor must adhere to this policy and contact the Town's Public Works Department prior to the closing of any street.

A penalty of \$200.00 for each occurrence will be charged for failure to comply with the above when closing a street.

**63. HIGHWAY TRANSPORTATION FACILITIES**

It is the responsibility of the Contractor to contact the appropriate representatives of the N.B. Department of Transportation and Infrastructure regarding any work affecting services or facilities within their right-of-way. The Contractor shall advise them within a reasonable time period prior to any construction. The Contractor is responsible to maintain ongoing communications with the highway personnel. Any necessary scheduling, procuring of required highway personnel or equipment, etc., or costs incurred as a result of the construction shall be borne by the Contractor and be incidental to the contract.

The N.B. Department of Transportation and Infrastructure can be contacted at:

**District Highway Engineer  
N.B. Department of Transportation  
46 Toombs Street  
Moncton, N.B. E1A 3A5**



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**TRENCH EXCAVATION**

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**1. TRENCH EXCAVATION**1.1 Trench Excavation1.1.1 Scope

This section governs the supply of all labour, materials and equipment necessary for trenching sewer mains, watermains, laterals and appurtenances. Refer to Section 7.1. where clearing and grubbing is required prior to trench excavation.

1.1.2 Construction Methods

- 1.1.2.1 All trenches shall be excavated according to the requirements of the General Regulation 91-191 under the Occupational Health and Safety Act of the Province of New Brunswick, latest revision. Any work required in meeting these regulations shall be considered incidental to the work.
- 1.1.2.2 Trenching shall be open cut and excavated only so far in advance of the laying of pipe as safely requirements and soil conditions permit. The centerline of the trench shall follow the line of the pipe as shown on the drawings unless otherwise directed.
- 1.1.2.3 The width of the trench at pipe depth shall be 600mm to 900mm greater than the outside diameter of the pipe. For pipes in a common trench, the trench width shall be as for one pipe plus a minimum of 300mm clearance between service lateral pipes, and 600mm or as required for main pipes.
- 1.1.2.4 The trench shall be excavated to the depth required for placing of the pipe bedding material. Where the bottom of the trench at subgrade is found to be unstable or unsatisfactory, the Contractor shall excavate and remove such unsuitable material to the width and depth as directed. The trench shall be dewatered for the proper placing of the bedding material and pipe. The subgrade shall be restored by backfilling with pipe bedding material in 150mm layers compacted to 95% of maximum dry density as determined by ASTM D698. Pipe bedding material shall be according to Section 2.1.
- 1.1.2.5 Trenches shall be widened where required for the installation of manholes and other appurtenances.
- 1.1.2.6 In locations where the trench must be excavated across or along paved surfaces, the Contractor will remove the pavement and road surfaces as a part of the trench excavation and the amount removed will depend upon the width of trench specified for the installation of the pipe. The width of pavement removed along the normal trench will not exceed the required width of the trench specified by more than 150 mm on each side as laid out on site. The marked width of proposed pavement removal will not relieve the responsibility of the Contractor to comply with Section 1.1.2.1.

Where excavation depths and/or soil conditions require a trench width at the surface greater than 4 m, pavement removal will be limited to 4 m and a trench box (cage) shall be used.

Cutting of pavement must be done by using a saw to give a square, undamaged edge for bonding. **UNDER NO CIRCUMSTANCES WILL RIPPING OF PAVEMENT BY EXCAVATION MACHINERY BE ALLOWED.**



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## TRENCH EXCAVATION

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If the Contractor removes or damages pavement or surfaces beyond the limits specified above, such pavement and surfaces will be repaired at the expense of the Contractor.

1.1.2.7 All trenches in roadways shall have “bump ahead” and “bump” signs installed; they are to remain until the final lift of asphalt is completed.

### 1.1.3 Payment

No separate payment shall be made for trench excavation excluding rock excavation. All trenching together with necessary sheeting and shoring and disposal of excavated material shall be included in the contract price for pipe in-place. Removal and disposal of existing pipes, structures and appurtenances (as directed) will be considered incidental to the excavation and will not be measured separately for payment.

## 1.2 Trench Excavation in Rock

### 1.2.1 Scope

This section governs the supply of all labour, materials and equipment necessary for trenching for service mains, service laterals and all appurtenances in material classified as rock. If rock as defined is encountered during any phase of construction, the Contractor shall immediately notify the Engineer. Any excavation done in rock prior to notification will not be considered for payment.

### 1.2.2 Definition

Rock is defined as solid rock, boulders, concrete or masonry exceeding one-half cubic meter ( $1/2\text{m}^3$ ) in volume for which drilling and blasting are required for removal. Soft, layered, broken rock or mudstone which can be excavated by a three quarter cubic meter ( $3/4\text{m}^3$ ) hydraulic excavator (minimum size), equipped with a one meter (1 m) wide general duty bucket and operating normally, is classed as common material; production slowdown due to excavation in this material shall not be compensated for in any way.

A Contractor may choose to bring on site a larger excavating machine than that stated above or larger than is presently on site in order to excavate the rock thus eliminating the need for drilling and blasting. Compensation and payment for this option shall be limited to the difference in the rate between the machine originally on site and the larger machine, at the hourly rental rates as per General Conditions. Compensation for the rental rate difference shall be made only for the time the larger machine is actually operating. A maximum of two (2) hours transportation (float) time shall also be paid at the specified hourly rate for the float used.

In the event there is not tendered price for rock excavation, the Town will establish a fair price based on average prices currently in effect in the region, for excavation where drilling and blasting was carried out to facilitate excavation in rock.

### 1.2.3 Construction Methods

#### 1.2.3.1 Dimensions of Trenches in Rock

Rock shall be excavated to a depth of at least 300mm below the bottom of the pipe to be installed. Width of trench excavation in rock shall be at least 600mm greater than the outside diameter of the pipe for a single main in a trench. For two or more mains in a

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## TRENCH EXCAVATION

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common trench, the width of trench shall be as specified for a single main plus 600mm clearance between pipes. For service laterals, the minimum width of trench shall be one metre.

### 1.2.3.2 Disposal of Excavated Rock

Rock fragments larger than 200mm in greatest dimension shall not be used for trench backfill. Disposal of excess rock shall be in accordance with section 44 of the General Conditions.

### 1.2.3.3 Blasting Operations

Refer to the General Conditions.

## 1.2.4 Measurement

Trench excavation in rock shall be measured in cubic metres. Calculations shall be based on the established profile of the top of the rock and the depth of 300mm below the bottom of the proposed pipe. Maximum trench width for calculation of quantities shall be as follows:

1.2.4.1 For single main, trench width = pipe O.D. plus 600mm.

1.2.4.2 For service laterals in the following installations, trench width = pipe O.D. plus 600mm.

1.2.4.2.1 single service, and

1.2.4.2.2 sanitary service and water or storm service and water;

1.2.4.3 For service laterals in the following installations(s), trench widths are:

1.2.4.3.1 sanitary service, storm service and water service; trench width of 1200mm, and

1.2.4.3.2 sanitary service and storm service; trench width of 1000mm;

1.2.4.3.3 for multiple mains, trench width = width as for single main plus 600mm clearance between pipes.

## 1.2.5 Payment

Payment for the work under this item shall be at the contract unit price for trench excavation in rock. The price shall include drilling to establish rock profile and for disposal of rock not used for trench backfill and all incidental items.

## 1.3 Excess Material

Payment for excavation shall be at the contract unit price and shall include transportation and spreading of excess materials as in accordance with General Conditions 44.

## BEDDING AND BACKFILLING

### 2. BEDDING AND BACKFILLING

#### 2.1 Bedding

##### 2.1.1. Scope

This section governs the supply of all labour, materials and equipment necessary for bedding of all sewer and watermains and service laterals.

##### 2.1.2 Bedding Material

Bedding material shall be crushed rock composed of clean, hard, sound, durable, uncoated particles that do not contain friable, soluble or reactive minerals or other deleterious materials or conditions that would make the crushed rock prone to decomposition or disintegration, or present any environmental hazard, from the presence of the parent material or its by-products, when exposed to the natural elements after placement in the work.

Bedding material shall conform to one of the following gradation limits, as specified.

#### **31.5mm Minus** (for normal conditions)

| <u>Sieve Size</u> | <u>% Passing</u> |
|-------------------|------------------|
| 31.5 mm           | 100 –            |
| 25 mm             | 95 – 100         |
| 19 mm             | 71 – 100         |
| 12.5 mm           | 56 – 82          |
| 9.5 mm            | 47 – 74          |
| 4.75 mm           | 31 – 59          |
| 2.36 mm           | 21 – 46          |
| 1.18 mm           | 13 – 34          |
| 300 um            | 5 – 18           |
| 75 um             | 0 – 8            |

#### **5mm – 20mm** (for wet trench conditions only as approved by the Engineer)

| <u>Sieve Size</u> | <u>% Passing</u> |
|-------------------|------------------|
| 20 mm             | 100 –            |
| 14 mm             | 40 – 80          |
| 10 mm             | 20 – 62          |
| 5 mm              | 0 – 20           |
| 2.5 mm            | 0 – 10           |
| 0.080 mm          | 0 – 3            |

It shall be completely wrapped in non-woven geotextile fabric in order to hinder the migration of fine materials into the rock.

The percentage wear of the aggregate as measured in the Micro-Deval Abrasion Test; MTO Standard LS-618 shall not exceed 25%.

At least 50% of the particles retained on the 5mm sieve shall have one or more surfaces formed by the fracture of a larger particle.

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## **BEDDING AND BACKFILLING**

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The plasticity index of that fraction of the aggregate base material passing the n° 40 sieve shall not exceed three (3).

The Owner reserves the right to reject any source of supply of aggregate on the basis of past field performance, documented by the records and experience of the Owner and/or the Engineer with a specific material, regardless of compliance with physical requirements or grading limits.

### **2.1.3 Bedding Construction Methods**

2.1.3.1 Bedding methods and materials must conform with the pipe manufacturer's requirements for all materials that are being bedded.

2.1.3.2 THE USE OF EXCAVATED MATERIAL FOR BEDDING IS STRICTLY FORBIDDEN UNLESS OTHERWISE DIRECTED AND APPROVED IN WRITING.

2.1.3.3 Once the trench has been excavated to the required grade, bedding shall be placed in layers to a minimum depth of 150mm or 300mm in rock and compacted to a density of 95% of maximum dry density as determined by ASTM D698.

2.1.3.4 Bedding shall be placed in 150mm lifts to a minimum height of 300mm over the top of the pipe. The bedding shall be tamped or rodden by hand under the haunches of the pipe upon placing of the first lift. Succeeding dry density layers shall then be placed and compacted to 95% of maximum dry density as determined by ASTM D698.

2.1.3.5 Bedding material shall not be placed in water or trenches having soft and unstable bottom conditions.

2.1.3.6 Compacting equipment for pipe bedding material shall be suitably sized so as not to cause damage to the pipe or movement of the pipe due to impact and vibration and of ample size to provide the degree of compaction specified.

2.1.3.7 The completed bedding shall meet the requirements for class "B" bedding, on PVC, Corrugated Metal Pipe, Ductile-iron and all lateral piping and for a modified class "B" bedding on concrete pipe, as per standard details.

### **2.1.4 Measurement**

There shall be no separate measurement for imported pipe bedding material. However, for record purposes, all weigh slips are to be submitted to the Engineer's representative on site.

### **2.1.5 Payment**

There shall be no separate payment for bedding material when authorized and obtained from excavations. Supply, hauling, placing and compaction of imported bedding material shall be considered incidental to the work – all costs associated with this item must be incorporated into bid items for pipe, structures and appurtenances.

## **BEDDING AND BACKFILLING**

### **2.2. Backfilling**

#### 2.2.1. Scope

This section governs the supply of all labour, materials and equipment necessary for backfilling of all pipes, service laterals and appurtenances.

#### 2.2.2. Backfill Material

2.2.2.1. Backfill material shall be approved material, obtained from excavation. The material shall be free of roots, brush, organic material, frozen lumps and shall contain no boulders or broken rock larger than 200mm greatest dimension, approved by the Engineer.

2.2.2.2. Imported Fill Material shall be a sound, durable, granular material free from clay, frozen lumps, organic or deleterious matter and conforming to the following gradation limits:

| <u>Sieve Size</u> | <u>% Passing</u> |
|-------------------|------------------|
| 112 mm            | 100 –            |
| 80 mm             | 95 – 100         |
| 20 mm             | 15 – 100         |
| 5 mm              | 0 – 80           |
| 0.08 mm           | 0 – 10           |

#### 2.2.3. Backfill Construction Methods

2.2.3.1. Once bedding material has been placed to the required depth and degree of compaction, the remaining depth of trench shall be backfilled. This backfill shall be placed in layers not exceeding 400mm in thickness (before compaction) and shall be compacted to at least 95% of the maximum dry density as determined by ASTM D698.

2.2.3.2. Where the excavated material is unsuitable for use as backfill, the Contractor shall dispose of this material as in accordance with General Conditions 44, and backfill with an imported fill material upon written order from the Engineer.

2.2.3.3. Backfilling of trenches with imported fill material shall be in layers not exceeding 400 mm in thickness before compaction and compacted to a density of 95% of maximum dry density as determined by ASTM D698.

2.2.3.4. Backfilling operations shall not be carried out in freezing weather except by special permission of the Engineer. When backfilling is done in freezing weather neither the material used nor the area being filled shall be frozen.

2.2.3.5. Excess backfill material shall be cleaned-up and disposed of at the end of the days' work.

#### 2.2.4. Measurement

Measurement for imported fill shall be per metric tonne.

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## **BEDDING AND BACKFILLING**

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### 2.2.5. Payment

There shall be no separate payment for backfilling excavation. Payment for imported fill shall be at the contract unit price per metric tonne and shall include the supply, hauling, placing and compaction of this material.

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**TRENCH RESTORATION AND MAINTENANCE**

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**3. TRENCH RESTORATION AND MAINTENANCE****3.1. Scope**

This section governs the supply of all labour, equipment and materials necessary for restoration and maintenance of trenches throughout the job site, until issuance of the Certificate of Final Acceptance.

**3.2. Materials**

Asphalt concrete for pavement restoration shall conform to New Brunswick Department of Transportation specifications for Type "B" mix (Base Course) and Type "D" Mix (Surface Course). Crushed rock for trench restoration shall conform to Section 7.3.2.1.

**3.3. Construction Methods****3.3.1. Restoration**

3.3.1.1. The Contractor shall conduct and confine all construction operations within the limits of the pipe installations.

3.3.1.2. All trenches cut in existing pavement shall be patched within 7 days with Type "B" mix (Base Course). The Seal Course Type "D" mix (Surface Course) shall be applied no more than 7 days after the Base Course application, or as otherwise directed by the Engineer.

3.3.1.3. The entire site and all properties, facilities, structures, fences, shrubs, lawns, trees, signs, driveways, sidewalks, ditches, culverts, appurtenances, etc... affected by the work must be fully restored to its original or better condition before issuance of the "CERTIFICATE OF FINAL ACCEPTANCE".

**3.3.2. Trench Maintenance**

3.3.2.1 The Contractor shall be responsible for maintaining all trenches until issuance of the Certificate of Final Acceptance.

3.3.2.2. Trenches in traveled roads shall be maintained with an aggregate base material as specified in Section 7 until such time as asphalt can be placed to allow a smooth travel surface.

3.3.2.3. Trenches that have settled, washed out or become rutted or displaced by traffic, shall be refilled, re-compacted and re-graded smooth with the existing street, using the following:  
settlement < 10cm → use crusher tailings (10mm minus).  
settlement ≥ 10 cm → use 0-31.5mm crushed rock.

3.3.2.4. The Contractor shall inspect the trench surface conditions and conduct a weekly program of trench maintenance, or daily when weather or traffic conditions dictate, until issuance of the "Certificate of Final Acceptance".

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**TRENCH RESTORATION AND MAINTENANCE**

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**3.3.3. Dust Prevention**

The Contractor is responsible for dust prevention on any street or site where works have been or are being carried out. Dust prevention shall be in effect until such works are restored to original condition or upon issuance of the "Certificate of Final Acceptance". Dust prevention shall include sweeping of paved roadways and/or sidewalks and flushing of same, when deemed necessary by the Engineer. All methods of dust prevention must be approved by the Engineer and must be in accordance with section 54 of the General Conditions.

The Contractor shall not use oil for dust prevention.

**3.4. Measurement and Payment**

Payment shall be for aggregate base material and asphalt concrete. Measurement for these items shall be per tonne in-place. There shall be no separate payment for trench maintenance.



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**WATER DISTRIBUTION SYSTEM**

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**4. WATER DISTRIBUTION SYSTEM****4.1 Watermains and Fittings**4.1.1. Scope

This section governs the supply of all materials, labour and equipment necessary for the installation of the watermains and fittings, flushing, testing and disinfecting of the watermains and the supply and installation of thrust blocks as shown on the drawings and herein specified.

4.1.2. Work Under Other Sections

## 4.1.2.1. Trenching – Section 1

## 4.1.2.2. Bedding and Backfilling – Section 2

## 4.1.2.3. Trench Restoration and Maintenance – Section 3

4.1.3. Materials

4.1.3.1. The minimum diameter size of watermains shall be 200mm, unless otherwise specified.

4.1.3.2. The Contractor shall supply all materials in accordance with the Town of Shediac standards and these specifications unless otherwise specified herein, or directed.

4.1.3.3. Watermains shall be:

Polyvinyl chloride (PVC) pressure pipe to the latest AWWA Standard C900 and CAN/CSA B137.3, Class 150, DR18 for pipe sizes 150mm to 300mm and AWWA C905, Pressure rating 235 psi, DR18 for pipe sizes 350mm to 900mm, colour coded blue.

**OR**

Ductile iron pipe, cement mortar lined meeting the requirements of the latest AWWA Standard C151, Class 350, with cement mortar lining in meeting the requirements of the latest AWWA Standard C104.

**OR**

Molecularly Oriented Polyvinyl Chloride (PVCO) pressure pipe meeting the requirements of the latest CAN/CSA Standard B137.3.1 and AWWA Standard C909. PVCO shall be produced with cast-iron-pipe outside diameter (CIOD) in all sizes; 100mm – 300mm dia. PVCO pipe wall shall meet minimum thickness requirements for AWWA C909 Pressure Class 235 PSI (PC235). PVCO pipe shall be joined by means of integral-bell elastomeric-gasket joints conforming to ASTM D3139. Spigot ends shall be chamfered by manufacturer. Pipe ends shall be capped at the production facility prior to storage and shipping. Manufactured under the trade name “Bionax” or approved equal.

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**WATER DISTRIBUTION SYSTEM**

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**Joints:**

For polyvinyl chloride piping they will be bell and spigot type with rubber gasket. This is a push-on joint and must be watertight. The bell will be an integral and homogeneous part of the pipe barrel.

For ductile iron pipe, they will be push-on rubber gasket type meeting the requirements of the latest AWWA Standard C111.

**4.1.3.4. End-Caps for watermains:**

Approved pipe up to and including 600mm diameter is to arrive on site with factory-installed end-caps on both ends and a “tamper evident seal” on the bell-end only.

Tamper-evident seals will display the manufacturer’s name and/or logos. Seals will straddle the cap and/or tape it to the pipe. Removal of the cap should render the tamper-evident seal unusable either by breaking the seal off by leaving a message such as “VOID” on the pipe.

For pipes with diameters greater than 600mm, end-caps are optional.

End-Caps shall be installed at the factory and will be one of the following:

- White, clear or black plastic discs or cone-shaped plugs fastened with tape.
- Closed-cell polypropylene foam (Charma Caps)
- Polyethylene pipe plugs (Manufactured by Taylor Made)

Due to their lengths and accessibility for field cleaning, end-caps are not required for fittings and valves.

**4.1.3.5. All fittings (tees, bends and caps) shall be:**

Polyvinyl Chloride (PVC) pressure fittings meeting the requirements of the latest AWWA Standard C907 and CSA Standard B137.2, Class 235 (for sizes 100mm through 200mm). PVC fittings sizes 250mm through 300mm shall be made from segments of the latest AWWA Standard C900 DR 18 PVC pipe bonded together and over-wrapped with fibreglass-reinforced polyester and certified to the latest CAN/CSA Standard B137.3.

**OR**

Ductile-iron meeting the requirements of AWWA Standard C110, 1725 kPa class or ductile-iron meeting the requirements of the latest AWWA Standard C153, 2415 kPa class.

Joints for ductile-iron and PVC fittings shall be mechanical-type rubber gaskets meeting the requirements of the latest AWWA Standard C111. PVC pressure fittings shall be the push-on bell and spigot type.

All iron fittings shall be corrosion resistant; with high-tensile steel tee bolts and nuts, and completely wrapped with 8-mil poly according to AWWA C105.

**4.1.3.6. Thrust blocks shall be cast-in-place concrete; strength 32mPa at 28 days.**

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**WATER DISTRIBUTION SYSTEM**

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4.1.3.7. Joint restraint system components may be used in lieu of concrete thrust blocks, subject to the written approval from the Town of Shediac. Such approvals shall be based on Manufacturer's Specifications, Engineer's design notes and detail drawings showing proposed joint restraints system. Approvals to be obtained prior to installation.

They shall be corrosion resistant, with high-tensile steel tee bolts and nuts tightened using a torque wrench to the Manufacturer's specification and completely wrapped with 8-mil poly according to AWWA C105.

4.1.3.8. Watermain couplings shall be the long-body type, and shall not be less than 20cm in length. Couplings shall be ductile-iron or steel complete with high-tensile steel tee bolts and nuts tightened using a torque wrench to the Manufacturer's specification and completely wrapped with 8-mil poly according to AWWA C105.

4.1.3.9. All ductile-iron pipe and fittings installations shall be polyethylene encased (wrapped) according to AWWA C105. All fittings shall have high-tensile steel tee bolts and nuts tightened using a torque wrench to the Manufacturer's specification, and completely wrapped with 8-mil poly according to the manufacturer's recommendation.

4.1.3.10. All iron fittings used on PVC installations shall have high-tensile steel tee bolts and nuts tightened using a torque wrench to the manufacturer's specification and completely wrapped with 8-mil poly according to AWWA C105.

#### 4.1.4. Construction Methods

##### 4.1.4.1 Installation of Watermains and Fittings

4.1.4.1.1. Installation of watermains and fittings and polywrapping procedures shall be in accordance with the recommendation of the manufacturer and appropriate AWWA Standards unless otherwise specified herein.

4.1.4.1.2. Proper implements, tools and facilities shall be provided and used by the Contractor for the safe and efficient execution of the work. All pipe fittings, etc., shall be carefully lowered into the trench in such a manner as to prevent damage to them. All tee bolts and nuts shall be tightened using a torque wrench to the manufacturer's specification. Under no circumstances shall pipe or accessories be dropped or dumped into the trench.

4.1.4.1.3. All pipe and fittings shall be thoroughly inspected for defects before and after laying. Any defective or damaged pipe or accessory shall be removed from the site and replaced with sound material.

4.1.4.1.4. All foreign matter shall be removed from the interior of the pipe before lowering it into the trench. Trenches shall be kept free of water. The pipe shall be installed without earth entering the main. When the work is not in progress trench water and other foreign matter shall be kept out of the pipe by inserting an acceptable test plug or night cap in the end line.

If water has accumulated in the trench, the plug shall remain in place until the trench is dry.

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## WATER DISTRIBUTION SYSTEM

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The Contractor shall, at his own expense, permanently provide for and maintain the flow of all sewers, drains, house or inlet connections, and all watercourses that may be encountered during the progress of the work. The Contractor shall not allow the contents or any sewer, drain or building or inlet connection to flow into the trench; and shall, at his own expense, immediately remove from the proximity of the work all offensive matter using such precautions as necessary or may be directed by the Engineer.

4.1.4.1.5. Appropriately sized and designed water main swabs shall be supplied and inserted by the Contractor into the watermain at as many locations as needed, to ensure that every section of watermain is swabbed when the water is first charged into the system. After swabbing, hydrant leads shall be thoroughly flushed but not swabbed. (For procedures see Appendix "H")

4.1.4.1.6. The pipe shall be laid to the grade as indicated on the drawings. Deviations from these grades shall be permitted only upon written approval by the Engineer. The pipe shall be laid with no reverse grades, humps or sags not indicated on the drawings.

The minimum depth of cover shall be 1.8m measured from finished grade to the top of the pipe.

4.1.4.1.7. Pipe shall be laid with bell ends facing in the direction of laying unless directed otherwise. If it is necessary to deflect pipe from a straight line, either in the vertical or horizontal plane, to avoid obstruction or to plumb valve stems, or where long-radius curves are permitted, the amount of deflection allowed shall not exceed that recommended by the pipe manufacturer for the particular size and type of piping being laid.

4.1.4.1.8. Mechanical joint connections and tightening and torquing of bolts shall be in accordance with the manufacturer's instructions and recognized good practice.

4.1.4.1.9. All tees and bends on watermains shall be provided with concrete thrust blocks or mechanical restraints, as per Section 4.1.3.7, in the locations and to the dimensions as indicated on the drawings. Thrust blocks shall extend to bear against undisturbed ground and shall be so placed that the pipe and fitting joints remain accessible.

4.1.4.1.10. All water lines located off traveled roadways require the installation of underground marking tape identifying the utility. The tape shall be installed approximately 600mm above the main or line.

4.1.4.1.11. End of main runs (stubs) will require at minimum a full length of pipe installed after valve or fitting or an approved joint restraint system, as per Section 4.1.3.7.

### 4.1.4.2. Connecting to Existing Watermains

4.1.4.2.1. UNDER NO CIRCUMSTANCES WHATSOEVER SHALL A CONTRACTOR OPERATE EXISTING WATERMAIN VALVES OR MAKE CONNECTIONS TO EXISTING WATERMAINS.

It is the Contractor's responsibility to ensure that their operations do not contaminate the public water supply. If, at any time, the water in the existing system becomes contaminated through actions by the Contractor, whether or not

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## WATER DISTRIBUTION SYSTEM

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due to negligence, he shall be held financially accountable for any corrective action taken by the Town of Shediac, as well as for the cost of defending any settlement of all claims resulting from his negligence, including but not limited to, costs and attorney fees.

4.1.4.2.2. The Contractor shall make all arrangements with the Town Engineering Department at least (48 hours) prior to connecting or locating existing watermains. The Contractor shall coordinate with the Municipality regarding schedules, methods and procedures to be followed for isolating sections of the water system and connecting to these mains.

4.1.4.2.3. All existing plugs or fittings, and hydrants shall, where possible be salvaged, carefully stored and on completion of the works delivered by the Contractor to the Town's Public Works garage. No such fittings shall be removed from the site without the permission of the Engineer. The Inspector shall record all salvaged materials during construction and if not returned, the amount shall be deducted from the first release of holdback.

### 4.1.5. Testing Water Distribution System

4.1.5.1. Upon completion of watermain installation and prior to testing and disinfection, it shall be flushed, according to Section 5 of the latest revision of AWWA C651 and Appendix "H" of this specification.

4.1.5.2. Pressure and leakage tests shall be applied to all watermains including hydrant leads from main tee to hydrant valve disc and all service laterals up to curb stops.

4.1.5.3. A test pressure of at least 1000 kPa shall be applied to each section of the line as it is completed. The Contractor shall supply clean water for tests, either by gravity via mains previously laid or by other means.

4.1.5.4. Valves, appurtenances and water service laterals installed in the test section of watermains shall be tested in conjunction with the mains. The gauge recording the pressure shall be installed at the top of the section under the test, or the required test pressure to be shown on the gauge shall be increased to allow for the static head on the gauge from the water above.

4.1.5.5. Prior to testing the mains, the trench shall be sufficiently backfilled to prevent movement of the pipe under test pressure. Where practical, joints and fittings shall be left exposed for inspections during testing. All permanent thrust blocks shall be installed on the test section prior to testing.

4.1.5.6. Care shall be taken to brace exposed end of the main to prevent movement when the test applied. The test section of the pipe shall be filled slowly, taking care to expel all air from the line. When all air has been expelled, the test pressure shall be applied. If no means are available for air release at high points on the test section, the Contractor shall make the necessary taps at points of highest elevation using main stops to expel air before the test is made. After testing, the main stop is to be turned off and service tubing to be removed to within 30cm of the main stop and crimped. This is to be witnessed by the Engineer or his representative.

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**WATER DISTRIBUTION SYSTEM**

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- 4.1.5.7. After all air has been expelled and the test pressure applied, it shall be maintained above the minimum level for at least two hours by pumping the required additional water into the section under test. The amount of water added shall be measured by a method acceptable to the Engineer. The leakage, as measured by the amount of water added during the test, shall not exceed the amount given by the formula:

$$Q = \frac{LDP^{1/2}}{795,000}$$

Where,

Q= allowable leakage in litres per hour;  
L= length of pipe (m)  
D= nominal diameter of pipe in mm  
P= average test pressure in kPa

- 4.1.5.8. If the test is unsatisfactory, the source of failure shall be located and repaired and the test shall be repeated, at the Contractor's expense.
- 4.1.5.9. The Contractor shall notify the Engineer at least twenty-four (24) hours in advance of beginning pressure and leakage tests.
- 4.1.5.10. Following successful completion of the hydrostatic test, each fire hydrant will be tested by the Town of Shediac by applying system pressure to the complete hydrant barrel for a minimum period of 15 minutes. Any leakage, except for minor leakage at the caps, will be cause for rejection.

4.1.6. Flushing & Disinfection of Watermains

- 4.1.6.1. The completed section of main shall be suitably flushed with clean water, according to AWWA C651 (see Appendix "H"); flushing velocity to be not less than 0.75 m/s. The injection and sampling of the new watermain shall be done by the installation of a 20mm main stop at each end of the watermain and 20mm service tubing with a complete curb box (not self-draining) installed as per Drawing 22. The injection and sampling shall be considered incidental to the work. Service laterals of 100mm  $\phi$  PVC shall also follow the procedures of this section.
- 4.1.6.2. Before the main is placed in service, it shall be disinfected with liquid chlorine meeting the requirements of the latest AWWA Standards – B300 section for Disinfection Chemicals. The dosage shall be 50 parts per million available chlorine. The chlorine water shall be allowed to stand in the main for a period of not less than twenty-four (24) hours. At the end of the twenty-four (24) hour period the treated water shall be tested and contain not less than 10 parts per million free chlorine or the procedure must be repeated. Following the disinfection procedure, the main shall be flushed until the residual chlorine is reduced to less than 2 parts per million.
- 4.1.6.3. After final flushing and before the watermain system is activated, water samples will be tested for HPC, e-coli and total coliform by an approved laboratory. Sampling shall be in accordance with AWWA C651. Two sets of samples shall be collected, at least 24 hours apart. At least one set of samples shall be collected from every 366 metres (1200ft) of the new watermain, plus one set from the end of the line and at least one set from each branch. Town of Shediac's staff will take samples. The Contractor shall notify the Engineer not less than forty-eight (48) hours in advance of readiness to sample. If results are not satisfactory, the Contractor shall carry out further flushing and disinfection of the

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## WATER DISTRIBUTION SYSTEM

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watermain until test results are acceptable. This shall be considered incidental to the work. No hose or fire hydrant shall be used in the collection of samples.

4.1.6.4. Swabbing, flushing, disinfections and bacteriological testing shall be done on new watermains and lateral installations 100mm in diameter and above within the Town's right-of-way and also up to the service entrance inside the building. All watermains and lateral installations smaller than 100mm in diameter shall be thoroughly flushed and bacteriological tested only.

#### 4.1.7. Measurement

Watermains shall be measured in linear metres of main in-place including the distance through valves and fittings.

#### 4.1.8. Payment

Payment for this item shall be at the contract unit price for watermains of the appropriate size and type and contract unit price for tees, bends, and crosses of the appropriate size. Payment shall include excavation, dewatering, supply and installation of all pipe and fittings including supply and installation of thrust blocks and or mechanical restrainers, anchors, all corrosion protection, testing, flushing, disinfection and removal of excess material in accordance with General Conditions 44.

Payment shall also include trench restoration and maintenance according to Section 3.

There shall be no separate payment for imported bedding material, in accordance with Section 2.1.

Payment for imported fill shall be according to Section 2.2.

### **4.2 Gate Valves, Butterfly Valves, Valve Boxes and Tapping Sleeves**

#### 4.2.1. Scope

This section governs the supply and installation of gate valves, butterfly valves, valve boxes and tapping sleeves.

#### 4.2.2. Materials

4.2.2.1. Gate valves will be AVK, McAvity, or Mueller and will be provided by the Contractor.

4.2.2.2. Gate valves will meet the requirements of the latest AWWA Standard C509 resilient-seated gate valves for water supply service. Valves shall be epoxy-coated, iron body, brass-mounted with non-rising stem, having high-strength low alloy steel tee bolts and nuts and a 50mm square operating nut. They will open counter clockwise and will have mechanical joints and be complete with component parts.

4.2.2.3. Butterfly valves will meet the requirements of the latest AWWA Standard C504, class 150B. Valves will be epoxy-coated, iron body, mechanical joint type having high-tensile steel tee bolts and nuts and a stainless steel shaft. Butterfly valves will be Mueller, Pratt, Clow or approved equal.

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**WATER DISTRIBUTION SYSTEM**

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## 4.2.2.4. Valve boxes shall be:

Cast-iron, Bibby or approved equal and shall be three-piece screw-type with minimum base diameter of 350mm. Top sections will have two lugs for turning. Valve boxes will be adjustable from 1.8 m to 2.1 m. Valve box threads shall be an integral part of the casting.

**or**

Mueller MVB composite valve box complete with 686mm ductile-iron adjustable top and guide plate.

## 4.2.2.5. Covers shall be Bibby VB-825 (112mm depth), Mueller AJBV-4C or approved equal, and will be marked "Water". Covers must have appropriate opening to allow insertion of a pick for ease of removal.

## 4.2.2.6. Tapping sleeves shall be stainless steel with full seals around the circumference of the pipe. Tapping sleeves shall be Romac Type SST or approved equal. A concrete thrust block is required.

Tapping valves shall be the resilient-seated type, meeting the requirements of the latest AWWA Standard C509. Tapping valves shall have a flanged mechanical joint, complete with high-strength low-alloy steel tee bolts and nuts tightened using a torque wrench to the manufacturer's specification. Tapping sleeves shall be AVK, McAvity, Mueller, or approved equal.

4.2.3. Construction Methods

## 4.2.3.1. Gate valves of the indicated size shall be installed at locations shown on the drawings. Special care must be given to compaction methods around units. Compaction shall conform to Section 1.1.2.4.

## 4.2.3.2. Gate valves shall be properly joined to the mains with mechanical joint connections according to the requirements of the manufacturer and recognized good practice. The valves shall be set so that the valve stems are vertical and plumb. All nuts shall be tightened with a torque wrench according to the manufacturer's specifications.

## 4.2.3.3. Valve boxes shall be set on gate valves as indicated on the drawings. The valve box shall be set so as not to transmit stress to the valve and shall be accurately centered over the wrench nut of the valve, with the valve box set plumb. Boxes will not be required where valves are in chambers.

## 4.2.3.4. Covers on valve boxes shall be set flush with the finish grade, under this contract. On gravel roadways, the valve boxes shall be screwed down 100mm after final inspection.

4.2.4. Measurement

This work shall be measured as the total number of gate valves or tapping sleeves and valves installed.



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**WATER DISTRIBUTION SYSTEM**

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**4.2.5. Payment**

Payment for this item shall be at the contract unit price for each gate valve or tapping sleeve and valve of the appropriate size. Payment shall include the supply and installation of the gate valve and complete valve box unit and corrosion protection.

**4.3. Hydrant**

4.3.1. This section governs the supply of all materials, labour and equipment necessary for the complete installation of hydrants, thrust blocks, hydrant extensions and repainting.

**4.3.2. Work Under Other Sections**

4.3.2.1. Trenching – Section 1

4.3.2.2. Bedding and Backfilling – Section 2

4.3.2.3. Trench Restoration and Maintenance – Section 3

**4.3.3. Location**

4.3.3.1. Hydrants shall be installed at the locations as indicated on the drawings so as to cover a radius of not more than 75m with the normal spacing not to exceed 150 m. A hydrant will normally be located at the very end of dead end mains.

**4.3.4. Materials**

Hydrant shall be Clow/McAvity Brigadier M-67. All hydrants will meet the requirements of the latest AWWA Standard C-502 for hydrants for ordinary water services. Hydrants will be compression type designed for a working pressure of 1000 kPa having two 65mm male threaded hose outlets, a 100mm Storz pumper connection, a 150mm riser barrel, a bottom valve and a 150mm connection with the main. Hydrants will open counter clockwise. Drain holes will be internally plugged. Hose outlets and pumper connections must be the same size and thread as Town of Shediac Standards.

Threads to be as follows: Hose nozzle: maximum OD-2.962  
Maximum PD-2.881  
TPI – 8

Pumper nozzle: 100mm ø Storz to figure 2 of  
CAN4-5543M

The hydrants will be installed to a 2.15 metre bury unless otherwise specified and shall be repainted to Town of Shediac Standards after installation.

Paint to be used for painting the hydrant body shall be:  
Devoe Coatings – Alkyd Industrial Gloss Enamel  
Color-code – Safety Red 4038-9000

Paint to be used for painting hydrant top and nozzle caps shall be:  
Glidden Ultra – Interior / Exterior Aluminum Paint  
Color-code – Aluminum 9591-0

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**WATER DISTRIBUTION SYSTEM**

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All fire hydrants shall have ductile-iron mechanical joints fitted with high-tensile steel tee bolts and nuts tightened using a torque wrench to the manufacturer's specification.

4.3.5. Construction Methods

- 4.3.5.1. Hydrants shall be set plumb in all respects and installed with pumper connections facing the street.
- 4.3.5.2. The bury line of the hydrant shall be set at the grade as indicated on detail drawing. Hydrant extensions, "Gradelok" or equivalent may be used as required to achieve specified grade.
- 4.3.5.3. Thrust blocks shall be provided on all hydrant bowls unless indicated otherwise on the drawings.
- 4.3.5.4. Hydrant drain holes are to be filled with brass plugs. The Contractor is responsible to check that these plugs are in-place at the time of installation.
- 4.3.5.5. Hydrant extensions on a live system shall be installed by the Contractor under the direct supervision of the Public Works Department. A 48-hour notice must be given to the Public Works Department for scheduling.

4.3.6. Measurement

Measurement for this work shall be for the total number of hydrants installed.

4.3.7. Payment

Payment for this work shall be at the contract unit price for each hydrant installed.

Payment shall include the supply and installation of the hydrant and fittings, thrust blocks, anchors, hydrant extensions, testing and repainting of hydrants to Town of Shediac Standards.

Payment shall also include connecting the hydrant to the gate valve, the excavation and backfilling and all incidental items.

Payment for gate valve adjoining hydrants shall be made under Section 4.2.5.

Payment for the pipe between the hydrant and the main shall be made under Section 4.1.8.

4.4. Water Service Laterals

4.4.1. Scope

This item governs the supply of all materials, labour and equipment necessary for the complete installation of water service laterals.

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**WATER DISTRIBUTION SYSTEM**

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**4.4.2. Work Under Other Sections**

- 4.4.2.1. Trenching – Section 1
- 4.4.2.2. Bedding and Backfilling – Section 2
- 4.4.2.3. Trench Restoration and Maintenance – Section 3

**4.4.3. Materials**

- 4.4.3.1. Service lateral piping, fittings and appurtenances shall be supplied by the Contractor and shall conform to Town of Shediac Standards. Appurtenances shall include service saddle, or PVC tapping tee, main stop, curb stop, curb box and marker post.

- 4.4.3.2. Pipe shall be minimum 20mm diameter “Q-Line” tubing (color-coded blue) meeting the latest CAN/CSA Standard B137.9 or minimum 25mm diameter blue (PEX) meeting the latest requirements of CAN/CSA Standard B137.5 and ASTM F877, or unless otherwise specified. Stainless steel liner shall be inserted into the ends of all Municipex tubing for all connections to compression fittings.

Brass components shall be Mueller, Cambridge, or Ford, meeting the requirements of ASTM B62 and threads to AWWA Standard C800, latest edition.

- 4.4.3.3. Corporation main stops shall be Cambridge, Ford, or Mueller, and shall be bronze ground key type with inlet end having the Standard Corporation Threads and an outlet having compression-type connection with no drain.
- 4.4.3.4. Service saddles for PVC pipe shall be Robar, or Romac type, cast bronze body with stainless steel double straps and components, or approved equal. **SERVICE SADDLES MUST BE USED FOR ALL SERVICE CONNECTIONS.**
- 4.4.3.5. PVC tapping tees shall meet the requirements of AWWA C907 and CSA B137.2, Class 150.
- 4.4.3.6. Curb stops shall be Mueller, Cambridge or A.Y. MacDonald, with no drains meeting ASTM B62 and shall be bronze ground key type with both inlet and outlet ends being copper, or compression-type fittings.

Stainless steel liners are to be inserted into the ends of Municipex tubing for all connections to compression fittings.

- 4.4.3.7. Curb boxes for 19mm and 25mm services shall be adjustable for a depth of bury 1.8.-2.1. m and shall be Mueller Type A-726, Bibby Fig. SB-1100, or approved equal, with a 90cm minimum stainless steel stationary rod and stainless steel cotter pin and Type A-800 cover. Service boxes and stems for 38mm and 50mm services shall meet the above requirements except that the model shall be Mueller Type A-728 or approved equal. Services larger than 50mm in diameter require a standard water valve box and cover as per Section 4.2.2.4 and 4.2.2.5.
- 4.4.3.8. Corporation couplings shall be suitable for copper to copper compression type, Grip Joint.
- 4.4.3.9. Compression connections shall be the gripper ring type, having a minimum 1000 kg (2200 lb) pull out resistance and shall be tightened using a torque wrench to the Manufacturer’s specification.

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**WATER DISTRIBUTION SYSTEM**

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**4.4.4. Construction Methods**

- 4.4.4.1. The location of water service laterals shall be as per Detail Drawings or as located in the field.
- 4.4.4.2. Water service laterals shall be installed from the watermain to the property line in common trench with the sanitary service lateral and storm service lateral. New water laterals shall be one continuous length of service pipe.
- 4.4.4.3. Tapping into watermains shall be with the use of proper tools and equipment and according to recognized good practice and in compliance with the pipe manufacturer's specifications. The watermain shall be tapped at a  $67\frac{1}{2}^{\circ}$  angle from the top centerline of the pipe.
- 4.4.4.4. A "goose neck" shall be provided in service lateral piping as detailed on the drawing n<sup>o</sup> 22 and shall have a maximum deflection of  $22\frac{1}{2}^{\circ}$ .
- 4.4.4.5. All connections on service laterals shall be of the compression type.
- 4.4.4.6. All new water service laterals shall be one continuous section of pipe with no couplings between the main stop and the curb stop.
- 4.4.4.7. The curb stop and curb box shall be installed at locations as indicated on the drawings. The curb box shall be set directly over the curb stop and installed plumb. Curb boxes shall be set to finish grade, then adjusted to match existing grade.
- 4.4.4.8. Water service lateral shall be staked with a 50mm x 100mm x 2m red marker extending one metre vertically above grade.

**4.4.5. Measurement**

Water service laterals shall be measured in linear metres from the center of the watermain to the end including the distance through the "goose neck".

**4.4.6. Payment**

Payment for this item shall be at the contract unit price for water service lateral pipe and the contract unit price for water service appurtenance.

Payment shall include excavation, dewatering, tapping and connecting to the main, supply and installation of main stop, service saddle, piping or tubing, corporation couplings, curb stop and box, supply and installation of a red marker stake at the curb box, removal and disposal of excess trench material and all incidental items.

Payment shall also include for trench restoration and maintenance according to Section 3.

There shall be no separate payment for imported bedding material, in accordance with Section 2.1.

Payment for imported fill material shall be according to Section 2.2.

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**SANITARY SEWER SYSTEMS**

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**5. SANITARY SEWER SYSTEM**

Refer to the Greater Shediac Sewerage Commission Standard Specifications, latest edition, Section No. 4 Sanitary Sewer Systems.

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**STORM SEWER SYSTEM**

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**6. STORM SEWER SYSTEM****6.1. Storm Sewer Mains**6.1.1. Scope

This section governs the supply of all labour, materials, equipment and incidentals necessary for the complete installation of storm sewer mains as shown on the drawings and herein specified.

6.1.2. Work Under Other Services

## 6.1.2.1. Trenching – Section 1

## 6.1.2.2. Bedding and Backfilling – Section 2

## 6.1.2.3. Trench Restoration and Maintenance – Section 3

6.1.3. Materials

6.1.3.1. Minimum size of storm sewer mains shall be 300mm.

6.1.3.2. Storm sewer pipes and gaskets will be supplied by the Contractor.

6.1.3.3. Storm sewer mains 300 mm and larger in diameter shall be reinforced concrete pipe and shall conform to CAN/CSA A257.2, Class 65D (ASTM C76 Class III), 100D (ASTM C76 Class IV), 140D (ASTM C76 Class V) for reinforced concrete pipe (pipe class as indicated on the drawings).

**or**

Polyvinyl chloride (PVC) sewer pipe and fittings DR35 meeting the requirements of CAN/CSA B182.2 and ASTM D3034. The installation shall be complete with marker tape, 100mm wide, with the words “STORM SEWER PIPE” in 50mm letters at 1.0m intervals. The marker tape shall be installed immediately on top of the crushed rock bedding.

**or**

Polyvinyl chloride (PVC) profile sewer pipe and fittings meeting the requirements CAN/CSA B182.4 and ASTM F794-97. The installation shall be complete with marker tape, 100mm wide, with the words “STORM SEWER PIPE” in 50mm letters at 1.0m intervals. The marker tape shall be installed immediately on top of the crushed rock bedding.

6.1.3.4. Joints will be bell and spigot type with rubber gaskets. The bell will be an integral and homogeneous part of the pipe barrel. All rubber gaskets must meet the requirements of CAN/CSA A257.3.

6.1.3.5. Re-bars for pipe inlet shall conform to CAN/CSA G30.18.

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**STORM SEWER SYSTEM**

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**6.1.4. Equipment**

Approved laser alignment equipment must be used to control line and grade during all pipe installation.

**6.1.5. Construction Methods**

6.1.5.1. Storm sewer mains shall be installed according to the sizes and in locations as indicated on the drawings.

6.1.5.2. Installation of all storm sewer mains shall be according to recommendations of the pipe manufacturer and in accordance with recognized good practice.

6.1.5.3. Pipe shall be thoroughly inspected before and after installation. Any defective or damaged pipe shall be immediately removed from the site and replaced with new sound material at the Contractor's expense.

6.1.5.4. Laying of pipe in prepared trenches shall commence at lowest point with the bell end of the pipe pointing upstream. Graded offset stakes will be provided only once to establish the line and grade that must be followed.

6.1.5.5. Pipe shall be laid true to line and grade with uniform bearing under the full length of the barrel of the pipe. Suitable excavation shall be made to receive the bell or collar that shall not bear upon the subgrade or bedding. Any pipe that is not in true alignment or shows any undue settlement after installation shall be taken out and re-laid at the Contractor's expense.

6.1.5.6. Trenches where pipe laying is in progress shall be kept dry; no pipe shall be laid in water or on wet bedding. As the pipes are laid, they must be thoroughly cleaned and protected from dirt and water. No length of pipe shall be laid until the preceding length has been thoroughly bedded and secured in-place so as to prevent any movement or disturbance of the pipe.

6.1.5.7. During the time when pipe laying is not in progress, open ends of pipe shall be closed with a watertight plug.

6.1.5.8. No walking on or working over the pipes after they have been laid will be allowed until there is at least 300mm of cover over them, except as may be necessary in backfilling the trench and compacting the bedding material.

6.1.5.9. Where sewer mains are to be laid on a curve or curved alignment to avoid obstructions, the amount of deflection allowed shall not exceed that required for satisfactory connection of the joint. Maximum deflections in pipe joints shall be according to recommendations of pipe manufacturer.

6.1.5.10 Laser beam equipment shall be installed in the pipe, just above the pipe, or in the bottom of the manhole. Installation of the laser beam contrary to the aforementioned shall require approval of the Engineer.

6.1.5.11. Installation of storm inlet pipe grates shall be as shown on the drawings and shall be incidental to the storm sewer pipe work.

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**STORM SEWER SYSTEM**

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**6.1.6. Visual and Video Inspection**

- 6.1.6.1. The sewers, manholes and all related appurtenances shall be cleaned of all foreign material either by flushing, the use of cleaning buckets, by hand or by combination of all three. The video inspection shall not be permitted during the flushing operation. Before the video inspection begins, enough water will be added to the upstream manhole so it can be seen flowing at the downstream manhole. The video inspection shall be done from manhole to manhole by passing the video camera through the sewer pipe in the direction of the flow.
- 6.1.6.2. Sewer pipes equal or greater than 300mmØ shall be inspected for alignment and obstructions. WATER PONDING IN GRAVITY SEWERS that cannot be eliminated by flushing and cleaning shall be considered as evidence of pipe settlement. One hundred percent (100%) of the sewers will be video inspected by the Contractor. The project inspector must be present when all new sewer pipe is being video inspected. The initial video inspection shall be at the cost of the Contractor and any costs to re-video any sewer main to inspect repaired defects shall be at the Contractor's expense.
- 6.1.6.3. Any and all defects shall be cause for rejection and must be repaired by the Contractor at no expense to the Town. The following conditions shall be considered as defects in the work:
- Any joint in the pipe that shows a gap or spread, offset, gasket or signs of infiltration.
  - Any service lateral showing signs of infiltration around connection.
  - Any service lateral with a pronounced protrusion into the sewer main.
  - Any section of sewer pipe that is cracked, crushed or broken.
  - Any variance in grade of sewer section causing ponding.
  - Any gravel, roots or foreign material that impedes the flow.
  - Any deformation in the shape of the pipe.
- 6.1.6.4. The video equipment provided to do the work shall meet the following Requirements:
- Have a self-contained monitoring unit and camera equipped with a remotely controlled lighting system capable of varying the illumination. Cameras to provide a pan, tilt, and zoom view above the regular 78° camera view.
  - Provide a pan and tilt view with close-ups of all laterals, defects, damages, collapses and all other faulty areas in pipe being videoed.
  - Picture quality shall produce a continuous 600-line resolution and showing the entire periphery of the pipe. The minimum camera resolution must be 640 x 480.
  - Equipped with a meter device with readings aboveground or markings on cable to clearly identify the exact location of the camera.
  - The maximum permissible error in accuracy to be within the following limits of fault location:
    - Up to 375mmØ of pipe - ± 75mm per 100m of length
    - 450mmØ and 600mmØ of pipe - ±150mm per 100m of length
    - 750mmØ and 900mmØ of pipe - ± 225mm per 100m of length
  - On-screen display to clearly identify location of camera.
- 6.1.6.5. The Video Contractor shall maintain an inspection record in log form during the video inspection. Each log to include the following:
- Identify all service laterals by distance from reference manhole; its inlet to be referenced to axis of pipe.
  - The location of each defect discovered.



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**STORM SEWER SYSTEM**

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The Video Contractor shall provide photographs of any and all defects discovered using a 35mm camera. All photographs to be clear and precise, and showing clearly the defects being photographed. A detailed technical description of the defect shall be included with the photographs as supporting data.

6.1.6.6. REPORTS provided by the Video Contractor shall be enclosed in a labeled binder bearing the project name. The report shall include the following pages on letter size paper:

- Title Page identifying the project and location, camera operator and dates of inspection.
- Index Page identifying the street name, section from manhole to manhole, page number where section data is contained.
- Inspection Records to be organized in sequence from upstream manhole to downstream manhole.
- Report Sheets for each section of sewer pipe shall contain the following:
  - Street Name
  - Applicable manhole numbers
  - Reference drawing n° if applicable
  - Weather on the day of inspection
  - Statement of soil condition in area of inspection (wet, dry, frozen, etc.)
  - Date of inspection
  - Include a plan view showing reference manholes, north arrow, horizontal distance, and type of pipe and direction of flow.
- Inspection Findings for each sewer section shall include:
  - Measured locations of all faults
  - Photographs of all faults
  - Measured locations of all service laterals
  - One photograph each of typical joint and section of pipe when faults are not found
- Repeat Inspections
  - Repair faults detected during CCTV inspections
  - Repeat CCTV inspections shall be at the Contractor's expense

6.1.6.7. Video Records supplied by the Video Contractor shall include a complete record of all inspections and shall be on DVD format.

All DVD disks shall be indexed listing sections of inspections and project name.

All DVD disks with their accompanying written or digital format reports shall be submitted to the Engineer and forwarded to the Engineering Department for review.

#### 6.1.7. Measurement

Measurement of storm sewer mains shall be in linear metres measured between the center of manholes. In the case of storm outfalls measurement shall be from the center of a manhole to the end of the pipe installed.

#### 6.1.8. Payment

Payment for work under this section shall be at the contract unit price for the appropriate size and type of pipe.

Payment shall include excavation, the supply and installation and joining of the pipe, backfilling, dewatering, inlet pipe grates, compaction and the removal and disposal of excess materials in accordance with General Conditions 44.

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**STORM SEWER SYSTEM**

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Payment shall also include the necessary trench restoration and maintenance according to Section 3.

There shall be no separate payment for imported bedding material, in accordance with Section 2.1.

Payment for imported fill shall be according to Section 2.2.

**6.2. Storm Sewer Manholes****6.2.1. Scope**

This section governs the supply of all labour, materials and equipment necessary for the complete installation of storm manholes as shown on the drawings and herein specified.

**6.2.2. Work Under Other Sections**

- 6.2.2.1. Trenching – Section 1
- 6.2.2.2. Bedding and Backfilling – Section 2
- 6.2.2.3. Trench Restoration and Maintenance – Section 3

**6.2.3. Materials**

- 6.2.3.1. Pre-cast manhole sections and frames and covers shall be supplied by the Contractor.
- 6.2.3.2. Manholes shall be of pre-cast concrete sections meeting the requirements of the latest CAN/CSA A257.4 for pre-cast reinforced concrete manhole sections. Joints between sections will be rubber gasket or Ram-nek gasket as indicated on the detail drawings, and will meet the requirements of the latest CAN/CSA A257.3.
- 6.2.3.3. Manhole base sections shall be of pre-cast concrete with reinforced concrete slabs within. Manhole bases will also have cast-in rubber gaskets to suit the inlet and outlet pipe. Any additional holes required in the field shall be core-drilled and a “Kor-n-seal” connector inserted.
- 6.2.3.4. Manhole frames and covers shall be 411W cast-iron or adjustable type (Laperle C-50M1) Town of Shediac Standard and shall meet the requirements of the latest ASTM Standard A-48 for grey-iron castings. Standard (off-road) manhole frames and covers shall be lock-down type, R12S as manufactured by IMP Group Ltd. or approved equal, and shall be cast-iron Town of Shediac Standard and shall meet the requirements of the latest ASTM Standard A-48 for grey-iron castings. Anchor bolts shall be stainless steel. Lock-down bolts shall be pentagon-shaped (5-sided) and shall be stainless steel.

**6.2.4. Construction Methods**

- 6.2.4.1. Manholes shall be constructed of pre-cast concrete sections according to the details indicated on the drawings. Additional openings required in the field in the units may be fabricated with the use of a core drill; hammering is not an approved method. Special care must be given to compaction methods around units. Compaction shall conform to Section 1.1.2.4.
- 6.2.4.2. Manhole base section shall be set on a 150mm layer of bedding material conforming in all respects to the requirements for pipe bedding. Manholes shall be constructed plumb.

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## **STORM SEWER SYSTEM**

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6.2.4.3. Joints in pre-cast manhole sections shall be made watertight with the use of rubber gaskets or Ram-nek gaskets. Lifting holes in pre-cast sections shall be plugged with cement mortar for full depth and made watertight.

6.2.4.4. Manhole frames and covers in paved roadways shall be set 10mm below finished grade and shall conform to the crown of the road. Frames and covers located in gravel roadways shall be set at least 50mm below the top of the aggregate base.

6.2.4.5. Manhole frames and covers located off traveled roadways shall be set flush with finished grade unless otherwise specified and be complete with stainless steel anchor bolts and marker posts. Marker posts to be 100mm x 100mm (4" x 4") wood and shall be embedded 1m in the ground and protrude 1.5m above ground level, painted yellow, with the words "STORM MH" written in black on all faces on the top. Install reflective tape (to C.G.S.B. 62GP-1 1M reflective Level 1) at top of post on all sides, 100mm wide, silver and orange in color.

### 6.2.5. Measurement

This work shall be measured as the total number of manholes installed of the appropriate size.

### 6.2.6. Payment

Payment for this work shall be at the contract unit price for manholes of the appropriate size.

Payment shall include the supply and installation of manholes including benching, frames and covers and adjustment work. The prices shall also include the excavation, dewatering, backfilling, trench restoration and maintenance and all incidental items.

## 6.3. Storm Sewer Laterals

### 6.3.1. Scope

This section governs the supply of all materials, labour, equipment and incidentals necessary for the complete installation of storm sewer laterals.

### 6.3.2. Work Under Other Sections

#### 6.3.2.1. Trenching – Section 1

#### 6.3.2.2. Bedding and Backfilling – Section 2

#### 6.3.2.3. Trench Restoration and Maintenance – Section 3

### 6.3.3. Materials

6.3.3.1. Storm service lateral pipe, tees, wyes, bends, couplings, rings, fittings, elbows, caps and saddles shall be provided by the Contractor.

6.3.3.2. Storm service lateral pipe and fittings shall be polyvinyl chloride (PVC) sewer pipe, DR28 meeting the requirements of ASTM D-3034 and CAN/CSA B182.1 and shall be a minimum 100mm diameter. Pipe shall be color-coded white. Joints will be bell and spigot type with locked-in rubber gasket.

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**STORM SEWER SYSTEM**

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6.3.3.3. Caps for ends of lateral pipe shall be PVC.

6.3.3.4. Saddles shall be PVC gasketed and strap-on type of the size as indicated on the drawings, meeting the same requirements as the storm sewer service pipe. Rubber "Inserta-tee" or "Korn-tee" type connections with stainless steel bands and flexible sewer saddle as manufactured by Mission Rubber, or approved equal are also accepted.

6.3.3.5. Bends shall be of the long radius type.

#### 6.3.4. Construction Methods

6.3.4.1. Storm service laterals shall be installed in the locations as staked and according to the sizes as indicated on the drawings.

6.3.4.2. Service laterals shall extend from the sewer main to the property line and terminate with a PVC cap. Service lateral piping shall be laid on a minimum grade of 2% for all new developments and 1% on existing streets. The minimum depth shall be 2.5m unless restricted by existing ground elevations.

Greater depth may be required where existing structures require services and where the sewer main permits the greater depth.

6.3.4.3. Service laterals shall be staked with a 50mm x 100mm red marker stake set vertically in the ground at the capped end of the lateral and extending 1 metre above existing grade.

6.3.4.4. Connection of the storm sewer laterals to concrete mains shall be made by cutting an appropriately sized circular hole in a neat and workmanlike manner without damaging the pipe. These holes shall be of sufficient size to accommodate Inserta-tee connection or approved equal.

6.3.4.5. Connections of service laterals to PVC mains shall be made with tees or saddles that shall be properly fitted to the sewer main. Orientation of the connection shall be as detailed on the drawings. When connecting a saddle, the appropriate circular hole shall be cut into the main in a neat and workmanlike manner without damaging the pipe. (See drawing n° 21)

6.3.4.6. Laterals shall be placed and bedded in dewatered trenches.

#### 6.3.5. Measurement

Measurement of storm service laterals shall be in linear metres measured from the center of the sewer main to the capped end of the service lateral.

#### 6.3.6. Payment

Payment for this work shall be at the contract unit price for storm sewer laterals.

Payment shall include the supply and installation of the pipe, saddles, bends, pipe caps, marker stakes and the excavation, dewatering, backfilling, connections, removal and disposal of excess materials in accordance with paragraph 44 of General Conditions, and all incidental items.

Payment shall also include trench restoration and maintenance according to Section 3.

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**STORM SEWER SYSTEM**

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There shall be no separate payment for imported bedding material, in accordance with Section 2.1.

Payment for imported fill shall be according to Section 2.2.

**6.4. Catch Basins****6.4.1. Scope**

This section governs the supply of all materials, labour and equipment necessary for the complete installation of catch basins as shown on the drawings and herein specified.

**6.4.2. Work Under Other Sections**

6.4.2.1. Trenching – Section 1

6.4.2.2. Bedding and Backfilling – Section 2

6.4.2.3. Trench Restoration and Maintenance – Section 3

**6.4.3. Materials**

6.4.3.1. Pre-cast catch basin sections and frames and grated covers shall be supplied by the Contractor.

6.4.3.2. Catch basins shall be of the pre-cast reinforced type, of a size as indicated on drawings and shall have cast-in rubber gaskets or pre-cut circular holes with “Kor-n-seal” connectors on all openings larger than 150mmø. Catch basins shall meet the requirements of the latest CSA A257.4 for pre-cast reinforced concrete manhole sections and shall be stamped with the manufacturer’s name and date of casting. Joints between sections will be rubber-gaskets or Ram-nek gaskets as indicated on the detail drawing.

6.4.3.3. Catch basin frames and grates shall be cast iron Town of Shediac Standard and meet the requirements of the latest ASTM A-48 for grey-iron castings.

**6.4.4. Construction Methods**

6.4.4.1. Catch basins shall be constructed of pre-cast concrete sections complete with pre-cast base sections. (See detail drawing n° 9). Openings for curb drains shall be made with the use of a core drill; hammering is not an approved method. Special care must be given to compaction methods around units and shall conform to Section 1.1.2.4.

6.4.4.2. Base sections shall be placed on a 150mm layer of bedding conforming in all respects to the requirements for pipe bedding. Catch basins shall be constructed plumb.

6.4.4.3. Sumps shall be provided on catch basins according to details as indicated on drawings.

6.4.4.4. Lifting holes in pre-cast sections shall be plugged with cement mortar to full depth and made watertight.

6.4.4.5. Catch basin frames and grates shall be constructed to grade as established on site and as indicated on drawings.

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**STORM SEWER SYSTEM**

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**6.4.5. Measurement**

This work shall be measured as the total number of catch basins installed.

**6.4.6. Payment**

Payment for this work shall be at the contract unit price for catch basins installed.

Payment shall include the supply and installation of catch basins including connection to storm sewer mains, supply and installation of frames and covers. The prices shall also include the excavation, dewatering, backfilling, trench restoration and maintenance and all incidental items.

**6.5. Catch Basin and Sluice Box Laterals****6.5.1. Scope**

This section governs the supply of all materials, labour, equipment and incidentals necessary for the complete installation of catch basin and sluice box laterals.

**6.5.2. Work Under Other Sections**

6.5.2.1. Trenching – Section 1

6.5.2.2. Bedding and Backfilling – Section 2

6.5.2.3. Trench Restoration and Maintenance – Section 3

**6.5.3. Materials**

6.5.3.1. Lateral pipes and all accessories shall be supplied by the Contractor.

6.5.3.2. Catch basin and sluice box lateral pipe shall be 200mm, unless otherwise specified, PVC DR35 meeting the requirements of CAN/CSA B182.2 and ASTM D3034 and color-coded white.

6.5.3.3. Requirements for bends to be approved by the Town of Shediac, long-sweep type, color-coded white.

**6.5.4. Construction Methods**

6.5.4.1. Laterals shall be installed to connect all catch basins to the storm sewer manhole and when directed to the storm sewer main and to connect all sluice boxes to catch basins.

6.5.4.2. These laterals shall have a minimum slope of one percent (1%).

6.5.4.3. The amount of protrusion of any pipe into a manhole or catch basin shall be, not more than 10cm and not less than 5cm.

6.5.4.4. Laterals shall be placed and bedded in dewatered trenches.

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**STORM SEWER SYSTEM**

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**6.5.5. Measurement**

Measurement of catch basin laterals shall be in linear metres measured from the center of the sewer pipe or manhole, to the center of the catch basin.

Measurement of the sluice box laterals shall be in linear metres measured from the center of the sluice box to the center of the catch basin.

**6.5.6. Payment**

Payment for this work shall be at the contract unit price for catch basin laterals and for sluice box laterals.

Payment shall include the supply and installation of the pipe, the excavation, dewatering, connections, gaskets, backfilling and all incidental items.

Payment shall also include trench restoration and maintenance according to Section 3.

There shall be no separate payment for imported bedding material, in accordance with Section 2.1.

Payment for imported fill shall be according to Section 2.2.

**6.6. Sluice Boxes****6.6.1. Scope**

This section governs the supply of all materials, labour and equipment necessary for the complete installation of sluice boxes as shown on the drawings and herein specified.

**6.6.2. Work Under Other Sections**

6.6.2.1. Trenching – Section 1

6.6.2.2. Bedding and Backfilling – Section 2

6.6.2.3. Trench Restoration and Maintenance – Section 3

**6.6.3. Materials**

6.6.3.1. Pre-cast sluice boxes and frames and grated covers shall be supplied by the Contractor.

6.6.3.2. Sluice boxes shall be of the pre-cast concrete type and shall meet the requirements of the latest CAN/CSA A257.4, with pre-cut holes of sufficient size to suit the OD of the storm lateral.

6.6.3.3. Concrete for sluice boxes shall conform to all requirements as specified in Section 9 of these specifications.

6.6.3.4. Sluice box frames and grates shall be cast-iron Town of Shediac Standard and meet the requirements of the latest ASTM A48 for grey-iron castings as supplied by Central Castings of Amherst or approved equal.

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**STORM SEWER SYSTEM**

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**6.6.4. Construction Methods**

6.6.4.1. Sluice boxes shall be installed at locations indicated on drawings, or as directed.

6.6.4.2. Sluice boxes shall be placed on a 150mm layer of bedding conforming to the requirements for pipe bedding and shall be constructed plumb.

6.6.4.3. Sluice box frames and grates shall be set to grade as indicated on drawings.

**6.6.5. Measurement**

This work shall be measured as the total number of sluice boxes installed.

**6.6.6. Payment**

Payment for this work shall be at the contract unit price for sluice boxes installed.

Payment shall include the supply and installation of sluice boxes including connection to the lateral, supply and installation of frames and covers. The prices shall also include the excavation, backfilling, trench restoration and maintenance and all incidental items.

**6.7. Storm Outfall Headwall****6.7.1. Scope**

This section governs the supply of all materials, labour and equipment necessary for the completion installation of storm outfall headwalls as shown on the Drawings and herein specified.

**6.7.2. Work under other sections**

6.7.2.1. Trenching – Section 1

6.7.2.2. Bedding and Backfilling – Section 2

6.7.2.3. Trench Restoration and Maintenance – Section 3

**6.7.3. Materials**

6.7.3.1. Pre-cast iron outfall headwalls shall be supplied by the Contractor.

6.7.3.2. Storm outfall headwalls shall be of the pre-cast concrete type and shall meet the requirements of CAN/CSA A23, with pre-cut holes of sufficient size to suit the OD of the storm pipe. Shop drawings to be submitted for approval by the Engineer prior to manufacturing.

6.7.3.3. Concrete for storm outfall headwalls shall conform to all requirements as specified in Section 9 of these specifications.

6.7.3.4. Steel plate and reinforcements shall conform to CAN/CSA G30.18.

6.7.3.5. Grates shall be made of aluminum and shall be hinged and locked.



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**STORM SEWER SYSTEM**

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**6.7.4. Construction Materials**

6.7.4.1. Storm outfall headwalls shall be installed at locations indicated on drawings or as directed.

6.7.4.2. Storm outfall headwalls shall be installed on a 150mm layer of bedding conforming to the requirements for pipe bedding and shall be constructed plumb.

6.7.4.3. Storm outfall headwalls shall be set to grade as indicated on the drawings.

**6.7.5. Measurement**

This work shall be measured as the total number outfall headwalls installed of the appropriate size.

**6.7.6. Payment**

Payment for this work shall be at the contract unit price for outfall headwalls of the appropriate size.

Payment shall include the supply and installation of outfall headwalls including the steel grate. The prices shall also include the excavation, dewatering, backfilling and all incidental items.

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**ROAD CONSTRUCTION**

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**7. ROAD CONSTRUCTION****7.1. Clearing and Grubbing****7.1.1. Scope**

This section governs the supply of all labour and equipment necessary for removal and disposal of all trees, logs and stumps and other perishable matter from the full width of the right-of-way and easements in order to carry out the installation of services and/or road construction.

**7.1.2. Construction Methods**

Clearing means and consists of the cutting of trees, bushes and brush within the entire width of the right-of-way and easements, including the removal and disposal of such cut materials from the site.

Grubbing means and consists of removal of stumps, roots, logs, branches and other organic matter in the area as described above, including removal and disposal of such grubbed material from the site.

All materials resulting from the clearing operation become the property of the Contractor, who will remove it from the site prior to completion date of the contract, or as directed.

The Contractor shall obtain all necessary permits prior to the start of any clearing and grubbing operations and shall be responsible for damage to adjacent properties along the limits of clearing and grubbing.

The material from the grubbing operation shall be disposed of in accordance with General Conditions 44.

Under no circumstances shall material resulting from the grubbing operation be disposed of under fill or embankments, nor shall excavation be combined with the grubbing operation.

Upon completion of clearing and grubbing operations, the site will be left in such a condition that grading operations and installation of services can be undertaken immediately.

All required ditches and/or swales are to be constructed upon completion of the grubbing operation. The disposal of all excavated materials shall be the Contractor's responsibility unless otherwise directed by the Engineer.

**7.1.3. Measurement**

Measurement for clearing and grubbing shall be in square metres or hectares. Grubbing operations shall be considered to include a depth of material of 300mm.

For clearing and grubbing the area of single trees, rows of trees, or hedges shall be calculated by using the measurements from tip to tip of the longest branches. For single trees, the area shall be considered as a circle.

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## ROAD CONSTRUCTION

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### 7.1.4. Payment

Payment for work under this item shall be at the contract unit price for clearing and grubbing. This includes cutting, burning, disposal of all materials, clean-up and all work incidental thereto.

Payment for the construction of ditches and/or swales shall be by the lineal metre.

## 7.2. Excavation

### 7.2.1. Scope

This section governs the supply of all labour and equipment necessary for the excavation of roads, draining swales and back slopes within the right-of-way limits.

### 7.2.2. Materials

All material, excluding rock excavated within the right-of-way, shall be classed as common excavation.

Rock excavation shall be as classified in Section 1.2.

Common excavation material may be used as fill material for embankments or fill areas, if required.

### 7.2.3. Construction Methods

Roadways, ditches and swales shall be excavated to the lines and grades indicated on the drawings or as staked in the field.

Suitable excavated material from roads or trenches shall be used as fill to bring roads to subgrade where required. This material shall be free of roots and organic material and rocks larger than 150mm in greatest diameter.

The top of all road cut sections shall be scarified to a depth of 150mm, below subgrade level, moistened if necessary, shaped and re-compacted to the subgrade to 95% maximum dry density as determined and by ASTM D698. Fill sections shall be placed in lifts having a maximum thickness of 200mm and shall be compacted to 95% maximum dry density as determined by ASTM D698. Moisture content during compaction shall be not more than three (3) percentage points above or below the optimum moisture content, as determined by ASTM D698.

### 7.2.4. Measurement

Measurement for common excavations shall be in cubic metres based on volumes calculated by the average end area method. The top elevations used in calculations shall be the elevations taken after grubbing operations, or topsoil removal, when these operations are paid for separately. Measurement for rock excavation shall be in cubic metres based on the average end area method.

### 7.2.5. Payment

Payment for excavation shall be at the contract unit price and shall include disposal of excess material as in accordance with General Conditions 44.

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**ROAD CONSTRUCTION**

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**7.3. Road Construction****7.3.1. Scope**

This section governs the supply of all labour, materials and equipment necessary for the completion of the aggregate base material in roadways.

**7.3.2. Materials****7.3.2.1. Aggregate Base**

Aggregate base material shall consist of approved sound crushed rock conforming to the NBDOT Specifications 201.2 and 201.4, latest version, as shown in Section 2.1.2.

The percentage wear of the aggregate as measured in the Micro-Deval Abrasion Test, MTO Standard LS-618 shall not exceed twenty-five percent (25%).

At least fifty percent (50%) of the particles retained on the 5mm sieve have one or more surfaces formed by the fracture of a larger particle.

The plasticity index of that fraction of the aggregate base material passing the n° 40 sieve shall not exceed three (3).

**7.3.2.2. Geotextile Fabric**

Geotextile fabric shall be installed in accordance with manufacturer's recommendations. Geotextiles for drainage applications shall be non-woven fabrics. Woven fabric shall be used for stabilization and separation under aggregate base material, when specified.

The Contractor shall submit, upon request, the manufacturer's recommended procedures for installation and instructions for handling of the selected geotextile. The areas to be covered with geotextile shall be prepared by shaping the ground to a uniform and regular surface, free from bumps and depressions. It shall not be placed on any material that may tear or puncture the fabric.

Where more than one width of fabric is used, it shall be jointed by sewing, or by an overlap of at least 500mm and all overlap joints shall be securely held in-place. In no case, shall equipment travel on uncovered fabric.

The Contractor shall immediately repair any damaged geotextile, by covering with a patch of the same fabric extending a minimum of one metre beyond the perimeter of the damaged area.

Overlapped joints, patches and seams shall be measured as a single layer of fabric; no payment shall be made for overlap.

## ROAD CONSTRUCTION

Geotextile fabrics shall meet the following minimum requirements:

| PROPERTY                                | UNIT    | ASTM TEST | NON-WOVEN FABRIC | WOVEN FABRIC |
|---|---------|-----------|------------------|--------------|
| Mullen Burst Strength                   | kPa     | D3786     | 1100             | 1500         |
| Tearing Strength (Trapezoid method)     | N       | D4533     | 160              | 200          |
| Grab Tensile Strength (Both Directions) | N       | D4632     | 400              | 400          |
| Elongation at Break                     | %       | D4632     | 50               | 25 max.      |
| Apparent Opening Size                   | µm      | D4751     | 50-250           | 840 max.     |
| UV Degradation                          | % Ret.  | D4355     |                  | 70 min.      |
| Permittivity                            | -1 sec. | D4491     | 1.75 – 3.50      | 0.01 min.    |

Property values above the heavy lines are Minimum Average Roll (MAR) values. A specification based upon minimum roll average ensures that over 95% of the fabric in a lot will meet or exceed minimum requirements. The minimum roll average is the average minus approximately two standard deviations.

### 7.3.3. Construction Methods

#### 7.3.3.1. Grading

Grading shall consist of clearing, grubbing, excavation and embankment construction conforming to the lines, grades and typical cross-sections shown on the plans, or as directed.

#### 7.3.3.2. Excavation and Embankment

Excavation shall be done to proper line and grade and the excavated material shall be placed in embankments or removed from the site as in accordance with General Conditions 44.

Immediately prior to placing the aggregate base material, the material below the subgrade shall be scarified to a depth of 150mm and compacted in accordance with Section 7.2.3. Embankments shall be constructed using suitable excavated material or imported fill. Topsoil and organic or deleterious material shall be stripped from all areas on which embankments are to be constructed.

Embankments shall be placed and compacted in layers having a compacted thickness not greater than 200 mm. At the start and completion of compaction, the moisture content of the material shall be not below and not more than three percentage points above optimum as determined by ASTM D698 (standard moisture-density relations test). Each layer shall be uniformly compacted to a density not less than ninety-five (95%) of maximum dry density as determined by ASTM D698.

At the completion of excavation and embankment construction, the subgrade shall be shaped and rolled to give a smooth firm surface.

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**ROAD CONSTRUCTION**

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**7.3.3.3. Aggregate Base Construction****7.3.3.3.1. Preparation**

Stockpiling of borrow or aggregate materials on site and intended to be incorporated into the works, is not permitted. Any borrow or aggregate materials placed in stockpiles on site without the permission of the Engineer will not be considered for payment, regardless of whether the material is incorporated into work.

Prior to placing the aggregate base, the subgrade shall be properly shaped, crowned and compacted so as to be firm and able to support the construction equipment without displacement. Soft or yielding subgrade shall be corrected and made stable and all ponding water shall be removed prior to placing the aggregate base material.

Where the gradation of the subgrade soil and the aggregate base are such that mixing of the two materials may occur, an approved geotextile fabric shall be placed.

For residential, collector or arterial streets, the overall thickness will as shown on the Detail Drawings.

**7.3.3.3.2. Spreading and Compaction**

The aggregate base material shall be spread and compacted in layers having a depth not greater than 200mm. Compaction must commence immediately following the spreading and shaping of each layer. Water shall be added to give a moisture content within two percentage points of optimum as determined by ASTM D6998 and each layer shall be uniformly compacted to at least 95% of maximum density as determined by ASTM D698 before the subsequent layer is placed.

Water truck(s) shall be supplied by the Contractor and shall be available to apply water for compaction purposes as required, and in accordance with section 55 of the General Conditions, and shall be considered as incidental to the work.

Following compaction, the surface of the aggregate base shall be shaped to require line, grade and cross-section. The surface shall be smooth, dense and free from ridges or loose material. The surface shall not vary more than 10mm in 3m in conformance with the roadway cross-section as shown on the detail drawings.

**7.3.3.3.3. Proof Rolling**

For proof rolling of the subgrade and the aggregate base, use a fully loaded tandem truck. Make sufficient passes of proof rolling equipment to make sure that every point on the surface has been subjected to at least one pass of loaded tire and to determine that no greater than 5mm of deflection occurs.

Where proof rolling reveals areas of defective subgrade or aggregate base material, remove defective material and replace to the depth and extent directed by the Engineer at no additional cost to the Town of Shediac.

Maintain the finished aggregate base conditions until asphalt concrete is applied. Proof rolling will not be measured separately but shall be considered incidental to the work.

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## **ROAD CONSTRUCTION**

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### 7.3.3.3.4. Fine Grading and Maintenance

All aggregate base surfaces must be fine graded to the specified crown and tolerances using a motor grader only, a minimum of three (3) specific times within the maintenance period of the contract.

First Grading Immediately prior to inspection in preparation for the issuance of the "Certificate of Provisional Acceptance".

Second Grading Immediately prior to the inspection in preparation for the issuance of the "Certificate of Final Acceptance".

Third Grading At any time during the maintenance period the Town may order that all aggregate base surfaces be fine graded.

All costs for work under this paragraph shall be considered incidental to the contract and separate payment to meet this requirement will not be considered.

### 7.3.4. Measurement

This work shall be measured in cubic units of material excavated, square meters of geotextile fabric in-place, excluding overlaps, and tonnes of aggregate base material.

Excavated material in cuts shall be measured in original position by the method of average end areas. Topsoil stripping shall be calculated in cubic units using a depth of 300mm for the area stripped.

Materials placed in excess of 110% of theoretical quantity, based on the specified measurements indicated on the detail drawings, or as determined by "Final Measure", shall not be included for payment.

### 7.3.5. Payment

Payment for this work shall be at the contract unit price for excavation, for Geotextile Fabric and for aggregate base material.

Payment shall include all incidentals such as water, dewatering, compaction, haulage (as in accordance with General Conditions 44), aggregate base preparation or treatment, placing of excavated material in embankments, finishing and shaping of road surfaces.

Excavation required for the installation of sewer and water pipes is included under Section 1, Trench Excavation and will not be measured for payment under this section.

## 7.4. Roadway Shoulder Construction

### 7.4.1. Scope

This section governs the supply of all labour, equipment and materials necessary for the construction of roadway shoulders according to these specifications and standard drawings.

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**ROAD CONSTRUCTION**

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**7.4.2. Materials**

All materials shall be supplied by the Contractor.

Shoulder material shall be an approved, sound, crushed rock conforming to the requirements for 31.5mm minus crushed rock as per Section 7.3.2.1. (NBDOT Standard 201.2 and 201.4)

**7.4.3. Construction Methods**

Shoulder material shall be spread by the use of a shoulder spreader of a type approved by the Engineer. This shoulder spreader shall be capable of placing shoulder material over a width and to a depth as required and shall be constructed so that it will not place or leave any material on the pavement. Any shoulder material that should fall on the pavement shall be cleaned off immediately.

Shoulder material shall be placed in layers not exceeding 150mm and compacted to a minimum of ninety-five percent (95%) maximum dry density as determined by ASTM D698.

Immediately after completion of the work or any portion of it, the Contractor shall remove from the site all unused material, refuse and dirt placed by him on or in the vicinity of the site and leave the road in a neat and clean condition.

**7.4.4. Measurement**

The quantities to be measured for payment shall be the number of tonnes of shoulder material in-place.

**7.4.5. Payment**

Payment for this work shall be at the contract unit price for crushed rock used for shoulder construction.

Payment shall include all incidentals such as weighing of material, hauling, spreading and compaction, cleaning or existing roadway, etc.



**ASPHALT CONCRETE PAVING, RESURFACING,  
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**8. ASPHALT CONCRETE PAVING, RESURFACING, PATCHING, RESTORATION AND CRACK SEALING**

**8.1. Scope**

This section governs the supply of all labour, equipment and materials necessary for the placement of asphalt concrete pavement in accordance with these plans and specifications or as directed by the Engineer.

**8.2. Materials**

8.2.1. General

All materials shall be supplied by the Contractor and must meet or exceed all requirements of the New Brunswick Department of Transportation as stipulated in their General Specifications, latest edition, unless these specifications provide otherwise.

- 8.2.2. Aggregate for asphalt concrete shall be approved sound material meeting the following gradation requirement for coarse and fine aggregate combined for Type "E" Sand Seal. Gradation requirements for Type "B", "C" and "D" shall be as per NBDOT Standard Specifications, latest edition.

Percent Passing By Weight

| Square Sieve Size, mm | Type "E" Sand Seal Surface |
|-----------------------|----------------------------|
| 28                    | ---                        |
| 20                    | ---                        |
| 14                    | ---                        |
| 10                    | 100                        |
| 5                     | 87 - 100                   |
| 2.5                   | 60 - 87                    |
| 1.25                  | 42 - 72                    |
| 0.630                 | 30 - 56                    |
| 0.315                 | 16 - 36                    |
| 0.160                 | 6 - 22                     |
| 0.080                 | 3 - 9                      |

Laboratory proof of this gradation to be supplied to the Town upon request.

- 8.2.3. Asphalt concrete shall be a dense graded hot-laid plant mix conforming to the requirements of the New Brunswick Department of Transportation Standard Specifications, Section 260.2.3 for Type "B" Base Course, Type "C" Base or Surface Course, Type "D" Surface Course, or the requirements of these specifications for Type "E" Sand Seal Surface Course for patching purposes.

Finished pavement shall conform to the lines, grades, dimensions and cross-sections as specified herein, or as set in the field, or in the case of patching and utility cuts, to the surrounding pavement conforming to the existing roadway crown and slope.

- 8.2.4. Asphalt Binder shall be *Performance Grade (PG 58 – 28)*, as approved by the Engineer, and shall meet the requirements of AASHTO MP1-98, Table 1-Performance Graded Asphalt

## ASPHALT CONCRETE PAVING, RESURFACING, PATCHING, RESTORATION AND CRACK SEALING

Binder Specification. Certified producer's test data or representative samples shall be supplied on request.

- 8.2.5. When anti-stripping admixtures are required, then the asphalt cement grade shall meet the specified requirements of Section 8.2.4. after the addition of the required admixtures. Certified viscosity-temperature curves and physical test data for each tanker load shall be supplied on request.
- 8.2.6. Tack coat shall be SS-1 Grade asphalt emulsion and shall conform in all respects to the provisions of CAN/CGSB 16.2. Certified producer's test data. Manufacturer's certifications that the materials supplied meet the specified requirements, or representative samples, shall be supplied on request.
- 8.2.7. Mineral filler in the form of hydrate lime shall be incorporated in the mixes. The amount of mineral filler shall conform to the current requirements of the New Brunswick Department of Transportation mixes.
- 8.2.8. Asphalt Concrete Mixes type "B", "C" and "D" shall meet the requirements of NBDOT Specifications, Section 260.2.3. Type "E" Sand Seal, used for seal coats in driveways, on parking lots, and for patching shall be as per the following table:

| <b>Type E Sand Seal</b>                     |                    |                        |   |   |
|---|--------------------|------------------------|---|---|
| <b>Stability<br/>kN at 60°C<br/>Minimum</b> | <b>Flow<br/>mm</b> | <b>Air Voids<br/>%</b> | <b>Voids in Mineral<br/>Aggregate (VMA)<br/>%</b> | <b>Asphalt Binder<br/>Content<br/>%</b> |
| 4.5   | 2-4                | 3-6                    | 17±1  | 6.0-8.0                                 |

In determining these properties, the ASTM bulk specific gravity for the aggregate shall be used and allowance shall be made for asphalt cement absorbed by the aggregate.

Theoretical density for calculation purposes:

| <b>Asphalt<br/>Concrete Mix</b>                   | <b>Type B</b> | <b>Type C</b> | <b>Type D</b> | <b>Type E</b> |
|---|---------------|---------------|---------------|---------------|
| <b>Theoretical<br/>Density<br/>(Tonnes/cu.m.)</b> | 2.40          | 2.40          | 2.35          | 2.35          |

- 8.2.9. **WATER REQUIRED FOR THE WORKS SHALL BE SUPPLIED BY THE CONTRACTOR. THE CONTRACTOR WILL NOT BE PERMITTED TO USE TOWN HYDRANTS.** The purpose of this policy is intended to minimize risk and maintain the integrity of the water distribution system.

Failure to comply with these requirements may result in prosecution by the Town under the law.

- 8.2.10. The Aggregate Base Material shall be approved, sound, crushed rock conforming to NBDOT Specifications 201.2 and 201.4, latest version for 31.5mm minus and as set forth in Section 7.3.2.1.

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**ASPHALT CONCRETE PAVING, RESURFACING,  
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- 8.2.11. Pavement Reinforcement Mesh shall be self-adhesive GlasGrid type 8501 (for full width reinforcement) or 8502 (for joints and major intermittent transverse cracks), or approved equal. Full width reinforcement shall have a minimum tensile strength of 100kN/M (560 lb/in) across width and along length. Detail repair reinforcement shall have a minimum tensile strength of 200kN/M (1120 lb/in) across width and 100kN/M (560 lb/in) along length.

**8.3. Equipment and Construction Methods****8.3.1. General**

All equipment and construction methods shall conform to the requirements and practices of the New Brunswick Department of Transportation as stipulated in their General Specifications, latest edition, unless these specifications provide otherwise.

**8.3.2. Mix Design**

Two weeks prior to the date paving operations are to commence, the Contractor shall present information in writing outlining the proposed mix and job mix formula based on the use of aggregate stockpiles that are representative of those to be used for the work. This information shall include evidence that the proposed mix meets the requirements specified herein.

The laboratory tests shall be done using aggregate and asphalt cement representative of those proposed for use in the project. At the same time as the mix design information is provided, stockpiles of aggregates proposed for use in asphalt concrete for the project shall be available for sampling to permit checking of the mix design. Checking of the mix design shall be at no expense to the Contractor except that sample of materials shall be provided free of charge.

The Engineer or his authorized representative shall have access at any time to all parts the paving plant for the verification of weights or proportions and character of materials and the determination of temperature used in the preparation of the mixture.

**8.3.3. Preparation****8.3.3.1. Aggregate Base**

Where the area is to be covered with asphalt concrete, the foundation shall be excavated or filled-up with an aggregate base material to top elevation of the aggregate base so that after being compacted to 95% of maximum dry density as determined by ASTM D698, the top elevation plus the thickness of the paving material will correspond to the finished surface of the pavement as set. In excavating, the earth must not be disturbed below the subgrade unless directed. Plowing will not be permitted where the depth of material to be removed is less than 150mm.

All areas that are found to be loose, soft spongy or composed of unsuitable material must be dug out, refilled with suitable material as specified and compacted to 95% of maximum dry density as determine by ASTM D698.

When the rolling of the aggregate base is completed, the dry surface must be nowhere more than 20mm below, nor more than 10mm above the finished grade of the aggregate base, either as set, or in conformity with the Town Standard roadway cross-section.

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Immediately prior to placing the asphalt concrete base course, the aggregate base material shall be reshaped and rolled in a manner that leaves the surface smooth, firm and true to grade. When checked with a straight edge, the surfaces shall not vary more than 10mm in 3m.

#### 8.3.3.2. Aggregate Base Preparation and Fine Grading

For the purpose of payment, aggregate base preparation shall mean the excavation, removal and disposal in accordance with General Conditions 44, of insitu material to a maximum depth of 300mm including backfilling, grading and compaction of the aggregate base material prior to paving. This shall also apply to widening of streets where a center strip of asphalt pavement exists.

For the purpose of payment, fine grading shall mean grading of existing aggregate base material to a maximum depth of 100mm, including the disposal of excess material in accordance with General Conditions 44, and compaction prior to paving.

#### 8.3.3.3. Disposal of Excavated Material

Excavated material, where suitable, shall be used as backfill material for the works included in the contract.

Excavated material shall be considered in the custody of the Contractor in accordance with General Conditions 44.

#### 8.3.3.4. Adjustment of Structures

All structures such as manholes, inlets and valve boxes shall be adjusted to match the finished surface transverse and longitudinal grade.

Structures that have been set to finished grade must not be disturbed. Damage to these structures due to grading or asphaltting operations shall be repaired at the Contractor's expense.

If crushed rock or asphalt material should fall inside the structures, they shall be cleaned out immediately following occurrence.

#### 8.3.3.5. Resurfacing and Patching Preparation on Existing Pavement

Where asphalt concrete is applied for resurfacing or patching purposes, all holes and areas showing signs of surface or base failure shall be cut out using a saw, cutting wheel or jack hammer to give a rectangular-shaped hole with a well squared edge for bonding.

If the aggregate base material is excessively wet and/or does not meet minimum compaction requirements, the areas so affected shall be excavated, filled with new aggregate base material and compacted all as per Section 7.

The holes or excavated areas shall be brought level with the surrounding pavement with a layer of Type "B" or Type "C" Base Course material, placed and compacted to these specifications. The edge of the surrounding pavement must first be painted with tack coat. Disposal of the excavated material shall be in accordance with General Conditions 44. Thickness of asphalt placed shall be within the guidelines as shown in Detail Drawings.

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## ASPHALT CONCRETE PAVING, RESURFACING, PATCHING, RESTORATION AND CRACK SEALING

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Where asphalt pavement widening is undertaken, the edges of existing pavement shall be cut, removed and tack applied before new asphalt is placed. The cuts shall be made with a cutting wheel giving a straight vertical face through the thickness of the pavement.

Where asphalt concrete is applied as a resurfacing layer on existing pavement, tack coat shall be applied at a coverage rate of 0.16 litres per square metre prior to placing new asphalt concrete. The edge of the cut along the existing pavement shall be cleaned and tack coated. The full width of surface to be treated shall be cleaned with power or hand broom to remove all sand, gravel, mud, etc. from existing pavement. This shall be incidental to the work.

Where the Engineer has designated the use of a pavement reinforcement, type 8501 for full width cracking shall be used unless otherwise specified. All remedial work such as base repairs, crack sealing, pothole filling, leveling or padding course application, etc. shall be performed prior to placing the reinforcement. Surface must be prepared as a clean, dry, even surface. On a milled or planed surface, a minimum 19mm leveling course of asphalt must be placed prior to the pavement reinforcement and final lift of asphalt.

**Tack:** Distributors shall be equipped with a tank gauge and measuring stick, graduated in litres, and a sampling valve. The Contractor may place the bituminous tack coat by hand placement method at longitudinal joint locations. Tack shall be applied only when the surface to be treated is dry and swept clean over the full width of surfaces to be treated.

The Contractor shall protect or cover concrete walks, curbs, walls, adjacent structures and other appurtenances, prior to spraying bituminous tack coat, to avoid over-spray of these sites. Any tack coat adhering to concrete walks, curb or adjacent structures along the street shall be removed at the Contractor's expense.

Temperature of the tack when applied shall be between 38° and 66°C.

The Contractor shall be responsible to reinstate, at his own expense, any bituminous tack-coated surface that becomes fouled due to weather and/or traffic.

Tack coat shall be applied in a uniform manner by means of approved pressure distributors. The use of brooms for manual application on patching contracts is acceptable. Tack coat shall not be applied in wet weather or at an ambient temperature lower than 10°C.

Traffic shall be diverted around freshly sprayed surfaces; if possible, until tack coat has set. Tack coat shall not be applied over an area greater than can be covered by the asphalt concrete placed that same day.

### 8.3.4. Applying Asphalt Concrete

Asphalt concrete base and surface courses shall be applied to proper line and grade to give the compacted depth, crown, profile and cross-section as per these specifications and detail drawings.

In order to bring the existing roadway surface to proper shape and crown, patching, padding and/or leveling courses of asphalt shall be applied as required or directed. This work shall be considered as being incidental to the work and no additional payment or allowance will be made over and above the rate of payment for the type of asphalt used, as per the Schedule of Quantities and Prices.

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Temperature of mixture shall not exceed 165°C.

Temperature of mixture shall not be less than 115°C immediately after spreading and prior to initial rolling.

The Base Course shall not be applied unless air temperature at surface of road is 2°C and rising. When air temperature drops below 2°C, paving operations will cease.

The Seal Course shall not be applied unless air temperature at surface of road is 5°C and rising.

Any mixture that does not comply with specifications and mixture that cannot be incorporated in the work shall be rejected.

Adequate spreading and compaction units shall be provided at the job site. The sizes, types and numbers of units required and their methods of operations shall be as stipulated in the New Brunswick Department of Transportation General Specifications, latest edition. Mixtures shall be compacted to a density not less than ninety-two and a half percent (92.5%) of the maximum theoretical density (MTD).

For patching operations a minimum of one Class "B" steel-tired tandem roller weighing at least eight (8) tonnes must be used with each patching crew.

Along curb and gutter, sluice boxes, manholes and similar structures and places not accessible to roller, the mixture shall be thoroughly compacted by means of hot hand tampers and effectively sealed.

Each course after final compaction shall be smooth and true to required crown and grade. It shall have average thickness specified and shall vary no more than 6mm from specified thickness.

Along the edge of gutter, asphalt pavement to be finished slightly higher than the front edge of gutter. Excess asphalt to be removed from gutter.

The surface of finished pavement shall be free from depressions exceeding 3mm as measured with a 3m straight edge.

Any part of pavement not meeting the requirements of specifications shall be removed by the Contractor and replaced with fresh, hot-laid asphalt compacted to meet the surrounding area and thoroughly bond to it.

**Weather Conditions:** When paving on aggregate base, it must be free from standing water. Asphalt concrete shall not be applied when weather conditions of fog or rain prevail, nor when the pavement surface shows any signs of moisture. Asphalt applied over existing pavement shall be laid upon a dry surface.

**Transportation of Asphalt Mix:** Trucks for transporting asphalt mixtures shall have tight, metal boxes free of foreign materials. Loads shall be covered with tarpaulins of sufficient size to overhang the fully loaded boxes and be tied down on three sides and the front shall be tight to the box of the truck or shielded to prevent air infiltration. Tarpaulins shall be rolled back and the hot mix shall be uncovered immediately prior to dumping the load into the

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paver. Trucks may be lightly lubricated with an approved release agent, as required, but must be raised and drained after each application and before loading.

**Applying Asphalt Concrete:** No traffic shall be allowed on newly applied asphalt concrete until finish rolling is complete and the finished mat has been permitted to cool to 60°C. Water required to lower the mat temperature shall be supplied by equipment capable of applying the water at a uniform and even rate of distribution in such amounts as required and/or as the Engineer may direct.

Compaction equipment shall consist of at least one of each of the following:

1. Vibratory roller
2. Pneumatic tire roller
3. Finish roller.

Finish rolling will be carried out with a steel drum roller, without vibration and exerting a contact pressure on compression roll of at least 3.0kg/mm of drum width.

**Transverse Construction Joint:** A transverse construction joint shall be constructed at the end of each day's work and at other times when paving is halted for a period of time which will permit the asphalt concrete to cool below 115°C.

On Arterial and Collector streets, where the asphalt concrete surface and/or base course has been terminated, the mat shall be tapered at 50:1 minimum. When paving resumes, tapers from surface courses previously laid shall be cut back to full mat thickness to expose a fresh, straight vertical surface, free from broken or loose material and tacked in accordance with 8.3.3.5.

A transverse key joint shall be constructed between existing and new asphalt concrete pavement at the beginning and at the end of the project and other locations where the new pavement terminates against existing pavement. If a key is cut in advance of paving the joint area, the Contractor shall construct a smooth taper at the joint area to a minimum slope of 50:1, incidental to asphalt paving work.

**Longitudinal Construction Joints:** Seal shall be placed in two course widths for paved street widths of 10.0m or less. The joint shall follow the street centerline. The underlying base course shall be placed with the joint offset minimum 150mm from the seal course. At no time shall longitudinal joints coincide. All longitudinal joint left exposed overnight or which are exposed to moisture from rain and all curb, manhole, culvert or other abutting structures, shall receive an application of tack coat.

Longitudinal joints shall be constructed to ensure that maximum compression under rolling is achieved. There should not be any excess material scattered on the surface of the freshly laid mat.

**Temporary Traffic Markings:** The Contractor shall place, daily, temporary markings on all newly constructed or milled pavements to be exposed to traffic, in areas as designated by the Engineer. The Town shall supply the temporary traffic marking strip material or pavement markers to the Contractor. Spacing shall be 50m center to center on tangents and 25m center to center on curves.

#### 8.3.5. Replacements

If, at any time before the work is finally accepted, any raveling, shoving or other fault develops in the pavement as laid, all materials in such place shall be removed, the edges of the joints cut

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square and painted with tack coat and fresh asphalt applied and compacted. All such removal and replacement of unsatisfactory material shall be done at the expense of the Contractor.

**8.3.6. Final Clean-up**

Immediately after the completion of the work, or any consecutive portion of it, the Contractor shall remove from the street all unused material, refuse and dirt placed by him on or in the vicinity of the work and leave the street in a neat and clean condition.

**8.4. Construction of Substructures**

During the progress of the work, the Town reserves the right to construct, rebuild or replace with as little inconvenience to the Contractor as possible, any structures such as manholes, inlets, valve boxes and to make any necessary connections or renewals with sewers, watermains or gas pipes lying within the limits to be paved. The Town also reserves the right to suspend the work at any time for the purposes stated above, without compensation to the Contractor other than an extension of time to complete the work equal to the delay thereby caused.

**8.5. Measurement****8.5.1. Asphalt Concrete Paving and Resurfacing**

This work shall be measured in tonnes of asphalt concrete of the appropriate type in-place, square units of tack coat applied, square units of pavement reinforcement, square units of fine grading, square units for aggregate base preparation, cubic units of excavation below subgrade, tonnes of asphalt base material in-place and square units of asphalt pavement cut and removed. Any asphalt quantity placed in excess of 110% of the theoretical quantity, based on the specified thickness, shall not be included for payment.

**8.5.2. Asphalt Concrete Patching**

The work shall be measured in tonnes of asphalt concrete of the appropriate type in-place, tonnes of asphalt concrete of the appropriate type at the plant and tonnes of aggregate base material in-place.

**8.5.3. Excavation**

Excavation quantities of street areas shall be determined from cross-sections and elevations taken prior to and immediately following the excavation; quantities will be based on in-place measurements.

Where excavated quantities are measured by truckload instead of sectional measure in-place, the excavated quantities and overhaul quantities for various distances shall be reduced by thirty percent (30%).



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**8.6. Quality Control / Quality Assurance****8.6.1. Quality Control**

Quality control (QC) shall be carried out by the Contractor in order to assure that the hot-mix asphalt paving meets the requirements of this specification.

**8.6.2. Quality Assurance**

Sampling frequency for QA testing is listed in Appendix “K” of the Town of Shediac Standard Municipal Specifications.

**8.7. Payment****8.7.1. General**

The cost of supplying water shall be considered incidental to the work and shall be included in the supplying and spreading of asphalt.

All the work to be done by the Contractor for which specific unit prices are not named in the contract, as well as any minor detail or work not specifically mentioned in the specifications but obviously necessary for the proper completion of the work, shall be considered as incidental and as being a part of and included with the work for which prices are named in the contract. The Contractor will not be entitled to any extra or additional compensation thereof.

**8.7.2. Asphalt Concrete Paving and Resurfacing**

Payment for asphalt concrete paving and resurfacing shall be at the contract unit price for asphalt concrete of the appropriate type in-place, for tack coat applied, for pavement reinforcement, for fine grading (when pre-existing granular base was placed by others), for aggregate base preparation, for excavation below subgrade, for aggregate base material and for pavement cutting and removal.

**8.7.3. Asphalt Concrete Patching**

Payment for patching work shall be at the contract unit price for asphalt concrete of the appropriate type in-place, for asphalt concrete of the appropriate type at the plant or for aggregate base material.

The cost of supplying and placing of tack coat shall be considered incidental to the work and shall be included in the supplying and spreading of asphalt.

The cost for cutting, excavation and preparation of the area in and around the hole to be patched and for overhaul and disposal of all excavated materials shall be considered incidental to the work and shall be included in the supplying and spreading of asphalt.

Excavation in excess of that normally required for the preparation of the area to be patched shall be paid for as aggregate base preparation.

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8.7.4. Reduced Payment Schedule – Adjustment for Asphalt Density

The Town of Shediac will reduce payment on the unit bid item of asphalt concrete if the density is less than 92.5 percent (%).

The Town will not accept any asphalt concrete that has a density below 89 percent (%); all such asphalt concrete must be replaced at the Contractor's expense.

For asphalt concrete placed as padding on shoulders where a single lift of asphalt concrete surface mix specified, the unit price adjustment as shown in the table below shall not apply.

If repairs are carried out by removal and replacement or overlay of the asphalt concrete, the unit price adjustment will be based on the quality assurance carried out on the repaired area.

The Town will allow a second set of core testing at the Contractor's cost if deemed necessary by the Town of Shediac.

The two series of test results shall be used to determine the total average density.

The unit price adjustment rates for density shall be as shown in the table below.

| % of Maximum Theoretical Density | Unit Price Adjustment<br>(\$ per Tonne) |
|----------------------------------|---|
| ≥92.5                            | 0                                       |
| 92.4 to 92.0                     | -0.5                                    |
| 91.9 to 91.5                     | -1.00                                   |
| 91.4 to 91.0                     | -2.00                                   |
| 90.9 to 90.5                     | -4.00                                   |
| 90.4 to 90.0                     | -6.00                                   |
| 89.9 to 89.5                     | -11.00                                  |
| 89.4 to 89.0                     | -16.00                                  |
| < 89.0                           | rejected                                |

**8.8. Asphalt Concrete Pavement Crack Sealing**

8.8.1. Description

The work under this section consists of routing, cleaning, drying and filling with joint sealing compound of cracks in asphalt concrete pavement in accordance with these specifications.

8.8.2. Materials

All materials shall be supplied by the Contractor.

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The joint sealing materials for crack filling shall be hot-poured rubberized asphalt compounds formulated to meet ASTM Specification D6690 and shall be Beram 195 LM, Beram LM or approved equal.

Certified producer's test data or representative samples shall be supplied on request.

#### 8.8.3. Equipment

The routing equipment must be sufficiently portable and flexible to accurately follow random cracks without undue spalling of the crack edge. The router shall be equipped with cutter bits that can cut a groove 20mm wide by 20mm deep with clean, neat edges formed at 90° to the base of the cut.

The hot compressed air lance shall deliver a high temperature, high velocity (300 metres per second) clean, oil-free air that can adequately and effectively clean and dry the routed crack.

The melting kettle shall be of the indirect heating or double boiler type with built-in mechanically operated agitator to ensure proper mixing and even heating of the sealing material and equipped with a positive thermostatic temperature control or accurate thermometers to maintain constant temperature control in both the sealing compound and heat transfer oil. The heat transfer oil shall have a high flash point.

#### 8.8.4. Construction Methods

##### 8.8.4.1. Crack Preparation

All random, longitudinal and transverse cracks, within the area designated by the Engineer, shall be routed to a width and depth of 20mm. Vertical sides of the cut are to be perpendicular to the pavement surface. The routed cracks shall be completely cleaned using suitable compressed air equipment and such other mechanical means as is essential to expose the freshly milled surface. All old sealing materials and/or other debris removed from the cracks shall be swept up and removed from the site.

##### 8.8.4.2. Hot Poured Sealant Preparation

The sealing compound shall be heated and melted in a melting kettle. The kettle should be charged by adding a few units of sealing compound at a time. When the compound has reached a fluid condition, additional material can be added until the kettle is full. The compound shall be subjected to continuous and positive agitation during melting. The temperature used in melting the compound shall be in accordance with the manufacturer's recommendation as shown on the container and extreme care shall be taken not to overheat the sealing compound. Material that is heated in excess of the maximum specified temperature shall be immediately removed and discarded from the project. The removal and cost of the overheated material shall be at the Contractor's expense. When the pouring temperature has been reached, the compound shall be maintained at this temperature until it is placed in the crack and in no instance shall the material be held at fluid temperatures for more than three (3) hours. Only as much compound as can be poured in a given day shall be melted on that day.

##### 8.8.4.3. Hot-Poured Sealant Application

Immediately prior to sealing the routed crack, the cracks shall be thoroughly dried and cleaned of all residual dust and debris with the hot compressed air lance. No sealing shall be carried

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out under adverse weather conditions but the use of the hot compressed air lance to clean and dry the cracks will permit the work to proceed in damp conditions, subject to Engineers approval.

The sealing compound shall be applied using a manual pouring cone or by using a mechanical pressure-type applicator equipped with a satisfactory means of keeping the sealer heated, positive temperature control, an effective mechanically operated agitator and a suitable show at the point of discharge so as to obtain a slightly overfilled crack. Immediately strike off excess sealant material using "V" shaped squeegee leaving as thin as possible a layer on adjacent pavement surface not to exceed 25mm on each side of the crack. Thicker bands will be subject to removal and replacement by Contractor at the direction of the Engineer's representative. Where the sealant shrinks or settles into the joint or cracks after the initial pouring, a second application shall be applied to bring the material up to the specified level. The spillage of sealant on exposed pavement surfaces shall be immediately corrected by the Contractor at his own expense.

The sealed joints or cracks shall be dusted immediately after the work is completed with neat cement in a quantity sufficient to prevent "picking up" under normal traffic flow.

Vehicular traffic shall not be permitted to use the area until sealing operations are completed.

#### 8.8.4.4. Restrictions

The sealing compound shall not be applied when the ambient temperature is below 5°C.

The sealing compound shall not be applied when there is any evidence of dampness on or within the pavement or pavement pores.

#### 8.8.5. Guarantee

The contractor shall guarantee that, subject to normal wear and tear, all work performed under this contract will remain in acceptable condition for a period of a 12 months from the Date of Acceptance. The Date of Acceptance being the date of the "Certificate of Provisional Acceptance" as issued by the Engineer.

#### 8.8.6. Measurement

Measurement for Asphalt Crack Sealing shall be in linear metres.

#### 8.8.7. Payment

Payment for this work shall be at the contract unit price for crack sealing.

All work done by the Contractor for which specific unit prices are not named in the contract, as well as any minor details or work not specifically mentioned in the specifications but obviously necessary for the proper completion of the work, such as tapers or ramps, traffic control (Signallers), disposal of debris, etc., shall be considered as incidental and as being a part of and included with the work for which prices are named in the contract. The Contractor will not be entitled to any extra or additional compensation thereof.

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**CONCRETE CURB & GUTTER AND SIDEWALKS**

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**9. CONCRETE CURB & GUTTER AND SIDEWALKS****9.1. Scope**

This section governs the supply of all labour, equipment and materials necessary for construction of concrete curb & gutter and sidewalks in accordance with the plans and specifications.

**9.2. Materials**

9.2.1. All materials shall be supplied by the Contractor.

9.2.2. The Aggregate Base Material shall be an approved, sound, crushed rock conforming to NBDOT Specifications 201.2 and 201.4, latest version for 31.5mm minus, and as set forth in Section 7.3.2.1.

The percentage wear of the aggregate as measured in the Micro-Deval Abrasion Test, MTO Standard LS-618 shall not exceed thirty-five percent (35%).

At least fifty percent (50%) of the particles retained on the 5mm sieve shall have one or more surfaces formed by the fracture of a large particle.

The plasticity index of that fraction of the aggregate base material passing the n° 40 sieve shall not exceed six (6).

9.2.3. Geotextile fabric shall be as per Section 7.3.2.3 of these Specifications.

9.2.4. Cement shall conform to the requirements for normal Portland cement, Type 10, CAN/CSA-A5.

9.2.5. Water used in mixing or curing shall be potable water and meet the requirements of CAN/CSA-A23.1.

9.2.6. Fine and coarse aggregate for concrete shall conform to the requirements of CAN/CSA-A23.1. Coarse aggregate shall be 20mm-5mm in nominal size.

9.2.7. Air-Entraining admixture shall conform to the requirements of ASTM Standard C 260.

9.2.8. Concrete shall conform to the requirements of CAN/CSA-A23.1 for Class C-2 exposure unless these or supplement specifications provide otherwise. All ready-mixed concrete shall be supplied from plants certified by the APRMCA (Atlantic Provinces Ready Mixed Concrete Association) Concrete Production Facilities Certification Program. A copy of the certification of conformance shall be provided to the Engineer prior to start of delivery under the proposed contract.

9.2.9. Materials for curing concrete shall meet the requirements of CAN/CSA-A23.1. They shall be moisture proof paper (Orange Label Fibreen as manufactured by Domtar), or approved equal, or white liquid membrane forming curing compound, ASTM C309 (latest edition) or approved equal.

9.2.10. Forms shall conform to the requirements of CAN/CSA-A23.1 and shall produce a final cross-section in compliance with the detail drawings.

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**CONCRETE CURB & GUTTER AND SIDEWALKS**

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- 9.2.11. Expansion joint material shall be pre-moulded, asphalt-saturated, cane fibreboard - "Flexicell" as manufactured by Sternson Limited or approved equal. Thickness shall be 13mm and shape shall conform to the section of the curb and gutter with which it is to be used.
- 9.2.12. Perforated Flexible Curb Drain and Fittings shall be 100mm Solflow by Soleno, Boss 1000 by Armtec, or approved equal, complete with factory-installed filter sock. This pipe must have a minimum 300 kpa stiffness at 5% deflection. All couplings shall be made with approved connectors. Filter sock shall be white polyester, needle punched, non-woven continuous tubular knit, regular tenacity filament of 4.0-5.5 grams/dernier, micro mesh, run-resistant, rot-proof and inert to most soil chemicals.

**9.3. Construction Methods**9.3.1. General

Concrete curb & gutter and sidewalk shall be constructed to the lines and grades as staked and in accordance with the typical cross-sections shown on the drawings. Unless modified by these specifications, construction methods shall conform to the requirements of CAN/CSA-A23.1.

9.3.2. Preparation9.3.2.1. Subgrade

Excavation for curb & gutter and sidewalk shall be to the depth and width shown on the plans or drawings. Disturbed material in the bottom of excavations shall be compacted to 95% maximum dry density as determined by ASTM D-698. Where existing curb & gutter or sidewalk is to be removed, the removal shall be done in a manner that leaves the subgrade undisturbed in so far as possible.

The subgrade shall be excavated or filled to proper line; grade and cross-section to provide a firm, smooth surface compacted to at least ninety-five percent (95%) of maximum dry density as determined by ASTM D698.

All soft, yielding material or other portions of the subgrade that will not compact readily when rolled or tamped shall be removed and replaced with an aggregate base material and compacted to ninety-five percent (95%) maximum dry density.

Limbs of mature trees damaged by construction operations shall be cut clean with a sharp saw immediately after occurrence. The cut must than be sealed with an approved tree wound dressing in accordance with the manufacturer's instructions.

9.3.2.2. Disposal of Excavated Material

Excavated materials, where suitable, shall be used as backfill material for the works included in the contract. Excavated material shall be considered in the custody of the Contractor until delivered at the place designated.

Surplus excavated material, after all backfilling is complete, shall be disposed of in accordance with paragraph 44 of General Conditions.

- 9.3.2.3. Perforated Flexible Curb Drain shall be installed as indicated on drawings. Care shall be taken during placement to prevent damage or collapse of the drain pipe. Each successive length will

## CONCRETE CURB & GUTTER AND SIDEWALKS

be connected using approved couplings. The drain pipe shall without exception extend into each catch basin and storm manhole, located in curb line, using a tee fitting and the annular space sealed with grout. Drain pipes shall not be connected through shaft riser rings and must drop a minimum of 30cm before entering the units.

### 9.3.3. Concrete

#### 9.3.3.1. Mix Design

Concrete shall be proportioned and have the uniformity of production, in accordance with the requirements of CAN/CSA-A23.1 for Class C-2 exposure.

Concrete shall have the following properties:

|                                    |                       |
|------------------------------------|-----------------------|
| Maximum Water/Cement Ratio by Mass | 0.45                  |
| Minimum Cement Content             | 400 kg/m <sup>3</sup> |
| Minimum Strength at 28 Days        | 32 mPa                |
| Slump (See Note Below)             | 80mm ±30mm            |
| Air Content                        | 5% - 8%               |

The cement content of 400kg/m<sup>3</sup> shall have a minimum of 360kg/m<sup>3</sup> of Portland cement.

Slump may be reduced when an approved slip-form machine is employed for placing.

Failure to meet the requirements for slump and air content shall be cause for immediate rejection of concrete supplied in accordance with paragraph 12 of the General Conditions.

If at any time there is a change of the components of the mix, a trial mix and a 28-day strength test of concrete cylinders must be submitted.

#### 9.3.3.2. Placing and Finishing

##### 9.3.3.2.1. General

Concrete shall be placed to proper line and grade to give the section required by the plans and typical sections. The time between batching and complete discharge shall not exceed 120 minutes.

Immediately prior to placing concrete, the aggregate base shall be thoroughly moistened. Water to be supplied by the Contractor as incidental to the work.

Concrete shall be placed as close to its final position so as to minimize re-handling. It shall be placed and struck off in a manner that does not result in segregation. When required, hand spreading of concrete shall be done with shovels, not rakes.

Concrete shall be thoroughly consolidated against and along the face of all forms and into the face of previously placed concrete.

After placing, the concrete shall be leveled or screeded to proper grade, then floated using an aluminum or magnesium float to eliminate unevenness. Floating is to be completed before bleed water accumulates on the surface.

**ADDING WATER TO THE SURFACE OF THE CONCRETE TO ASSIST IN THE FINISHING OPERATION IS NOT PERMITTED.**

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## CONCRETE CURB & GUTTER AND SIDEWALKS

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Adequate material and labour shall be at the site prior to placement to carry out finishing and curing, including material to protect the concrete from damage by rain. These shall include waterproof paper or plastic sheeting. The plastic sheeting shall not be left to continue as the curing material.

Approval to use a slip-form machine may be given by the Engineer providing the cast section conforms to Town of Shediac Standards. The Engineer may request the casting of a trial section at no cost to the Town to verify the casting characteristics of the machine.

Placement of the slip-form machine guide markers shall be the responsibility of the Contractor. Any adjustment required prior to placement shall be carried out at no cost to the Town.

Pedestrian traffic shall not be allowed on newly placed concrete for a minimum of twenty-four (24) hours. Light passenger vehicular traffic shall not be allowed on newly placed concrete for a minimum of seven (7) days. Truck traffic shall not be allowed on newly poured concrete for a minimum of twenty-eight (28) days unless approved otherwise by the Engineer. At no time shall vehicles of any type be permitted to travel on newly placed concrete until the compressive strength has reached 80% of its specified value.

### 9.3.3.2.2. Curb & Gutter

Control joints shall extend completely through the curb height and  $\frac{1}{4}$  into the gutter section and have a width not greater than 6mm. They shall be spaced at intervals of 3 metres along the length of the curb and gutter. Additional control joints to be saw-cut at all municipal structures within the curb.

Expansion joints shall be formed using expansion joint material at locations where the curb and gutter abuts structures.

If an approved slip form machine is used, control joints shall extend completely through the curb height and  $\frac{1}{4}$  into the gutter section and have a width not greater than 6mm. They shall be spaced at intervals of 3 metres along the length of the curb and gutter.

### 9.3.3.2.3. Sidewalks

The depth of lumber forms shall be at least 125mm and not less than the thickness of any other concrete sidewalk required.

Control joints having a depth of not less than one third ( $\frac{1}{3}$ ) that of the slab shall be saw-cut at intervals of 1.5 metres along the length of the sidewalk. Both sides of the sidewalk shall be tooled.

Expansion joints shall be formed using expansion joint material at locations where the sidewalk abuts the curb and gutter, buildings, or other objects and at 6 metre intervals along the sidewalk. Expansion joints and edges shall be tooled to give a radius of 6mm. Expansion joint materials to be in place and supported prior to the placement of concrete. **Under no circumstances** is this material to be installed after the concrete has been placed.



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**CONCRETE CURB & GUTTER AND SIDEWALKS**

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Following floating, the slab shall be given a skid-resistant texture by lightly scoring it in the transverse direction using a broom. Broom finish shall be at 90° to curb at wheelchair ramps.

The spacing of control joints shall vary to coincide with the centre of manholes or other box-outs.

#### 9.3.3.3. Curing

As soon as practical after the texturing operation is completed, the entire surface, including exposed sides shall be protected against loss of moisture, rapid temperature change and mechanical injury, in accordance with the requirements of CAN/CSA A23.1.

Approved curing compounds shall be applied to the exposed surface and edges of the concrete immediately following the final texturing operation. Complete and uniform coverage shall be at the rate specified by the manufacturer. The compound shall be kept agitated to prevent pigment from settling. It shall be applied to the edges of formed concrete immediately following the removal of the forms. Membrane forming curing compound shall not be permitted after October 1<sup>st</sup>, after which time moisture-proof paper shall be used.

The surface must be protected from damage by traffic for a period of at least seven (7) days.

The period for which moisture is applied or retained in the concrete surface shall be not less than seven (7) days immediately following the placing of the concrete.

The Contractor must use moisture proof paper or curing compound. Paper shall be a minimum width of 2 metres for both sidewalk and curb & gutter applications. Polyethylene is not permitted as a substitute for moisture proof paper.

Edges of the curb and gutter or sidewalk shall be covered to prevent evaporation and all joints lapped 300mm and adequately weighed to prevent displacement or billowing due to wind. Material folded down over the edges shall be secured by a continuous bank of earth. Tears or holes appearing in the curing paper during curing period shall be repaired immediately. Curing paper shall not be reused once it has been installed.

#### 9.3.3.4. Defective Concrete

If the concrete has been damaged in any way before complete set has taken place, or if any defects are discovered at any time prior to final acceptance of the work, i.e. cracking, vandalism, footprints, etc. or if samples taken from the work fail to meet specifications, the defective concrete shall be entirely removed and replaced with new concrete at the expense of the Contractor. Concrete not placed to the required minimum thickness or width shall be removed and replaced at the contractor's expense.

#### 9.3.3.5. Cold Weather Requirements

Moisture-proof paper shall be used when the forecasted nightly low temperature is at or below 5 degrees Celsius. When the outside air temperature is at or below -5 degrees Celsius the concrete must be protected by adequate insulation or supplementary heating for a minimum of 7 days. To protect the concrete from cold weather, the Contractor shall provide fiberglass batt insulation over the surface of the concrete to produce a minimum R-value of 10. The insulation shall be placed over the moisture proof paper and be covered by 6mil polyethylene. Care shall be taken to lap all joints and secure all edges from heat loss. The Contractor shall

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prevent any removal of the completed system and shall replace at no extra cost all uncovered areas regardless of the cause of removal.

The placing temperature of concrete shall be between 10 and 35 degrees Celsius. To avoid cracking of the concrete due to sudden temperature change near the end of the curing period, the protection shall not be completely removed until the concrete has cooled to a permissible temperature differential.

No ice or snow shall be permitted on the placing surface. Concrete shall not be placed on, or against any surface that will lower the temperature of the concrete in-place below 10 degrees Celsius. Under no circumstances shall concrete be placed over frozen ground.

#### 9.3.4. Restoration

All properties within or adjacent to the construction area affected by the Contractor's operations shall be restored to their original or better condition as per Section 12 of the Technical Specifications.

Immediately after completion of the work or any consecutive portion of it, the Contractor shall remove from the site all unused material, refuse and dirt placed by him on or in the vicinity of the work and leave the site in a neat and clean condition.

#### 9.3.5. Catch Basin Adjustment

Catch basins shall be adjusted with appropriate steel inserts and rings, as required, and as indicated on detailed drawings and be set at the elevation of the top of finished gutter elevation.

### 9.4. Measurement

#### 9.4.1. General

Excavation quantities shall be determined from cross-sections and elevations taken by the Engineer prior to and immediately following the excavation. Quantity will be an in-place measurement (no bulking will be allowed).

Where excavated quantities are measured by truckload instead of sectional measure in-place, the excavated quantities shall be reduced by thirty percent (30%).

Standard excavation for curb and gutter or sidewalk shall not be measured for payment but shall be included in the unit bid prices for installation of curb and gutter or sidewalk. The standard excavation for either shall be considered to have a volume of 0.5 m<sup>3</sup> per linear metre.

Any extra excavation that is required greater than 0.5 m<sup>3</sup> per linear metre shall be paid in cubic metres. Extra excavation shall be considered for sloping of adjacent embankments or for depths greater than those shown on the detail drawings for curb and/or sidewalks due to soil conditions. Perforated curb drain and its connection to the catch basin will not be measured for payment but shall be included in the unit prices for concrete curb and gutter.

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**9.4.2. Curb and Gutter**

This work shall be measured in linear metres of concrete curb and gutter in-place including perforated flexible curb drain and curing, linear metres of curb and gutter protected with insulation, cubic metres of extra excavation, cubic metres of fill material if required, and tonnes of crushed rock in-place.

**9.4.3. Sidewalk**

This work shall be measured in square metres of sidewalk in-place including curing, square metres of sidewalk protected with insulation, cubic metres of extra excavation below subgrade, cubic metres of fill material if required, and tonnes of crushed rock in-place.

Felts used for expansion joints at 6 metres intervals along the sidewalk and for isolating the curb and gutter at corners will not be measured for payment and will be considered as incidental to the work. Extra felts used for isolating fixed structures, buildings etc. will not be measured for payment.

**9.5. Payment****9.5.1. General**

All the work to be done by the Contractor for which specific unit prices are not named in the contract, as well as any minor details or work not specifically mentioned in the specifications, but obviously necessary for the proper completion of the work, shall be considered as incidental and as being a part of and included with the work for which prices are named in the contract. The Contractor will not be entitled to any extra or additional compensation thereof.

**9.5.2. Curb and Gutter**

Payment for this work shall be at the contract unit price for concrete curb and gutter in-place, for curb and gutter protected with insulation, for cubic units of extra excavation below subgrade, for fill material and for crushed rock.

**9.5.3. Sidewalks**

Payment for this work shall be at the contract unit price for concrete sidewalk in-place, for sidewalk protected with insulation, for cubic units of extra excavation below subgrade, for fill material and for crushed rock.

**9.5.4. Catch Basin Adjustment**

Payment for catch basin adjustments shall be at the contract unit price for catch basin adjustments. Payment shall include the supply and installation of the pre-cast concrete catch basin sections, cast iron inserts and rings, excavation, dewatering, backfilling and all incidental items.

## CONCRETE CURB & GUTTER AND SIDEWALKS

### 9.5.5. Reduced Payment Schedule – Concrete Strength

The Town of Shediac will reduce payment on the unit bid item of concrete if the 28-day strength test cylinder(s) is less than the minimum 32 MPa.

The Town of Shediac will not accept any concrete that has a strength less than 28.0 MPa at 28 days; all such concrete must be replaced at the Contractor's cost.

The table below lists the rates that the Town of Shediac will pay for strength reductions based on concrete test cylinders at 28 days.

|      | <b>Compressive Strength</b>                             | <b>Pay Percentage of Unit Bid</b>             |
|------|---|---|
| i)   | Less than 32.0 MPa<br>Equal to or greater than 30.0 MPa | 80% of unit bid                               |
| ii)  | Less than 30.0 MPa<br>Equal to or greater than 28.0 MPa | 60% of unit bid                               |
| iii) | Less than 28.0 MPa                                      | Complete replacement at Contractor's expense. |

### 9.5.6. Reduced Payment Schedule - Scaling

Individual concrete sidewalk blocks and curb sections showing evidence of scaling during the warranty period shall be noted according to severity of surface damage.

The Town of Shediac will not accept a concrete sidewalk showing signs of scaling on more than 50% of its surface. All such areas must be replaced at the Contractor's expense.

The table below lists the rates that the Town of Shediac will pay for scaled concrete.

|      | <b>Percentage of Surface Damage</b> | <b>Pay percentage of Unit Bid</b>             |
|------|-------------------------------------|---|
| i)   | Less Than 10                        | 100   |
| ii)  | 10 - 25                             | 75  |
| iii) | 25 - 50                             | 50  |
| iv)  | More than 50                        | Complete replacement at Contractor's expense. |

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**ELEVATION ADJUSTMENT OR REPLACEMENT  
OF MUNICIPAL STRUCTURES**

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**10. ELEVATION ADJUSTMENT OR REPLACEMENT OF MUNICIPAL  
STRUCTURES****10.1. Scope**

This section governs the supply of all labour, equipment and materials for the adjustment or replacement of structures such as manholes, catch basins, inlets and valve boxes to the proper elevation in accordance with the plans and specifications or as directed.

**10.2. Materials**

10.2.1. All materials shall be supplied by the Contractor.

10.2.2. Concrete shall conform to the requirements of CSA A23.1 unless these specifications provide otherwise.

10.2.3. Valve box, curb box and valve box accessories shall conform to the Town Standards. Cast-iron valve box extensions shall be the screw type only. The Mueller adjustable valve box top (AJBV-5D), or equivalent will be accepted under certain conditions, to be determined by the Engineer or his designate, providing that the top bell section of the cast iron valve box has been properly cut off to allow for fit. Covers shall be Bibby Ste. Croix VB-825 (112mm depth) (or Mueller AJBV-5C when using the self-adjusting Mueller valve box top section) or equivalent, and will be marked "Water". Covers must have appropriate openings to allow insertion of a pick for ease of removal. See Detail Drawings. Valve box covers and upper section adjustment units shall be of the long neck design.

10.2.4. Pre-cast reinforced concrete manhole and catch basin sections shall meet the requirements of the latest CAN/CSA Standard A257.4 and ASTM Standard C478. Concrete sections shall be legibly marked with the manhole, catch basin and specification designation, date of manufacture, and name or trademark of the manufacturer. Marking shall be indented or painted thereon with waterproof paint.

10.2.5. Backfill shall be as per Section 7 of these specifications.

10.2.6. Final height adjustment to catch basins shall be made using approved cast-iron rings and/or steel inserts, according to Detail Drawings.

**10.3. Construction Methods****10.3.1. General**

Manholes, catch basins, sluice boxes, valve boxes and curb boxes requiring adjustment shall be raised or lowered in order to match the proposed finish grade of the sidewalk, curb and gutter, roadway or boulevard as per detail drawings.

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## **ELEVATION ADJUSTMENT OR REPLACEMENT OF MUNICIPAL STRUCTURES**

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### 10.3.2. Preparation

The material immediately surrounding the structure to be adjusted shall be carefully excavated and piled neatly nearby so as to cause minimum interference to vehicular and pedestrian traffic. Cutting of pavement shall be carried out so as to leave a vertical edge.

### 10.3.3. Adjustment

The structure, once uncovered, shall be adjusted up or down so as to have the top of the structure 10mm below the finished grade level.

Existing pre-cast concrete catch basins and manholes shall be adjusted to finished grade levels with rings and covers sloped to match the crown of the road. Pre-cast sections, if required, shall be joined with Ram-nek gaskets or approved jointing compound. Cement mortar will not be allowed for jointing concrete sections.

Manholes and catch basins shall be lowered by removing the top section and replacing it with a shorter section.

Water valve boxes and curb boxes shall be adjusted to the required elevation.

Valve box and curb box extensions, if required, shall be supplied by the Contractor.

### 10.3.4. Valve Box and Curb Box Repair or Extension

Should the Contractor encounter a valve box or curb box requiring repair or extension the box will be excavated and the repair or extension performed using materials and methods conforming to these Standard Municipal Specifications. Upon completion of the repair, the box will be properly adjusted and backfilled with aggregate base material compacted to ninety-five percent (95%) of maximum dry density as determined by ASTM Standard D698. No separate payment shall be made for final height adjustment.

### 10.3.5. Backfilling around structures

The aggregate base material excavated from around the structures shall be replaced in uniform layers not exceeding 300mm in thickness and shall be compacted using suitable vibration compactors to ninety five percent (95%) maximum dry density as determined by ASTM D698. For excavation below subgrade, backfilling will be done using suitable material compacted to 95% of maximum density.

If the excavated material is unsuitable for use as backfill, imported fill material shall be supplied by the Contractor and the unsuitable material removed and disposed of in accordance with paragraph 44 of General Conditions. Payments shall be at the contract unit price for fill material as specified in Section 7 of these specifications.

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**ELEVATION ADJUSTMENT OR REPLACEMENT  
OF MUNICIPAL STRUCTURES**

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**10.4. Measurement and Payment****10.4.1. Measurement**

Each manhole, catch basin, sluice box, valve box and curb box that is adjusted shall be measured as a single unit. Materials, required to adjust manholes or catch basins beyond 450mm, or for repair work, will be measured for payment. If valve box extensions or curb box extensions are required they will be measured for payment.

**10.4.2. Payment**

Payment for this work shall be at the contract unit price for the adjustment of valve boxes, for adjustment of curb boxes and for the adjustment of manholes. For the purpose of payment, all catch basins and sluice boxes shall be considered manholes.

Manual adjustments to curb boxes not requiring excavation will be considered incidental.

The Contractor will be reimbursed for the cost of materials required to adjust manholes or catch basins beyond 450mm, valve box extensions and curb box extensions unless allowed for in the Schedule of Quantities and Prices. Copy of purchase invoices for these materials will be required to substantiate the claim.

All work done or materials supplied by the Contractor for which specific unit prices are not named in the contract, as well as any minor details or work not specifically mentioned in the specification but obviously necessary for the proper completion of the work, shall be considered as incidental and as being a part of and included with the work for which prices are named in the contract. The Contractor will not be entitled to any extra or additional compensation thereof.

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**REMOVAL AND DISPOSAL OF  
EXISTING ASPHALT AND CONCRETE**

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## **11. REMOVAL AND DISPOSAL OF EXISTING ASPHALT AND CONCRETE**

### **11.1 Scope**

This section governs the removal haulage and stockpiling and disposal of existing asphalt or concrete.

### **11.2 Construction Methods for Cut and Removal**

The Contractor shall cut and remove all pavement or concrete as marked or specified, within the limits of the proposed work. In order to facilitate removal and prevent lifting or damage to adjacent pavement, concrete or structures during excavation, vertical cuts shall be made with cutting saw in a manner so as to provide a straight line and proper transition between material that is to remain and what is to be removed and must be done in a manner which leaves the aggregate base undisturbed. Under no circumstances will the cutting of pavement be allowed by the use of excavators or backhoe buckets, etc.

Where concrete sidewalk has been overlaid with a layer of pavement, the removal will be considered as removal of concrete only.

Where excavated materials are to be recycled for Town use, they will remain the sole property of the Town of Shediac and any use, disposal or sale thereof, not specifically approved in writing is strictly forbidden.

Where materials are not designated for recycling, they will become the property of the Contractor and may be used or disposed of as the contractor sees fit, respecting all Federal, Provincial and Municipal regulations and requirements, including acquisition of permits, etc.

### **11.3 Construction Methods for Cold Milling of Asphalt Pavement**

In full depth removal, care must be taken not to contaminate the reclaimed asphalt pavement (RAP) with the underlying aggregate base material. All loose material remaining after cold milling shall be swept to a granular shoulder or picked up from paved shoulders or gutters before re-opening to traffic.

When partial depth removal is performed on a road with paved shoulders, and some or all of the shoulder is to remain, the Contractor shall provide for drainage. The Contractor shall remove all pavement from the faces of gutter, catch basins or manholes and other structures abutting the work, in such a manner that the structures are not damaged, and the area after removal matches the grade of the adjacent area. Any RAP that falls into structures shall be removed.



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## **REMOVAL AND DISPOSAL OF EXISTING ASPHALT AND CONCRETE**

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At all transverse vertical cuts milled in the existing pavement at the limits of the work area, the Contractor shall immediately construct a temporary smooth taper with hot mix asphalt concrete to a minimum slope of 25:1.

The Contractor shall continuously maintain the site work, in a condition to provide for the safe and efficient flow of traffic, free of potholes and any sharp transitional edges, from the time of removal until such time as the new asphalt concrete is placed.

### **11.4 Removal and Stockpiling of Materials**

Where excavated materials are to be retained for Town use, they will remain the sole property of the Town of Shediac and any use, disposal or sale thereof, not specifically approved in writing is strictly forbidden. All RAP, retained for Town use, shall be loaded and hauled to sites as directed by the Engineer.

Where materials are not designated for recycling, they will become the property of the contractor and may be used or disposed of as the contractor sees fit, respecting all regulations, by-laws, etc., pertaining to these materials and shall be disposed of in accordance with paragraph 44 of General Conditions.

### **11.5 Measurement**

The work shall be measured in square metres of pavement removed, linear metres of curb and gutter removed and square metres of sidewalk removed.

### **11.6 Payment**

Payment for the work shall be at the contract unit price for pavement removal, for curb and gutter removal and for sidewalk removal. Where material is salvaged for use by the Town, the cost of overhaul to the Town salvage site or site designated in the specifications will be included in the price for removal.

Where material is not salvaged by the Town and becomes the property of the Contractor, payment for overhaul and disposal at the Contractor's site will be included in the price for removal.

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**PROPERTY RESTORATION**

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**12. PROPERTY RESTORATION****12.1. Scope**

This section governs the supply of all labour, equipment and materials necessary for property restoration within or adjacent to the construction area as shown on the plans or as directed.

**12.2. Materials**

12.2.1. All materials shall be supplied by the Contractor.

12.2.2. Asphalt concrete shall conform to Section 8 of these specifications.

12.2.3. Crushed rock for driveway restoration shall be 19mm minus, unless otherwise specified.

12.2.4. Seeding, topsoil and sodding shall be as per Section 13.

**12.3. Construction Methods**

Where it is necessary to place sidewalk or curb and gutter adjacent to a paved area, the pavement shall be repaired following construction. Pavement repairs shall be accomplished using New Brunswick Department of Transportation mixes of asphalt material to meet the sidewalk or curb and gutter and restore the area to its original condition or better.

The edge of existing pavement to be restored shall be cut in a straight line to full depth using a saw. The surface of the existing pavement adjacent to the cut shall be swept clean in areas requiring paving. Tack coat shall be applied to all edges of the existing pavement, the edge of the sidewalk or curb and gutter where the asphalt concrete will abut, and to the edge of the pavement cut, and over the surface of existing pavement requiring paving.

Where it is necessary to place sidewalk or curb and gutter adjacent to crushed stone driveways or walkways, they shall be repaired following construction. Such repairs shall be accomplished using a matching gradation and color of existing crushed rock, 19mm minus crushed rock, unless other sizes are allowed for in the Schedule of Quantities and Prices, to meet the sidewalk or curb and gutter and to provide a proper grade for pedestrian and vehicle traffic and proper drainage. Restoration is to be completed as soon as possible at each individual property and not be left to the end of the project.

Where it is necessary to do restoration of driveways that are constructed of crushed rock not readily available at local quarries because of the type, gradation and colour, the contractor must retain and stockpile the crushed stone in the individual owner's driveway for use in driveway restoration.

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**PROPERTY RESTORATION**

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**12.4 Measurement**

The work shall be measured in tonnes of asphalt concrete in-place and tonnes of crushed rock in-place.

Each driveway that requires retention of existing crushed rock, brick pavers or non-standard materials for restoration shall be considered individually.

**12.5 Payment**

Payment for this work shall be at the contract unit price for asphalt concrete in-place including tack coat and for crushed rock in-place.

Payment for non-standard driveway restoration will be based on a negotiated price prior to work being done and paid for under contingency allowance, if not listed in tender items.

Where proper restoration requires cutting back embankments or slopes on private property to obtain proper grade, the excavated material shall be classified as extra excavation and paid by cubic measure.

All work to be done by the Contractor for which specific unit prices are not names in the contract or not specifically mentioned but obviously necessary for the proper completion of the work, shall be considered as incidental and as being a part of and included with the work for which prices are given in the contract.

## TOPSOILING, SEEDING AND SODDING AND EROSION CONTROL

### 13. TOPSOILING, SEEDING AND SODDING AND EROSION CONTROL

#### 13.1. Topsoiling, Seeding and Sodding

##### 13.1.1. Scope

This section governs the supply of all labour, equipment and materials for topsoiling, seeding and sodding of property for the purposes of establishing or restoring ground surface. All work under this section shall be completed by a landscaper company of person with current membership in the Canadian Nursery Landscaping Association (CNLA), unless otherwise approved by the Engineer.

##### 13.1.2. Materials

Note: All materials shall be approved by the Engineer prior to incorporation into the works and shall meet the following criteria:

13.1.2.1. All materials are to be supplied by the Contractor. The Engineer shall be informed of proposed source of topsoil and sod and samples shall be provided before work begins. Basic soil tests will be done by N.P.K. (nitrogen / phosphorous / potassium - pH). If test results indicate amendments required, work will not commence until corrected and accepted by the Engineer.

##### 13.1.2.2. Topsoil

Friable loam shall contain a minimum of 4% organic matter for clay loams and 2% for sandy loams to a maximum of 20% by volume, and having a pH of 6.0 to 7.0. Topsoil shall be free of admixture of subsoil, refuse, roots, stumps, sod, and stones larger than 20mm.

##### 13.1.2.3. Fertilizer

Fertilizer shall be complete commercial, specially blended for promoting root development of newly seeded or sodded areas, **Scotts Turfbuilder**, **Nutrite Nutri S Starter Fertilizer**, **Nu-Gro Turf Starter** or approved equal with a formulating ratio of:

2:4:1 80% SCU for Spring and early Fall planting (6-12-3)

1:4:1 100% SCU for late Fall planting (6-24-6)

##### 13.1.2.4. Lime

Agriculture grade dolomitic limestone containing total 85% carbonates and graded as follows:

| SIEVE DESIGNATION | CUMULATIVE & PASSING |
|-------------------|----------------------|
| N°10              | 100%                 |
| N°100             | 50%                  |

## TOPSOILING, SEEDING AND SODDING AND EROSION CONTROL

### 13.1.2.5. Seed and Hydraulic Seed Mix

Canada N° 1 lawn grass mixture to Government of Canada Seeds Regulations having a minimum germination of 75% with a purity of 95%.

The grass seed mixture containing the following formulation shall be used on areas adjacent to privately maintained properties:

| % BY WEIGHT                               | REGULAR MIX   |
|---|---|
| <b><u>APPLICATION RATE: 245 kg/ha</u></b> |   |
| 60%                                       | Kentucky Bluegrass (min - 3 varieties)<br>equal % by weight                   |
| 20%                                       | Fescues (80% Creeping Red 20% Tall)   |
| 20%                                       | Nurse Grasses (100% Perennial Rye)<br>or<br>(80% Perennial Rye + 20% Red Top) |

The grass seed mixture containing the following formulation shall be used on low maintenance area (i.e. landfills):

| SEED MIX % BY WEIGHT                      | SPECIES                |
|---|------------------------|
| <b><u>APPLICATION RATE: 167 kg/hg</u></b> |                        |
| 40%                                       | Creeping Red Fescue    |
| 20%                                       | Hard Fescue            |
| 15%                                       | Canadian Blue Grass    |
| 10%                                       | Alsike or White Clover |
| 10%                                       | Annual Ryegrass        |
| 5%  | Red Top                |

### 13.1.2.6. Mulch

Wood or wood cellulose fibre, free of germination of growth-inhibiting ingredients and forming blotter-like ground cover allowing absorption and percolation of water.

### 13.1.2.7. Erosion Control Agent

Emulsified asphalt to CAN/CGSB-16.2, Type 2 or polyvinyl acetate polymer.

### 13.1.2.8. Water

Clean, fresh and free from impurities that inhibit plant growth.

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## TOPSOILING, SEEDING AND SODDING AND EROSION CONTROL

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### 13.1.2.9. Sod

Commercial Grade Turfgrass Nursery Sod is grass that has been seeded and cultivated in a nursery sod field as a turfgrass sod. At the time of sale, it should be in a healthy condition. Sod of this quality may contain up to 5 broadleaf weeds per 40 square metres and up to 20% native grasses. Sod should be of sufficient shoot density that no surface soil will be visible from a standing position when mowed to a height of 4cm. The mowing height range should be 7 to 10cm with the exception of Creeping Bentgrass sod, where mowing height is determined by the end use. The thickness of the soil portion of the sod should not exceed 1.5cm. Thickness of the soil portion of the sod may vary with field and environmental condition at the time of harvest. Note that the soil portion is generally composed of at least 50% volume of grass roots.

Commercial Grade Turfgrass Nursery Sod is suitable for erosion control, roadsides, boulevards and minimum maintenance areas.

### 13.1.2.10. Accessories

Pegs - Wood 25mm x 25mm x 200mm nominal size.

Mesh - 37mm chicken wire or plastic

### 13.1.3. Construction Methods

#### 13.1.3.1. Field Conditions

Work shall not be performed under adverse field conditions, such as frozen ground or ground covered with snow, ice or standing water, without prior approval.

For hydraulic seeding (hydro-seeding), reasonable care shall be taken to prevent spraying items such as structures, signs, guide rails, fences, plant materials and utilities. Hydraulic seeding shall not be performed in wind speeds over 20 km/hr. Any over spray on other facilities shall be cleaned-up immediately or the Town shall have it cleaned-up at the Contractor's expense.

For hydraulic seeding (hydro-seeding), all hydrants shall be covered up before spraying and shall be uncovered immediately after spraying.

#### 13.1.3.2. Preparation

Ground surface to be graded to eliminate uneven areas and rough spots, and to ensure positive drainage. All debris, roots, branches, stones in excess of 50mm diameter, and other deleterious materials shall be removed, as well as any subsoil that has been contaminated with toxic materials. Contaminated material shall be disposed of off site.

When topsoil is not required, the area shall be cultivated, or tilled to minimum depth of 50mm.

Cultivation to be repeated in those areas where equipment used for hauling and spreading has compacted soil.

## TOPSOILING, SEEDING AND SODDING AND EROSION CONTROL

### 13.1.3.3. Placing Topsoil

Topsoil shall not be spread until ground surface has been inspected and a test result, of the soil being placed, has been approved by the Engineer.

Topsoil to be spread in uniform layer over dry ground surface where seeding or sodding is indicated. Topsoil shall not be placed on frozen ground surface.

Topsoil to be kept 15mm below finished grade for sodded areas. For seeded areas, topsoil shall be brought to finished grade by applying topsoil to minimum depth of 150mm after rolling.

Topsoil to be fine graded to lines and elevations indicated, leaving surface smooth and uniform with a fine loose texture. Approval of topsoil grade and depth shall be obtained before proceeding with seeding or sodding.

### 13.1.3.4. Application of Lime and Fertilizer (Hydro Seeding Low Maintenance Areas)

Lime shall be applied in accordance with pH test results as determined by soil analysis. Lime shall be mixed thoroughly into full depth of topsoil prior to application of fertilizer, at the following rates:

Please note that the following table is in Imperial measurements as governed by current industry usage.

#### **Limestone Recommended to bring pH to 6.5**

| Sandy Loam Soil |            |                            | Loam Soil  |                           |
|-----------------|------------|----------------------------|------------|---------------------------|
| pH              | Lbs / acre | Lbs / 1000 ft <sup>2</sup> | Lbs / acre | Lbs / 100 ft <sup>2</sup> |
| 4.5             | 5000       | 120                        | 7000       | 160                       |
| 5.0             | 35000      | 80                         | 5000       | 120                       |
| 5.5             | 25000      | 60                         | 3000       | 70                        |
| 6.0             | 1000       | 25                         | 2000       | 45                        |

### 13.1.3.5. Dry Seeding

Seeding shall be completed during local growing season when natural moisture is available to ensure germination and growth (April – June, September – October).

Seed shall be applied with mechanical spreader at a rate 81.6 kg/ha or as recommended by seed manufacturer, then covered and rolled with a roller having a mass of 50 kg/m of width.

## TOPSOILING, SEEDING AND SODDING AND EROSION CONTROL

### 13.1.3.6. Sodding

Sod shall be placed as soon as possible after lifting to ensure proper establishment.

Sod shall be placed in rows perpendicular to the slope, smooth and even with adjoining areas, and with joints staggered. Sections to be butted closely without overlapping or gaps between sections. Irregular or thin sections shall be cut out. If necessary, existing lawn or adjoining areas shall be cut out to accommodate sod. Sod shall never be placed over existing grass or lawn.

Sod shall be rolled with a roller having a mass of 50kg/m of width. Repeated rolling to correct irregularities in grade is not permitted.

Sod shall be watered within 4 hours of placing to obtain moisture penetration through sod into top 100mm of topsoil. The Contractor is responsible for the first full watering when the work has been completed directly in front of a residential property within the town's right-of-way. (Ex. Boulevard areas or directly behind sidewalk fronting a residence) The landscaping company completing the sod work shall provide a bilingual letter (on their letterhead) to every affected homeowner / resident requesting their support and help in continuing the maintenance fronting their home. This letter shall be approved by the Town prior to delivery.

For slopes steeper than 2 horizontal to 1 vertical (2:1), mesh shall be placed over topsoil and secured in-place with pegs, then covered lightly with topsoil. Sod shall be placed next, secured with pegs. Pegs shall be placed at 100mm below the top edges, spaced at 3 pegs per metre and flush with surface of root mat.

### 13.1.3.7. Hydraulic Seeding

Seeding shall be done during local growing season when natural moisture is available to ensure germination and growth (April – June, September – October).

All quantities of material shall be measured by weight or by weight-calibrated volume measurement.

Seeder shall be charged with water and, while agitating, mulch, seed, fertilizer and lime shall be slowly added until all components are thoroughly mixed.

When required, erosion control agent shall be added to seeder and mixed thoroughly to complete seeding slurry.

| <b>Slurry Application per ha</b> |   |
|----------------------------------|---|
| Seed                             | 81.65 kg or as recommended by seed manufacturer |
| Fertilizer                       | 50 kg of nitrogen                               |
| Mulch                            | 1000 kg   |
| Erosion Control Agent            | As recommended by manufacturer or 300 kg        |
| Water                            | Minimum 1000 L                                  |
| Lime                             | As determined by soil analysis                  |

Apply slurry uniformly, blending into grassed areas.

Remove slurry from items and areas not designated to be sprayed.



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## TOPSOILING, SEEDING AND SODDING AND EROSION CONTROL

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### 13.1.3.8. Maintenance: Hydraulic Seeding (Low Maintenance Areas)

Seed or sod shall be watered adequately to assure continued growth. Watering shall be controlled to prevent washouts.

Grass shall be mowed to height of 60mm when it first reaches a height of 80mm, and maintained at height of 50 – 75mm for two more mowings. Clippings that could smother grass shall be removed.

Grassed areas shall be fertilized after first mowing using a turf starter type fertilizer, at the manufacturer's recommended rate.

In the Spring following the initial installation, an approved fertilizer to promote newly seeded or sodded areas, shall be applied.

### 13.1.4. Acceptance

Grassed or sodded areas will be accepted upon completion of third mowing provided that growth is properly established, and the area is free of bare and dead spots and without weeds.

Areas sodded or seeded in the fall will be accepted the following Spring, one month after start of growing season, providing that above acceptance conditions are fulfilled.

Maintenance and mowing shall be continued until acceptance (Low Maintenance Areas).

### 13.1.5. Measurement

The work shall be measured in square metres of topsoil, sod and hydro-seeding in-place.

### 13.1.6. Payment

Payment for this work shall be at the contract unit price for topsoil, sod and hydro-seeding preparation and placement.

Where proper restoration requires cutting back embankments or slopes on private property to obtain proper grade, the excavated material shall be classified as extra excavation and paid by cubic units of measurement.

All work to be done by the Contractor for which specific unit prices are not named in the contract or not specifically mentioned but obviously necessary for the proper completion of the work, shall be considered as incidental and as being a part of and included with the work for which prices are given in the contract.

## 13.2. Erosion and Sediment Control

### 13.2.1. Scope

This section governs the supply of all labour, equipment and materials for the installation of erosion and sediment control measures. All erosion and sediment control work shall be in accordance with NBDOT Standard Specifications Division 600, Item 946 "Work Progression",

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## TOPSOILING, SEEDING AND SODDING AND EROSION CONTROL

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948 "Environment Requirements", NBDOT Environmental Protection Plan and the NBDOT Environmental Field Guide.

### 13.2.2. Materials

All materials and equipment for this item shall be supplied by the Contractor.

### 13.2.3. Construction Methods

Refer to NBDOT Standard Specifications Division 600.

### 13.2.4. Maintenance

A maintenance program should be implemented throughout construction activities. The maintenance program includes daily routine checks, repairs, replacements and an inventory of control materials. All control measures shall be inspected periodically and after each rainfall event.

Ensuring that erosion and sediment control structures are properly maintained will help prevent or limit mosquito breeding. Maintenance should include cleaning out temporary sediment traps and basins, maintaining ditches to ensure positive drainage and removing grass cuttings and other debris.

The sediment and erosion control measures must remain in place and be maintained on functional condition until permanent vegetation has been established, the site has been otherwise stabilized or until instructed by the Engineer.

### 13.2.5. Measurement

#### Mulch

The work shall be measured in square meters of mulch applied. The area shall be measured along the slope of the ground.

#### Mats and Geotextiles

The quantity to be measured for payment shall be the number of square meters of mats or geotextiles installed in accordance with this item. Overlapped joints, patches and seams will be measured as a single layer.

#### Rip Rap

The quantity to be measured for payment shall be the number of tonnes of random rip rap supplied and placed in accordance with this item.

#### Sediment Control Fence

The quantity to be measured for payment shall be the number of linear meters of sediment control fence supplied, installed and maintained in accordance with this item.

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## TOPSOILING, SEEDING AND SODDING AND EROSION CONTROL

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### Erosion Control Structures - Check Dams

The quantity to be measured for payment shall be the number of erosion control structures that are supplied, installed, constructed and maintained in accordance with this item.

### Gabions

The quantity to be measured for payment shall be the volume in cubic metres of gabions supplied and installed in accordance with this item.

### 13.2.6. Payment

#### Mulch

Payment for this work shall be at the contract unit price for straw or hay mulch erosion control.

#### Mats

Payment for work under this item shall be at the unit price.

#### Geotextiles

Payment for work under this item shall include a separate unit price for each type of geotextile, as identified under the contract.

#### Rip Rap

Payment for work under this item shall include a separate unit price for each gradation of rip rap, as identified under this contract.

Cost of the provision of materials, labour and equipment to test the rip rap to resolve disagreement between the owner and the Contractor shall be borne by the Contractor if the test results show that the material does not meet the specified gradation, otherwise the owner shall bear the cost of the test.

Cost of any retesting to resolve the supply of the specified material gradation shall be borne by the Contractor.

#### Sediment Control Fence

Payment for work under this item shall be at the unit price.

### Erosion Control Structures - Check Dams

Payment for work under this item shall include a separate unit price for each type of erosion control structure, as identified under this contract.

### Gabions

Payment for work under this item shall be at the unit price.

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**PIPE CULVERTS**

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**14. PIPE CULVERTS****14.1. Scope**

The work under this section consists of the installation of polyethylene pipe culverts as per plans and specifications.

**14.2. Work Under Other Sections**

14.2.1. Trenching – Section 1

14.2.2. Bedding and Backfilling – Section 2

14.2.3. Reinstatement and Trench Maintenance – Section 3

**14.3. Materials**

14.3.1. All materials shall be supplied by the Contractor.

14.3.2. Polyethylene pipe shall be high-density, double wall with smooth interior surface and a minimum ring stiffness of 320kPa, meeting the requirements of the latest CAN/CSA B182.6. Ends of pipe shall be plain end with proper couplings supplied by the manufacturer.

14.3.3. Crushed rock slope protection to be 75-150mm crushed drainage material.

**14.4. Construction Methods**

Prior to placing the pipe in the ditch, each pipe shall be inspected for defects. All defective pipes shall be removed from the site and replaced with sound materials.

All dirt and gravel must be kept out of the joint so that the corrugations fit snugly.

The pipes and specials shall be laid in the trench so that after the culvert is completed the interior surface shall conform accurately to the grades and the alignment of the ditch. All adjustments of line and grade of pipes laid directly upon the bottom must be done by scraping away or filling in the backfill under the body of the pipe and not by blocking or wedging up.

**14.5. Measurement**

14.5.1. Measurement of culvert pipe shall be per linear metre of the appropriate size and type.

14.5.2. Measurement for imported fill shall be in cubic metres, crushed rock and rip-rap shall be in metric tonnes.

**14.6. Payment**

14.6.1. Payment for culvert pipe shall be per linear metre of the appropriate size of pipe.

14.6.2. Payment for imported fill shall be at the contract unit price per cubic metre, crushed rock and rip-rap shall be at the contract unit price per metric tonne.

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**MULTI-PURPOSE TRAILS**

---

**15. MULTI-PURPOSE TRAILS**15.1. Scope

This section governs the supply of all labour, equipment and materials necessary for construction of multi-purpose trails in accordance with plans and specifications.

15.2. Materials

All materials shall be supplied by the Contractor.

Granular Fill material shall be pit run gravel meeting the latest revision of the Standard Specifications of the Department of Transportation, Section 201.

Aggregate Base material shall be 0-31.5mm crushed rock, as per Section 9.2.2.

Crusher Tailings shall be 0-6mm crushed rock approved by the Town.

Asphalt concrete paving shall be Type "B" Base and Type "E" Surface Course, as per Section 8.2.

15.3. Construction Methods15.3.1. General

Multi-purpose trails shall be constructed to the lines and grades as staked and in accordance with the typical cross-sections shown on the drawings. All equipment and construction methods shall conform to the requirements and practices of the New Brunswick Department of Transportation as stipulated in their General Specifications, latest edition, unless these specifications provide otherwise.

Preparation for multi-purpose trails shall be as per Section 9.3.2 and Section 8.3.3.

For gravel trails, the overall thickness of the trail shall be 300mm, of which 200mm shall be Aggregate Base material topped off with 100mm of crusher tailings. A layer of pit run gravel may be applied under the Aggregate Base material, if required.

For asphalted trails, the overall thickness of the trail shall be 270mm, of which 200mm shall be the Aggregate Base material and 70mm shall be asphalt concrete, Type "B" and "E". Applying Asphalt Concrete shall be as per Section 8.3.4 of these Specifications. Any asphalt quantity placed in excess of 110% of the theoretical quantity, based on the specified thickness, shall not be included for payment.

15.3.2. Replacements

If, at any time before the work is finally accepted, any raveling, shoving or other fault develops in the pavement as laid, all materials in such place shall be removed, the edges of the joints cut square and painted with tack coat and fresh asphalt applied and compacted. All such removal and replacement of unsatisfactory material shall be done at the expense of the Contractor.

---

**MULTI-PURPOSE TRAILS**

---

**15.3.3. Restoration**

All properties within or adjacent to the construction area affected by the Contractor's operations shall be restored to their original or better condition, as per Section 12.

Immediately after completion of the work or any consecutive portion of it, the Contractor shall remove from the site, all unused material, refuse and dirt placed by him, on or in the vicinity of the work, and leave the site in a neat and clean condition.

**15.4. Measurement**

The work shall be measured in lineal meters of gravel trail and lineal metres of asphalted trail.

**15.5. Payment**

The cost of supplying water shall be considered incidental to the work and shall be included in the supplying and spreading of asphalt.

All the work to be done by the Contractor for which specific unit prices are not named in the contract, as well as any minor details or work not specifically mentioned in the specifications, but obviously necessary for the proper completion of the work, shall be considered as incidental and as being a part of and included with the work for which prices are named in the contract. The Contractor will not be entitled to any extra or additional compensation thereof.

Payment for the work shall be at the contract unit price for, lineal metres of gravel trail and lineal metres of asphalted trail.



**APPENDIX “A”****DETAIL DRAWINGS INDEX****DRAWING N°****TITLE**

1. STANDARD MANHOLE SECTION  
FOR PIPE SIZES UP TO 525mmø
2. STANDARD MANHOLE SECTION  
FOR PIPE SIZES UP TO 750mmø
3. STANDARD MANHOLE SECTION  
FOR PIPE SIZES ABOVE 750mmø UP TO 1500mm
4. TYPICAL MANHOLE CROSS-SECTION  
TOP SHAFTING
5. STANDARD CATCH BASIN
6. MANHOLE / CATCH BASIN  
411W FRAME AND COVERS
7. ADJUSTABLE MANHOLE FRAME AND COVER  
FOR USE WITHIN THE PAVEMENT SURFACE
8. SLUICE BOX DETAIL
9. SLUICE BOX  
FRAME AND COVER
10. PIPE BEDDING AND BACKFILL DETAIL  
CLASS “B” AND MODIFIED CLASS “B”
11. SERVICE DETAIL  
CROSS-SECTION AT STREET LINE
12. TYPICAL STREET CROSS-SECTION  
LOCATION OF SERVICES
13. TYPICAL STREET CROSS-SECTION  
LATERAL SERVICES
14. TYPICAL SERVICE CONNECTIONS  
CROSS-SECTION THROUGH PIPES
15. TYPICAL WATER SERVICE  
BRANCH LATERAL
16. STANDARD HYDRANT, LEAD AND VALVE  
INSTALLATION DIAGRAM

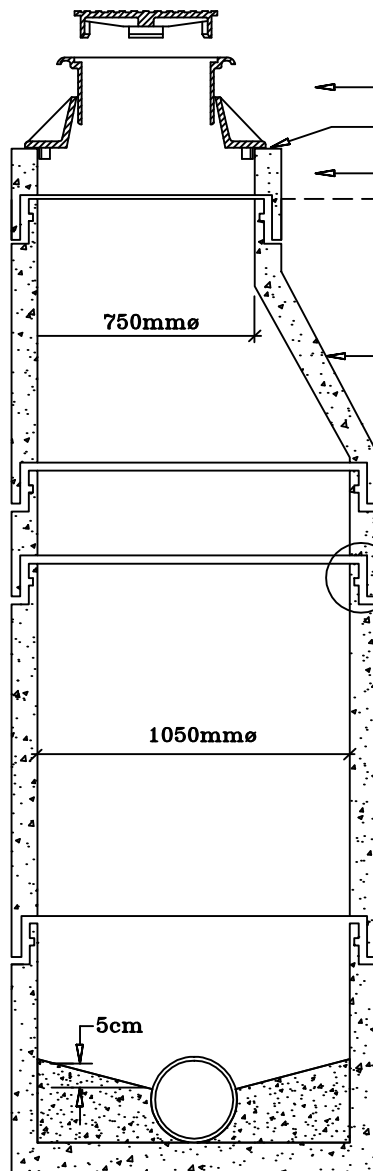


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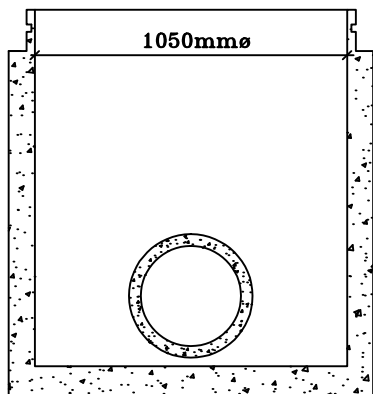
**APPENDIX “A”**

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17. VALVE BOXES
18. CONCRETE THRUST BLOCK DETAIL  
TYPICAL END CAP & TEE
19. CONCRETE THRUST BLOCK DETAIL  
HORIZONTAL BENDS
20. CONCRETE THRUST BLOCK DETAIL  
VERTICAL BENDS
21. CONCRETE THRUST BLOCK REQUIREMENTS  
MINIMUM CONTACT AREAS
22. CONCRETE CURB AND GUTTER  
BARRIER AND MOUNTABLE TYPES
23. SIDEWALK AND BOULEVARD DETAIL  
SECTIONS
24. TYPICAL WHEELCHAIR RAMPS  
FOR STANDARD 6M CURB RETURNS
25. TYPICAL DRIVEWAY ENTRANCE  
FOR STREETS WITH A BOULEVARD
26. TYPICAL DRIVEWAY ENTRANCE  
FOR STREETS WITH SIDEWALK ADJACENT TO THE CURB
27. TYPICAL ROADBED CONSTRUCTION  
RESIDENTIAL STREETS AND COLLECTOR / ARTERIAL STREETS
28. TYPICAL ROAD CROSS-SECTION  
OPEN DRAINAGE
29. DRIVEWAY CULVERT
30. MULTI-PURPOSE TRAILS  
CROSS-SECTIONS



**STORM**



FRAME and COVER (see DWG. N° 7)  
 RAMNEK  
 FLATTOP SECTION (see DWG. N° 4)

ECCENTRIC CONE  
 1050mmø x 750mmø  
 BELL & SPIGOT

THIS 90mm BELL and SPIGOT is  
 REQUIRED ON ALL MANHOLE SECTIONS.  
 COMPLETE WITH "O" RING RUBBER  
 GASKET

INTERMEDIATE SECTIONS  
 VARIABLE HEIGHTS AVAILABLE

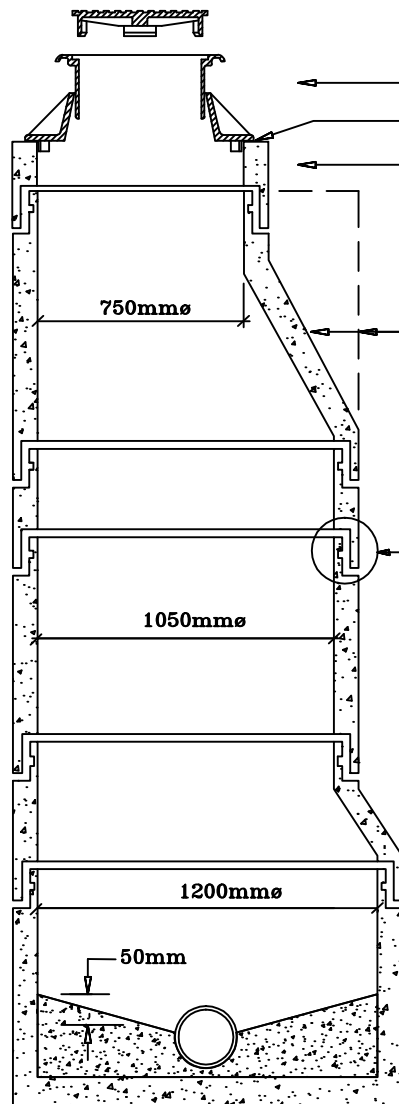
BASE SECTION  
 45cm to 1.5m deep  
 AVAILABLE WITH OR WITHOUT BENCHING

-WHEN STORM MANHOLES ARE USED AS CATCH UNITS  
 AND PLACED IN THE CURB LINE, THEY SHALL BE  
 EQUIPPED WITH A 60cm SUMP.

GENERAL NOTES:

- ALL JOINTS TO BE MADE WATERTIGHT WITH RUBBER GASKETS, OR RAMNEK WHERE APPLICABLE, TO C.S.A. - A257.3
- STRUCTURE TO C.S.A. - A257.4
- CONCRETE TO BE AIR-ENTRAINED, STRENGTH 32mPa (4640 psi) AT 28 DAYS, TO C.S.A. A23.1
- MANHOLE BASE DIAMETER TO BE DETERMINED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION BASED ON MAINLINE PIPE DIAMETER AND DEFLECTION ANGLE.

|                  |                                 |  |
|------------------|---------------------------------|--|
| SCALE: N.T.S.    | <b>STANDARD MANHOLE SECTION</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                                 | FOR PIPE SIZES UP TO 525mmø                  |
| DATE: March 2013 |                                 | DRAWING N° 1                                 |



FRAME and COVER (see DWG. N° 7)

RAMNEK

FLATTOP SECTION (see DWG. N° 4)

750mmø

ECCENTRIC CONE  
1050mmø x 750mmø  
BELL & SPIGOT

1050mmø

THIS 90mm BELL and SPIGOT is  
REQUIRED ON ALL MANHOLE SECTIONS.  
COMPLETE WITH "O" RING RUBBER  
GASKET

INTERMEDIATE SECTIONS  
VARIABLE HEIGHTS AVAILABLE

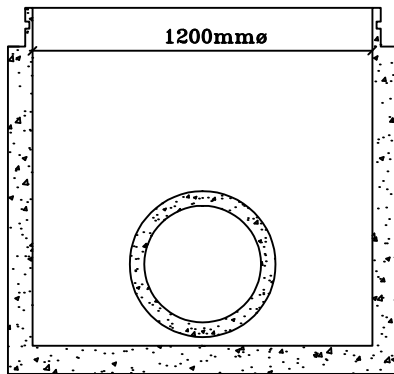
1200mmø

BASE SECTION  
45cm to 1.5m deep  
AVAILABLE WITH OR WITHOUT BENCHING

50mm

STORM

WHEN STORM MANHOLES ARE USED AS CATCH UNITS  
AND PLACED IN THE CURB LINE, THEY SHALL BE  
EQUIPPED WITH A 60cm SUMP.

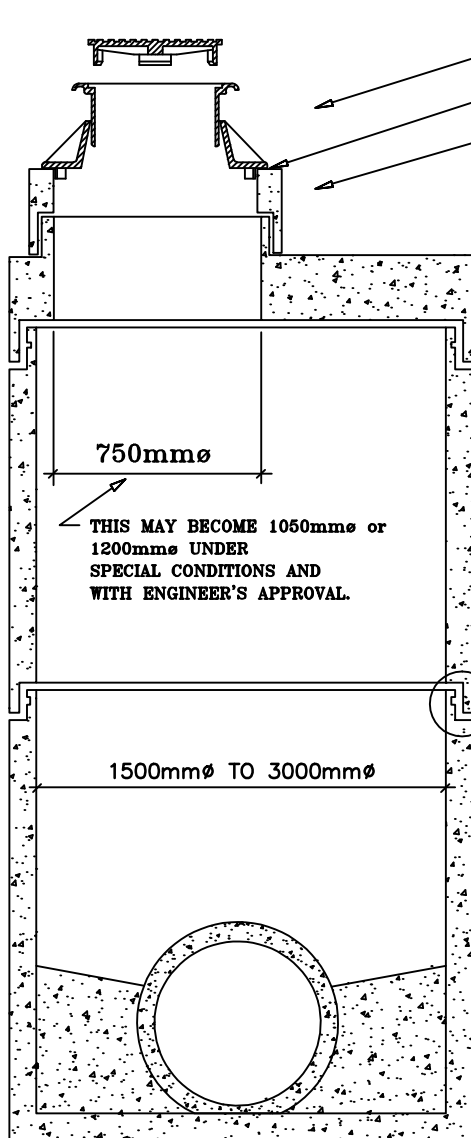


1200mmø

GENERAL NOTES:

- ALL JOINTS TO BE MADE WATERTIGHT WITH RUBBER GASKETS, OR RAMNEK WHERE APPLICABLE, TO C.S.A. - A257.3
- STRUCTURE TO C.S.A. - A257.4
- CONCRETE TO BE AIR-ENTRAINED, STRENGTH 32mPa (4640 psi) AT 28 DAYS, TO C.S.A. A23.1
- MANHOLE BASE DIAMETER TO BE DETERMINED IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATION BASED ON MAINLINE PIPE DIAMETER AND DEFLECTION ANGLE.

|                  |                                 |  |
|------------------|---------------------------------|--|
| SCALE: N.T.S.    | <b>STANDARD MANHOLE SECTION</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                                 | FOR PIPE SIZES UP TO 750mmø                  |
| DATE: March 2013 |                                 | DRAWING N° 2                                 |



FRAME and COVER (see DWG. N° 7)

RAMNEK

FLATTOP SECTION (see DWG. N° 4)

FLAT TOP COVER  
25cm deep

NOTE: USE ECCENTRIC CONE INSTEAD OF  
FLAT TOP COVER IF THE  
DEPTH ALLOWS.

INTERMEDIATE SECTIONS  
VARIABLE HEIGHTS AVAILABLE

750mmø

THIS MAY BECOME 1050mmø or  
1200mmø UNDER  
SPECIAL CONDITIONS AND  
WITH ENGINEER'S APPROVAL.

THIS 90mm BELL and SPIGOT is  
REQUIRED ON ALL MANHOLE SECTIONS.  
COMPLETE WITH "O" RING RUBBER  
GASKET

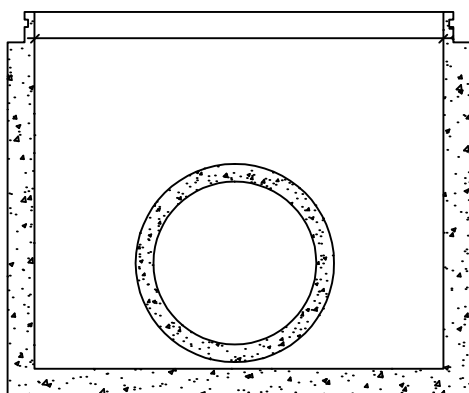
1500mmø TO 3000mmø

BASE SECTION

120cm to 230cm deep  
AVAILABLE WITH OR WITHOUT BENCHING

-WHEN STORM MANHOLES ARE USED AS CATCH UNITS  
AND PLACED IN THE CURB LINE, THEY SHALL BE  
EQUIPPED WITH A 60cm SUMP.

STORM



GENERAL NOTES:

-ALL JOINTS TO BE MADE WATERTIGHT WITH  
RUBBER GASKETS, OR RAMNEK WHERE  
APPLICABLE, TO C.S.A. - A257.3

-STRUCTURE TO C.S.A. - A257.4

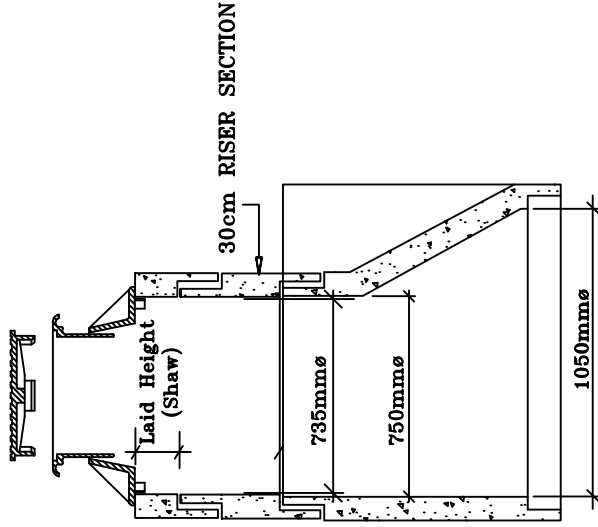
-CONCRETE TO BE AIR-ENTRAINED, STRENGTH  
32mPa (4640 psi) AT 28 DAYS, TO C.S.A. A23.1

-MANHOLE BASE DIAMETER TO BE DETERMINED IN  
ACCORDANCE WITH THE MANUFACTURER'S  
RECOMMENDATION BASED ON MAINLINE PIPE DIAMETER  
AND DEFLECTION ANGLE.

|              |            |                          |  |
|--------------|------------|--------------------------|--|
| SCALE:       | N.T.S.     | STANDARD MANHOLE SECTION | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°: |            |                          | FOR PIPE SIZES ABOVE 750mmø UP TO 1500mm     |
| DATE:        | March 2013 |                          | DRAWING N° 3                                 |

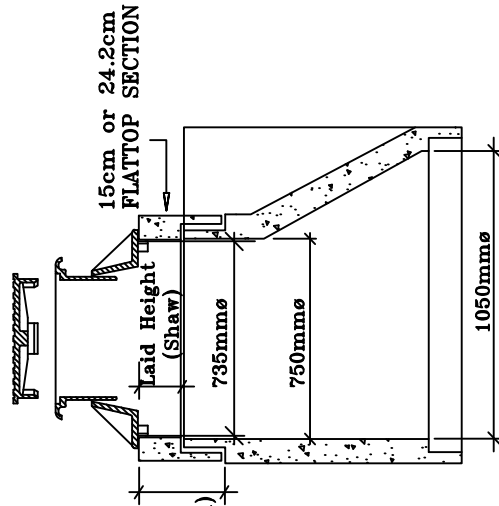
CONE TOP MANHOLE

OPTION ③



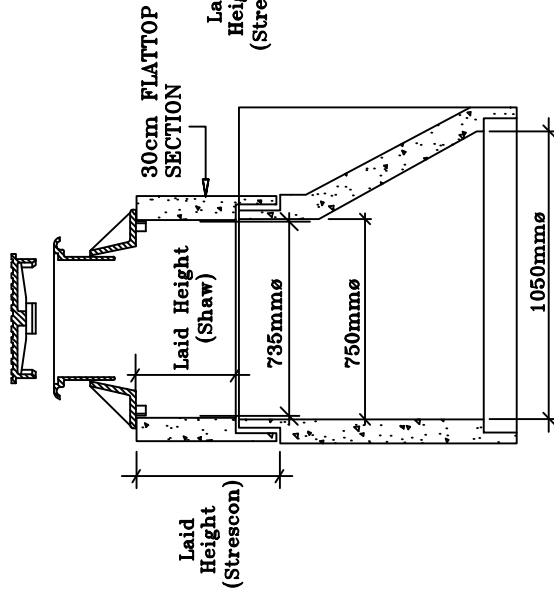
CONE TOP MANHOLE

OPTION ②

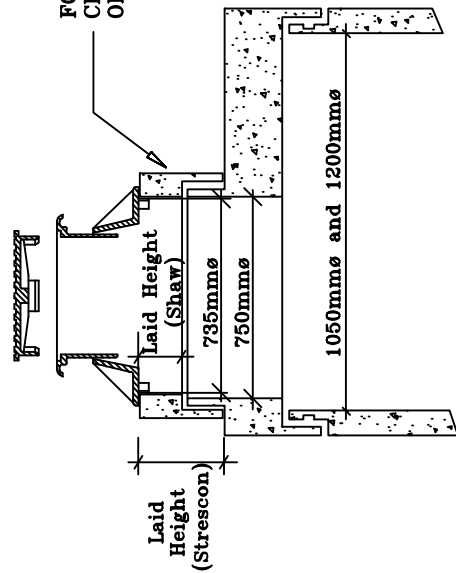


CONE TOP MANHOLE

OPTION ①



FLAT TOP MANHOLE



GENERAL NOTES

- FRAME and COVER (see DWG. N° 7).
- RAMNEK BETWEEN CONCRETE AND STEEL AND ON ALL JOINTS BELOW STEEL FRAME.
- FLATTOP SECTION (follow option 1, 2, or 3).
- TOP OF STRUCTURE TO BE 10mm BELOW FINISHED GRADE.
- STEEL/CAST IRON SHIMS ARE NOT PERMITTED.

FLAT TOP COVER (see DWG. N° 3)

25cm deep

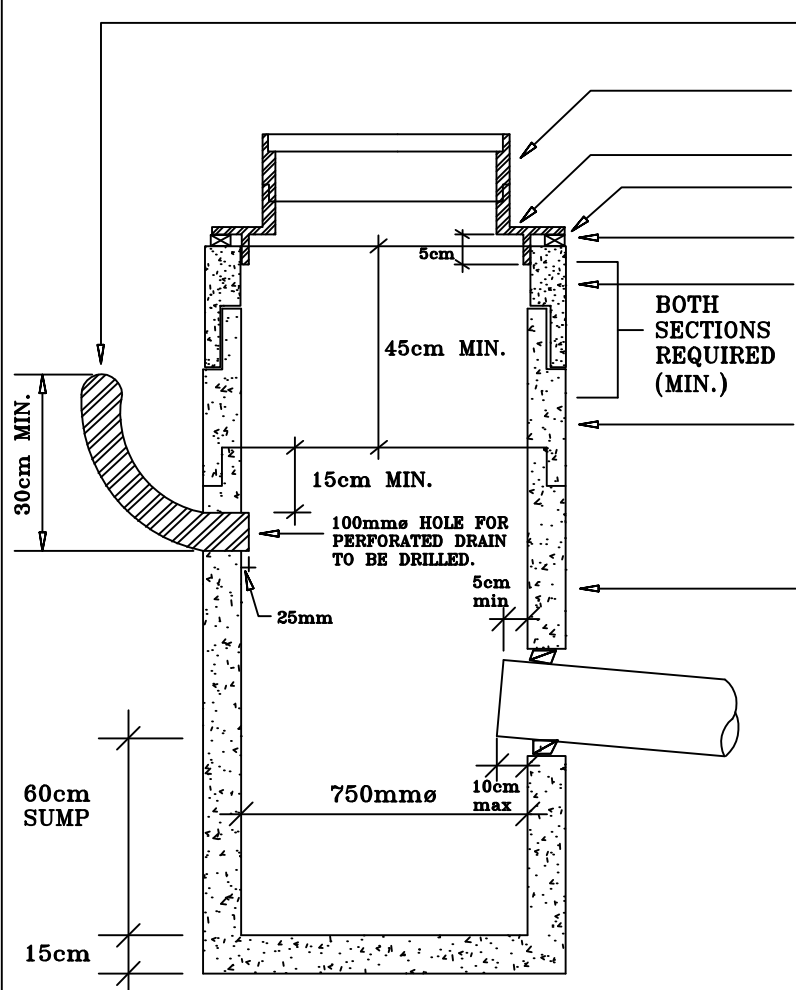
|              |            |
|--------------|------------|
| SCALE:       | N.T.S.     |
| REVISION N°: |            |
| DATE:        | March 2013 |

**TYPICAL MANHOLE CROSS-SECTION**

**TOP SHAFTING**

TOWN OF SHEDIAC  
ENGINEERING  
DEPARTMENT

DRAWING N° 4



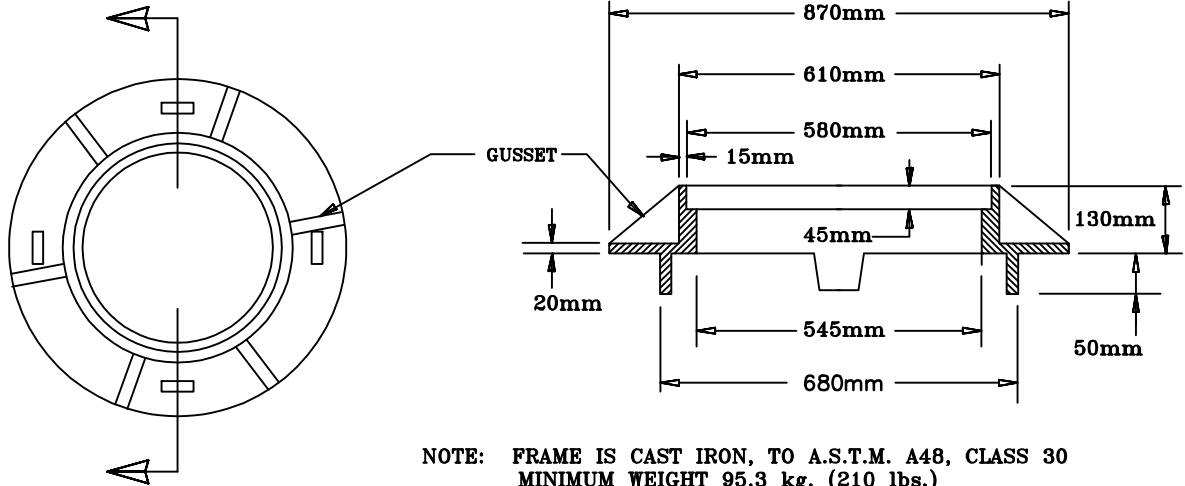
- CONTINUOUS DRAIN TILE
- 411 FRAME EXTENSION - 7cm (optional)  
(MAXIMUM OF TWO)
- FRAME and COVER (see DWG. N° 6)
- RAMNEK
- 25mm CAST IRON RING (optional)  
(MAXIMUM OF ONE)
- BOTH SECTIONS REQUIRED (MIN.)
- 15cm FLATTOP SECTION  
SHAW H150F (150mm Laid height)  
or  
STRESCON COVER SECTION (304mm Laid height)
- 30cm RISER SECTION
- ALL JOINTS TO BE MADE WATERTIGHT  
WITH RUBBER GASKETS, TO ASTM C443  
OR RAMNEK GASKET.
- BASE SECTION  
1.2m deep
- OUTLET PIPE TO BE SECURED  
WITH RAMNEK GASKETS AND  
GROUT AROUND OPENING  
AFTER INSERTION OF PIPE.
- CONCRETE TO BE AIR-ENTRAINED  
STRENGTH 32mPa (4640 psi)  
AT 28 DAYS.

|                  |                             |  |
|------------------|-----------------------------|--|
| SCALE: N.T.S.    | <b>STANDARD CATCH BASIN</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                             | DRAWING N° 5                                 |
| DATE: March 2013 |                             |  |

**FRAME N° 411W**

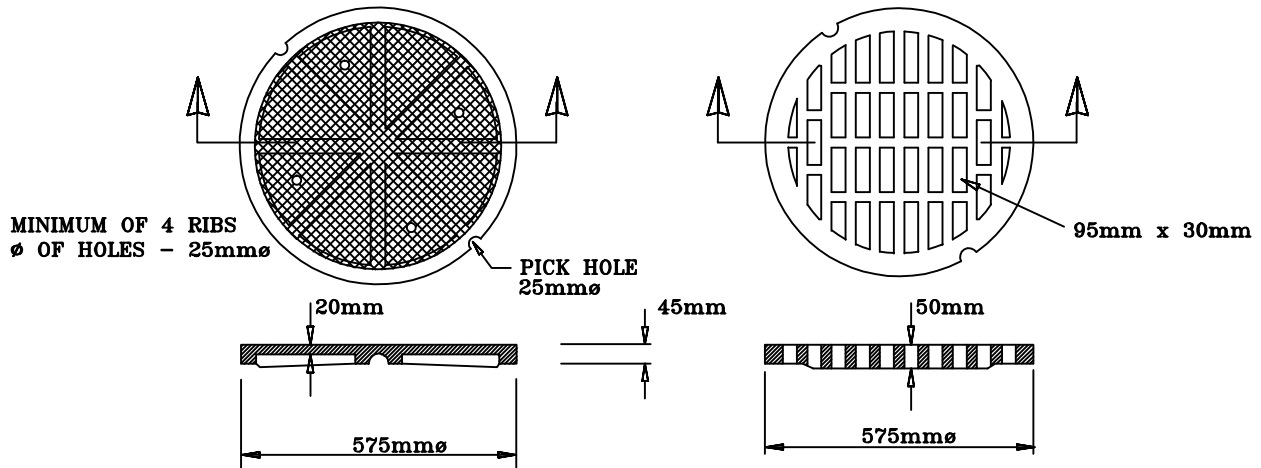
**NOTE:**

ALL CASTINGS MUST HAVE A PERMANENT MARKING, IDENTIFYING THE MANUFACTURER AND MAKE OR MODEL NUMBER OF THE CASTING.



**MANHOLE COVER N° 411  
SOLID**

**CATCH BASIN COVER N° 411  
GRATED**



**NOTE:** ALL COVERS TO BE SNUG FIT, RATTLE FREE.  
COVERS ARE CAST IRON, TO A.S.T.M. A48, CLASS 30.  
M.H. COVER MIN. WEIGHT 43.1kg (95lbs.)  
C.B. COVER MIN. WEIGHT 52.2kg (115lbs.)

|                  |                            |  |
|------------------|----------------------------|--|
| SCALE: N.T.S.    | <b>MANHOLE/CATCH BASIN</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                            | <b>411W FRAME AND COVERS</b>                 |
| DATE: March 2013 |                            | DRAWING N° 6                                 |

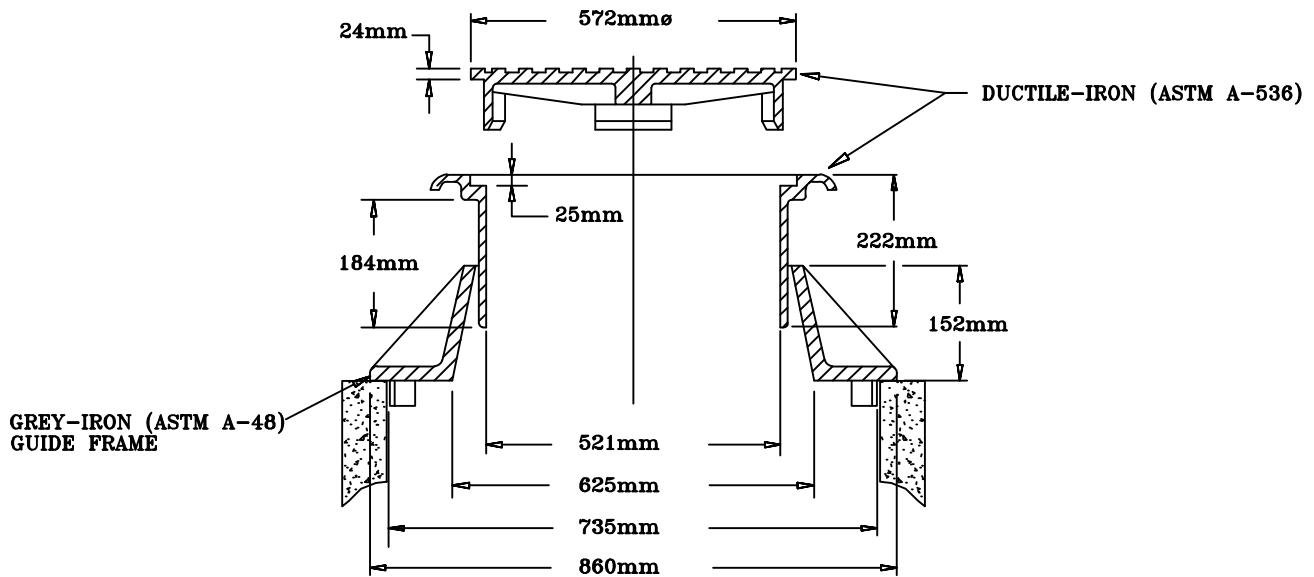
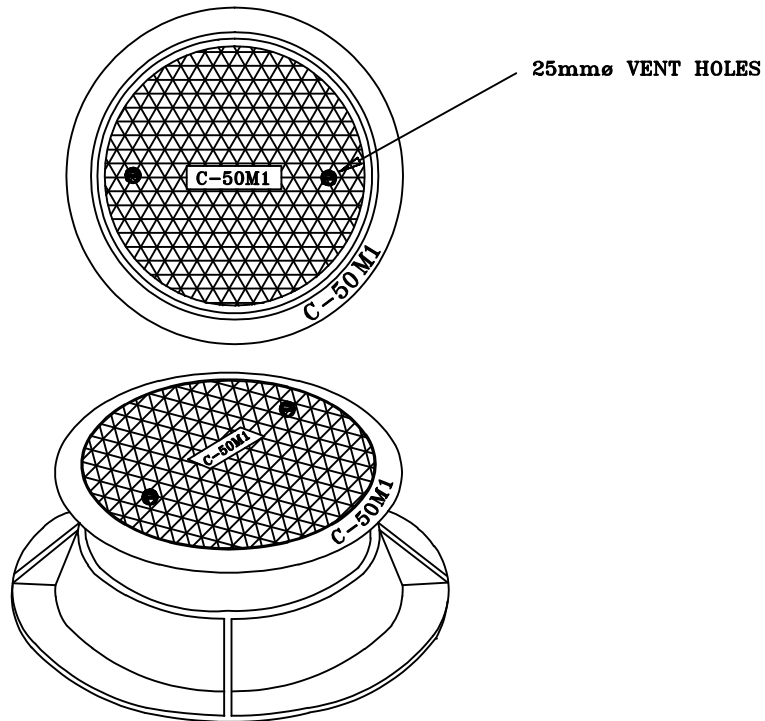
# ADJUSTABLE MANHOLE FRAME & COVER

C-50M1 CONE SHAPED FRAME  
AUTOSTABLE OR APPROVED  
EQUAL.

**IMPORTANT:** WHEN IN USE, THE  
AUTOSTABLE FRAME SHOULD NOT  
REST ON THE GUIDE FRAME. A  
51mm MINIMUM SPACE MUST BE  
RESPECTED.

ALL CASTINGS MUST HAVE A  
PERMANENT MARKING IDENTIFYING  
THE MANUFACTURER AND MAKE  
OR MODEL NUMBER OF THE  
CASTING.

ONE 51mm OR 102mm GUIDE  
FRAME RISER ALLOWED FOR  
HEIGHT ADJUSTMENT.



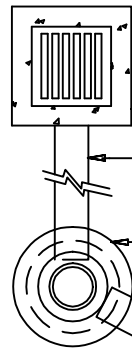
## NOTES:

1. BOTTOM OF GUIDE FRAME/TOP OF CONCRETE.  
20cm - 30cm BELOW PAVEMENT GRADE.
2. MINIMUM WEIGHT  
COVER 55Kg - 120 lbs  
GUIDE & FRAME 98Kg - 216 lbs
3. ADJUSTABLE FRAME AND COVER TO HAVE MACHINED SEATS.
4. ASPHALT DENSITY UNDER THE FRAME IS OF UTMOST IMPORTANCE.
5. TO BE USED ON 750mm $\phi$  CONCRETE FLAT TOP RISER SECTIONS.

|                  |                                     |  |
|------------------|-------------------------------------|--|
| SCALE: N.T.S.    | ADJUSTABLE MANHOLE FRAME AND COVER  | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     | FOR USE WITHIN THE PAVEMENT SURFACE | DRAWING N° 7                                 |
| DATE: March 2013 |                                     |  |



**SCHEMATIC**



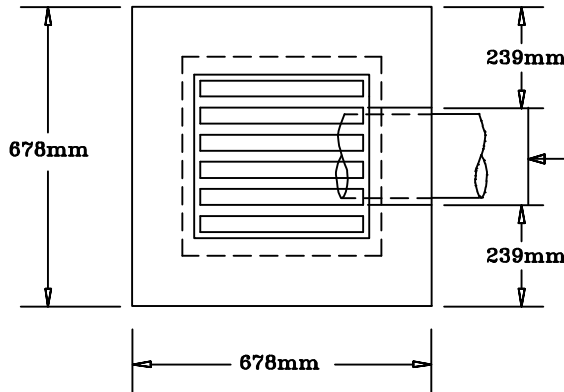
SLUICE BOX GRATE MUST LIE PERPENDICULAR TO DIRECTION OF TRAFFIC.

SLUICE BOX  
150mmø PVC PIPE, DR 35 (COLOR CODED WHITE)

CATCH BASIN

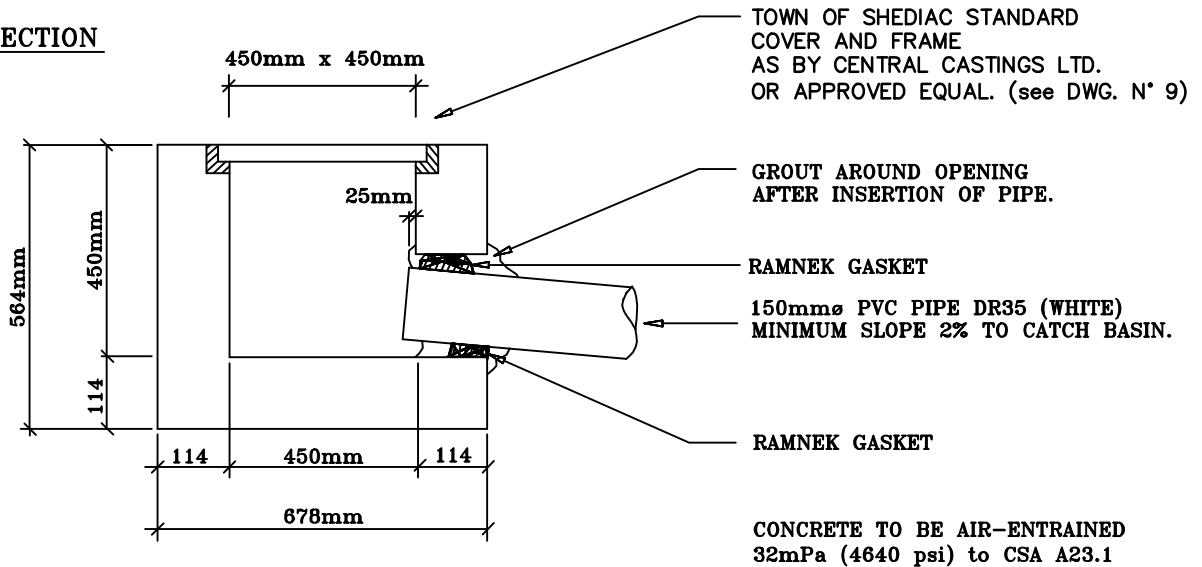
LEAD TO MANHOLE  
150mmø PVC PIPE DR 35 (COLOUR CODED WHITE)

**PLAN**



200mmø PIPE OPENING  
150mmø PVC PIPE, DR 35 (COLOR CODED WHITE)

**CROSS-SECTION**



TOWN OF SHEDIAC STANDARD COVER AND FRAME AS BY CENTRAL CASTINGS LTD. OR APPROVED EQUAL. (see DWG. N° 9)

GROUT AROUND OPENING AFTER INSERTION OF PIPE.

RAMNEK GASKET

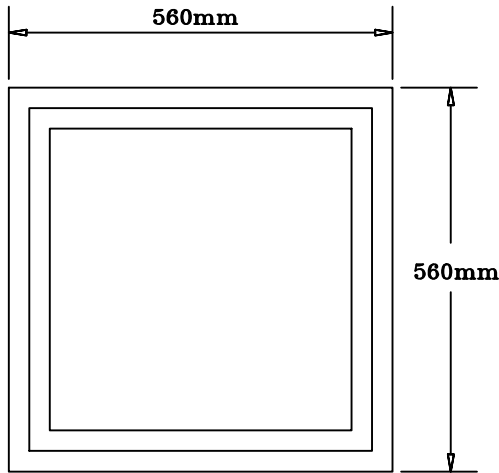
150mmø PVC PIPE DR35 (WHITE) MINIMUM SLOPE 2% TO CATCH BASIN.

RAMNEK GASKET

CONCRETE TO BE AIR-ENTRAINED 32mPa (4640 psi) to CSA A23.1

|                  |                          |  |
|------------------|--------------------------|--|
| SCALE: N.T.S.    | <b>SLUICE BOX DETAIL</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                          | DRAWING N° 8                                 |
| DATE: March 2013 |                          |  |

# FRAME N° 405

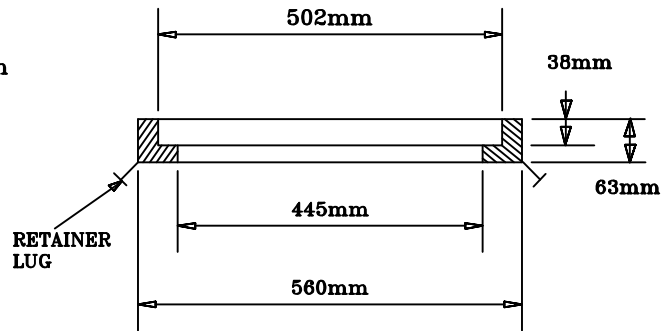


**NOTES:**

ALL CASTINGS MUST HAVE A PERMANENT MARKING, MODEL NUMBER OF THE CASTING, IDENTIFYING THE MANUFACTURER AND MAKE.

FRAME IS CAST IRON, TO A.S.T.M. A48, CLASS 30.

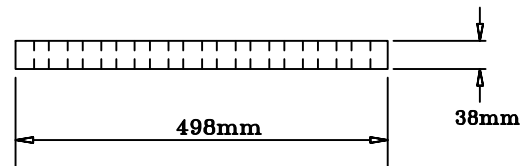
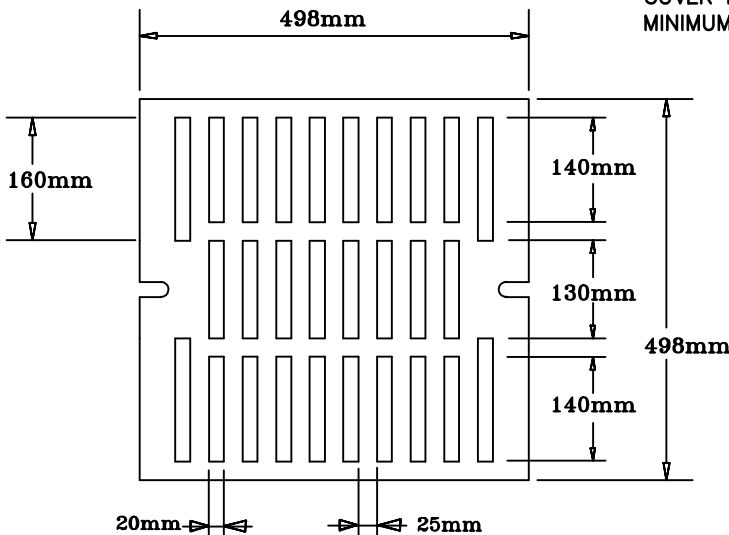
MINIMUM WEIGHT 36.3kg (80 lbs.)



# COVER N° 405

**NOTE:**

COVER IS CAST IRON, A.S.T.M. A48, CLASS 30.  
MINIMUM WEIGHT 36.3kg (80 lbs.)



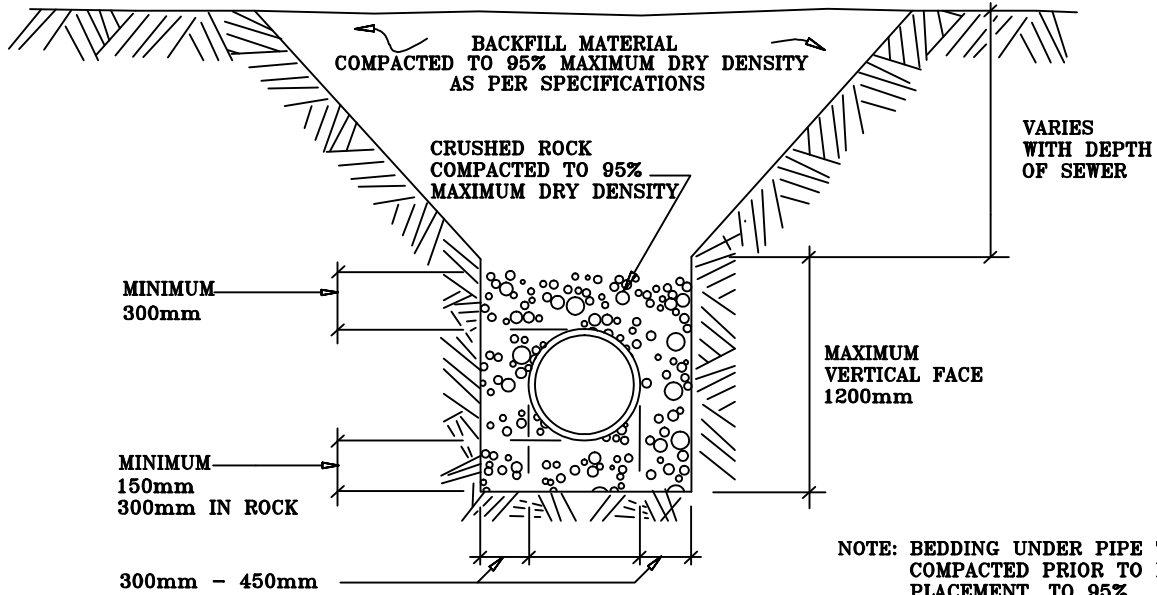
SLUICE BOX FRAME AND COVER AS MANUFACTURED BY CENTRAL CASTINGS LTD. OR APPROVED EQUAL.

|                  |                   |  |
|------------------|-------------------|--|
| SCALE: N.T.S.    | <b>SLUICE BOX</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                   | <b>FRAME AND COVER</b>                       |
| DATE: March 2013 |                   | DRAWING N° 9                                 |

# CLASS "B" BEDDING

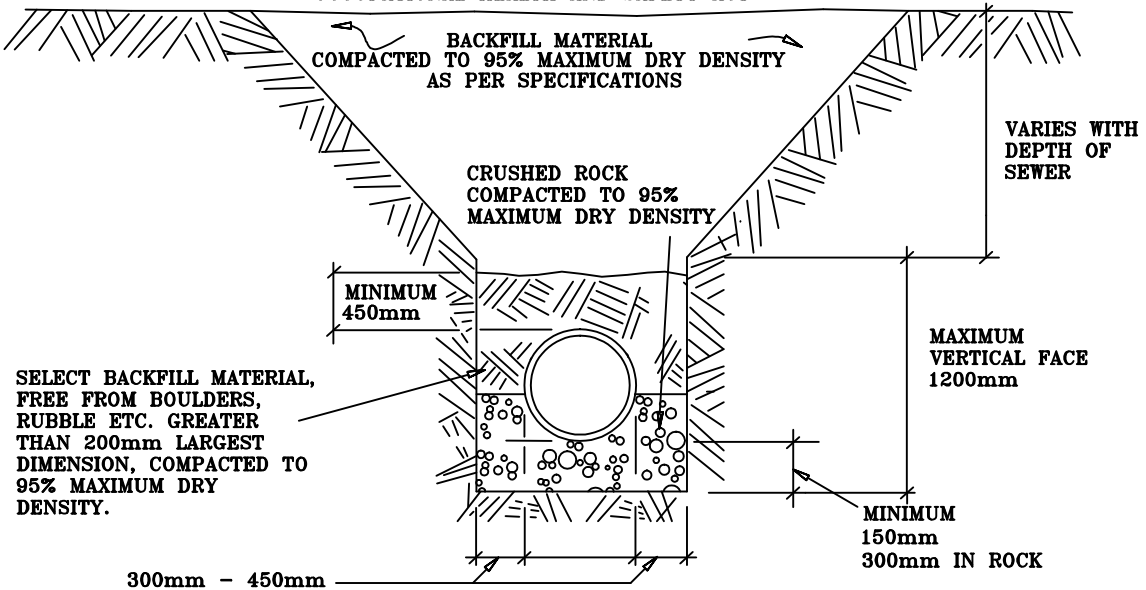
FOR ALL PVC, DUCTILE IRON, and LATERALS PIPES.

TRENCH WALLS TO BE SLOPED OR SHORED IN ACCORDANCE WITH THE N.B. OCCUPATIONAL HEALTH AND SAFETY ACT



# MODIFIED CLASS "B" BEDDING: FOR CONCRETE PIPE

TRENCH WALLS TO BE SLOPED OR SHORED IN ACCORDANCE WITH THE N.B. OCCUPATIONAL HEALTH AND SAFETY ACT



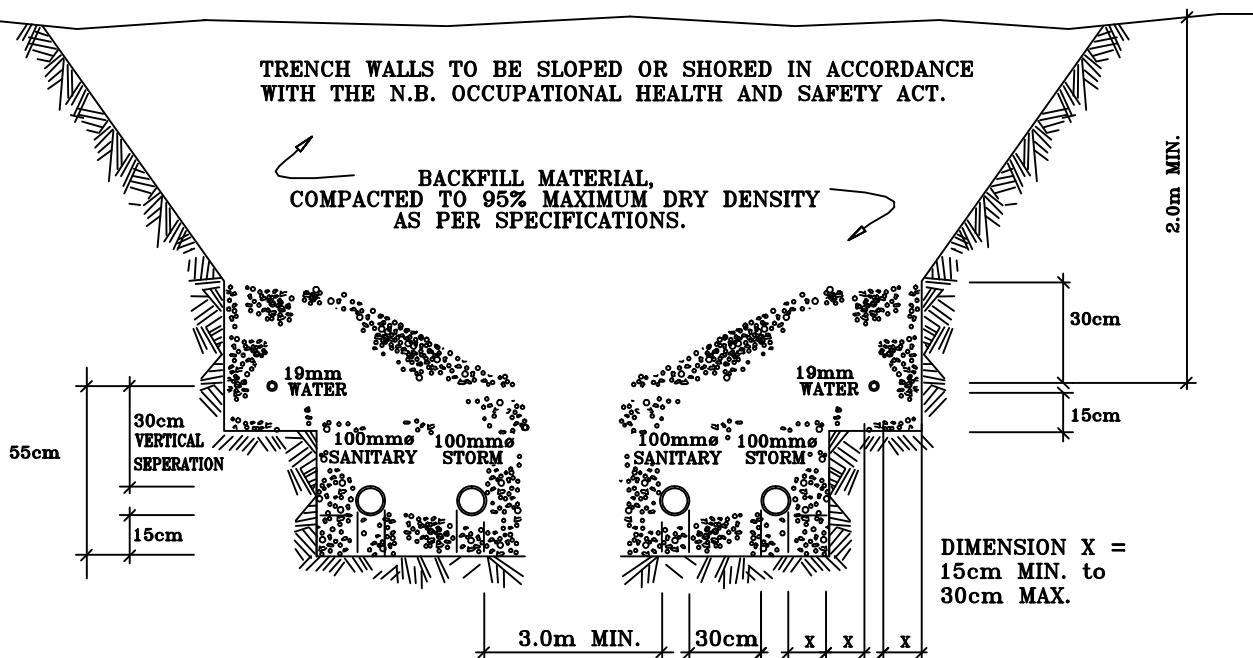
|                  |                                  |  |
|------------------|----------------------------------|--|
| SCALE: N.T.S.    | PIPE BEDDING AND BACKFILL DETAIL | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                                  | DRAWING N° 10                                |
| DATE: March 2013 | CLASS "B" AND MODIFIED CLASS "B" |  |

**NOTE:**  
 THIS IS A CROSS-SECTION VIEW OF A DOUBLE  
 SERVICE APPLICATION, AS VIEWED FROM THE  
 PROPERTY LINE LOOKING TOWARDS THE HOUSE.

FOR SINGLE SERVICE APPLICATION,  
 USE RIGHT SIDE CONFIGURATION BELOW

GENERAL RULE—STORM SEWER ON THE RIGHT.

ALSO SEE DRAWING N° 13



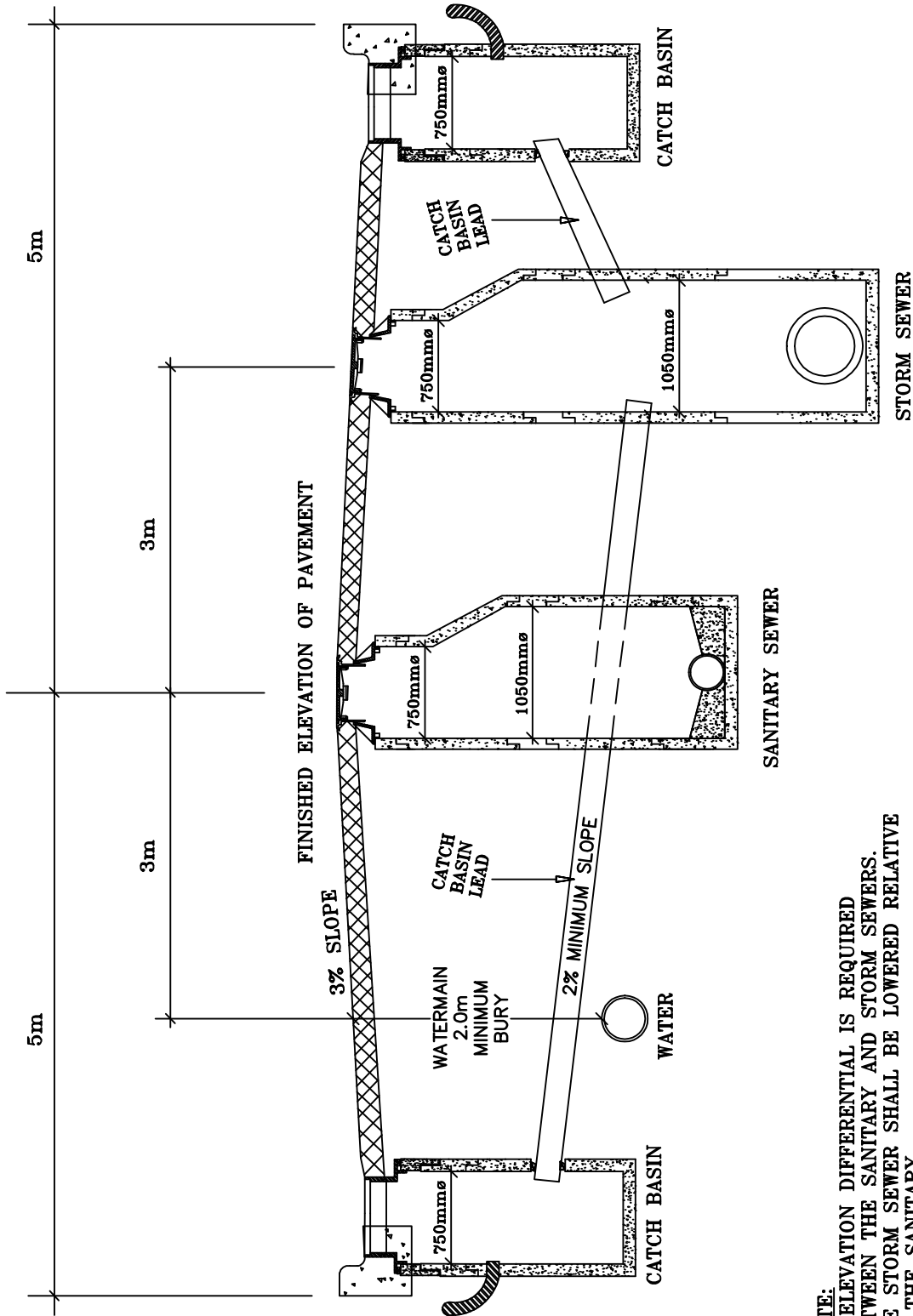
**NOTES:**  
 ALL SEWER LATERALS TO BE PVC PIPE, DR 35.  
 STORM - COLOR CODED WHITE  
 SANITARY - COLOR CODED GREEN

BEDDING UNDER SERVICE PIPES TO BE COMPACTED  
 PRIOR TO PIPE PLACEMENT, TO 95%  
 MAXIMUM DENSITY.

SEMI-DETACHED DWELLINGS SHALL HAVE 2  
 SEPARATE SANITARY SEWER, STORM SEWER  
 AND WATER SERVICES; ONE ON EACH SIDE OF THE  
 COMMON PROPERTY LINE. A MINIMUM OF 3m SHALL  
 SEPARATE THE SETS OF SERVICES AND SHALL BE INSTALLED  
 IN THE SAME TRENCH OR IN SEPARATE TRENCHES.

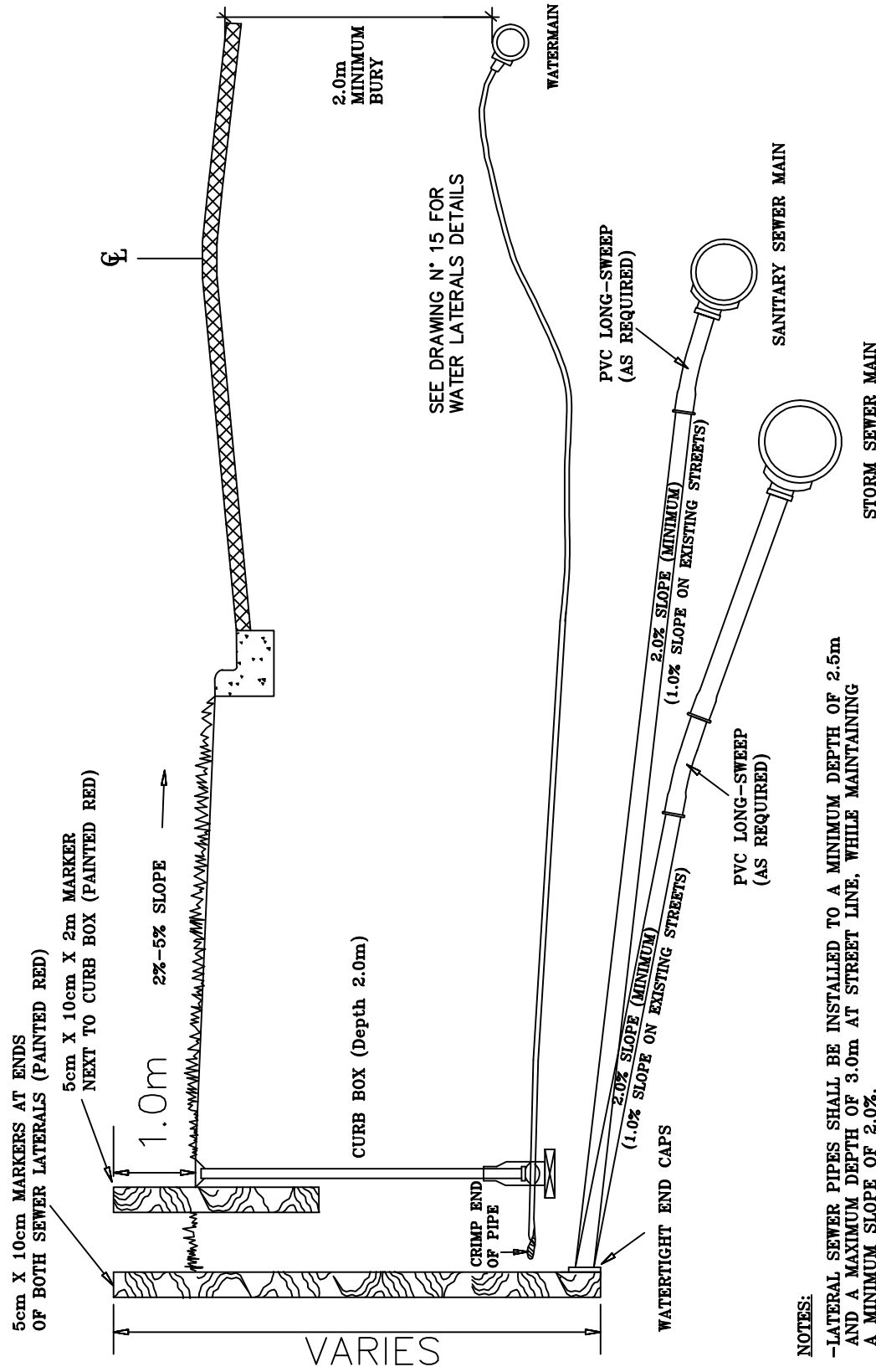
|                  |                       |  |
|------------------|-----------------------|--|
| SCALE: N.T.S.    | <b>SERVICE DETAIL</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                       | <b>CROSS-SECTION AT STREET LINE</b>          |
| DATE: March 2013 |                       | DRAWING N° 11                                |

TYPICAL 10m WIDE STREET



**NOTE:**  
 IF ELEVATION DIFFERENTIAL IS REQUIRED  
 BETWEEN THE SANITARY AND STORM SEWERS,  
 THE STORM SEWER SHALL BE LOWERED RELATIVE  
 TO THE SANITARY.  
 THE AMOUNT OF PROTRUSION OF ANY PIPE INTO  
 A MANHOLE OR CATCH BASIN SHALL BE NOT MORE  
 THAN 10CM AND NOT LESS THAN 5CM.

|                  |                              |  |
|------------------|------------------------------|--|
| SCALE: N.T.S.    | TYPICAL STREET CROSS-SECTION | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                              | LOCATION OF SERVICES                         |
| DATE: March 2013 |                              | DRAWING N° 12                                |



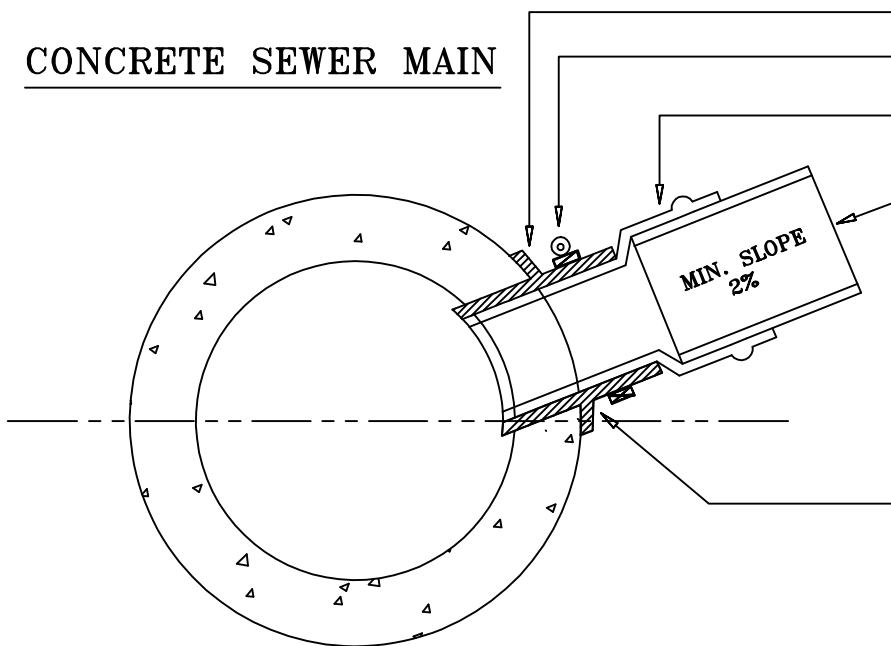
SEE DRAWING N° 15 FOR WATER LATERALS DETAILS

**NOTES:**

- LATERAL SEWER PIPES SHALL BE INSTALLED TO A MINIMUM DEPTH OF 2.5m AND A MAXIMUM DEPTH OF 3.0m AT STREET LINE, WHILE MAINTAINING A MINIMUM SLOPE OF 2.0%.
- WHEN INSTALLATION OF SEWER MAIN IS ON A STREET WITH EXISTING HOUSES, LATERALS MUST BE OF ADEQUATE DEPTH TO PROVIDE DRAINAGE FROM ALL SUMP ELEVATIONS.
- BENDS SHALL BE OF LONG RADIUS TYPE ONLY.
- REFER TO DRAWING N° 11 FOR DETAILS OF SERVICE TRENCH (CROSS-SECTION).

|                  |                                     |  |
|------------------|-------------------------------------|--|
| SCALE: N.T.S.    | <b>TYPICAL STREET CROSS-SECTION</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                                     | <b>LATERAL SERVICES</b>                      |
| DATE: March 2013 |                                     | DRAWING N° 13                                |

**CONCRETE SEWER MAIN**



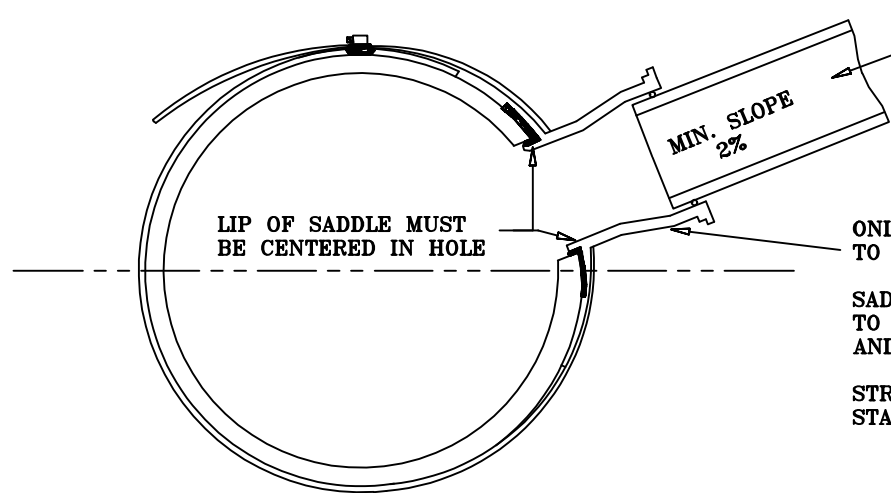
- RUBBER BOOT
- BAND
- PVC HUB
- PVC PIPE, DR 35
- COLOR-CODE**
- WHITE FOR STORM SEWER
- GREEN FOR SANITARY SEWER

WATERTIGHT CONNECTIONS ACCEPTABLE FOR SANITARY AND STORM SEWER LATERALS SHALL BE DONE USING ONE OF THE FOLLOWING SADDLES:

- \*INSERTA-TEE
- \*MISSION RUBBER T-FLEX
- \*DFW/HPI FLEXIBLE SEWER SADDLE

**NOTE:** BENDS SHALL BE OF LONG RADIUS TYPE ONLY.

**PVC SEWER MAIN**



- PVC PIPE, DR 35
- COLOR-CODE**
- WHITE FOR STORM SEWER
- GREEN FOR SANITARY SEWER

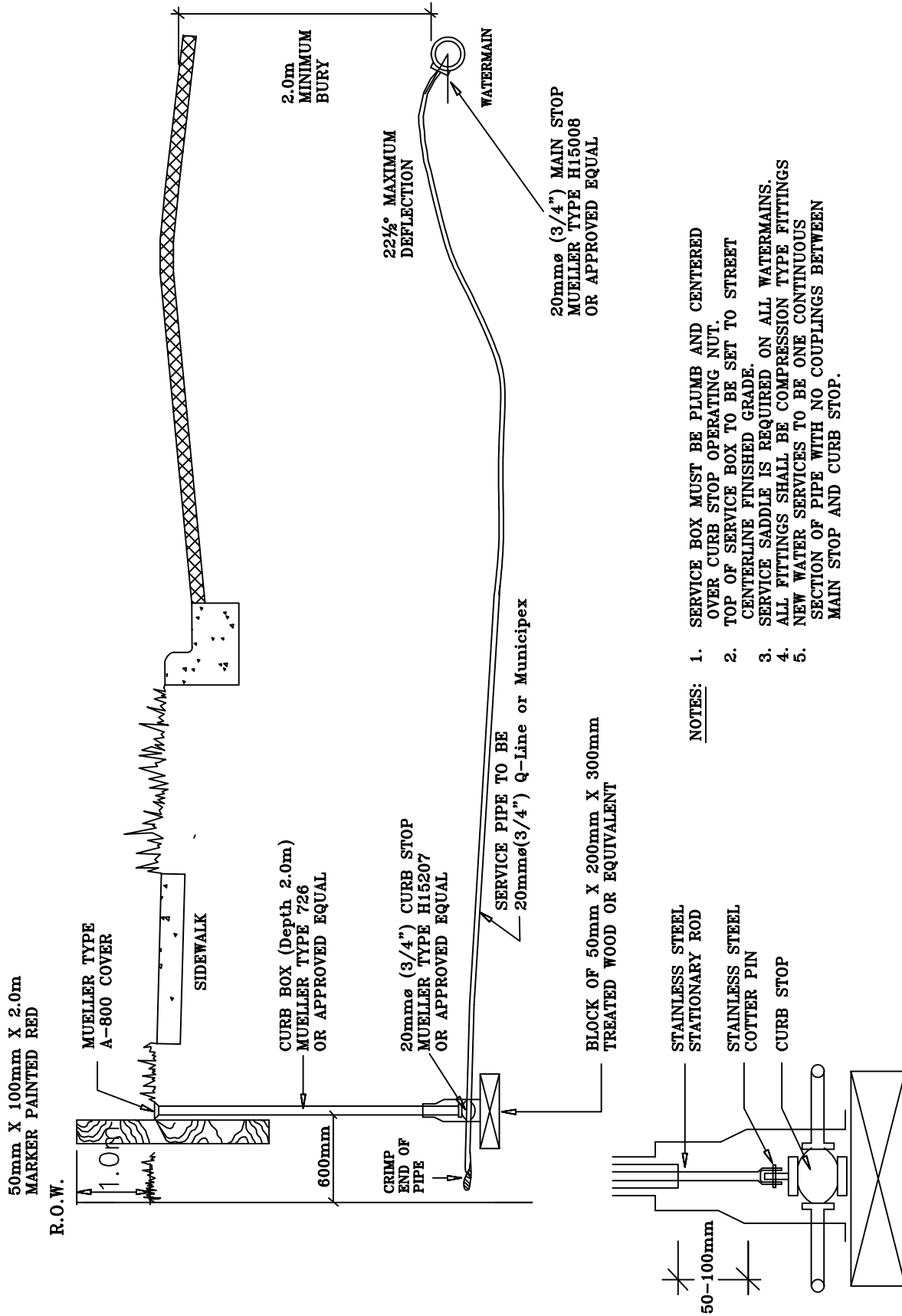
ONLY PVC OR TEE SADDLES TO BE USED.

SADDLES TO OF APPROPRIATE SIZE TO SUIT DIAMETERS OF SEWER MAIN AND SERVICE LATERAL.

STRAPS AND FITTINGS TO BE STAINLESS STEEL.

**NOTE:** BENDS SHALL BE OF LONG RADIUS TYPE ONLY.

|                  |                                    |  |
|------------------|------------------------------------|--|
| SCALE: N.T.S.    | <b>TYPICAL SERVICE CONNECTIONS</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                                    | <b>CROSS-SECTIONS THROUGH PIPES</b>          |
| DATE: March 2013 |                                    | DRAWING N° 14                                |



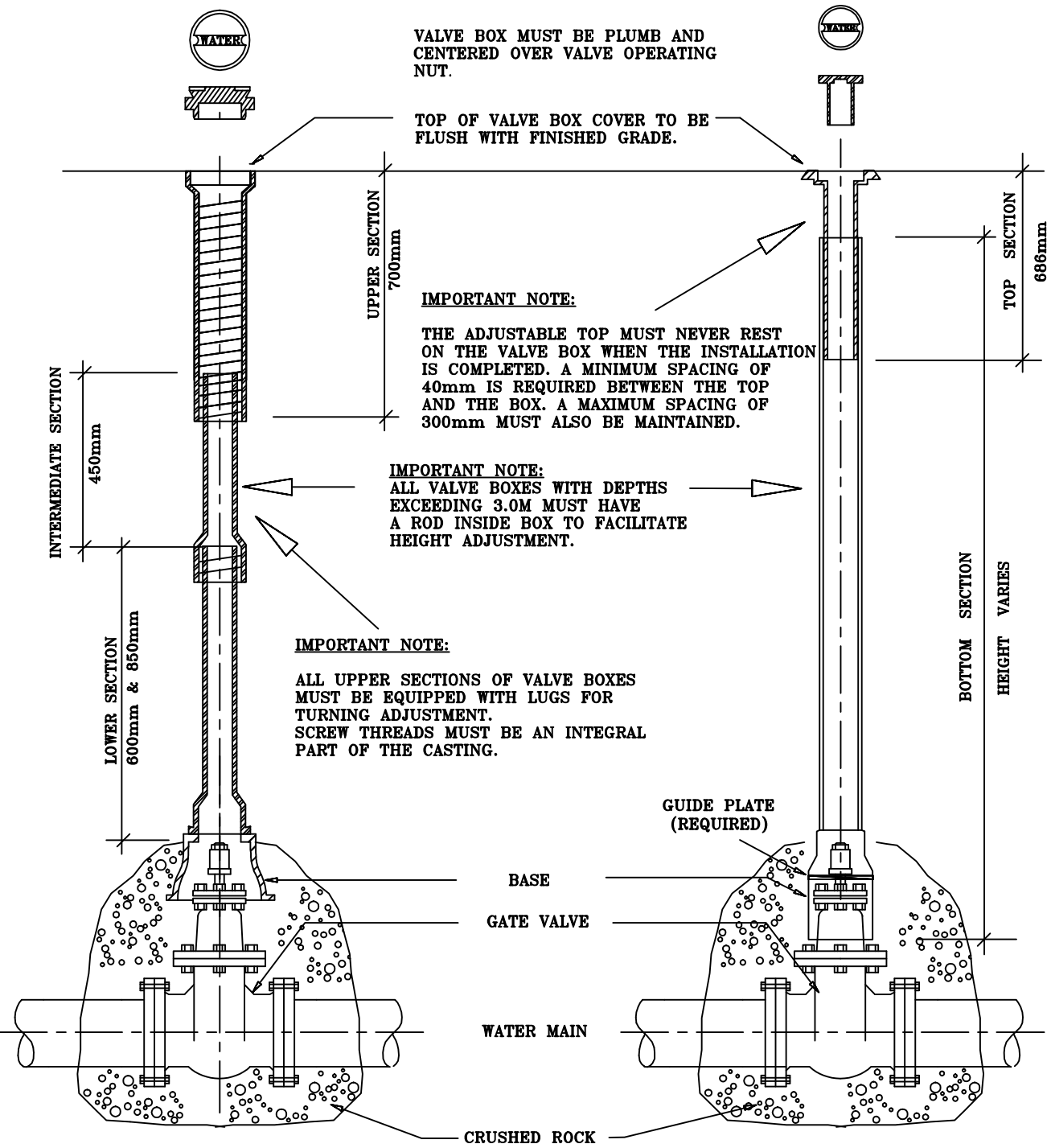
SCALE: N.T.S.  
 REVISION N°:  
 DATE: March 2013

TYPICAL WATER SERVICE  
 BRANCH LATERAL

TOWN OF SHEDIAC  
 ENGINEERING  
 DEPARTMENT  
 DRAWING N° 15







VALVE BOX MUST BE PLUMB AND CENTERED OVER VALVE OPERATING NUT.

TOP OF VALVE BOX COVER TO BE FLUSH WITH FINISHED GRADE.

**IMPORTANT NOTE:**

THE ADJUSTABLE TOP MUST NEVER REST ON THE VALVE BOX WHEN THE INSTALLATION IS COMPLETED. A MINIMUM SPACING OF 40mm IS REQUIRED BETWEEN THE TOP AND THE BOX. A MAXIMUM SPACING OF 300mm MUST ALSO BE MAINTAINED.

**IMPORTANT NOTE:**

ALL VALVE BOXES WITH DEPTHS EXCEEDING 3.0M MUST HAVE A ROD INSIDE BOX TO FACILITATE HEIGHT ADJUSTMENT.

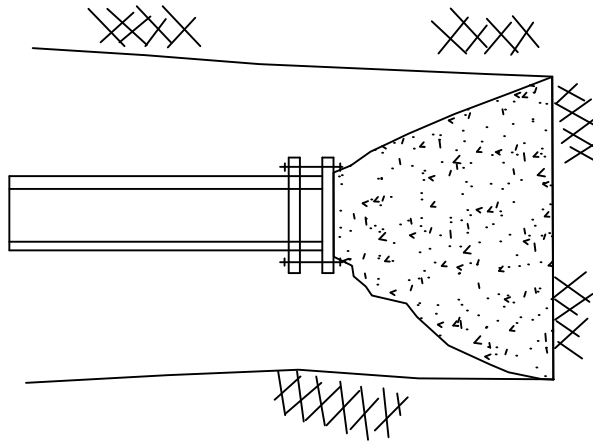
**IMPORTANT NOTE:**

ALL UPPER SECTIONS OF VALVE BOXES MUST BE EQUIPPED WITH LUGS FOR TURNING ADJUSTMENT. SCREW THREADS MUST BE AN INTEGRAL PART OF THE CASTING.

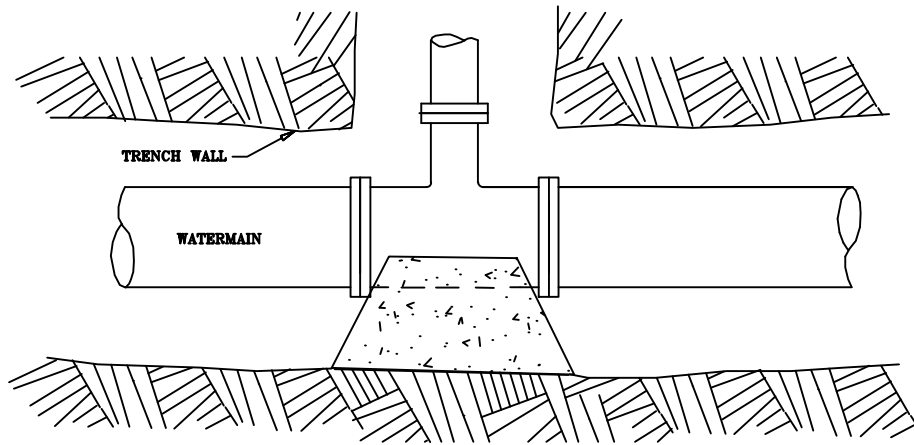
**SCREW-TYPE**

**COMPOSITE TYPE**

|                  |             |  |
|------------------|-------------|--|
| SCALE: N.T.S.    | VALVE BOXES | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |             | DRAWING N° 17                                |
| DATE: March 2013 |             |  |



**TYPICAL END CAP DETAIL**

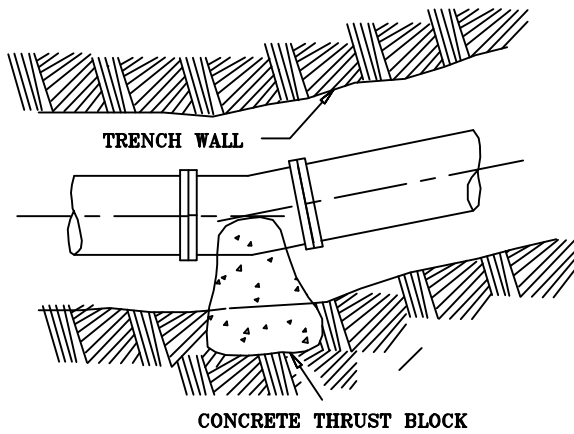


**TYPICAL TEE DETAIL**

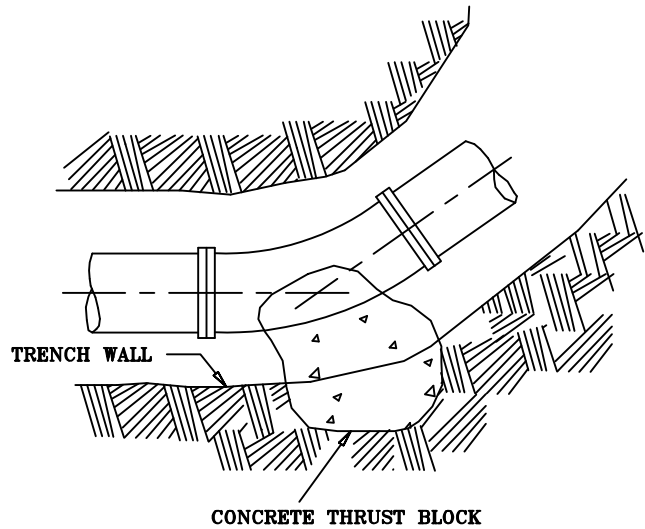
NOTE:  
SEE DRAWING N° 21 FOR IMPORTANT NOTES  
AND MINIMUM CONTACT AREAS FOR  
CONCRETE THRUST BLOCKS.

THE TEE DETAIL ALSO APPLIES TO TAPPING  
SLEEVE INSTALLATION.

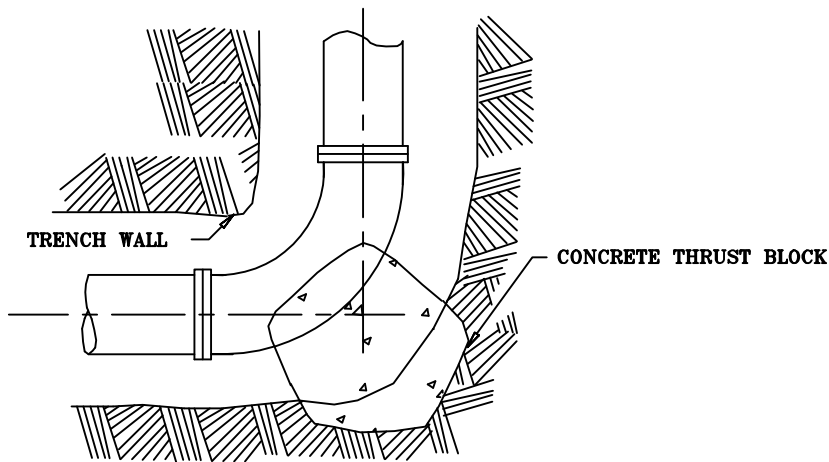
|                  |                              |  |
|------------------|------------------------------|--|
| SCALE: N.T.S.    | CONCRETE THRUST BLOCK DETAIL | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                              | DRAWING N° 18                                |
| DATE: March 2013 | TYPICAL END CAP & TEE        |  |



11 1/4° - 22 1/2° BEND



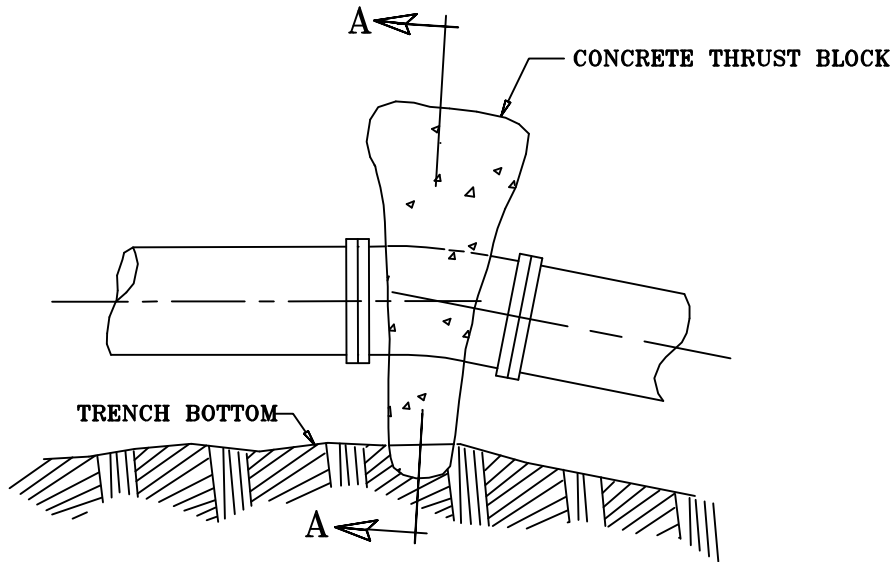
22 1/2° - 45° BEND



90° BEND

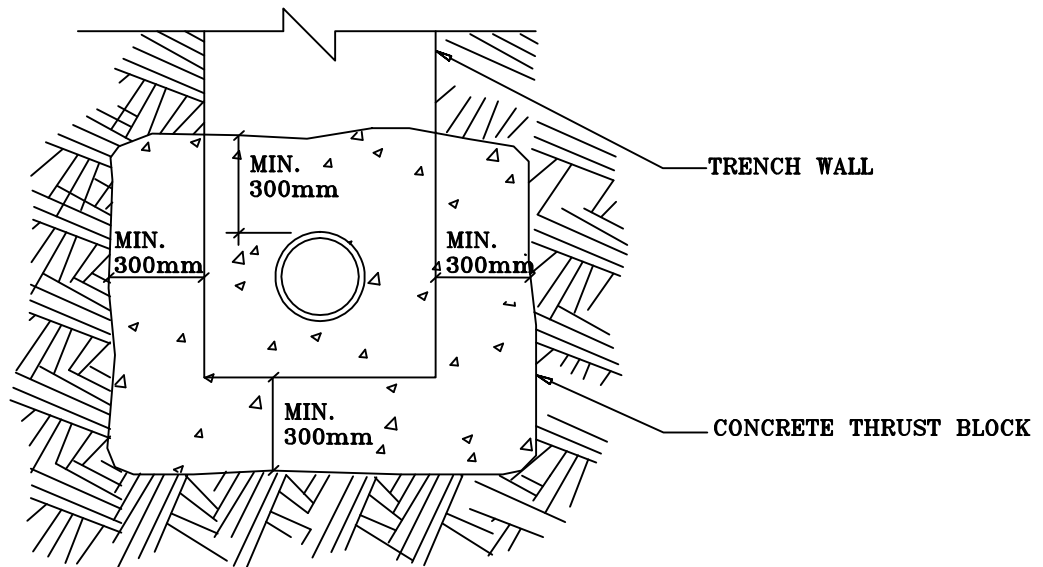
NOTE:  
SEE DRAWING N° 21 FOR IMPORTANT NOTES  
AND MINIMUM CONTACT AREAS FOR  
CONCRETE THRUST BLOCKS.

|                  |                              |  |
|------------------|------------------------------|--|
| SCALE: N.T.S.    | CONCRETE THRUST BLOCK DETAIL | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                              | DRAWING N° 19                                |
| DATE: March 2013 | HORIZONTAL BENDS             |  |



ELEVATION

NOTE:  
SEE DRAWING N° 21 FOR IMPORTANT NOTES  
AND MINIMUM CONTACT AREAS FOR  
CONCRETE THRUST BLOCKS.



SECTION A-A

|                  |                              |                        |
|------------------|------------------------------|------------------------|
| SCALE: N.T.S.    | CONCRETE THRUST BLOCK DETAIL | TOWN OF SHEDIAC        |
| REVISION N°:     |                              | ENGINEERING DEPARTMENT |
| DATE: March 2013 | VERTICAL BENDS               | DRAWING N° 20          |

## MINIMUM CONTACT AREAS FOR CONCRETE THRUST BLOCKS:

| PIPE $\phi$ | AREA (m <sup>2</sup> ) FOR SOIL SUPPORTING CAPACITY OF 100 kPa (2,000 p.s.f.) |             |      |          |          |           |
|-------------|---|-------------|------|----------|----------|-----------|
|             | mm  | CAP or PLUG | TEE  | 90° BEND | 45° BEND | 22½° BEND |
| 150         | 0.48  | 0.48        | 0.64 | 0.40     | 0.24     | 0.16      |
| 200         | 0.80  | 0.80        | 1.12 | 0.64     | 0.32     | 0.16      |
| 250         | 1.28  | 1.28        | 1.76 | 0.96     | 0.48     | 0.24      |
| 300         | 1.76  | 1.76        | 2.56 | 1.44     | 0.72     | 0.40      |
| 350         | 2.40  | 2.40        | 3.52 | 1.92     | 0.96     | 0.48      |
| 400         | 3.20  | 3.20        | 4.48 | 2.56     | 1.28     | 0.64      |
| 450         | 4.16  | 4.16        | 5.76 | 3.20     | 1.60     | 0.80      |

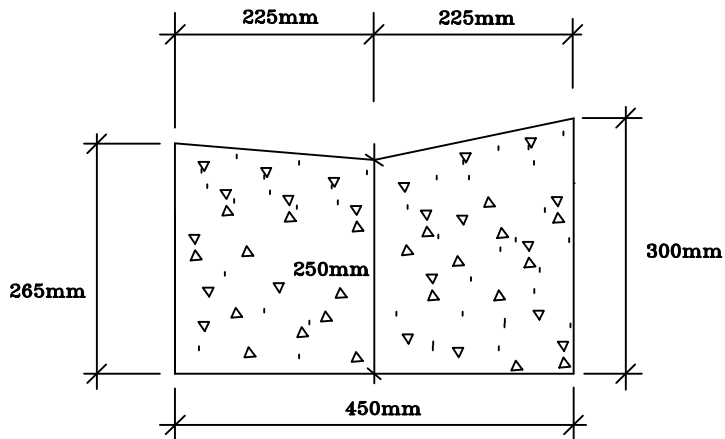
| PIPE $\phi$ | AREA (m <sup>2</sup> ) FOR SOIL SUPPORTING CAPACITY OF 200 kPa (4,000 p.s.f.) |             |      |          |          |           |
|-------------|---|-------------|------|----------|----------|-----------|
|             | mm  | CAP or PLUG | TEE  | 90° BEND | 45° BEND | 22½° BEND |
| 150         | 0.24  | 0.24        | 0.32 | 0.24     | 0.16     | 0.16      |
| 200         | 0.40  | 0.40        | 0.56 | 0.32     | 0.16     | 0.16      |
| 250         | 0.64  | 0.64        | 0.88 | 0.48     | 0.24     | 0.24      |
| 300         | 0.88  | 0.88        | 1.28 | 0.72     | 0.40     | 0.24      |
| 350         | 1.20  | 1.20        | 1.76 | 0.96     | 0.48     | 0.24      |
| 400         | 1.60  | 1.60        | 2.24 | 1.28     | 0.64     | 0.32      |
| 450         | 2.08  | 2.08        | 2.88 | 1.60     | 0.80     | 0.40      |

CONVERSION FACTOR: 1 sq.m = 10 sq.ft.

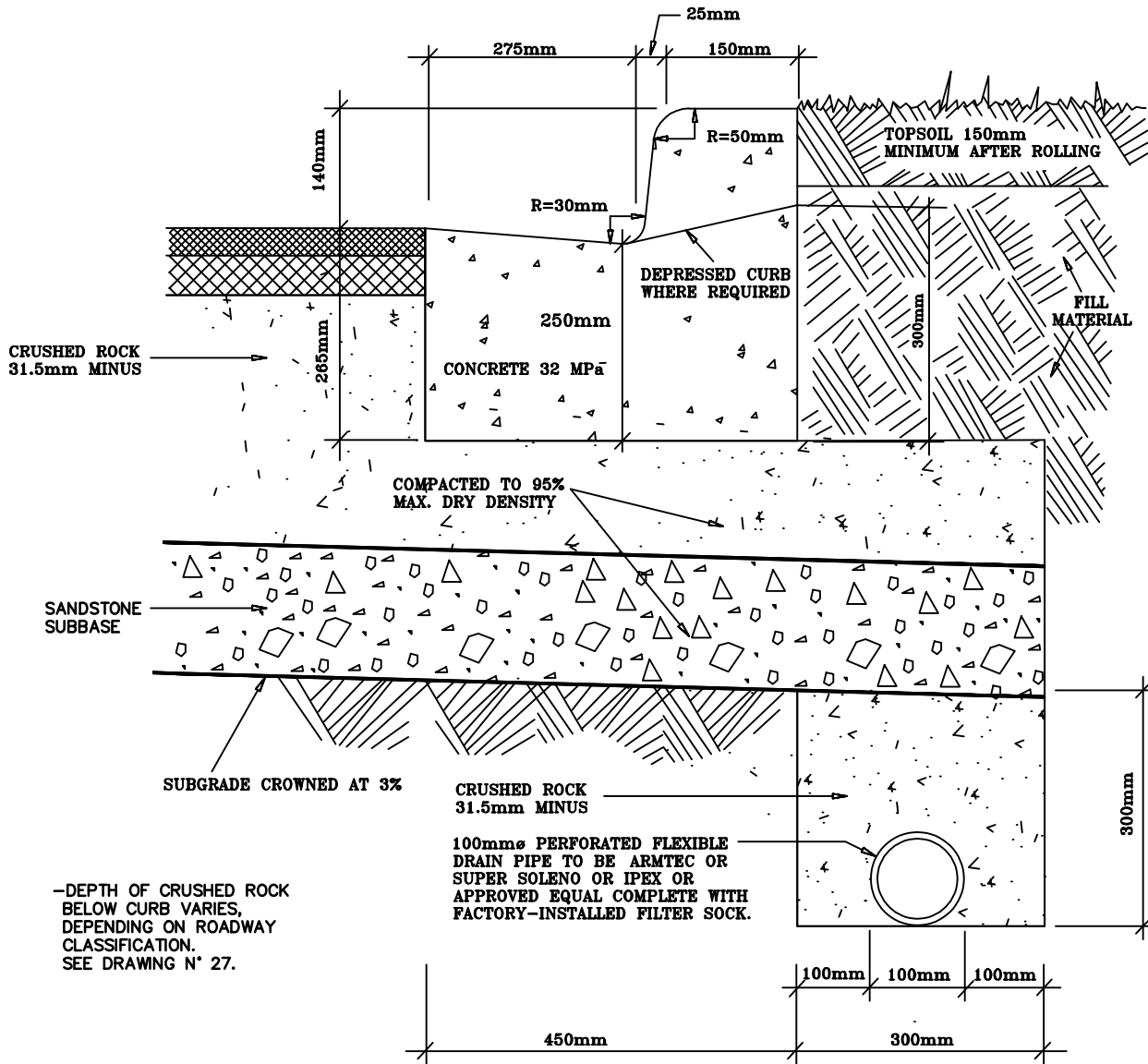
**NOTES:**

1. SEE DRAWING N° 16 and N° 17 FOR THRUST BLOCK CONFIGURATIONS.
2. THESE CHARTS ARE BASED ON SOIL SUPPORTING CAPACITIES OF 100 kPa (2,000 p.s.f.) 200 kPa (4,000 p.s.f.), AND AN INTERNAL PIPE PRESSURE OF 1000 kPa (145 p.s.i.). WHERE DIFFERENT SUPPORTING CAPACITIES OR INTERNAL PRESSURES ARE ENCOUNTERED, CONTACT AREAS SHOULD BE CALCULATED ACCORDINGLY. SAFE SUPPORTING CAPACITY SHOULD BE DETERMINED BY THE DESIGN ENGINEER, AND INCLUDE AN APPROPRIATE FACTOR FOR SAFETY.
3. CONCRETE FOR THRUST BLOCKS TO BE A MINIMUM OF 32 MPa (32 MPa EQUALS 4500 p.s.i.) AT 28DAYS.
4. THRUST BLOCKS TO EXTEND INTO BOTTOM AND SIDES OF TRENCH, AND ALSO ABOVE THE PIPE:  
A MINIMUM OF 150mm (6") FOR HORIZONTAL BENDS, AND  
A MINIMUM OF 300mm (12") FOR VERTICAL BENDS.
5. ALL CONCRETE MUST RUN OVER, UNDER AND AGAINST THE BODY OF THE FITTING, AND INTO THE TRENCH WALL; HOWEVER, THE MECHANICAL JOINTS MUST BE LEFT EXPOSED.

|                  |   |  |
|------------------|---|--|
| SCALE: N.T.S.    | <b>CONCRETE THRUST BLOCK REQUIREMENTS</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |   | <b>MINIMUM CONTACT AREAS</b>                 |
| DATE: March 2013 |   | DRAWING N° 21                                |



**MOUNTABLE CURB**

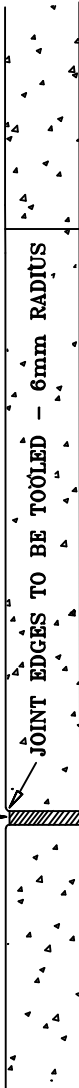


**BARRIER CURB**

|                  |                             |  |
|------------------|-----------------------------|--|
| SCALE: N.T.S.    | CONCRETE CURB AND GUTTER    | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                             |  |
| DATE: March 2013 | BARRIER AND MOUNTABLE TYPES | DRAWING N° 22                                |

EXPANSION JOINT (WITH FELT),  
AT 6m INTERVALS INSTALLED  
PERPENDICULAR TO EDGES AND  
TO THE FULL DEPTH OF SIDEWALK

CONTROL JOINT TO BE SAW-CUT  
MINIMUM 1/3 OF SLAB DEPTH  
AT 1.5m INTERVALS



LONGITUDINAL SECTION

MINIMUM SLOPE 2%, MAXIMUM SLOPE 5.0% (SIDEWALK 2%)

R.O.W. LINE

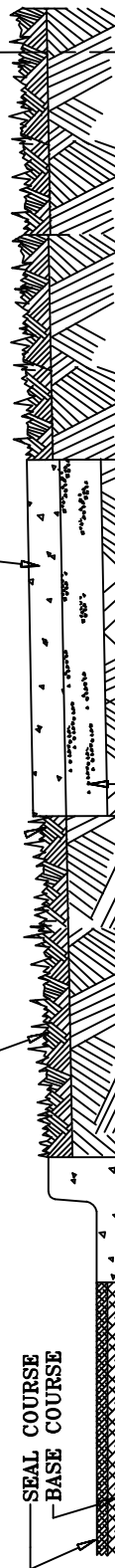
CONCRETE SIDEWALK, 32MPa  
THICKNESS:

1. 125mm TYPICAL
2. 200mm INDUSTRIAL/COMMERCIAL  
AND HEAVY VOLUME DRIVEWAYS

TOPSOIL  
150mm MINIMUM  
AFTER ROLLING

PAVEMENT

SEAL COURSE  
BASE COURSE



AGGREGATE BASE  
31.5mm minus  
CRUSHED ROCK  
15cm deep  
COMPACTED TO 95%  
MAXIMUM DRY DENSITY

1.5m MIN.

1.5m MIN.

VARIES

AGGREGATE BASE  
31.5mm minus  
CRUSHED ROCK

AGGREGATE SUB-BASE

CROSS-SECTION

|                  |        |
|------------------|--------|
| SCALE:           | N.T.S. |
| REVISION N°:     |        |
| DATE: March 2013 |        |

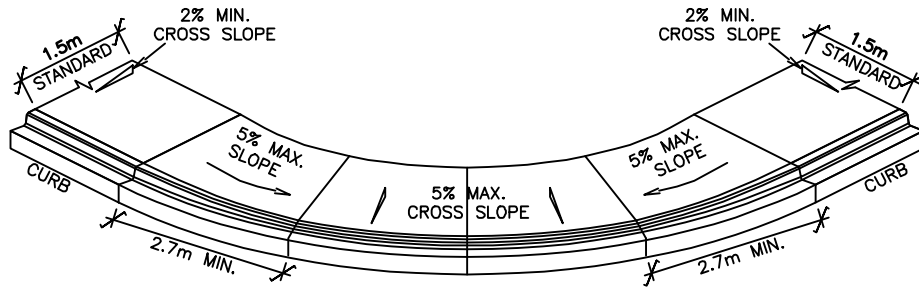
**SIDEWALK AND BOULEVARD DETAIL**

**SECTIONS**

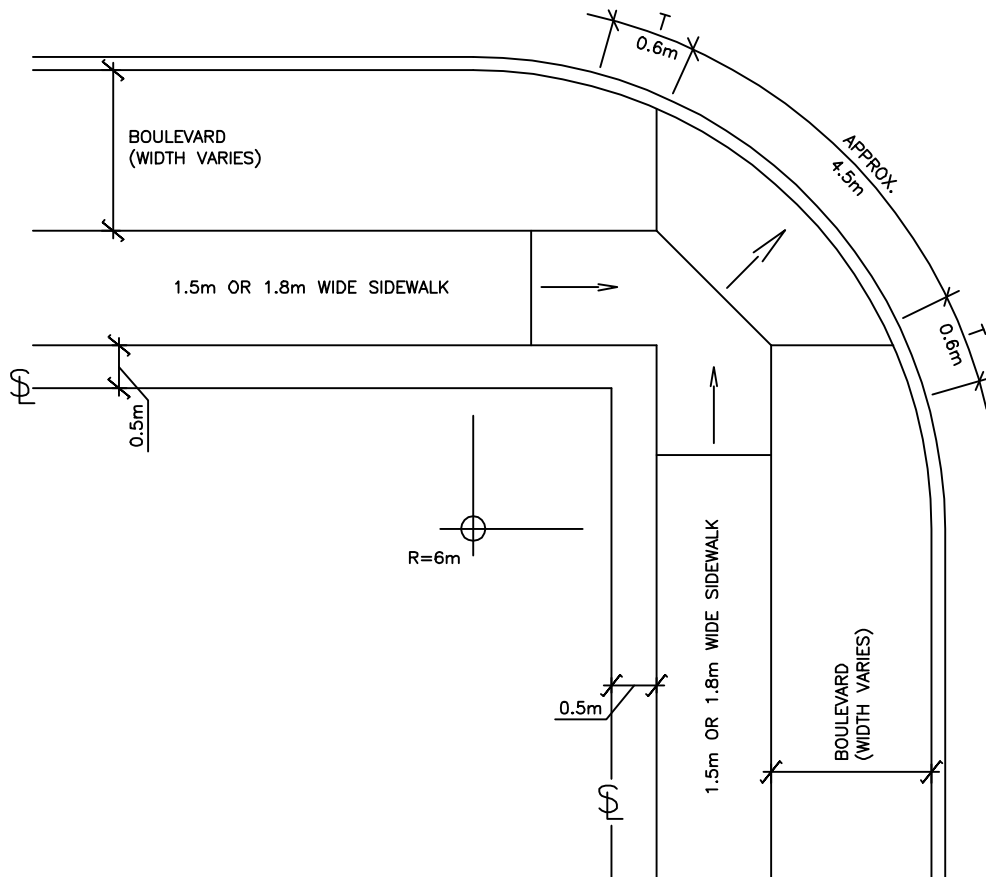
|  |
|--|
| TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| DRAWING N° 23                                |



## INTEGRATED CURB AND SIDEWALK



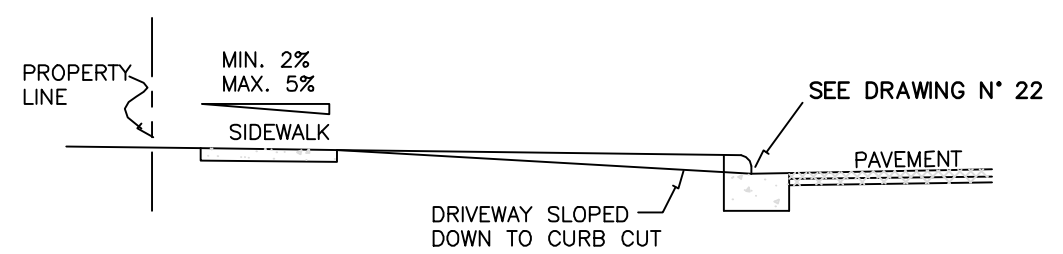
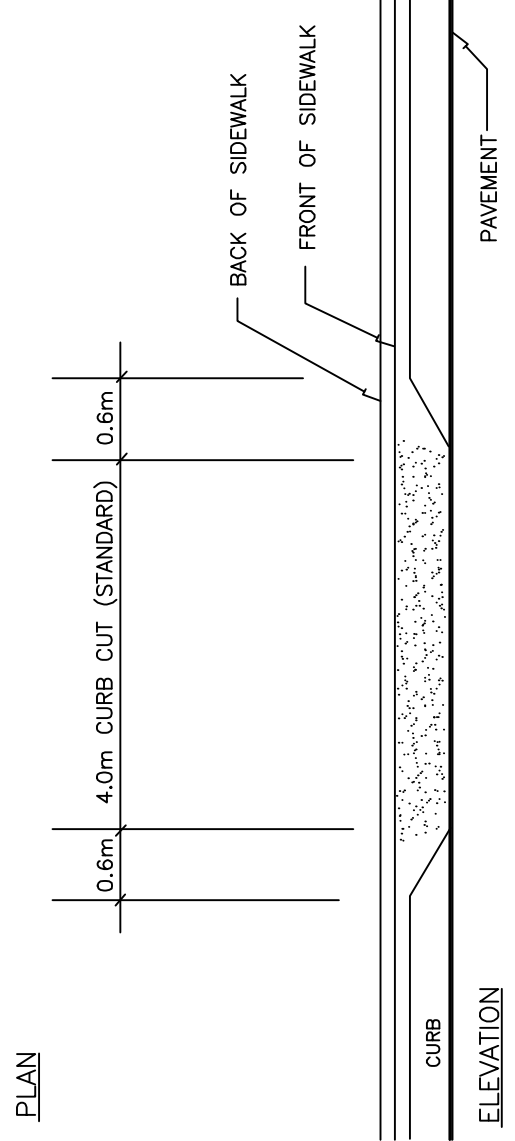
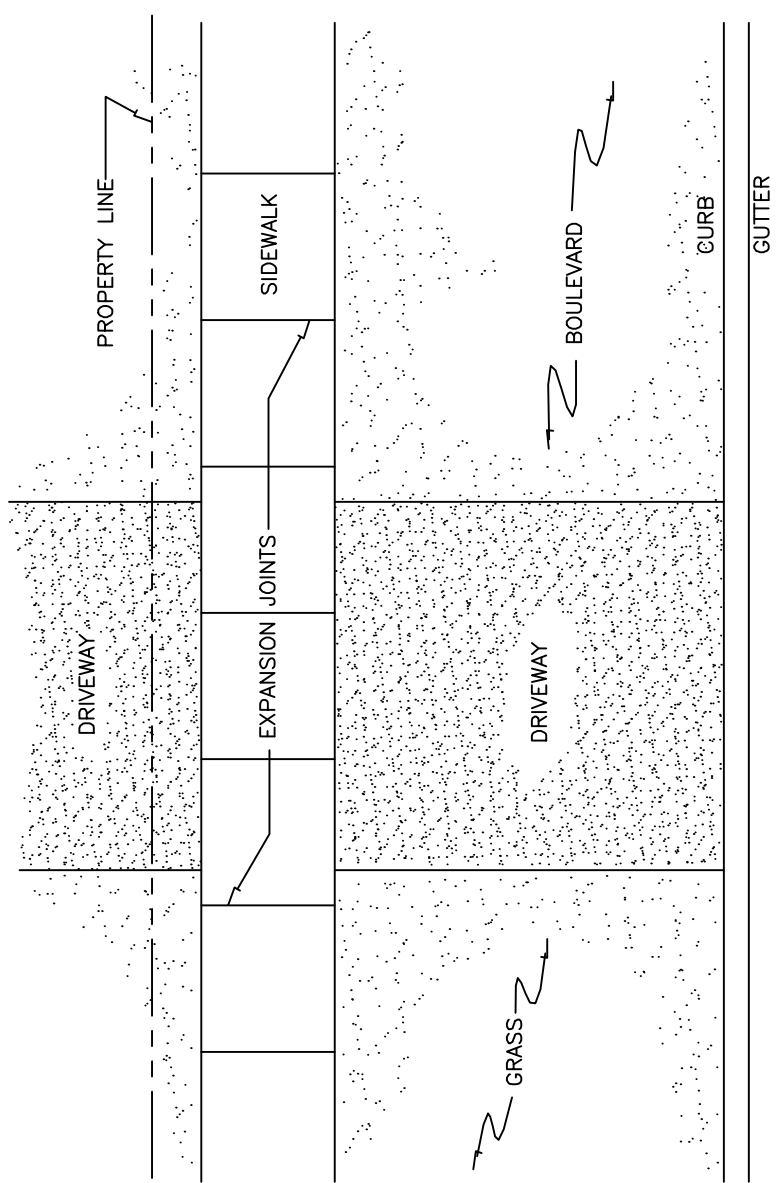
## CURB AND SIDEWALK WITH BOULEVARD



**NOTES:**

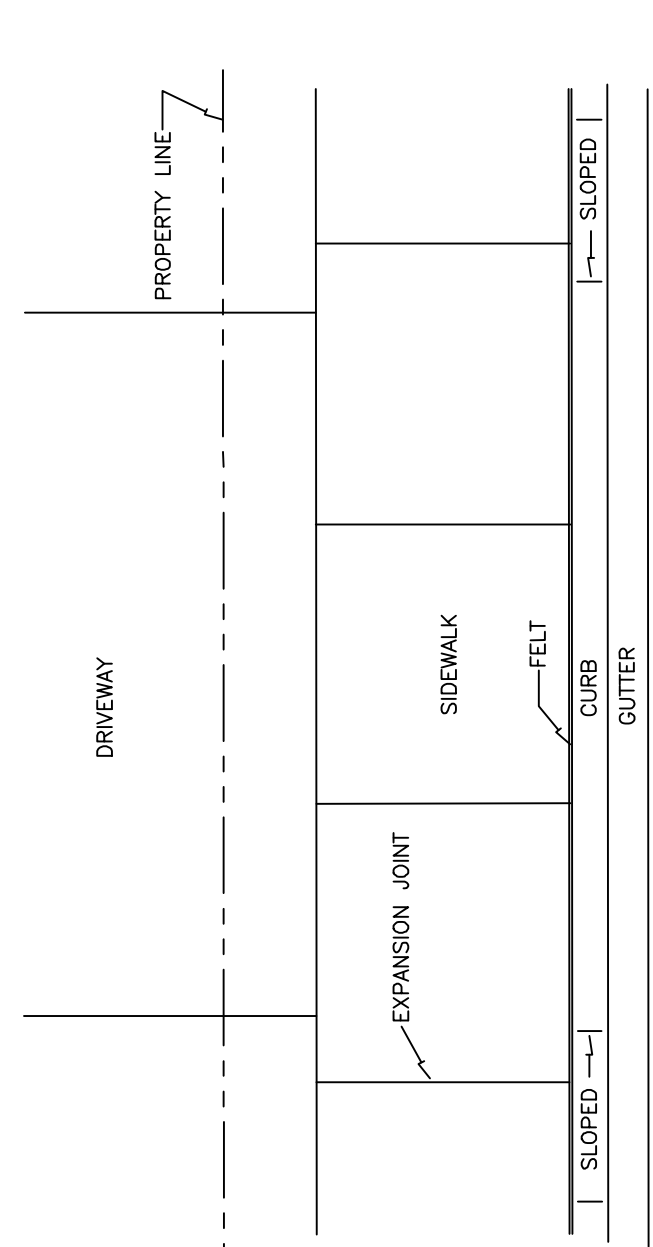
1. 'T' DENOTES AREA WHERE CURB IS TAPERED DOWN TO GUTTER  
ARROWS (→) DENOTE AREA WHERE SIDEWALK IS SLOPED  
DOWN TO GUTTER (WHEELCHAIR RAMPS)
2. MAXIMUM SLOPE AT ANY LOCATION ON SIDEWALK IS 5%.

|                  |                                 |  |
|------------------|---------------------------------|--|
| SCALE: N.T.S.    | <b>TYPICAL WHEELCHAIR RAMPS</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     | FOR STANDARD 6m CURB RETURNS    | DRAWING N° 24                                |
| DATE: March 2013 |                                 |  |



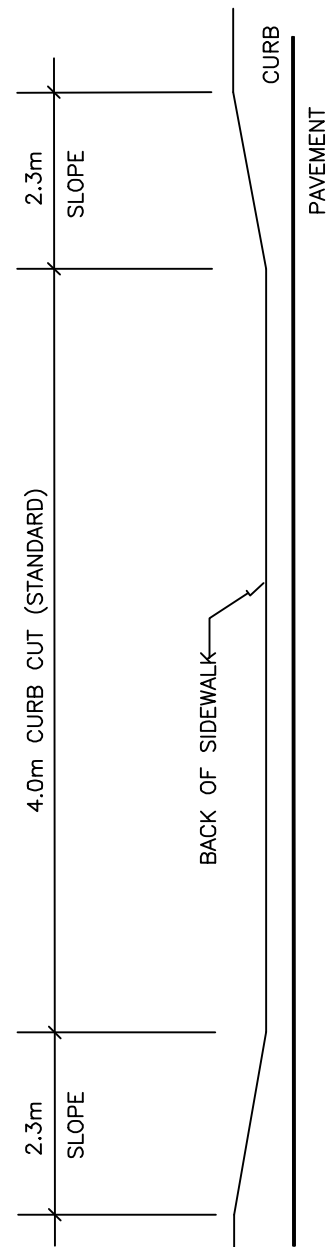
CROSS-SECTION

|                  |                                  |  |
|------------------|----------------------------------|--|
| SCALE: N.T.S.    | <b>TYPICAL DRIVEWAY ENTRANCE</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                                  | FOR STREETS WITH A BOULEVARD                 |
| DATE: March 2013 |                                  | DRAWING N° 25                                |

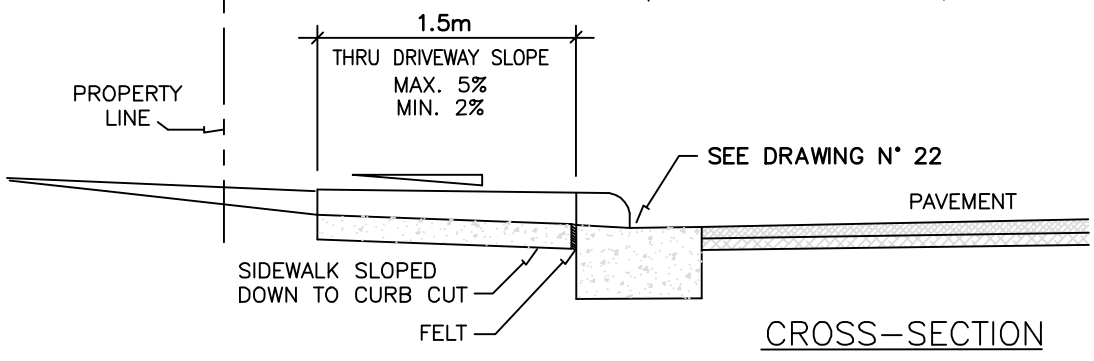


NOTE: ALL DRIVEWAYS WITH NARROW BOULEVARD TO ALSO HAVE SIDEWALK SLOPED -- MAXIMUM SLOPE 5%

PLAN

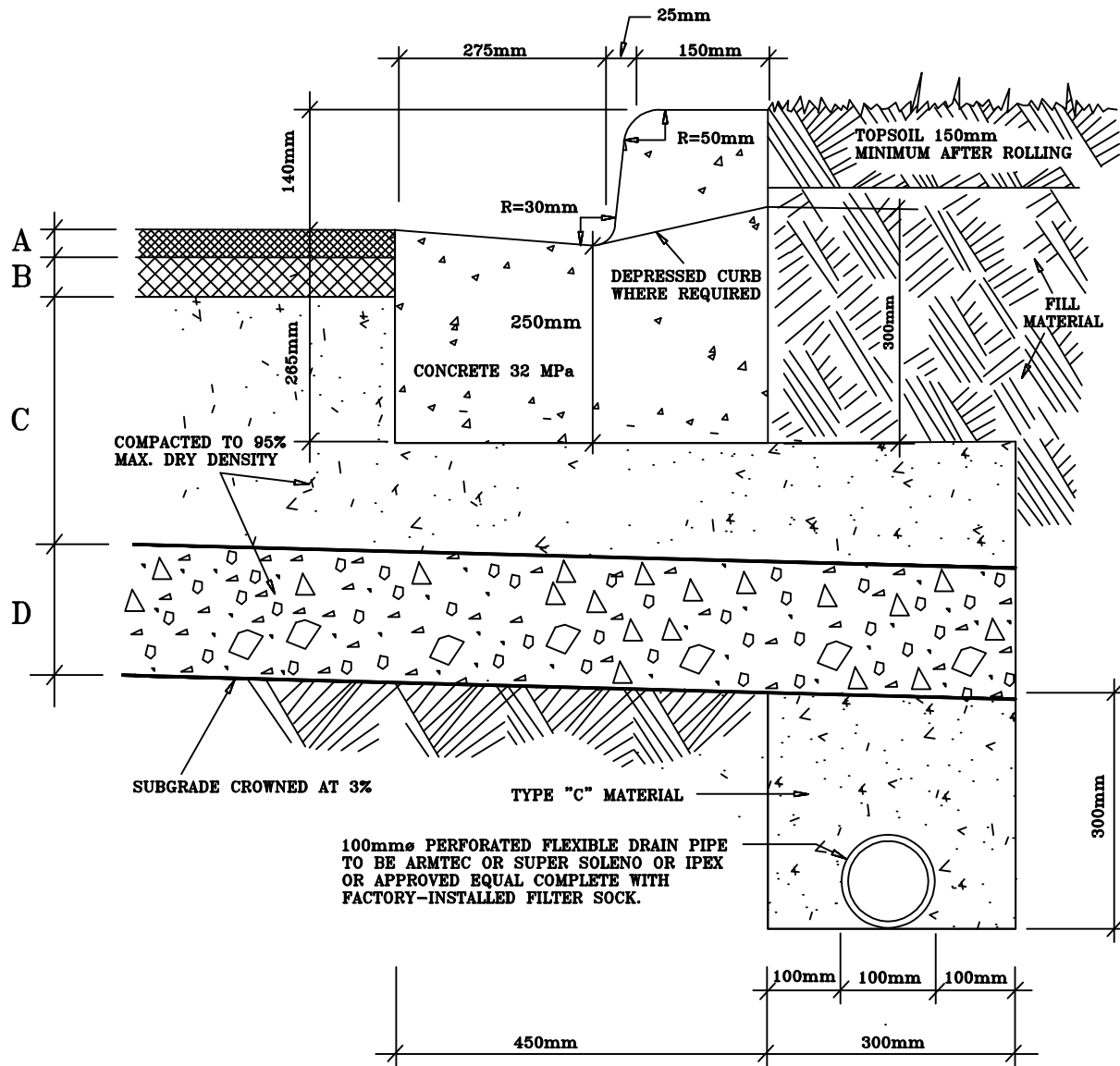


ELEVATION



CROSS-SECTION

|                  |   |  |
|------------------|---|--|
| SCALE: N.T.S.    | <b>TYPICAL DRIVEWAY ENTRANCE</b>                  | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |   |  |
| DATE: March 2013 | FOR STREETS WITH SIDEWALK<br>ADJACENT TO THE CURB | DRAWING N° 26                                |



MINIMUM LONGITUDINAL SLOPE TO BE 0.5% AS PER TAC STANDARD

| ITEM | DESCRIPTION            | MATERIAL THICKNESSES          |          |                    |                                |       |
|------|------------------------|-------------------------------|----------|--------------------|--------------------------------|-------|
|      |                        | LOCAL ROADWAYS & PARKING LOTS |          | COLLECTOR ROADWAYS | ARTERIAL & INDUSTRIAL ROADWAYS |       |
|      |                        | Option A                      | Option B |                    |                                |       |
| A    | ASPHALT SURFACE COURSE | N.B.D.O.T. TYPE "D"           | 40mm     | 40mm               | 40mm                           | 40mm  |
| B    | ASPHALT BASE COURSE    | N.B.D.O.T. TYPE "B"           | 60mm     | 60mm               | 100mm                          | 110mm |
| C    | AGGREGATE BASE         | CRUSHED ROCK 31.5mm MINUS     | 400mm    | 250mm              | 200mm                          | 200mm |
| D    | AGGREGATE SUB-BASE     | CRUSHED SANDSTONE             |          | 400mm              |                                |       |
|      |                        | CRUSHED ROCK 75mm MINUS       |          |                    | 350mm                          | 400mm |

|                  |                                     |   |
|------------------|-------------------------------------|---|
| SCALE: N.T.S.    | <b>TYPICAL ROADBED CONSTRUCTION</b> | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT            |
| REVISION N°:     |                                     | RESIDENTIAL STREETS AND<br>COLLECTOR / ARTERIAL STREETS |
| DATE: March 2013 |                                     | DRAWING N° 27   |

20m R.O.W. (min.)

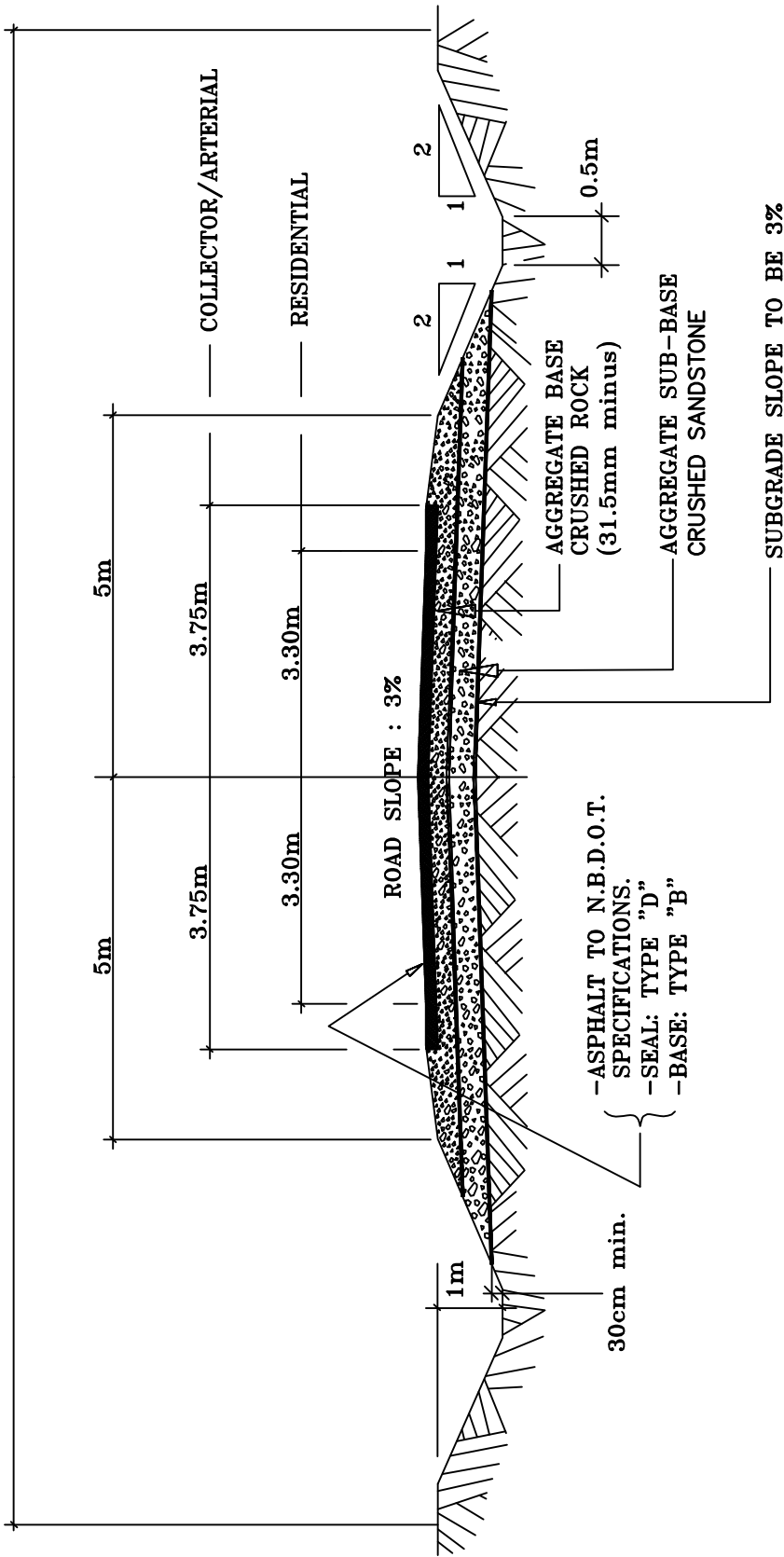


TABLE OF THICKNESSES

| TYPE OF STREET     | SEAL | BASE  | AGGREGATE BASE | AGGREGATE SUB-BASE |
|--------------------|------|-------|----------------|--------------------|
| RESIDENTIAL        | 40mm | 60mm  | 300mm          | 300mm              |
| COLLECTOR/ARTERIAL | 40mm | 100mm | 300mm          | 375mm              |

SCALE: N.T.S.  
 REVISION N°:  
 DATE: March 2013

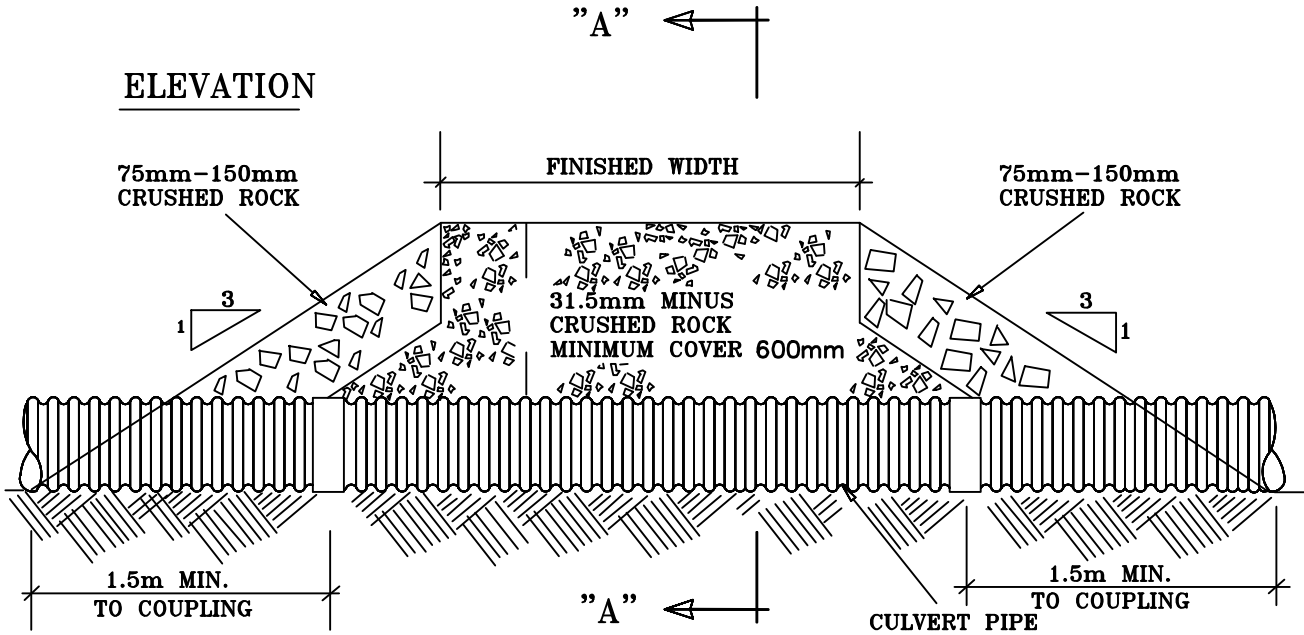
TYPICAL ROAD CROSS-SECTION  
 OPEN DRAINAGE

TOWN OF SHEDIAC  
 ENGINEERING DEPARTMENT  
 DRAWING N° 28

STANDARD DRIVEWAY ACCESS

| TYPE        | FINISHED WIDTH |
|-------------|----------------|
| RESIDENTIAL | 6m             |
| COMMERCIAL  | 8m             |

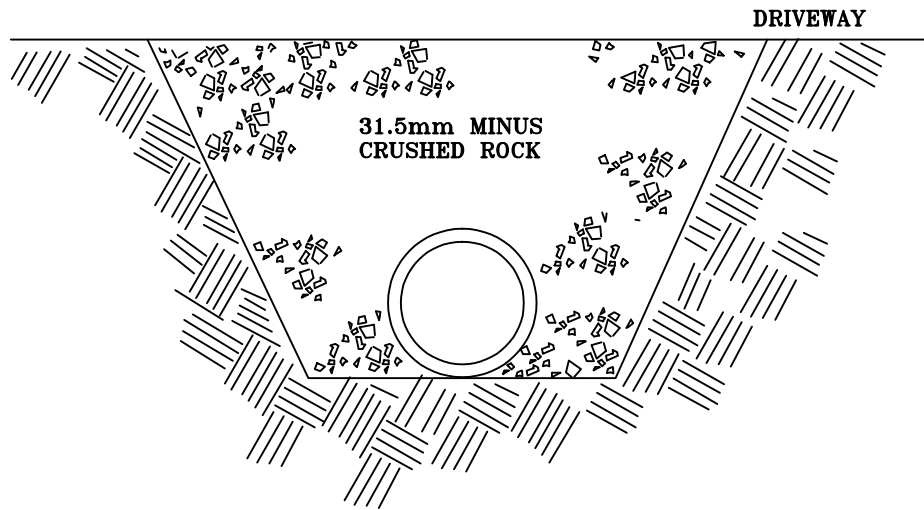
ELEVATION



**NOTES:**  
 CULVERT PIPE TO BE HIGH DENSITY  
 POLYETHYLENE DUAL-WALL PIPE OR  
 CLASS 65D CONCRETE PIPE.

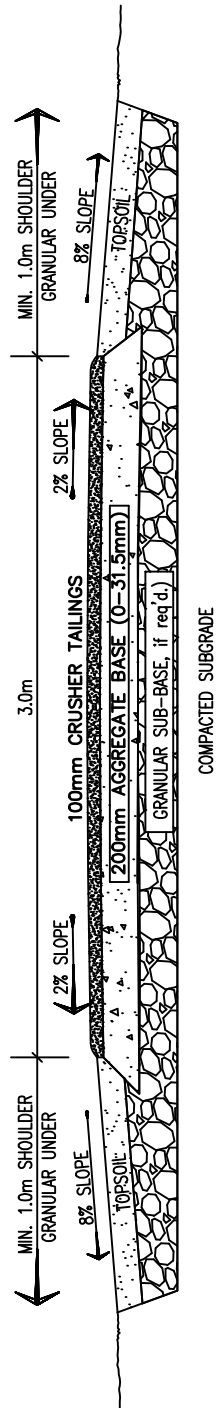
**NOTES:**  
 CULVERT PIPE TO BE MINIMUM 450mmø.  
 PIPE OF 600mmø AND LARGER TO HAVE  
 ENDS BEVELLED AT 45°.

WHEN CONCRETE PIPE IS USED, INSTALL  
 BELL-END ON UPSTREAM END.

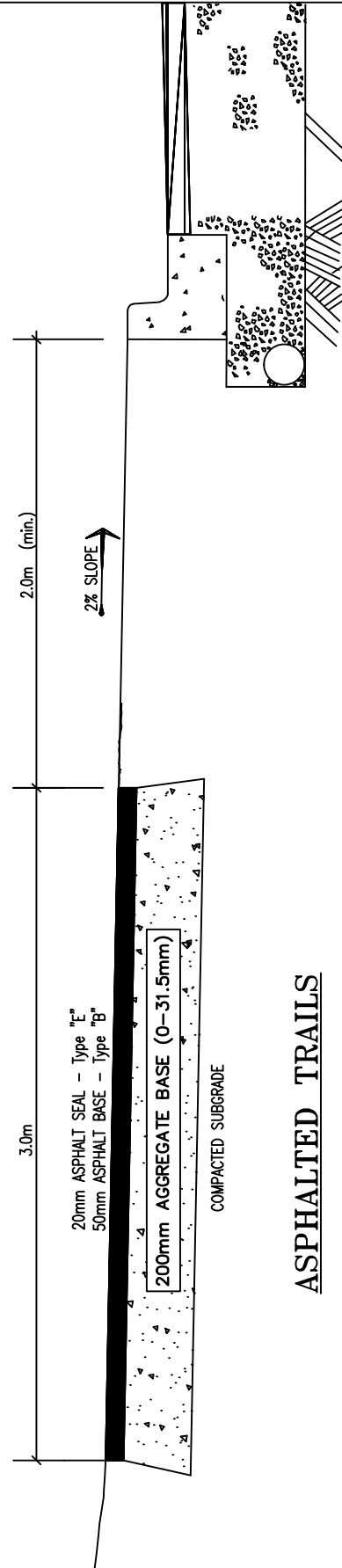


SECTION "A-A"

|                  |                  |  |
|------------------|------------------|--|
| SCALE: N.T.S.    | DRIVEWAY CULVERT | TOWN OF SHEDIAC<br>ENGINEERING<br>DEPARTMENT |
| REVISION N°:     |                  | DRAWING N° 29                                |
| DATE: March 2013 |                  |  |



GRAVEL TRAILS



ASPHALTED TRAILS

|              |            |
|--------------|------------|
| SCALE:       | N.T.S.     |
| REVISION N°: |            |
| DATE:        | March 2013 |

MULTI-PURPOSE TRAILS  
CROSS-SECTIONS

TOWN OF SHEDIAC  
ENGINEERING  
DEPARTMENT  
DRAWING N° 30

**APPENDIX "B"**

**TENDER FORM**

Yellow: For Tender Submission

White: Retained by Contractor

TOWN OF SHEDIAC  
ENGINEERING DEPARTMENT

**SAMPLE**

Tender Submitted By: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone N° \_\_\_\_\_

Administrator/Clerk  
Town of Shediac  
290 Main Street, unit 300  
Shediac, NB  
E4P 2E3

Dear Sir/Madam:

We, the undersigned, hereby offer and agree to furnish all and every kind of labour, tools, implements, machinery, plant, maintenance, materials and incidental items that may be required to execute and complete all work embraced in the construction of the above names project and in accordance with the plans, the Tender Form, the Town "Standard Municipal Specifications", supplementary specifications and such revisions, details and special plans as may be furnished from time to time during the progress of the work.

We have examined the plans, specifications and site and have ascertained all necessary particulars with regard to the work, and upon acceptance of this tender, are prepared to enter into a contract, in full compliance with all plans and specifications for the performance of the work for the unit or fixed prices tendered herein.

I, HEREBY, CONFIRM THAT I HAVE READ AND UNDERSTOOD THE ABOVE \_\_\_\_\_  
(Initials)



**APPENDIX "B"**

**TENDER FORM**

**TYPICAL UNIT PRICE  
QUANTITY SHEET**

| SPEC.<br>ITEM<br>N°   | DESCRIPTION | UNIT | ESTIMATED<br>QUANTITY | UNIT BID<br>PRICES<br>(IN FIGURES) | TOTAL<br>(IN FIGURES) |
|---|-------------|------|-----------------------|------------------------------------|-----------------------|
| UNIT PRICES TO BE EITHER TYPEWRITTEN, PRINTED<br>OR WRITTEN IN INK IN WORDS AS WELL AS IN FIGURES |             |      |                       |                                    |                       |
|   |             |      |                       |                                    |                       |

I, HEREBY, CONFIRM THAT I HAVE READ AND UNDERSTOOD THE ABOVE \_\_\_\_\_  
(Initials)

**APPENDIX "B"**

**TENDER FORM**

**SUBCONTRACTORS**

It is hereby agreed the following subcontractor(s) will be employed to complete portions of the work and that upon acceptance of this tender any additions or deletions hereto are subject to prior written approval of the Engineer.

SUB-TRADE

CONTRACTOR

ADDRESS

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**MACHINERY AND EQUIPMENT**

It is hereby agreed the following trucks and equipment will be provided to complete the work within the time allowed and that exclusive of trucks, all major pieces of equipment will not be removed from the job site without prior written approval.

| MACHINE | MAKE | MODEL NO. & YEAR | LICENSE N° | GAS / DIESEL | NET ENGINE HORSE-POWER | BUCKET SIZE EXCAVATOR OR G.V.C. (TRUCK) |
|---------|------|------------------|------------|--------------|------------------------|---|
|         |      |                  |            |              |                        |   |
|         |      |                  |            |              |                        |   |
|         |      |                  |            |              |                        |   |
|         |      |                  |            |              |                        |   |
|         |      |                  |            |              |                        |   |
|         |      |                  |            |              |                        |   |
|         |      |                  |            |              |                        |   |
|         |      |                  |            |              |                        |   |
|         |      |                  |            |              |                        |   |

I, HEREBY, CONFIRM THAT I HAVE READ AND UNDERSTOOD THE ABOVE \_\_\_\_\_  
 (Initials)

**APPENDIX "B"**

**TENDER FORM**

**LISTING OF OTHER JOBS**

The following is a listing of on-going projects that have been publicly awarded to this contractor prior to this tender. This includes any projects that are incomplete from the previous year; these projects being all of a Municipal, Provincial or Federal nature.

---

Project: \_\_\_\_\_

Owner: \_\_\_\_\_ Location \_\_\_\_\_

Approximate Value: \_\_\_\_\_ % Complete \_\_\_\_\_

Project Superintendent: \_\_\_\_\_ Project Foreman: \_\_\_\_\_

---



---

Project: \_\_\_\_\_

Owner: \_\_\_\_\_ Location \_\_\_\_\_

Approximate Value: \_\_\_\_\_ % Complete \_\_\_\_\_

Project Superintendent: \_\_\_\_\_ Project Foreman: \_\_\_\_\_

---



---

Project: \_\_\_\_\_

Owner: \_\_\_\_\_ Location \_\_\_\_\_

Approximate Value: \_\_\_\_\_ % Complete \_\_\_\_\_

Project Superintendent: \_\_\_\_\_ Project Foreman: \_\_\_\_\_

---



---

Project: \_\_\_\_\_

Owner: \_\_\_\_\_ Location \_\_\_\_\_

Approximate Value: \_\_\_\_\_ % Complete \_\_\_\_\_

Project Superintendent: \_\_\_\_\_ Project Foreman: \_\_\_\_\_

---



---

Project: \_\_\_\_\_

Owner: \_\_\_\_\_ Location \_\_\_\_\_

Approximate Value: \_\_\_\_\_ % Complete \_\_\_\_\_

Project Superintendent: \_\_\_\_\_ Project Foreman: \_\_\_\_\_

---

\_\_\_\_\_  
Contractor's Name

\_\_\_\_\_  
Authorized Signature

I, HEREBY, CONFIRM THAT I HAVE READ AND UNDERSTOOD THE ABOVE \_\_\_\_\_  
(Initials)

**APPENDIX "B"**

**TENDER FORM**

**FOREMAN / SUPERINTENDENT**

It is hereby agreed that subject to approval, the following person(s) will be employed under this contract until completion.

IF ONLY ONE PERSON OF AUTHORITY WILL BE RESPONSIBLE FOR THIS CONTRACT, THE NAME MUST BE STATED IN THE APPROPRIATE PLACE.

FOREMAN

QUALIFICATIONS & EXPERIENCE

\_\_\_\_\_  
\_\_\_\_\_

Telephone No. after normal working hours: \_\_\_\_\_

Summer Residence: \_\_\_\_\_

JOB SUPERINTENDENT

QUALIFICATIONS & EXPERIENCE

\_\_\_\_\_  
\_\_\_\_\_

Telephone No after Normal working hours: \_\_\_\_\_

Summer Residence: \_\_\_\_\_

COMMENCEMENT AND COMPLETION DATES

This contract provides for \_\_\_\_ number of "working days" as defined in the General Conditions paragraph 1.10. The Contractor shall commence the works on or before the \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_. The date fixed for Substantial Completion is the \_\_\_\_ day of \_\_\_\_\_. The date fixed for Provisional Acceptance is \_\_\_\_ working days following the Substantial Completion Date.

SECURITY DEPOSIT

Tenders must be submitted on this Tender Form and each tender must be "Properly Signed" by the tenderer and accompanied by a \_\_\_\_\_ in the amount of \_\_\_\_\_ as a guarantee that, if accepted, the tenderer will execute the contract, in full, as specified.

I, HEREBY, CONFIRM THAT I HAVE READ AND UNDERSTOOD THE ABOVE \_\_\_\_\_  
(Initials)

**APPENDIX "B"**

**TENDER FORM**

It is hereby agreed that this offer is irrevocable for sixty (60) working days from the date on which tenders are opened and if accepted, I (we) undertake to enter into a contract for the execution of the work and to complete the work within the time allowed.

The undersigned hereby declares that this tender is made without any connection or collusion with any persons making any tender or estimate for this work and no person employed by or holding office under the Town has any interest in this tender or in supplies for work to which it relates or in any portion of the profits thereof.

DATED  
AT \_\_\_\_\_

THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_\_

NAME OF  
FIRM \_\_\_\_\_

ADDRESS \_\_\_\_\_

SIGNATURE OF WITNESS \_\_\_\_\_ SIGNATURE OF REPRESENTATIVE \_\_\_\_\_

NAME (PRINTED) \_\_\_\_\_ NAME (PRINTED) \_\_\_\_\_

TITLE (PRINTED) \_\_\_\_\_

SIGNATURE OF WITNESS \_\_\_\_\_ SIGNATURE OF REPRESENTATIVE \_\_\_\_\_

NAME (PRINTED) \_\_\_\_\_ NAME (PRINTED) \_\_\_\_\_

TITLE (PRINTED) \_\_\_\_\_

THE LOWEST OR ANY TENDER WILL NOT NECESSARILY BE ACCEPTED.

THE TOWN RESERVES THE RIGHT TO REJECT ANY OR ALL TENDERS.

I, HEREBY, CONFIRM THAT I HAVE READ AND UNDERSTOOD THE ABOVE \_\_\_\_\_  
(Initials)

**APPENDIX "B"**

**TENDER FORM**

IN MAKING A DECISION TO AWARD A CONTRACT, PURSUANT TO THIS INVITATION TO TENDER, THE TOWN MAY TAKE INTO ACCOUNT THE FOLLOWING:

1. THE TENDERER'S HISTORY OF WORK PERFORMED ON SIMILAR OR DIFFERENT TYPES OF WORK IN PRIOR CONTRACTS WITH THE TOWN.
2. THE TENDERER'S HISTORY PERTAINING TO HEALTH AND SAFETY PERFORMANCE.
3. THE COMPETENCE OF THE TENDERER WITH RESPECT TO HIS QUALIFICATIONS TO PERFORM THE WORK, THE QUALITY OF HIS PAST WORK, AND HIS FINANCIAL CAPABILITY TO COVER THE WORK.
4. WHETHER OR NOT THE TENDER CONTAINS AN UNBALANCED BID.

THE TENDER MUST BE "PROPERLY SIGNED" IN ACCORDANCE WITH SECTION 4.1.3. OF THE INSTRUCTIONS TO TENDERERS CONTAINED IN THE TOWN OF SHEDIAC STANDARD MUNICIPAL SPECIFICATIONS.

I, HEREBY, CONFIRM THAT I HAVE READ AND UNDERSTOOD THE ABOVE \_\_\_\_\_  
(Initials)

**APPENDIX "B"**

**TENDER SUBMISSION CHECKLIST**

BEFORE SUBMITTING YOUR TENDER, CHECK THE FOLLOWING IMPORTANT POINTS:

- 1. ARE YOU IN POSSESSION OF AND HAVE READ THE LATEST EDITION OF THE "TOWN OF SHEDIAC STANDARD MUNICIPAL SPECIFICATIONS" AND LATEST REVISIONS THERETO? \_\_\_\_\_
- 2. HAVE YOU READ AND UNDERSTOOD THE DEFINITION OF "**PROPERLY SIGNED**" AS DEFINED IN THE INSTRUCTIONS TO TENDERERS PARAGRAPH 4.1.3.? \_\_\_\_\_
- 3. HAVE YOU SUMITTED PRICES FOR ALL ITEMS AND COMPLETED ALL SCHEDULES AND PRICES IN THE FORM OF TENDER? \_\_\_\_\_
- 4. HAVE YOU WRITTEN EACH UNIT PRICE OR LUMP SUM PRICE OUT IN WORDS INCLUDING THE WORDS "DOLLARS" AND "CENTS"? \_\_\_\_\_
- 5. HAVE YOU INCLUDED A SECURITY DEPOSIT OF THE SPECIFIED TYPE AND AMOUNT? \_\_\_\_\_
- 6. HAVE YOU LISTED YOUR SUBCONTRACTORS, MACHINERY AND EQUIPMENT AND FOREMAN/ SUPERINTENDENT? \_\_\_\_\_
- 7. HAVE YOU COMPLETED THE CONSTRUCTION SCHEDULE INDICATING YOUR WORK ACTIVITIES AND LENGTH OF TIME REQUIRED TO COMPLETE THE JOB? (THIS APPLIES ONLY IF THE CONSTRUCTION SCHEDULE IS CALLED FOR IN THE TENDER FORM.) \_\_\_\_\_

I, HEREBY, CONFIRM THAT I HAVE READ AND UNDERSTOOD THE ABOVE \_\_\_\_\_  
(Initials)

**APPENDIX "B"**

**TENDER SUBMISSION CHECKLIST**

- 8. HAVE YOU INCLUDED WITH YOUR TENDER SUBMISSION, A LETTER INDICATING THAT THE BID BOND (IF REQUIRED) HAS BEEN OBTAINED FROM AN AGENT LICENSED TO DO BUSINESS IN NEW BRUNSWICK? \_\_\_\_\_
  
- 9. HAVE YOU ENCLOSED WITH YOUR TENDER A COPY OF ALL ADDENDA ISSUED, EACH ONE **"PROPERLY SIGNED"**? \_\_\_\_\_
  
- 10. HAVE YOU INCLUDED WITH YOUR TENDER SUBMISSION A COPY OF THE RESOLUTION FROM YOUR BOARD OF DIRECTORS REGARDING SIGNING AUTHORITY; SAID COPY MUST BE **"PROPERLY SIGNED"**? \_\_\_\_\_
  
- 11. IS YOUR TENDER FORM **"PROPERLY SIGNED"**? \_\_\_\_\_
  
- 12. ARE YOU SUBMITTING YOUR TENDER IN AN ENVELOPE HAVING ON THE FACE OF IT THE NAME OF THE TENDERER AND IDENTIFICATION OF THE CONTRACT FOR WHICH THE TENDER IS SUBMITTED? \_\_\_\_\_

THIS CHECKLIST IS PROVIDED FOR YOUR CONVENIENCE ONLY A REMINDER OF THE MAJOR REQUIREMENTS FOR THE SUBMISSION OF TENDERS. IT IN NO WAY RELIEVES THE BIDDER FROM THE OBLIGATION TO READ AND BECOME THOROUGHLY FAMILIAR WITH ALL REQUIREMENTS OF THE TOWN OF SHEDIAC STANDARD MUNICIPAL SPECIFICATIONS AND TENDERING PROCEDURES.

I, HEREBY, CONFIRM THAT I HAVE READ AND UNDERSTOOD THE ABOVE \_\_\_\_\_  
(Initials)



**APPENDIX "C-1"**

**TOWN OF SHEDIAC**

**STATUTORY DECLARATION**

**FOR PROGRESS CLAIM PAYMENTS**

CONTRACT NAME: \_\_\_\_\_

CONTRACT N°: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

I SOLEMNLY DECLARE THAT ALL PERSONS WHO HAVE BEEN EMPLOYED TO DO THE WORK, OR WHO HAVE FURNISHED EQUIPMENT, MATERIALS OR SERVICES FOR THE WORK, OR PERSONS ENTITLED TO A LIEN UNDER THE MECHANICS' LIEN ACT, HAVE BEEN FULLY PAID AND THAT, ATTACHED HERETO, IS A CERTIFICATE FROM WORKSAFENB STATING THAT ALL REQUIRED PAYMENTS RELATING TO THIS CONTRACT HAVE BEEN PAID.

I MAKE THIS SOLEMN DECLARATION CONSCIENTIOUSLY BELIEVING IT TO BE TRUE AND KNOWING THAT IT IS OF THE SAME FORCE AND EFFECT AS IF MADE UNDER OATH, AND BY VIRTUE OF THE EVIDENCE ACT.

I/WE, THE UNDERSIGNED, ALSO DECLARE THAT THE FIRM OF \_\_\_\_\_, HAS NO FURTHER CLAIMS WHATSOEVER, AGAINST THE TOWN OF SHEDIAC WITH RESPECT TO THIS CONTRACT, EXCEPT FOR THIS PROGRESS CLAIM AND RETAINED HOLDBACKS TO DATE.

**DECLARED BEFORE ME**

IN THE \_\_\_\_\_ OF \_\_\_\_\_ )

IN THE PROVINCE OF \_\_\_\_\_ )

THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_\_ )

) \_\_\_\_\_  
) **SIGNATURE OF CONTRACTOR**

) \_\_\_\_\_  
) **NAME (PRINTED)**

) \_\_\_\_\_  
) **TITLE**

\_\_\_\_\_  
**A COMMISSIONER OF OATHS OR NOTARY**

) \_\_\_\_\_  
) **AFFIX COMPANY SEAL**

**APPENDIX "C-2"**

**TOWN OF SHEDIAC**

**STATUTORY DECLARATION**

**FOR FINAL ACCEPTANCE**

CONTRACT NAME: \_\_\_\_\_

CONTRACT N°: \_\_\_\_\_

CONTRACTOR: \_\_\_\_\_

I SOLEMNLY DECLARE THAT ALL PERSONS WHO HAVE BEEN EMPLOYED TO DO THE WORK, OR WHO HAVE FURNISHED EQUIPMENT, MATERIALS OR SERVICES FOR THE WORK, OR PERSONS ENTITLED TO A LIEN UNDER THE MECHANICS' LIEN ACT, HAVE BEEN FULLY PAID AND THAT, ATTACHED HERETO, IS A CERTIFICATE FROM WORKSAFENB STATING THAT ALL REQUIRED PAYMENTS RELATING TO THIS CONTRACT HAVE BEEN PAID.

I MAKE THIS SOLEMN DECLARATION CONSCIENTIOUSLY BELIEVING IT TO BE TRUE AND KNOWING THAT IT IS OF THE SAME FORCE AND EFFECT AS IF MADE UNDER OATH, AND BY VIRTUE OF THE EVIDENCE ACT.

I/WE, THE UNDERSIGNED, ALSO DECLARE THAT THE FIRM OF \_\_\_\_\_, HAS NO FURTHER CLAIMS WHATSOEVER, AGAINST THE TOWN OF SHEDIAC WITH RESPECT TO THIS CONTRACT.

**DECLARED BEFORE ME**

IN THE \_\_\_\_\_ OF \_\_\_\_\_ )

IN THE PROVINCE OF \_\_\_\_\_ )

THIS \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_\_ )

) \_\_\_\_\_  
) SIGNATURE OF CONTRACTOR

) \_\_\_\_\_  
) NAME (PRINTED)

) \_\_\_\_\_  
) TITLE

\_\_\_\_\_  
A COMMISSIONER OF OATHS OR NOTARY

) \_\_\_\_\_  
) AFFIX COMPANY SEAL



**APPENDIX "D"**

**CERTIFICATE OF SUBSTANTIAL COMPLETION**

**CONTRACT NAME:** \_\_\_\_\_

**CONTACT N°:** \_\_\_\_\_

**CONTRACTOR:** \_\_\_\_\_

I, \_\_\_\_\_, PROJECT MANAGER, DO HEREBY CERTIFY THAT THE WORK REQUIRED UNDER THIS CONTRACT IS "SUBSTANTIALLY COMPLETE" AS OF THE \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_, AND THAT THE FOLLOWING CONTRACT REQUIREMENTS HAVE BEEN FULLY MET.

- 1. ALL SEWER MAINS HAVE PASSED LEAKAGE TESTS WHICH WERE CARRIED OUT ON \_\_\_\_\_ . (ATTACH COMPLETED APPENDIX "G")
- 2. VIDEO SEWER INSPECTION     WAS COMPLETED ON \_\_\_\_\_ .  
 IS SCHEDULED TO BE DONE ON \_\_\_\_\_ .
- 3. ALL WATER MAINS HAVE PASSED PRESSURE TESTS, WHICH WERE CARRIED OUT ON \_\_\_\_\_ . (ATTACH COMPLETED APPENDIX "H")
- 4. A COMPLETE INSPECTION OF THE WORKS, BY ALL REQUIRED TOWN AND CONTRACTOR REPRESENTATIVES, WILL BE CONDUCTED ON \_\_\_\_\_ .
- 5. THE FOLLOWING MINOR WORKS ITEMS WILL BE COMPLETED BY \_\_\_\_\_ .

**LIST AND COMMENTS:**

\_\_\_\_\_  
\_\_\_\_\_

SUBJECT TO THE REQUIREMENTS OF THE GENERAL SPECIFICATIONS, THE FIRST RELEASE OF HOLDBACK MONIES SHALL BECOME DUE SIXTY (60) DAYS AFTER THE ABOVE-STATED DATE.

\_\_\_\_\_  
**SIGNATURE OF PROJECT MANAGER**

\_\_\_\_\_  
**SIGNATURE OF MANAGER OF ENGINEERING**

**DATED:** \_\_\_\_\_

cc:     **CONTRACTOR**



---

**APPENDIX "E"**


---

**CERTIFICATE OF PROVISIONAL ACCEPTANCE**

**CONTRACT NAME:** \_\_\_\_\_

**CONTRACT N°:** \_\_\_\_\_

**CONTRACTOR:** \_\_\_\_\_

**I, \_\_\_\_\_, PROJECT MANAGER, DO HEREBY CERTIFY THAT ALL THE WORK REQUIRED UNDER THIS CONTRACT IS "PROVISIONALLY ACCEPTED" AS OF THE \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_\_. THAT THE "MAINTENANCE PERIOD" COMMENCES AS OF THIS DATE, AND THAT THE FOLLOWING CONTRACT REQUIREMENTS HAVE BEEN FULLY MET:**

1. **CERTIFICATE OF SUBSTANTIAL COMPLETION WAS ISSUED ON \_\_\_\_\_ (IF NOT ISSUED THE FOLLOWING ITEMS MUST BE FILLED IN IF APPLICABLE)**
  - a) **ALL SEWER MAINS HAVE PASSED EXFILTRATION TESTS WHICH WERE CARRIED OUT ON \_\_\_\_\_ (ATTACH COMPLETED FORM FROM GSSC)**
  - b) **VIDEO SEWER INSPECTION  WAS COMPLETED ON \_\_\_\_\_**  
 **IS SCHEDULED TO BE DONE ON \_\_\_\_\_.**
  - c) **ALL WATER MAINS HAVE PASSED LEAKAGE AND DISINFECTION TESTS WHICH WERE CARRIED OUT ON \_\_\_\_\_. (ATTACH COMPLETED APPENDIX "H")**
2. **A COMPLETE INSPECTION OF THE WORK WAS CARRIED OUT ON \_\_\_\_\_ AND THOSE PRESENT WERE:**  
 \_\_\_\_\_
3. **A DEFICIENCY LIST WAS PREPARED. YES \_\_\_ NO \_\_\_ (IF YES, ATTACH)**
4. **THE ATTACHED DEFICIENCY LIST HAS BEEN ADDRESSED BY THE CONTRACTOR AND AN ADDITIONAL INSPECTION CONDUCTED ON \_\_\_\_\_ BY \_\_\_\_\_ CONFIRMED THAT ALL ITEMS NOW MEET TOWN REQUIREMENTS.**
5. **A COMPLETED STATUTORY DECLARATION FOR PROGRESS CLAIM PAYMENTS PERTAINING TO THIS CONTRACT DATED \_\_\_\_\_, IS ATTACHED HERETO, INCLUDING A LETTER FROM WORKSAFENB.**
6. **CONTRACT IN DISPUTE YES \_\_\_ NO \_\_\_**
7. **CONTRACT ENTIRELY COMPLETED YES \_\_\_ NO \_\_\_**

**IF ANY PORTION OF THIS CONTRACT IS IN DISPUTE OR NOT ENTIRELY COMPLETED, A SEPARATE WRITTEN REPORT MUST ACCOMPANY THIS CERTIFICATE, EXPLAINING THE PARTICULARS.**

**APPENDIX "E"**

**CERTIFICATE OF PROVISIONAL ACCEPTANCE**

**8. CALCULATION OF COMPLETION DATE:**

|                  | <u>AS SPECIFIED</u> | <u>REVISED</u> | <u>ACTUAL</u> |
|------------------|---------------------|----------------|---------------|
| START DATE:      | _____               | _____          | _____         |
| COMPLETION DATE: | _____               | _____          | _____         |

**PROVIDE EXPLANATION FOR REVISION TO DATE OR REASON FOR BEING BEHIND SCHEDULE.**

\_\_\_\_\_  
\_\_\_\_\_  
**DAYS AHEAD / BEHIND SCHEDULE:** \_\_\_\_\_

**9. LIQUIDATED DAMAGES: \_\_\_\_\_ DAYS X \_\_\_\_\_ PER DAY = \$ \_\_\_\_\_ THIS AMOUNT WILL BE CALCULATED WITH THE FIRST RELEASE OF HOLDBACK PAYMENT.**

**10. THE FIRST RELEASE OF HOLDBACK WILL BECOME DUE ON THE \_\_\_\_\_ DAY OF \_\_\_\_\_, 20 \_\_\_\_ WHICH IS BASED ON THE DATE HEREIN DECLARED OR THE DATE ON THE CERTIFICATE OF SUBSTANTIAL COMPLETION OF \_\_\_\_\_.**

**I FURTHER CERTIFY THAT ALL MATTERS RELATING TO THIS CONTRACT HAVE BEEN COMPLETED TO MY SATISFACTION AND THAT THE CERTIFICATE OF "PROVISIONAL ACCEPTANCE" CAN BE ISSUED.**

**DATE:** \_\_\_\_\_ **SIGNED:** \_\_\_\_\_  
**PROJECT MANAGER**

**I, THE UNDERSIGNED, DO HEREBY ACKNOWLEDGE THAT ALL MATTERS RELATING TO THIS CONTRACT HAVE BEEN COMPLETED AND HEREBY ISSUE THIS CERTIFICATE OF "PROVISIONAL ACCEPTANCE".**

**DATE:** \_\_\_\_\_ **SIGNED:** \_\_\_\_\_  
**MANAGER OF ENGINEERING**

**cc: CONTRACTOR**

**APPENDIX "F"**

**CERTIFICATE OF FINAL ACCEPTANCE**

**CONTRACT NAME:** \_\_\_\_\_

**CONTRACT N°:** \_\_\_\_\_

**CONTRACTOR:** \_\_\_\_\_

**I, \_\_\_\_\_, PROJECT MANAGER, HEREBY CERTIFY THAT ALL WORK REQUIRED UNDER THIS CONTRACT IS ACCEPTED AS OF THE \_\_\_\_\_ DAY OF \_\_\_\_\_, 20\_\_\_\_.**

- 1. A "CERTIFICATE OF SUBSTANTIAL COMPLETION" WAS ISSUED ON \_\_\_\_\_.
- 2. THE "CERTIFICATE OF PROVISIONAL ACCEPTANCE" WAS ISSUED ON \_\_\_\_\_.
- 3. A COMPLETED STATUTORY DECLARATION FOR FINAL ACCEPTANCE, PERTAINING TO THIS CONTRACT, DATED \_\_\_\_\_, IS ATTACHED HERETO, INCLUDING A LETTER FROM WORKSAFENB.
- 4. A FINAL INSPECTION OF THE WORK WAS CARRIED OUT ON \_\_\_\_\_ AND THOSE PRESENT WERE: \_\_\_\_\_  
\_\_\_\_\_
- 5. A FINAL DEFICIENCY LIST WAS PREPARED YES\_\_\_ NO \_\_\_ (IF YES, ATTACH)  
  
THE ATTACHED DEFICIENCY LIST HAS BEEN ADDRESSED BY THE CONTRACTOR AND AN ADDITIONAL INSPECTION CONDUCTED ON \_\_\_\_\_ BY \_\_\_\_\_ CONFIRMED THAT ALL ITEMS NOW MEET TOWN REQUIREMENTS.
- 6. PORTION OF WORK IN DISPUTE YES \_\_\_ NO \_\_\_  
CONTRACT ENTIRELY COMPLETED YES \_\_\_ NO \_\_\_
- 7. AS-BUILT DRAWINGS ARE COMPLETED YES \_\_\_ NO \_\_\_ AND ON FILE AS NUMBER \_\_\_\_\_. (IF NO, EXPLAN)  
\_\_\_\_\_

**I FURTHER CERTIFY THAT ALL MATTERS RELATING TO THIS CONTRACT HAVE BEEN COMPLETED TO MY SATISFACTION AND THAT THE "CERTIFICATE OF FINAL ACCEPTANCE" CAN BE ISSUED.**

**DATE:** \_\_\_\_\_ **SIGNED:** \_\_\_\_\_  
**PROJECT MANAGER**

**I, THE UNDERSIGNED, DO HEREBY ACKNOWLEDGE THAT ALL MATTERS RELATING TO THIS CONTRACT HAVE BEEN COMPLETED AND HEREBY ISSUE THIS "CERTIFICATE OF FINAL ACCEPTANCE".**

**DATE:** \_\_\_\_\_ **SIGNED:** \_\_\_\_\_  
**MANAGER OF ENGINEERING**

**cc: CONTRACTOR**





**APPENDIX "G"**

(REMOVED)



**APPENDIX "H"**

**WATERMAIN LEAKAGE TEST**

| GENERAL INFORMATION           |                     |
|-------------------------------|---------------------|
| CONTRACT NAME                 | _____               |
| SECTION OF TEST               | _____               |
| LOCATION OF TEST PUMP STATION | _____               |
| DATE                          | _____ WEATHER _____ |
| CONTRACTOR                    | _____               |
| CONSULTANT                    | _____               |

| ALLOWABLE LEAKAGE in LITRES   |                                      |
|---|--------------------------------------|
| Q = ALLOWABLE LEAKAGE (litres/hr)   | L = LENGTH OF PIPE (m) = _____       |
| D = DIAMETER OF PIPE (mm) = _____   | P = AVG. TEST PRESSURE (kPa) = _____ |
| <p>1<sup>st</sup> main (150ø), <math>Q = \frac{LD\sqrt{P}}{795000} = \left( \frac{\quad m}{795000} \right) \left( \frac{\quad mm}{795000} \right) \sqrt{1030 \text{ kPa}} = \quad \text{(A) litres/hr}</math></p> |                                      |
| <p>2<sup>nd</sup> main (200ø), <math>Q = \frac{LD\sqrt{P}}{795000} = \left( \frac{\quad m}{795000} \right) \left( \frac{\quad mm}{795000} \right) \sqrt{1030 \text{ kPa}} = \quad \text{(B) litres/hr}</math></p> |                                      |
| (A) + (B) _____ litres/hr   |                                      |
| <b>TOTAL ALLOWABLE LEAKAGE (x) 2hrs. _____ litres</b>   |                                      |

| CONDITIONS FOR TESTING   | TEST RESULTS  |
|--|---|
| <input type="checkbox"/> Duration of test is 2 hours   | TIME STARTED _____ rdg. _____ cm  |
| <input type="checkbox"/> All water valves within test section are fully open                                       | TIME FINISHED _____ rdg. _____ cm   |
| <input type="checkbox"/> All main valves and hydrant valves within test section operated by Contractor during test | difference in readings _____ cm   |
| <input type="checkbox"/> All hydrants closed during test   | $L_{\text{actual}} = \frac{\pi r^2 h}{1000} = \frac{\pi (\quad cm)^2 (\quad cm)}{1000} = \quad \text{litres}$ |

SECTION OF TEST HAS : PASSED  FAILED  INSPECTOR (signature) \_\_\_\_\_  
 (print below)

Comments \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**APPENDIX "H"**

**WATERMAIN DISINFECTION**

| GENERAL INFORMATION |         |
|---------------------|---------|
| LOCATION            |         |
| SECTION OF TEST     |         |
| DATE                | WEATHER |
| CONTRACTOR          |         |
| CONSULTANT          |         |

**PART ONE - FLUSHING**

All hydrants and branch lines shall be individually flushed using the main control valve to regulate the water flow through the hydrants.

SWAB REMOVAL DATE: \_\_\_\_\_

WATERMAIN FLUSHED... (See table "A ")      YES       NO

**PART TWO - DISINFECTION**

A sodium hypochlorite solution shall be injected into the watermain at a point not more than 3 metres from the main control valve. This injection shall be done with the watermain flushing through a hydrant carrying the solution throughout the watermain. The injection shall be complete when a concentration of 50ppm free residual chlorine is achieved through all the watermain. Free residual testing shall be done by the Town of Shediac. The disinfection period shall be 24 hours, after which free residual testing shall again be done; all samples must have not less than 10ppm. All valves to be operated during the disinfection period.

where,  $V_p = \text{Volume of pipe (cu. m.)}$ ,       $r = \text{radius ( m )}$ ,       $l = \text{length ( m )}$

primary watermain size,       $V_p = \pi r^2 l = \pi ( \text{_____ m} )^2 ( \text{_____ m} ) = \text{_____ cu. m}$

secondary watermain size,       $V_p = \pi r^2 l = \pi ( \text{_____ m} )^2 ( \text{_____ m} ) = \text{_____ cu. m}$

**TOTAL \_\_\_\_\_ cu. m**

where,  $V_c = \text{Volume of chlorine needed to disinfect}$

$$V_c = V_p \times 1,000 \text{ litres } \times \frac{50}{1,000,000} = \frac{V_p}{20} = ( \text{_____} ) = \text{_____ litres of 100\% chlorine}$$

where,  $x = \%$  chlorine concentration ( ex: 12% = 0.12 )

Volume of chlorine required to disinfect      =  $\frac{V_c}{x}$       = ( \_\_\_\_\_ )      = \_\_\_\_\_ litres  
 according to % of concentration       $x$       ( \_\_\_\_\_ )

**Total Residual Chlorine**      = \_\_\_\_\_ ppm ( not less than **50 ppm** )

**Free Residual Chlorine after 24 hrs.** = \_\_\_\_\_ ppm ( not less than **10 ppm** )

**APPENDIX "H"**

**WATERMAIN DISINFECTION TABLES**

**CHLORINE INJECTION CALCULATIONS**

WATERMAIN DISCHARGE = **114 l/min (25 igpm)** or **227 l/min (50 igpm)**

WATERMAIN DISCHARGE TIME =  $\frac{\text{watermain volume}}{\text{watermain discharge}}$  example :  $\frac{2650 \text{ l}}{114 \text{ l/min}} = 23 \text{ minutes}$

$\frac{l}{\text{l/min}} = \text{minutes}$

INJECTION RATE FOR CHLORINE SOLUTION =  $\frac{\text{chlorine solution (l)}}{\text{discharge time (min)}}$  example :  $\frac{205 \text{ l}}{23 \text{ min}} = 8.9 \text{ l/min ( 2 igpm )}$

$\frac{l}{\text{min.}} = \text{l/min ( igpm )}$

\* Note : Chlorine solution mixed in 205 l ( 45 imperial gallon ) drum.

**PART THREE - BACTERIOLOGICAL TESTING**

Water samples for bacteriological testing shall be taken by the Town after disinfection and flushing of the watermain is successful.

Free Residual Chlorine taken below to be less than 2 ppm

Date \_\_\_\_\_

1<sup>st</sup> Bacteriological Test Result    passed     failed     Free residual Chlorine = \_\_\_\_\_ ppm    \_\_\_\_\_

2<sup>nd</sup> Bacteriological Test Result    passed     failed     Free residual Chlorine = \_\_\_\_\_ ppm    \_\_\_\_\_

Attached bacteriological test results to this form

**PART FOUR - COMMISSIONING OF WATERMAIN**

DISINFECTED BY: \_\_\_\_\_ (NAME)    \_\_\_\_\_ (NAME)    \_\_\_\_\_ (NAME)

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DATE WATERMAIN PLACED IN SERVICE  APPROVED

## APPENDIX "H"

**WATERMAIN DISINFECTION TABLES**

TABLE " A " - REQUIRED FLOWS TO PRODUCE 0.8m/s ( 2.5 ft/s )

| PIPE DIAMETER & |        | REQ'D FLOW 0.8m/s ( 2.5ft/s ) |       | NUMBER OF 2 ½" HYDRANT OUTLETS |
|-----------------|--------|-------------------------------|-------|--------------------------------|
| ( in. )         | ( mm ) | IGPM                          | l / s |                                |
| 4               | 100    | 83                            | 6.3   | 1                              |
| 6               | 150    | 167                           | 12.6  | 1                              |
| 8               | 200    | 333                           | 25.2  | 1                              |
| 10              | 250    | 500                           | 37.9  | 1                              |
| 12              | 300    | 750                           | 56.8  | 2                              |
| 16              | 400    | 1330                          | 100.9 | 2                              |

TABLE " B " - PITOT GAUGE READING FOR FLOWS

| PITOT GAUGE<br>READING | NOZZLE DIAMETER IN INCHES coeff= 0.99 |     |     |     | coeff. 0.90 |
|------------------------|---------------------------------------|-----|-----|-----|-------------|
|                        | 1 ½                                   | 1 ¾ | 2   | 2 ½ | 2 ½         |
| ( psi )                | DISCHARGE - GALLONS PER MINUTE (IGPM) |     |     |     |             |
| 5                      | 124                                   | 169 | 222 |     | 313         |
| 6                      | 136                                   | 186 | 243 |     | 343         |
| 7                      | 147                                   | 201 | 262 |     | 370         |
| 8                      | 157                                   | 214 | 280 |     | 396         |
| 9                      | 167                                   | 227 | 297 |     | 420         |
| 10                     | 176                                   | 240 | 314 | 488 | 442         |
| 12                     | 193                                   | 264 | 342 | 538 | 485         |
| 14                     | 208                                   | 283 | 370 | 577 | 524         |
| 16                     | 223                                   | 303 | 396 | 618 | 560         |
| 18                     | 236                                   | 322 | 420 | 655 | 594         |
| 20                     | 249                                   | 339 | 443 | 690 | 626         |
| 30                     |                                       |     |     | 846 | 767         |

TABLE " C " - SAMPLE DILUTIONS

| Sample Volume ( ml ) | Deionized Water used to bring Volume to 25 ml ( ml ) | Multiplication Factor |
|----------------------|--|-----------------------|
| 25.0                 | 0.00   | 1                     |
| 12.5                 | 12.50  | 2                     |
| 10.0                 | 15.00  | 2.5                   |
| 5.0                  | 20.00  | 5                     |
| 2.5                  | 22.50  | 10                    |
| 1.0                  | 24.00  | 25                    |
| 0.25                 | 24.75  | 100                   |

| Multiplication factors to be used when sample is diluted to 100 ml |         |
|--|---------|
| Sample Volume ( ml )   | Factors |
| 1  | 100     |
| 2  | 50      |
| 5  | 20      |
| 10   | 10      |
| 25   | 4       |
| 50   | 2       |

Note : The concentration of the sample is equal to the diluted sample reading multiplied by the multiplication factor.

Example : A 2.5 ml sample was diluted with 22.5 ml of deionized water.

The result was 0.35 mg / l . Concentration of this sample is

$$0.35 \times 10 = 3.5 \text{ mg / l}$$

More accurate dilutions can be done with a pipet and a 100 ml volumetric flask. Pipet the sample and dilute to volume with deionized water. Swirl to mix.

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**APPENDIX "H"**

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**STANDARD PROCEDURE FOR COMMISSIONING NEW WATERMAINS****GENERAL**

All tests, disinfection and commissioning of watermains are to be in accordance with AWWA Standard C651 Disinfecting Water Mains, the Town of Shediac Standard Municipal Specifications, and the following procedures.

- The Contractor is to make all arrangements with the site Inspector and the Town's Engineering Department at least 48 hours prior to the start of any testing.
- The Contractor is not to operate any existing valves or hydrants.
- The Contractor is to supply all labour, equipment and materials necessary to carry out pressure and leakage tests, swabbing, sterilization and flushing of all watermains and appurtenances. There must be a Contractor's representative on site at all times when watermain disinfection, flushing and bacteriological testing takes place.
- The Contractor is to insert a swab of appropriate size into first pipe section of new watermain at start of construction, for each section to be tested.

Initial flushing to remove swab requires a temporary pipe section at end of test section, to be brought up to grade with a 45 degree bend and pipe of same size and type as being installed, or a modified hydrant installed as a standpipe at the end of the main. (As shown in figure 1)

- At the discharge at the end of the main to be tested, if there is no hydrant available within the test section, the Contractor shall provide a temporary standpipe (see Figure 1 following), consisting of a minimum 100mm pipe with a smooth, unthreaded ½ inch sampling faucet so that water leaving the main can be tested without disturbing the flow.
- A completed Watermain Leakage Test and Disinfection form (Appendix "H" of Town of Shediac Specs) must be filled out.



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**APPENDIX “H”**

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**GENERAL SEQUENCE FOR TESTING AND ACCEPTANCE****1. Filling and Initial Flushing**

Public Works crew to operate valves for filling the main.

(48 hour notice to the Engineering Department at 532-7000 ext. 235 or 533-4037)

Flushing shall be via permanent hydrant (if available at end of new line), by a temporary 45 degree bend and pipe installed by the Contractor. (This bend to be removed and standpipe installed as soon as swab is expelled from pipe.)

**2. Pressure and Leakage Tests**

Perform pressure and leakage tests.

**3. Disinfection**

System shall then be sterilized / disinfected by the Contractor and tested for chlorine residual by the Water Control Technicians. (48 hour notice to the Public Works Water Department at 532-7000 ext. 235 or 533-4037).

Contractor must supply standpipe together with the necessary valves and piping, if no permanent hydrant is available at the end of the line.

**4. Flushing**

Heavily chlorinated water to be discharged into the sanitary sewer through a hose connection with an air gap, and water must be de-chlorinated prior to discharge.

**5. Bacteriological Testing by the Public Works Water Department**

Two tests taken 24 hours apart. Test results usually take a minimum of 48 hours. All new watermains disinfection shall commence only on the days of Monday, Tuesday and Wednesday. There must be a 48-hour notice to the Engineering Department prior to disinfection.

**6. Final Flushing**

Flushing shall be carried out to remove any stagnant water allowing a Free Available Chlorine Residual to be taken of the water distribution system.

## APPENDIX "H"

**1. FILLING AND INITIAL FLUSHING**

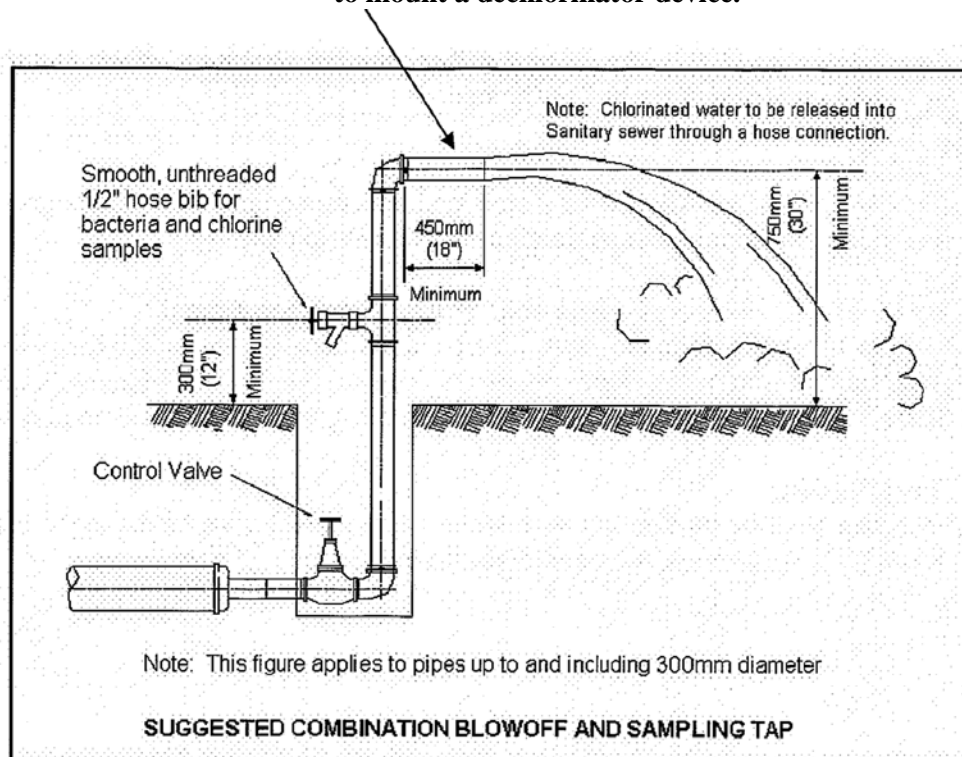
The Contractor is not to operate any existing valves or hydrants; Public Works Water staff will operate them.

Preliminary flushing shall be carried out in conjunction with swabbing operations, using relatively high flow rates (at least 0.75m/sec or 2.5.ft/sec) by the Public Works Water Department staff opening existing valves. Standpipe to be in open position; hydrants within test section are to be closed until swab is expelled.

Once the swab is expelled, all hydrants within the section shall be opened in order to expel air.

As system fills, close fire hydrants from the low end to the high and flush main using the standpipe, or end hydrant. This standpipe or end hydrant is the last utility to be closed; it remains in the open position until all valves are closed so as not to have water from the new section of main mixing with the existing water system.

**Requires a 63.5mm $\varnothing$  hydrant thread, as per Town Standard, to mount a dechlorinator device.**



**Figure 1**

This standpipe is to be used when no hydrant is available at end of new main.

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**APPENDIX “H”**

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**2. PRESSURE AND LEAKAGE TESTS**

The Contractor shall provide complete testing equipment (suitable pump and storage tank, pressure gauge, relief valve and check valve), and shall provide and install the necessary piping to connect to the main.

The watermain shall be filled with water from the Town Distribution System by Town of Shediac’s Public Works Water crews via existing valves.

Apply hydrostatic pressure of 1000kPa (145 psi) for 2 hours.

Measure water volume required to maintain this pressure and compare to allowable leakage. This can be done by measuring the amount of water reduction in the storage tank, or by means of a calibrated water meter.

Take readings every 15 minutes over a period of 2 hours. If the average leakage for the 2-hour period exceeds the allowable rate, the Contractor shall examine all parts of the main for leakage and shall take the necessary steps to reduce the leakage to the allowable rate.

The “WATER MAIN – LEAKAGE TEST AND DISINFECTION” form of this Appendix “H” must be filled out and signed the site inspector.

**3. DISINFECTION**

Induce a controlled flow by opening the standpipe or end hydrant and cracking gate valve at beginning of new watermain (slowly) to allow the air to escape at the hydrants and standpipe.

**No valves are to be opened until hydrants and standpipes are open.**

Using the 20mm service tubing (previously installed by the Contractor), inject chlorine solution (Javex 12 + Water) into the new main immediately downstream of valve being operated. Continue to move highly chlorinated water through the new pipes until strong chlorine smell is detected at flowing hydrant(s). Each hydrant will be concurrently closed when chlorine smell is detected.

Town of Shediac Public Works Water Department will measure chlorine residual at the open hydrant(s); when it reaches 50ppm, shut down the valves and hydrants. The Contractor shall operate all valves and hydrants within the new section after the introduction of chlorine to ensure their disinfection.

Let stand for a minimum of 24 hours; at that time, Town of Shediac Public Works Water Department will take samples and retest for chlorine residual from dead ends to confirm at least 10ppm free chlorine.

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**APPENDIX "H"**

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Note: Heavily chlorinated water shall never stand in the pipe for more than 48 hours, in order to prevent damage to the pipe lining or corrosion damage to the pipe itself.

**4. FLUSHING**

If greater than 10ppm, flush system down to 2ppm or less. **Again, hydrants and standpipe must be open prior to opening valves.** If less than 10ppm, repeat chlorination procedure. All costs of re-sterilization shall be borne entirely by the Contractor, including all Town of Shediac staffing costs.

Chlorinated water shall be dechlorinated and discharged into the sanitary sewer via hose connections, unless written approval is received from the Town Engineer.

**5. BACTERIOLOGICAL TESTING BY PUBLIC WORKS WATER DEPARTMENT**

Samples will be taken from each branch (i.e. side streets) and at end of each section via 20mm service tubing; second set 24 hours later. They will forward the samples to lab for testing of Total Coli form, E-coli, and HPC if required. Recommended days for bacteriological tests are Tuesday, Wednesday and Thursday, as test results take a minimum of 48 hours.

If test fails, flush and repeat chlorination and sampling procedure.

**6. FINAL FLUSHING**

Flushing shall be carried out at a minimum flow rate of 0.75m/sec (2.5 ft/sec.)

**7. COMMISSIONING**

Advise all residents within the new area to flush their system prior to using it; there still may be larger than normal amounts of chlorine in their service line.

The Public Works Water Department will remove "out of service" hydrant markers, verify that all valves are fully open or closed as may be required, perform static tests on all hydrants, and install hydrant numbers, ensuring that the system is fully operational and functional.

**REPAIRS – DISINFECTION PROCEDURES**

If repairs are made with the line under full pressure, disinfection is required as per AWWA Standard C651.

In wet excavations, large quantities of hypochlorite must be applied to the open trench areas to lessen the danger of contamination. Tablets are the best method as they dissolve slowly and continue to release hypochlorite as the water is pumped from the excavation.

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**APPENDIX “H”**

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Spray the interior of all pipe, fittings and materials used in the repair with a 1 to 5% solution of chlorine at a pressure of 690kPa (100 psi) as it is lowered into the trench. An ordinary pressure-type stainless steel fire extinguisher will do the job.

Flush the main.

**CAULKED TAPPING SLEEVES – PROCEDURE FOR DISINFECTION**

Before a tapping sleeve is installed, the exterior of the main to be tapped shall be thoroughly cleaned and the interior surface of the sleeve shall be lightly dusted with calcium hypochlorite powder or sprayed with a 1 to 5% chlorine solution.

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**APPENDIX "T"**

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**LIST OF STANDARDS**

| <b><u>ASTM</u></b> | <b><u>AMERICAN SOCIETY FOR TESTING AND MATERIALS</u></b>  |
|--------------------|---|
| A 48               | GRAY IRON CASTINGS  |
| A 536              | DUCTILE IRON CASTINGS   |
| B 88               | SEAMLESS COPPER WATER TUBE  |
| C 131              | STANDARD TEST METHOD FOR RESISTANCE TO DEGRADATION OF SMALL SIZE COARSE AGGREGATE BY ABRASION AND IMPACT IN THE LOS ANGELES MACHINE                         |
| C 260              | AIR ENTRAINING ADMIXTURES FOR CONCRETE  |
| C 309              | LIQUID MEMBRANE FORMING COMPOUNDS FOR CURING CONCRETE   |
| C 443              | JOINTS FOR CIRCULAR CONCRET SEWER AND CULVERT PIPE, USING RUBBER GASKETS.   |
| C 478              | PRECAST REINFORCED CONCRETE MANHOLE SECTIONS  |
| C 902              | PEDESTRIAN AND LIGHT TRAFFIC PAVING BRICK   |
| C1244              | STANDARD TEST METHOD FOR SEWER MANHOLES BY THE NEGATIVE AIR PRESSURE (VACUUM) TEST.   |
| D 698              | TEST METHOD FOR LABORATORY COMPACTION CHARACTERISTICS OF SOIL USING STANDARD EFFORT (12,400 ft-lbf/ft <sup>3</sup> (600kN/m <sup>3</sup> ))                 |
| D 946              | PENETRATION GRADED ASPHALT CEMENT FOR USE IN PAVEMENT CONSTRUCTION  |
| D3405              | JOINT SEALANTS, HOT-POURED, FOR CONCRETE AND ASPHALT PAVEMENTS  |
| D3034              | TYPE PSM POLYVINYL CHLORIDE (PVC) SEWER PIPE AND FITTINGS   |
| F 794              | PVC RIBBED GRAVITY SEWER PIPE AND FITTINGS  |
| <br>               |   |
| <b><u>AWWA</u></b> | <b><u>AMERICAN WATER WORKS ASSOCIATION</u></b>  |
| B 300              | HYPOCHLORITES   |
| C 104              | CEMENT MORTAR LINING FOR DUCTILE-IRON PIPE AND FITTINGS FOR WATER   |
| C 110              | DUCTILE-IRON AND GRAY-IRON FITTINGS, 3 INCHES THROUGH 48 INCHES (75mm through 1200mm) FOR WATER AND OTHER LIQUIDS   |
| C 111              | RUBBER-GASKET JOINTS FOR DUCTILE-IRON PRESSURE PIPE AND FITTINGS  |
| C 151              | DUCTILE-IRON PIPE, CENTRIFUGALLY CAST, FOR WATER AND OTHER LIQUIDS  |
| C 153              | DUCTILE-IRON COMPACT FITTINGS, 3 INCHES THROUGH 24 INCHES (76mm THROUGH 610mm) AND 54 INCHES THROUGH 64 INCHES (1,400mm THROUGH 1,600mm), FOR WATER SERVICE |
| C 500              | METAL-SEATED GATE VALVES FOR WATER SUPPLY SERVICE   |
| C 502              | DRY-BARREL FIRE HYDRANTS  |

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**APPENDIX “T”**

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|                   |   |
|-------------------|---|
| <b>C 504</b>      | <b>RUBBER-SEATED BUTTERFLY VALVES</b>   |
| <b>C 509</b>      | <b>RESILIENT-SEATED GATE VALVES FOR WATER SUPPLY SERVICE</b>  |
| <b>C 651</b>      | <b>DISINFECTING WATER MAINS</b>   |
| <b>C 800</b>      | <b>UNDERGROUND SERVICE LINE VALVES AND FITTINGS</b>   |
| <b>C 900</b>      | <b>POLYVINYL CHLORIDE (PVC) PRESSURE PIPE, 4 INCHES THROUGH 12 INCHES FOR WATER DISTRIBUTION</b>                          |
| <b>C 905</b>      | <b>POLYVINYL CHLORIDE (PVC) WATER TRANSMISSION PIPE, NOMINAL DIAMETERS 14 INCHES THROUGH 36 INCHES</b>                    |
| <b>C 907</b>      | <b>POLYVINYL CHLORIDE (PVC) PRESSURE FITTINGS FOR WATER – 4 INCHES THROUGH 8 INCHES (100mm THROUGH 200mm)</b>             |
| <b><u>CSA</u></b> | <b><u>CANADIAN STANDARDS ASSOCIATION</u></b>  |
| <b>A 5</b>        | <b>(CAN/CSA) PORTLAND CEMENT</b>  |
| <b>A 23.1</b>     | <b>CONCRETE MATERIALS AND METHODS OF CONCRETE CONSTRUCTION</b>  |
| <b>A 23.2</b>     | <b>METHODS OF TEST FOR CONCRETE</b>   |
| <b>A23.2-16A</b>  | <b>RESISTANCE TO DEGRADATION OF SMALL SIZE COARSE AGGREGATE BY ABRASION AND IMPACT IN THE LOST ANGELES MACHINE</b>        |
| <b>A82.1</b>      | <b>(CAN/CSA) BURNED CLAY BRICK (SOLID MASONRY UNITS MADE FROM CLAY OR SHALE)</b>  |
| <b>A179</b>       | <b>MORTAR AND GROUT FOR UNIT MASONRY</b>  |
| <b>A257.2</b>     | <b>(CAN/CSA) REINFORCED CIRCULAR CONCRETE CULVERT, STORM DRAIN, SEWER PIPE AND FITTINGS</b>                               |
| <b>A257.3</b>     | <b>(CAN/CSA) JOINTS FOR CIRCULAR CONCRETE SEWER AND CULVERT PIPE, MANHOLE SECTIONS, AND FITTINGS USING RUBBER GASKETS</b> |
| <b>A257.4</b>     | <b>(CAN/CSA) PRECAST REINFORCED CIRCULAR CONCRETE MANHOLE SECTIONS, CATCH BASINS AND FITTINGS</b>                         |
| <b>B137.2</b>     | <b>PVC INJECTION-MOULDED GASKETED FITTINGS FOR PRESSURE APPLICATIONS</b>  |
| <b>B137.3</b>     | <b>(CAN/CSA) RIGID POLYVINYL CHLORIDE (PVC) PIPE FOR PRESSURE APPLICATIONS</b>  |
| <b>B137.10</b>    | <b>CROSSLINKED POLYETHYLENE/ALUMINUM/CROSSLINKED POLYETHYLENE COMPOSITE PRESSURE PIPE SYSTEMS</b>                         |
| <b>B182.1</b>     | <b>(CAN/CSA) PLASTIC DRAIN AND SEWER PIPE AND PIPE FITTINGS</b>   |
| <b>B182.2</b>     | <b>(CAN/CSA) PVC SEWER PIPE AND FITTING (PSM TYPE)</b>  |
| <b>B182.4</b>     | <b>(CAN/CSA) PROFILE PVC SEWER PIPE AND FITTINGS</b>  |
| <b>G30.18</b>     | <b>(CAN/CSA) BILLET-STEEL BARS FOR CONCRETE REINFORCING</b>   |
| <b>G401</b>       | <b>CORRUGATED STEEL PIPE PRODUCTS</b>   |

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**APPENDIX "T"**

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**CGSB CANADIAN GENERAL STANDARDS BOARD**

**16.2            EMULSIFIED ASPHALTS, ANIONIC TYPE FOR ROAD PURPOSES**





**APPENDIX "J"**

**Schedule A**

**AGREEMENT BETWEEN TOWN OF SHEDIAC AND CONTRACTOR**

**THIS AGREEMENT** made on this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

**BETWEEN:**                    The Town of Shediac, a municipal corporation, duly incorporated under and by virtue of a Special Act of the Legislative Assembly of the Province of New Brunswick,

hereinafter called the "**Town**"

**AND:**                            \_\_\_\_\_, a company incorporated under the laws of the Province of \_\_\_\_\_ having its Head Office in the \_\_\_\_\_ of \_\_\_\_\_, in the Province of \_\_\_\_\_.

hereinafter called the "**Contractor**"

The Town and the Contractor agree as follows:

**ARTICLE A-1:                    THE WORK**

The Contractor shall:

1.1     perform the Work required by the Contract Documents for \_\_\_\_\_  
\_\_\_\_\_  
(insert above the title of Work)

located at \_\_\_\_\_,  
(insert above the place of the Work)

which have been signed by the parties, and for which \_\_\_\_\_,  
\_\_\_\_\_  
(insert above the name of the Consultant)

is acting as and is hereinafter called the "**Consultant**" and

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**APPENDIX "J"**

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- 1.2 do and fulfill everything indicated by the Agreement, and
- 1.3 commence the Work by the \_\_\_\_\_, day of \_\_\_\_\_, in the year \_\_\_\_\_ and subject to adjustment in the completion date as provided for in the Contract Documents, attain Substantial Completion of the Work, by the \_\_\_\_\_ day of \_\_\_\_\_ in the year \_\_\_\_\_ and attain Provisional Acceptance of the work within \_\_\_\_\_ Working Days after the Substantial completion Date. Failure to comply shall result in the application of liquidated damages, as per General condition 25.

**ARTICLE A-2: AGREEMENT AND AMENDMENTS**

- 2.1 The Contract supersedes all prior negotiations, representations, or agreement, either with written or oral, relating in any manner to the Work, including the bidding documents that are not expressly listed in Article A-3 of the Agreement - Contract Documents.
- 2.2 The Contract may be amended only as provided in the Contract Documents.

**ARTICLE A-3: CONTRACT DOCUMENTS**

The following are the Contract Documents referred to in Article A-1 of the Agreement - THE WORK:

- Schedule A) Agreement between Town of Shediac and Contractor;
- Schedule B) Town of Shediac Standard Municipal Specifications (including Contract Definitions and General Conditions)
- Schedule C) Supplementary Conditions
- Schedule D) Supplementary Technical Specifications
- Schedule E) N/A
- Schedule F) Tender Form
- Schedule G) Certificate of Insurance
- Schedule H) Performance Bond
- Schedule I) Labour and Material Payment Bond

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**APPENDIX “J”**


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**ARTICLE A-4: CONTRACT PRICE**

- 4.1 The quantities shown in the Schedule of Contract Unit Prices are estimated. The Contract Price shall be the final sum of the products of the actual quantities that are incorporated in, or made necessary by the Work, as confirmed by count and measurements, and the appropriate Contract Unit Prices, together with any adjustments that are made in accordance with the provisions of the Contract Documents.
- 4.2 The Estimated Contract Price shall be the sum of the products of the estimated quantities and the appropriate Contract Unit Prices in the Schedule.
- 4.3 Schedule of Contract Prices

| <u>Item No.</u> | <u>Description</u> | <u>Unit</u> | <u>Estimated<br/>Quantity</u> | <u>Contract<br/>Unit Price</u> | <u>Estimated<br/>Total Price</u> |
|-----------------|--------------------|-------------|-------------------------------|--------------------------------|----------------------------------|
|-----------------|--------------------|-------------|-------------------------------|--------------------------------|----------------------------------|

**ARTICLE A-5: PAYMENT**

- 5.1 The Town shall pay the Contractor for the performance of the Contract, the amounts being determined by actual measured quantities of the individual work items contained in the Schedule of Contract Unit Prices in Article A-4.3 of this Agreement, and measured in accordance with the methods of measurement given in the specifications.

**ARTICLE A-6: RIGHTS AND REMEDIES**

- 6.1 The duties and obligations imposed by the Contract Documents and the rights and remedies available thereunder shall be in addition to and not a limitation of any duties, obligations, rights and remedies otherwise imposed or available by law.
- 6.2 No action or failure to act by the Town, Consultant or Contractor shall constitute a waiver of any right or duty afforded any of them under the contract, nor shall any such action or failure to act constitute an approval of or acquiescence in any breach thereunder, except as may be specifically agreed in writing.

**APPENDIX “J”**

**ARTICLE A-7: RECEIPT OF AND ADDRESSES FOR NOTICES**

7.1 Notices in writing between the parties or between them and the Consultant shall be considered to have been received by the addressee on the date of delivery if delivered to the individual, or to a member of the firm, or to an officer of the corporation for whom they are intended by hand or by registered post; or if sent by regular post, to have been delivered within 5 working days of the date of mailing when addressed as follows:

The Town at

290 Main Street, unit 300

\_\_\_\_\_  
Street and number and postal box number if applicable

Shediac, NB, Canada, E4P 2E3

\_\_\_\_\_  
Post office or district, province, postal code

The Contractor at

\_\_\_\_\_  
Street and number and postal box number if applicable

\_\_\_\_\_  
Post office or district, province, postal code

The Consultant at

\_\_\_\_\_  
Street and number and postal box number if applicable

\_\_\_\_\_  
Post office or district, province, postal code

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**APPENDIX "J"**

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**ARTICLE A-8: SUCCESSION**

**8.1** The Contract Documents are to be read into and form part of this Agreement and the whole shall constitute the Contract between the parties, and subject to the law and the provisions of the Contract Documents shall ensure to the benefit of and be binding upon the parties hereto, their respective heirs, legal representatives, successors and assigns.

**IN WITNESS WHEREOF** the parties hereto have executed this Agreement and by the hands of their duly authorized representatives.

**SIGNED SEALED AND DELIVERED:**

**TOWN OF SHEDIAC:**

\_\_\_\_\_  
Mayor

\_\_\_\_\_  
Town Administrator/Clerk

**CONTRACTOR:**

\_\_\_\_\_  
(Signature - name and title of person signing)

\_\_\_\_\_  
(Signature - name and title of person signing)

**APPENDIX "J"**

COUNTY OF WESTMORLAND  
PROVINCE OF NEW BRUNSWICK

**AFFIDAVIT FOR TOWN OF SHEDIAC SIGNATURES**

TO WIT:

I, \_\_\_\_\_, OF THE TOWN OF SHEDIAC, IN THE COUNTY OF WESTMORLAND AND PROVINCE OF NEW BRUNSWICK MAKE OATH AND SAY:

1. THAT I AM THE TOWN CLERK OF THE TOWN OF SHEDIAC AND \_\_\_\_\_ IS THE MAYOR OF THE SAID TOWN.

2. THAT AS TOWN CLERK OF THE TOWN OF SHEDIAC, I HAVE THE CUSTODY OF THE COMMON SEAL OF THE TOWN OF SHEDIAC AND AM DULY AUTHORIZED TO AFFIX THE SEAL TO ANY CONTRACT MADE BY THE TOWN OF SHEDIAC.

3. THAT THE SEAL AFFIXED TO THE AFOREGOING CONTRACT IS THE COMMON AND CORPORATE SEAL OF THE TOWN OF SHEDIAC AND SUCH SEAL WAS BY ME AFFIXED THERETO BY ORDER OF THE COUNCIL OF THE TOWN OF SHEDIAC AND FOR THE PURPOSES THEREIN SET FORTH.

4. THAT THE SIGNATURE "JACQUES LEBLANC" TO THE SAID CONTRACT SUBSCRIBED AS MAYOR, IS IN THE TRUE AND PROPER HANDWRITING OF HIM, THE SAID \_\_\_\_\_ AND WAS SIGNED BY HIM IN MY PRESENCE; AND THE SIGNATURE "GILLES BELLEAU" TO THE AFOREGOING CONTRACT SUBSCRIBED AS TOWN CLERK IS IN MY TRUE AND PROPER HANDWRITING.

SWORN TO AT THE TOWN OF SHEDIAC )  
IN THE COUNTY OF WESTMORLAND AND )  
PROVINCE OF NEW BRUNSWICK, THIS )  
\_\_\_\_\_ DAY OF \_\_\_\_\_ )  
A.D., , \_\_\_\_\_ BEFORE ME : )  
)  
)  
)  
)  
)  
)  
)

\_\_\_\_\_  
A COMMISSIONER OF OATHS  
BEING A SOLICITOR

\_\_\_\_\_  
GILLES BELLEAU

**APPENDIX "J"**

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**AFFIDAVIT FOR CONTRACTOR SIGNATURES**





**APPENDIX “K”****MINIMUM TESTING FREQUENCY**

| Item No. | Description                         | Test Method                      | Testing Frequency   | Remarks  |
|----------|-------------------------------------|----------------------------------|---|--|
| 1.       | Trench Work<br>(water and sewer)    | ASTM<br>D 2922                   | Rolling pattern for both stone and common backfill to establish a benchmark to continue until a noticeable change in material. Once procedure is established, Inspector must insure that the recommended method is followed on all trenches.  | Nuclear Gauge Testing, Inspector to make field notes on method and results.                          |
| 2.       | Subgrade Testing<br>(Fill Sections) | ASTM<br>D 2922                   | One field test section per material type to develop a definite compaction procedure (equipment, lift thickness, moisture application and number of passes), which will produce the required density.<br><br>Visual deflection test of all subgrade surfaces with a fully loaded tandem truck.<br><br>Minimum one test per 20m of street, for each 300mm lifts.  | Nuclear Gauge Testing  |
| 3.       | Subgrade Testing<br>(Cut Sections)  |                                  | Visual Deflection Test of all subgrade surfaces with a fully loaded tandem truck.   | Inspector must record and confirm the results.   |
| 4.       | Granular Base and Subbase           | ASTM<br>D 2922                   | Minimum one test per 20m of street, for each lift of stone added.   | Nuclear gauge testing  |
| 5.       | Concrete Curb and Sidewalks         | CSA<br>A23.1-00                  | Minimum one set of tests and cylinders per 50cu.m ( $\pm 300m$ ).   | Air, slump and compressive strength  |
| 6.       | Asphalt Concrete                    |                                  | Rolling pattern for each different type of asphalt to establish a benchmark to continue. Once procedure is established, Inspector must insure that the recommended method is followed.  | Nuclear gauge testing  |
| 7.       | Asphalt Concrete Sampling           | ASTM<br>D 979                    | Minimum of three Asphalt Concrete Mix samples per street per hot-mix type. Only one sample to be tested, other 2 samples to be tested only if 1 <sup>st</sup> sample fails.<br><u>Note:</u> As per Section 8.6.3, each sample shall be split in two equal portions; one tested, the other set aside in the event that an appeal is requested by the Contractor. | Testing to be carried out following Asphalt Institute Manual Series Sp2, Superpave mix design method |
| 8.       | Asphalt Concrete Coring             | ASTM<br>D 3549<br>ASTM<br>D 5361 | Minimum of three cores per street per hot-mix type. Two additional cores per job to be done at joints adjacent to two of the other core locations. Small areas, tapers, aprons and areas of handwork shall not be cored.  |  |
| 9.       | Asphalt Binder                      | ASTM<br>D 140                    | Minimum of one litre per contract per Asphalt Binder Type.  | Sample shall be taken from the Contractor's storage tank in accordance with ASTM D 140.              |

\* Frequency or number of tests may be increased at any time by the Engineer when deemed necessary.

\* All test results shall be immediately faxed or e-mailed to the Town of Shediac concurrently with notification to the Consultant/Engineer and/or Owner/Developer.