



**CITY OF
SWIFT CURRENT**
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**SECTION 06010
CONCRETE SIDEWALK, CURB AND GUTTER**

DECEMBER 2015



CONSTRUCTION SPECIFICATIONS

SECTION: 06010 CONCRETE CURB, GUTTER AND SIDEWALK

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1 GENERAL

1.1 DESCRIPTION

- 1.1.1 The work described in this section pertains to the construction of concrete curbs, gutters, sidewalks, crossings and paving stones.
- 1.1.2 Products, Concrete Materials, Execution and Methods of Concrete Construction shall be in accordance with CSA CAN3-A23.1 or as modified in this section.
- 1.1.3 The Contractor shall construct curb, gutter and sidewalks so as to cause the least possible obstruction to the streets, lanes, private crossings, or entrances within or adjacent to the construction area.
- 1.1.4 The Contractor shall provide safe pedestrian crossings across streets, roadways and sidewalks and provide temporary entrances to local businesses, public buildings and homes.
- 1.1.5 During sidewalk reconstruction in commercial, industrial or residential areas, the amount of sidewalk removed will be controlled by the City. The Contractor will be permitted to remove sufficient sidewalk to accommodate a one-day concrete pour as well as the sub-grade preparation and forming for the following day's pour.
- 1.1.6 The Contractor shall construct the sidewalk, driveway, curb and gutter in accordance with the dimensions and slopes as indicated on the drawings.
- 1.1.7 During sidewalk or curb construction, the Contractor shall be responsible for any damage to private sidewalks and driveways. Neat saw cuts shall be used to carry out such modifications.

1.2 RELATED SECTIONS

- 02010 Site Preparation and Grading
- 02015 Sub – Grade Preparation
- 03001 Aggregates General
- 03005 Granular Base Course
- 03010 Granular Sub – Base
- 03060 Geotextile and Rolled Erosion Control Devices
- 03070 Rip – Rap
- 04000 Asphalt Pavement Crack Routing and Sealing
- 04001 Asphalt Pavement Crack Sealing
- 04015 Asphalt Concrete
- 04025 Prime, Tack and Fog Coats
- 04070 Asphalt Concrete Pavement Milling

- 07000 Pavement Markings
- 10000 Flexible Guide Posts and Delineators
- 12000 Regulatory Roadway Signs

1.3 INSPECTION AND TESTING

- 1.3.1 Inspection and Testing shall be in accordance with requirements of the sections in this specification.

2 PRODUCTS

2.1 PORTLAND CEMENT

- 2.1.1 Portland cement shall meet the requirements of CSA Standard Portland A5-M cement and shall be Type 10 normal, or type 50 sulfate resistant, as required by the City.

2.2 AGGREGATES

- 2.2.1 The fine and coarse aggregate used in the concrete mix shall conform to the following specifications:

- Fine Aggregate: CSA CAN3-A23.1, Clause 5.3.
- Coarse Aggregate: CSA CAN3-A23.1, Clause 5.4. Table 2 Group 1 (28-5)

<u>Sieve Size (mm)</u>	<u>% Passing by Weight</u>
40	100
28	95 – 100
14	30 – 65
5	1 – 10
2.5	0 – 5

2.3 ADMIXTURES

- 2.3.1 All admixtures used to enhance the concrete shall conform to the following specifications:

- Air Entrainment: ASTM C260
- Chemical: ASTM C494
- Calcium Chloride: ASTM C494

The use of calcium chloride shall only be used when approved by the City, but in no case will the amount added be greater than 2% of the cement weight. It shall not be used when the air temperature is above 4°C.

- Fly ash shall not exceed 10% by weight of cement, and it shall conform to the requirements of CAN/CSA-A23.5. Only approved compatible superplasticizing admixtures and air entraining agents shall be used with the fly ash. The City may require characteristic data for fly ash to prove conformance to the

standards. After September 1st no portion of the specified cement content may be replaced with fly ash unless approved in writing.

- 2.3.2 Other admixtures may be used with written approval by the City but must conform to current ASTM specifications.

2.4 REINFORCING STEEL

- 2.4.1 Reinforcing bars shall be deformed bars in accordance with CSA Standard Specification G30.12-M1977.
- 2.4.2 Cold drawn wire or welded wire fabric for concrete reinforcement shall be 150 x 150 and conform to the requirements of CSA Standard Specification G30.3-1972.

2.5 EXPANSION JOINT FILLER

- 2.5.1 Joint filler shall conform to CGSB Standard Specification for polyurethane sealing compound #19-GP-15 or ASTM Standard Specification for SIKA FLEX 1A.

2.6 MEMBRANE CURING COMPOUND

- 2.6.1 Resin base impervious curing compound shall conform to ASTM Standard Specification C309 Type 1D-Type B. The curing compound shall contain white fugitive dye.

2.7 PREFORMED EXPANSION JOINT FILLER

- 2.7.1 Preformed expansion joint filler shall conform to ASTM Standard Specification D-1752.

2.8 CONCRETE

- 2.8.1 Concrete mixes shall be designed by a qualified testing laboratory engaged by the Contractor. The mix design shall be submitted to the City for approval a minimum of ten (10) days prior to delivery of any concrete to the site. The specified compressive strength at twenty-eight (28) days shall be 32 MPa.
- 2.8.2 The concrete shall contain not less than 315 kg of Portland cement per cubic metre of concrete produced.
- 2.8.3 The air content of the concrete shall be maintained between the ranges of 5-8%.
- 2.8.4 The minimum slump permissible will be that which will allow the concrete to be placed efficiently and provide a homogeneous mass. The maximum allowable slump shall be 70mm +/- 10mm for all hand poured concrete and 40mm +/-10mm for all machine poured concrete.
- 2.8.5 Proportions for the various mixes must be approved by the City and once approved must be adhered to as much as possible depending on the grading of the aggregate and the circumstances of placing. Alterations in mix proportions must be approved by the City.
- 2.8.6 The proportions shall be determined or proven by or from Trial Mix Tests conducted in the City's laboratory.
- 2.8.7 The City may waive preliminary strength tests if the manufacturer of the concrete can furnish evidence satisfactory to the City that the concrete of the proportions and make of

the materials that he proposes to use will have the specified strength. The average strength upon which proportions are based shall be 15% higher than the strength specified, unless experience with the materials, proportions and mixing and delivery procedures show that a smaller or larger amount of over-design is required.

- 2.8.8 The concrete shall be mixed in a weight batch mixer of a type approved by the City. The mixer shall be properly equipped and used in accordance with the manufacturer's rating. When ready-mixed concrete is used, the current ASTM specifications C94 shall apply. Except where there is conflict with the general specifications, the general specifications shall apply.

2.9 RETEMPERING WITH AIR

- 2.9.1 If, due to a low air entrainment percentage, as specified, the City may feel it is necessary to add an approved air-entraining agent on site. Placement of concrete shall stop to allow the concrete truck's drum to turn at mixing speed for a minimum of three (3) minutes. Should the air content of the concrete not conform to specifications after retempering, then the concrete shall be rejected.
- 2.9.2 Other admixtures may be used with written approval by the City but must conform to current ASTM specifications.
- 2.9.3 The City has the right to withdraw permission to add an air-entraining agent to the mix and reject the concrete if this practice is being abused.

2.10 RETEMPERING WITH WATER

- 2.10.1 If, due to a low slump as specified, the City may feel it is necessary to add water to the mix, it shall be injected into the drum under such pressure and direction of flow that it conforms to the specifications in ASTM C-94, Appendix XI. Placement of concrete shall stop at that point to allow the concrete truck's drum to turn at mixing speed for a minimum of three (3) minutes. Should the slump of the concrete not conform to specifications, after retempering, then the concrete shall be rejected.
- 2.10.2 The City has the right to withdraw permission to add water to the mix and reject the concrete if this practice is being abused.

3 EXECUTION

3.1 OPENINGS AND ALTERATIONS

- 3.1.1 When alterations to underground services, poles, hydrants, valves, curb boxes, catch basins, or other structures are required, the Contractor shall leave openings in the sidewalk or curb to facilitate these alterations. The length of such openings shall be determined by the City but generally 3 metres shall be left open. Such openings shall be initially backfilled with gravel to make the sidewalk safe for public use and after the alteration has been completed, the Contractor shall construct sidewalk or curb over this opening with no compensation for the inconvenience to the Contractor.
- 3.1.2 In the event that the Contractor fails to leave such openings as required, the Contractor shall, at his own expense, be responsible for making these openings.

- 3.1.3 The Contractor shall be responsible to maintain clear approaches to all fire hydrants to permit access at any time, without delay, by the Fire Department.

3.2 PLACING CONCRETE

- 3.2.1 Concrete shall not be placed until the sub-grade and base course materials have been completed, and approved by the City. Sidewalks and curb & gutter base material shall consist of cutting the existing sub-grade or filling with native material or if the contract specified uniform backfill, specified granular materials will be installed to the designed grades as directed by the City. The base shall be compacted to a minimum of 98% standard proctor maximum dry density with a moisture content of plus/minus two percent (2%) of the specified optimum moisture content. The thickness of base placed shall be in accordance with the design and standard detail drawings or as directed by the City.
- 3.2.2 Excavation shall be graded to the levels given on the ground to such widths and depths as may be required to enable the forms to be set properly and to permit sufficient working clearance to obtain a properly finished product. 0.5 metres of asphalt must be saw cut and removed away from the edge of the proposed gutter to permit proper compaction by a plate tamper during the asphalt repair.
- 3.2.3 When the foundation material for the sidewalk consists of loose fill material, the Contractor shall, at his own expense, compact such material by means of mechanical vibrators or by other approved methods to a minimum density of 98% Standard Proctor Density.
- 3.2.4 No concrete shall be placed when temperatures are expected to drop below freezing within the next twenty-four (24) hours.
- 3.2.5 When the air temperature is 5°C or less, the Contractor shall preheat the aggregate and water. The maximum temperature of the concrete produced with heated aggregates and water shall at no time during its production or transportation exceed 32°C nor less than 10°C. Freshly placed concrete shall be adequately covered and protected or heated to maintain 5°C for thirty-six (36) hours. The cost of all heating and protection shall be borne by the Contractor.
- 3.2.6 In no case shall concrete be placed on frozen soil. When temperatures are expected to drop below freezing the Contractor shall furnish and have available on the job site, sufficient material such as canvas and dry straw to protect sub-grade from freezing until the next day's placing.
- 3.2.7 Concrete damage by freezing shall be replaced at the Contractor's expense. The Contractor shall limit the amount of sidewalk or curb poured during hot weather to enable the work to be finished to the satisfaction of the City. Protective cover material shall be maintained and used as required to prevent the concrete from setting too quickly. The City may terminate the concrete pour at any time during hot weather if the concrete sets up too quickly. Surface wetting will not be permitted during finishing.

- 3.2.8 Whenever deemed necessary by the Contractor and approved by the City, the Contractor may detour traffic from a street when dust caused by local traffic has become injurious to the sidewalk finish.
- 3.2.9 No concrete shall be poured when the wind blows dust on the fresh concrete and any poured previously shall be covered. The Contractor shall maintain on the job sufficient canvas, plastic or other suitable covering to protect the concrete from rain, dust, frost, or other adverse weather conditions.
- 3.2.10 The concrete shall be placed within ninety (90) minutes of initial mixing at the plant, or before the drum on the concrete truck has turned 300 revolutions. Complete discharge of concrete shall not exceed two (2) hours. The concrete shall be transported by methods which will prevent segregation and deposited on the sub-grade so that as little handling as possible is required.
- 3.2.11 Concrete shall be placed continuously until a complete section between expansion joints has been poured.
- 3.2.12 The concrete shall be thoroughly consolidated against and along the faces of the forms. Hand spreading shall be done with shovels, not with rakes, in order that the concrete will not be segregated. Precautions should be taken to prevent overworking of the concrete.
- 3.2.13 Concrete shall be handled from the mixer to the place of final deposit as rapidly as practicable by methods which shall prevent the separation or loss of the ingredients. It shall be deposited in the forms as near as practicable to its final position to avoid re-handling.
- 3.2.14 Special care shall be taken to work the concrete around and under the reinforcing bars without displacing them. Horizontal reinforcing steel shall be supported rigidly by the use of vertical steel rods.
- 3.2.15 Fresh concrete will not be deposited on concrete which has hardened sufficiently to cause formation of seams and planes of weakness within the section. The concrete shall be distributed by shovels and consolidated by vibration or other approved means. The forms, bulk heads and screens will be substantial enough to with stand vibration.
- 3.2.16 The sequence of concrete placement shall be arranged so that concrete which has partially hardened shall not be subjected to injurious vibration.
- 3.2.17 The vertical free fall height of concrete shall not exceed 1.0 m. For falls greater than 1.0 m chutes or tremies shall be used.
- 3.2.18 During placement, concrete shall be sufficiently tamped or vibrated with suitable equipment to secure a close bond with the reinforcement, eliminate entrapped air voids and ensure a homogeneous structure with adequate consolidation.
- 3.2.19 The rate of delivery of mixed concrete shall be such that the interval between the placing of successive truck loads shall not exceed thirty (30) minutes. If the time exceeds thirty (30) minutes, then a construction joint shall be formed.

- 3.2.20 After the initial set of the concrete, neither the forms nor the concrete structure shall be jarred and no strain shall be placed on the ends of projecting reinforcement.
- 3.2.21 Construct all pararamps and crossings monolithically to the dimensions and at locations specified as per design and standard detail drawings.
- 3.2.22 Special care shall be taken to prevent over-vibration of the concrete and in no case shall an excess amount of water be brought to the surface.

3.3 JOINTS

- 3.3.1 Curb, gutter and sidewalk contraction joints shall be constructed at 1.5 m intervals and as detailed on the standard drawings, and shall not be less than 35 mm deep. Contraction joint widths shall be than 5 - 8 mm. Each separate block shall be marked on all edges with an approved marking tool that will round off the edges to a radius of 6mm. The edges of the walk and all dividing lines shall be rigidly straight. Warped lines and ragged edges will not be permitted.
- 3.3.2 A surface joint shall be constructed longitudinally at the location shown on the standard drawings and shall continue through all driveways and lane crossings.
- 3.3.3 A construction joint shall be formed at the end of every pour. This joint shall be constructed in a "V" shape, as directed by the City, and using 10 M rebars 600 mm long, spaced every 500 mm.
- 3.3.4 10 M bars at 500 mm on centre shall be dowelled and epoxied into the back of the existing curb prior to placing concrete.
- 3.3.5 Expansion joints will not be used in the construction of sidewalks, curbs and gutters unless specified by the City.
- 3.3.6 The expansion joint shall extend completely through the slab and shall be perpendicular and at right angles to the general direction of the sidewalks and curb. The expansion joint shall be placed 3mm below the sidewalk level. The edges shall be rounded off to a 6mm radius or as approved by the City.
- 3.3.7 Where utility poles, hydrants or other services require openings left in the sidewalk, the open space shall be formed and left open with the pour of the sidewalk. After the sidewalk has set, the forms will be removed from the opening, expansion material placed on all four sides, the opening filled with concrete and broom finished by the Contractor.

3.4 FINISHING

- 3.4.1 Sidewalk surfaces, either separate or monolithic with curb and gutter, shall be struck off and screeded to the slope, cross-section and elevation shown on the drawings or as directed by the City. Maximum variation in surface tolerance shall be 3 mm in 3 metres. The surface shall be consolidated and smoothed using a wood float. Light-steel trowelling shall be used followed by a uniform brush finish. Sidewalk shall be edged at all joints to prevent chipping of the concrete.

- 3.4.2 The exposed surfaces of concrete curbs and gutters, either separate or monolithic with sidewalks, shall be finished by means of a wood floating, light-steel trowelling and uniform brushing, and all edges shall be rounded to the required radius. No patching will be allowed.
- 3.4.3 Pararamps, and crossings to lanes and private property shall be struck off and screeded to the required slope and cross-section. The finished surface shall be brushed as specified above.
- 3.4.4 All edges, including contraction or surface joints, shall be tooled for a width of 50 mm and rounded to a radius of 6 mm. The brush grooves shall be transverse on the sidewalk and longitudinal on the curb and gutter. The finished surface shall have no exposed aggregate or honeycomb.
- 3.4.5 If there is evidence of excess water on the concrete surface, finishing shall be delayed until the excess water has evaporated. Under no circumstances will the sprinkling of dry cement or sand on the wet concrete surface be permitted.
- 3.4.6 Surface grooves made by the broom shall not be more than 3 mm deep. Before brushing, all surplus water shall be removed from the brush.
- 3.4.7 Any sub-standard construction shall be corrected before the initial concrete set. Patching thereafter will not be permitted and repairs shall be made by the Contractor by replacing all damaged work to the extent requested by the City.
- 3.4.8 After the initial concrete set, the curb form shall be removed and the exposed surface of the curb and gutter shall be worked to a true surface, trowelled smooth and then given a uniform brush finish. In the absence of a gutter, the face of curb shall be given a uniform brush finish to a depth of 200 mm from the top of the curb.
- 3.4.9 The Contractor shall mark each block or portion of block at each end with a suitable marking tool showing the name of Contractor and year of construction. The imprint shall be legible.

3.5 CURING

- 3.5.1 Immediately after finishing, the concrete surface shall be protected by applying a membrane curing compound. After finishing and removal of forms if necessary, all exposed surfaces shall be wetted with water and then thoroughly sprayed with membrane curing compound. The membrane curing compound shall be applied in accordance with the manufacturer's instructions with an approved pressurized spray.
- 3.5.2 The curing compound shall be applied in such a manner as to cover the entire surface thoroughly and completely with a uniform film at a rate which shall depend on the roughness of the surface of the concrete, but in no case at less than 0.25 litres per square metre of concrete surface. The application will be such that the concrete surface is completely coated and sealed in one operation.
- 3.5.3 Concrete shall be protected from excessively high or low temperatures, hot sun and drying winds as well as future construction operations until it has hardened. Concrete shall be

protected from loss of moisture after placement. This protection shall consist of curing compound as specified.

3.6 BACKFILLING

- 3.6.1 Unless otherwise directed by the City, the Contractor shall backfill along the back of the curb or sidewalk edges, to the top of the concrete, within ten (10) days but no sooner than seven (7) days of the placing of the concrete. The backfill shall be mechanically tamped in maximum lifts of 200 mm, to a minimum of 98% Standard Proctor Density and to a distance of 300 mm from the back of the walk or curb.
- 3.6.2 Where landscaping is to be carried out immediately after completion of the walks or curbs and gutters, the backfilling shall be left 100 mm low to allow for the topsoil.
- 3.6.3 Topsoil used for backfilling shall be fertile, friable, natural loam containing not less than 4% of organic matter for clay loams and not less than 2% for sandy loams with an acidity value ranging from pH 6.0 to pH 7.5 and capable of sustaining vigorous plant growth. It shall be free of any admixture of subsoil, clay lumps, and free of stones, roots and other extraneous matter.

3.7 FORMING

- 3.7.1 Forms shall be steel or properly seasoned wood of sufficient strength to resist the pressure of wet concrete, and the supply shall be sufficient to permit their remaining in place until hydration has occurred, or longer if the City considers it necessary. The Contractor shall remove all face forms to allow for a smooth brush finish. The use of bent, twisted, battered or worn-out forms will not be permitted. The City may at any time condemn any form which he considers unsatisfactory to attain the proper quality of work. Inferior workmanship, as result of poor forming, shall be replaced at the cost of the Contractor. Forms will be checked for alignment and elevation by the City before concrete is poured, and shall be cleaned and oiled before each use. All forms shall be thoroughly oiled before any concrete is deposited within them. Form oils shall be of a type approved only by the City.
- 3.7.2 Where required, reinforcement shall be secured in the location shown on the standard drawings and shall be free from mill scale, grease and rust prior to placing concrete. Forms shall be held securely by approved methods to prevent movement and bulging when the concrete is placed and to permit use of mechanical concrete vibrators and vibrating screeds without causing any deviations to the established line and design grade. Forms must be approved by the City before concrete is poured.
- 3.7.3 Curbs having a radius of less than 40 m shall be constructed with flexible forms. A sufficient length of form (not less than 50 metres) shall be placed and checked before concrete is poured to ensure true line and grade. The forms shall be well staked, braced or otherwise held rigidly true to the established line and grade. The City may, at any time, reject the use of any forms considered unsatisfactory.
- 3.7.4 After the foundation of gravel has been placed and adequately compacted. The Contractor shall ensure proper thickness of concrete for sidewalk construction.

- 3.7.5 The Contractor shall use a template corresponding to the cross section of separate sidewalk, curb or curb and gutter to terminate a concrete pour. Such templates shall be sufficiently rigid and braced adequately to terminate the concrete pour perpendicular and at right angles to the general direction of the sidewalk and curb.
- 3.7.6 The Contractor shall make and use any other templates that may be required by the City to control construction procedures and methods.

3.8 MECHANICAL EXTRUDING MACHINES

- 3.8.1 Slip-form paving machines or concrete, extruding machines may be used for placing concrete provided they have received the approval of the City prior to commencement of the work and meet the following requirements:
- The vibrators on the equipment shall be capable of producing a dense mass with a smooth surface, free of honeycombing.
 - The equipment shall include automatic grade and line controls which shall be used at all times.
- 3.8.2 Commence placement of concrete only after the sub-grade has been prepared and approved by the City.
- 3.8.3 Any special grading or preparation of the base required by the Contractor to accommodate equipment shall be the responsibility of the Contractor, and shall restore the roadway and boulevards to their original condition within three (3) to seven (7) days of the initial disturbance.
- 3.8.4 The extruded concrete shall be checked for alignment and elevation by the City while the concrete is being placed. All incorrectly placed or misaligned work shall be immediately removed while the concrete is still wet, and the work redone to the proper specifications using whatever means are required.
- 3.8.5 Whenever possible, the forming and placing of concrete by conventional hand pouring methods (as may be required at corners, crossings and catch basins) shall be carried out in conjunction with the extruding machine operation. Where this procedure is not practical, the “tie-ins” shall be completed within three (3) days of construction of the adjacent extruded section, using 10 M rebar at all joints. All “tie-ins” shall be completed in one (1) continuous pour.

3.9 CONSOLIDATION

- 3.9.1 The concrete shall be consolidated by means of an approved vibrating screed or, in the case of curb and gutter only, by means of a poker or pencil vibrator not exceeding 50 mm in diameter.
- 3.9.2 Particular care shall be given to placing and tamping along the faces of the forms to ensure a dense, smooth surface.
- 3.9.3 Vibrations shall be of sufficient duration to thoroughly compact the concrete but not long enough to cause segregation. Vibrators shall not be used for moving concrete.

3.10 INSPECTION

- 3.10.1 All exposed concrete surfaces shall be checked by the Contractor with a 3 m straight-edge, and any water pockets or deviations in line or grade exceeding a total of 5 mm shall be corrected immediately.
- 3.10.2 Differences in elevation at any given point from that given by the design shall not exceed 13 mm, and the maximum variation shall not be greater than 13 mm.
- 3.10.3 Deviations in horizontal alignment at any given point from that given by the design shall not exceed 25 mm, and the fluctuations in the horizontal alignment shall not be greater than 25 mm.
- 3.10.4 Concrete not meeting the above criteria shall be replaced.

3.11 FIELD TESTS

- 3.11.1 Testing shall be performed by a qualified CSA testing laboratory in accordance with the following:
- Samples of concrete shall be obtained in accordance with CSA Test Method A23.2-1C for sampling plastic concrete.
 - Test cylinders shall be made and stored in accordance with CSA Test Method A23.2-3C. No less than one (1) strength test shall be made from samples from each 50 cubic metres of concrete placed, and in no case shall there be less than one (1) test from each day's pour. Each strength test shall consist of three (3) test cylinders, one (1) tested at seven (7) days and two (2) at twenty-eight (28) days.
 - Air content determinations shall be made in accordance with CSA Test Method A23.2-7C, Air Content of Plastic Concrete by the Volumetric Method, or CSA Test Method A23.2-4C, Air Content of Plastic Concrete by the Pressure Method.
- 3.11.2 During construction start-up, every load or batch of concrete shall be tested until such time as satisfactory control of the air content has been established. Air content tests taken with the test cylinders will be sufficient once satisfactory control has been established. Whenever a test falls outside the specified limits, the testing frequency shall revert to one (1) test per load or batch until satisfactory control is re-established. Any concrete that falls outside specified air control levels shall be rejected from use.
- 3.11.3 Slump tests made in accordance with CSA Test Method A23.2-5C, Slump of Concrete, shall be made in conjunction with each strength test.
- 3.11.4 The costs of all preliminary testing necessary for approval of materials, mixtures, etc. shall be paid for by the Contractor. The Contractor shall notify the City of the source of his aggregates and make available to the City samples of these aggregates for testing. No concrete work shall commence until the materials have been approved by the City.

- 3.11.5 Frequent tests of concrete shall be made throughout the work by the City, the cost of which shall be borne by the City. All testing will be carried out in accordance with the current CSA and ASTM specifications.

3.12 CLEAN-UP

- 3.12.1 As the work progresses, the Contractor shall clean up the site, and all areas in which work has been done shall be left in a neat and presentable condition. All gutters and street drainage ditches that have been blocked as a result of the Contractor's operation shall be restored or repaired.
- 3.12.2 The Contractor shall dispose of all surplus excavated material, organic soil, rock, boulders and pieces of concrete and masonry at an approved location. Excess stockpiling of gravel, topsoil, etc. should be avoided.

3.13 PROTECTION

- 3.13.1 The Contractor shall provide and maintain all necessary flagmen, notices, barricades and warning lights. The City may erect the required barricades and warning lights at the expense of the Contractor. All barricades should be positioned to ensure safety but allow maximum traffic flow.
- 3.13.2 Concrete walk shall be allowed to set a minimum of twenty-four (24) hours before pedestrian traffic is permitted. In no case shall traffic or construction equipment be allowed on the concrete until the concrete has reached a minimum in situ compressive strength of 20MPa or has been allowed to cure for a minimum of seven (7) days. Any work damaged within the time period shall be replaced at the Contractor's expense.
- 3.13.3 The Contractor shall be responsible for keeping all animals and pedestrians off the newly constructed sidewalks or curb until completely set. The Contractor shall also be responsible for keeping all vehicles off the work for a period of three (3) days after the concrete has been finished.

3.14 DEFICIENCY PENALTY

- 3.14.1 Test cylinders will be used as the basis for acceptance of the concrete for compressive strength. These cylinders will be cast by the Engineer and cured and tested at twenty-eight (28) days of age in accordance with current ASTM specifications C31. No field cured cylinders will be used as a basis of acceptance.
- 3.14.2 Where variations from the standards are encountered the following damages will be assessed:
- If concrete strength of any set of cylinders exceeds 32 MPa, full payment of the work shall be given at the contract unit price.
 - If the concrete strength of any set falls below 32 MPa, but exceeds 24 MPa, payment for the work represented by the set of cylinders bearing these results will be the contract unit price multiplied by the average strength divided by 32 MPa.

- If the concrete strength falls below 20 MPa in any one set of 3 cylinders, the work represented by the test results shall be replaced at the Contractor's expense. Their replaced work shall be subject to all the requirements of the original work.

- 3.14.3 The City reserves the right to request that the concrete mix design be altered to improve strength with extra costs so incurred being borne by the Contractor.
- 3.14.4 When the construction begins, the City reserves the right to request additional cylinders to be made in order to establish a definite concrete strength pattern as quickly as possible.
- 3.14.5 When tests are missed on a section of work, that work so missed shall be represented by tests taken on the following section of work and may be penalized if the said following work is under strength.
- 3.14.6 All basis of payment shall be on cylinder strength only, cores and other methods of evaluation of the concrete strength will not be accepted.

3.15 REMOVAL OF SIDEWALK, CURB AND GUTTER

- 3.15.1 During the removal of existing sidewalk, curb, and gutter the Contractor shall carefully remove the concrete around existing utilities, services, structures, sign and parking meter posts, private sidewalk and driveways, buildings, and building entrances as to avoid any damage. Neat saw cuts shall be used where required or as directed by the City. Any damage incurred shall be repaired at the Contractor's expense, to the satisfaction of the City.

4 MEASUREMENT AND PAYMENT

4.1 REMOVAL AND DISPOSAL OF CURB, GUTTER AND SIDEWALKS

- 4.1.1 The unit price bid shall be considered full compensation to supply all labour, material and equipment necessary to saw cut, remove, load, haul and dispose of existing curb, gutter and sidewalks. The contractor shall be responsible for securing a disposal site and paying for any associate disposal fees.
- 4.1.2 Payment will be at the unit price per lineal meter. Measurement will be lineal meter of curb, gutter and sidewalk removed regardless of width.

4.2 REMOVAL AND DISPOSAL OF MISCELLANEOUS CONCRETE

- 4.2.1 The unit price bid shall be considered full compensation to supply all labour, material and equipment necessary to saw cut, remove, load, haul and dispose of any existing miscellaneous concrete. The contractor shall be responsible for securing a disposal site and paying for any associate disposal fees.
- 4.2.2 Payment will be at the unit price per square meter of concrete removed. Measurements will be based on field measurements.

4.3 REMOVAL AND DISPOSAL OF PARAPLEGIC RAMP

- 4.3.1 The unit price bid shall be considered full compensation to supply all labour, material, and equipment necessary to saw cut, remove, load, haul and dispose of any existing paraplegic ramps. The contractor shall be responsible for securing a disposal site and paying for any associate disposal fees.
- 4.3.2 Payment will be at the unit price per paraplegic ramp. Measurement shall be made for each ramp removed.

4.4 SUPPLY AND INSTALLATION OF CURB, GUTTER AND SIDEWALKS

- 4.4.1 The unit price bid shall be considered full compensation to supply all labour, material and equipment necessary to supply, haul and place concrete, forming, jointing, jointing material, any necessary reinforcement material, finishing, curing, stripping of forms and backfilling. Price bid will also include the excavation, supply and placement of granular base course as per design and or standard detail drawings or as directed by the City.
- 4.4.2 Payment will be at the unit price per lineal meter. Measurement shall be made by the lineal meter of curb, gutter and sidewalk installed regardless of width. Measurement to be field measured along back of new curb or sidewalk.

4.5 SUPPLY AND INSTALLATION OF MISCELLANEOUS CONCRETE

- 4.5.1 The unit price bid shall be considered full compensation to supply all labour, material and equipment necessary to supply, haul and place concrete, forming, jointing, jointing material, any necessary reinforcement material, finishing, curing, stripping of forms and backfilling. Price bid will also include the excavation, supply and placement of granular base course as per design and or standard detail drawings or as directed by the City.
- 4.5.2 Payment will be at the unit price per square meter. Measurement shall be made by the square meter of concrete installed based on field measurements.

4.6 SUPPLY AND INSTALL PARAPLEGIC RAMP

- 4.6.1 The unit price bid shall be considered full compensation to supply all labour, material and equipment necessary to supply, haul and place concrete, forming, jointing, jointing material, any necessary reinforcement material, finishing, curing, stripping of forms and backfilling. Price bid will also include the excavation, supply and placement of granular base course as per design and or standard detail drawings or as directed by the City.
- 4.6.2 Payment will be at the unit price per paraplegic ramp. Measurement shall be made for each ramp constructed.

END OF SECTION