

DIVISION 6 - CONCRETE		
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06005-1 REFERENCE TO STANDARD SPECIFICATIONS

Reference in these Specifications will be made to the latest edition of the Canadian Standards Association (C.S.A.).

A23.1-94 Concrete Materials and Methods of Concrete Construction

A23.2-94 Methods of Test for Concrete

06005-2 CONCRETE AGGREGATE

Aggregate shall consist of clean, hard, durable, crushed stone or gravel free from lumps, soft and flaky particles, organic matter, salt, alkali, free from adherent coatings and shall conform to the C.S.A. Standard Specification for Concrete Aggregates.

2.1 Aggregate Rejection

2.1.1 Fine Aggregate:

Aggregate shall comply with the grading requirements of C.S.A. Standard Specifications.

Aggregate shall be rejected if it:

- a) produces a colour darker than the reference standard specified in the C.S.A. Test Method for Organic Impurities in Sands for Concrete.
- b) contains more than 1% clay lumps, as determined by C.S.A. Methods.
- c) contains more than 3% of material finer than 71 um sieve.

2.1.2 Coarse Aggregate:

Coarse aggregate shall be 20 mm nominal and comply with the grading requirements of C.S.A. Standard Specifications.

Aggregate shall be rejected if it:

- a) contains clay lumps in excess of 0.25% as determined by C.S.A. Methods.
- b) contains more than 1% of material finer than the No. 71 um Sieve.
- c) percentage loss is greater than 35% as determined by the Los Angeles Abrasion Test described in C.S.A. Methods.
- d) contains more than 0.5% low density material as determined by C.S.A. Methods.

06005-3 TESTS ON CONCRETE AGGREGATE

The Contractor shall have a Testing Laboratory, approved by the Engineer, perform certain tests on the concrete aggregate according to the current C.S.A. Specifications.

The Contractor shall, at his own expense, supply the following material tests:

1. Wash Sieve Analysis - C.S.A. - A23.2-2A.
2. Organic Impurities - C.S.A. - A23.2-7A.
3. Clay Lumps - C.S.A. - A23.2-3A.

4. Specific Gravity Test - C.S.A. - A23.2-6A for sand and A23.2 - 12A for course aggregate.
5. Los Angeles Abrasion Test - C.S.A. - A23.2-16A & C.S.A. - A23.2-17A.
6. Test for Soundness of Aggregate - C.S.A. - A23.2-9A.
7. Low density material in aggregate - C.S.A. - A23.2-24A.

The above aggregate tests shall be submitted to the Engineer each year as follows:

1. Seven days before any concrete is placed.
2. During the first week in July.
3. During the first week in September.

The Contractor shall also, at his own expense, supply to the Engineer the proposed concrete mix design at least 7 days before any concrete is placed.

In the event that the original concrete design mix submitted to the Engineer requires changes, such design changes shall be approved by the Engineer or requested by the Engineer and a new concrete design mix shall be submitted at the cost of the Contractor. At no time shall the mix design be changed by the Contractor or concrete supplier unless approved by the Engineer.

All test or mix design reports shall be submitted in duplicate to the Engineer and whenever applicable, be compared to the current C.S.A. Standard or as specified. The report shall be complete and to the satisfaction of the Engineer.

06005-4 CEMENT

Cement used on the work shall be a type of Portland Cement conforming to C.S.A. - A23.3.1 unless a different type of cement is specified.

06005-5 PROVIDING CHEMICAL AND PHYSICAL TESTS ON CEMENT

The results of the chemical and physical tests on the cement to be used in the production of the ready-mixed concrete shall be supplied to the City Engineer by the manufacturer of the cement. Frequency of tests shall be:

1. As specified by the Engineer.
2. Any time when there is a change in either the chemical or physical properties of the cement.

Copies of the test results supplied by the manufacturer of the cement will be sufficient, providing that they are certified.

One copy of the report shall be submitted within 5 days to the City Engineer and one copy to the supplier of the ready-mix concrete.

06005-6 WATER

All water used for concrete shall be clean and free from injurious amounts of acid, oil, alkali, organic matter or other deleterious substances.

06005-7 CONCRETE PROPORTIONS AND CONSISTENCY

The proportions of aggregates to cement for concrete shall be such as to produce a mixture which will work readily into the corners and angles of the forms without permitting the materials to segregate or excess free water to collect on the surface. The quantity of water used shall be the minimum necessary to produce workable concrete.

The consistency of the concrete shall be such that the slump shall not exceed 70 mm or be less than 25 mm for hand placed concrete, and less than 25 mm for extruders when tested by the "Standard Method of Slump Test for consistency of Portland Cement Concrete" as described in C.S.A. A23.2-5C. Non-compliance with the slump specified shall constitute sufficient ground for rejection of the concrete.

06005-8 MIXING OF CONCRETE

The mixing of concrete shall be done in an approved type of mixer which shall ensure a uniform distribution of materials throughout the mass so that the mixture is homogeneous and uniform in colour. The entire contents of the mixing drum shall be discharged before recharging and the drum shall be thoroughly cleaned at frequent intervals. The volume for the mixed material, per batch, shall not exceed the manufacturer's rated capacity of the mixer. The mixing of each batch shall continue for not less than 2 minutes after all the materials (including the water) are in the mixer, at the manufacturer's recommended speed.

Ready-mixed or/and transit mix concrete shall conform in every respect to all specifications herein contained and with the "Standard Specifications for Ready-Mixed Concrete" as described in C.S.A. specifications and shall further be subject to any additional written directions that the Engineer may deem necessary to ensure the obtaining of concrete of the quality specified.

06005-9 FLYASH

Flyash shall not be used in concrete unless the mix design containing flyash has been approved in writing by the Engineer.

As a mineral admixture, flyash shall conform to C.S.A. specification. The material shall be sampled and tested by an independent testing laboratory and copies of the test results shall be submitted to the Engineer for approval.

Flyash shall not replace more than 20% by mass of cement in the concrete. The use of flyash will not be permitted in concrete placed after September 30 each year unless approval is given by the Engineer.

06005-10 ACCELERATING ADMIXTURES

Accelerating admixtures may only be used only in non-reinforced concrete with the approval of the Engineer.

The quantity accelerating admixtures shall be approved by the Engineer but at no time shall exceed 2% by weight of cement. Accelerating admixtures shall be used in the concrete when the air temperature is below 5° C or at the discretion of the Engineer.

06005-11 WINTER SERVICE AND SULPHATE RESISTANCE

The Contractor shall submit additional unit prices per cubic metre for:

- a) Heating concrete during cold weather construction.
- b) Providing sulphate resistant - Type 50 cement.
- c) High early strength - Type 30 cement.

06005-12 TESTS ON CONCRETE

During the progress of work, test cylinders will be taken to determine the quality of the concrete. There shall be a minimum of one test per 60 m³. Concrete tests will be done by a Testing Laboratory appointed by the Engineer and paid for by the City of Saskatoon unless otherwise specified. The following tests will be carried out:

1. Slump Test, as per Section 06005-7 of this Specification.
2. Air-Entraining Test, as per Section 06005-9 of this Specification.
3. Concrete Compressive Strength (set of 3 test cylinders). One test cylinder will be broken at 7 days and two test cylinders will be broken at 28 days.

The Contractor shall provide, at his own expense, materials and facilities as the Engineer may require for carrying out the above mentioned tests.

The fresh concrete will be sampled in accordance with C.S.A. Specification.

Concrete with a slump greater than 75 mm shall be rodded. Concrete with slump of 25 mm to 75 mm may be rodded or vibrated. Concrete with slump of less than 25 mm shall be consolidated by vibration.

The concrete supplied shall have a basic minimum specified compressive strength at 28 days. The average of the 2 cylinders of any single test broken at 28 days shall be equal to or greater than the specified strength at 28 days.

Concrete compressive strengths are expressed in the metric designation of megapascals (MPa). The following standard compressive strengths are to be provided as requested: 20.0 MPa, 25.0 MPa, 30.0 MPa, 32.0 MPa, 35.0 MPa.

Cores

The length of concrete cores shall be measured in accordance with the current C.S.A. Specification.

06005-13 MIX DESIGN, TESTING AND DELETERIOUS MATERIALS

Concrete shall meet CSA specifications unless otherwise specified. Concrete mix properties shall conform to exposure classification C-2 and air content is summarized as follows:

1. Minimum specified 28-day compressive strength: 32 MPa
2. Maximum W/C ratio: 0.45
3. Air content: 5% to 8% (20 mm aggregate)

Further to the CSA requirements the minimum air content for extruded flatwork shall be 5% and the minimum for hand placed flatwork shall be 6%.

The minimum Portland cement content shall be 285 kg/m^3 with a total minimum cementitious content of 330 kg/m^3 .

Contrary to CSA, the time requirement for casting cylinders will be within 60 minutes from the time of sampling. All testing for slump, air content, and sample for casting cylinders will be done immediately after the first metre of concrete is removed from the concrete truck. Also, contrary to CSA, retempering of concrete to add air entrainment will only be considered for the first truck tested. Following a low air test the City will initiate another concrete test on the next load. The Contractor will be charged for the second concrete test.

In addition to the mix design testing requirements set out in Section 06005 - Ready Mixed Concrete, the Contractor shall provide the following information:

1. A legal description for the location of the source pits for the aggregates used in this contract.
2. A linear traverse, as per ASTM Standard C457, showing size and spacing of air bubbles entrained in the concrete.
3. Petrographic analysis as per ASTM Standard Practice C295.

ADDITIONAL DELETERIOUS REQUIREMENTS

In addition to the deleterious requirements contained in Clause 5.6 of CSA-A23.1-94, the following limits shall apply when the aggregate is tested in accordance with ASTM Standard Practice C295.

Deleterious Substance	Maximum Percent by Mass of Total Sample	
	Fine Aggregate	Coarse Aggregate
Siliceous Shalestone (1)	1.0	0.5
Ironstone (2)	1.5	1.0
Chert (3)	2.0	2.0
Other Deleterious (4)	7.0	3.0

Materials above are defined as follows for the purposes of these specifications:

1. **SILICEOUS SHALESTONE** - light to medium grey, or greenish grey shale generally exhibiting a platy shape. The material absorbs water readily, and turns dark grey, dark green or black on wetting. The shalestone is composed of varying amounts of opal, clay materials and fine quartz grains.

2. IRONSTONE - derived from clay ironstone concretions which consist of a relatively hard, dark brown outer shell of limonite and clay surrounding a relatively soft, brown or grey core of siderite and clay. The material has a high absorption.
3. CHERT - this chert category also includes cherty limestones and cherty claystones. The rocks are generally dense and hard but contain varying amounts of potentially reactive chalcedony.
4. OTHER DELETERIOUS - physically weak and/or absorptive rocks such as sandstones, siltstones, argillaceous or deeply weathered carbonate, friable or weathered schists or gneisses.

All petrographic examination on fine and coarse aggregates for concrete must be done on material sampled in the year that the concrete is being placed, unless the following information about the concrete aggregate production is provided to the project engineer:

1. a summary of all test results for sieves sampled at a rate of a minimum of one test per 2,000 tonnes.
2. a petrographic analysis at a rate of a minimum of one analysis for coarse and one for fine aggregate based on a random sample taken during the production of the first 3,000 tonnes. If the first set of petrographic analysis detects no deleterious materials within the specified limits, a random sample taken during each 3,000 tonnes of production shall be recombined and split to produce a representative sample of the concrete aggregate produced. A petrographic analysis for fine and coarse aggregate shall be performed on this aggregate sample.
3. a summary test results for percentage of lightweight aggregates at a frequency of a minimum of one test every 5000 tonnes.

4. the production date of the aggregate stockpile and the estimated current quantity in the stockpile.
5. the location of the gravel pit where the aggregate was produced and the location of the stockpile in the pit area.

06005-14 AIR-ENTRAINING ADMIXTURES

An approved air-entraining agent shall be used in all concrete and shall comply with the "Specifications for Air-Entraining Admixtures for Concrete" as described in C.S.A. specifications and used in strict accordance with the manufacturer's recommendations.

The Contractor shall submit a letter, at least 7 days prior to construction, to the Engineer certifying that the air-entraining agent to be used meets the C.S.A. requirements.

The air-entrainment limits shall be between 5 to 8 percent by volume as determined in accordance with C.S.A. - A 23.2-4C.

06005-15 PAYMENT REDUCTION FOR LOW AIR ENTRAINMENT

Reduction of payment for air entrainment below the minimum specified value shall be calculated and applied as follows:

Air Entrainment Payment Adjustment Factors;

Hand Placed Concrete

<u>Air Entrainment</u>	<u>Payment</u>
6.0% - 8.0%	100%
5.5% - 5.9%	95%
5.0% - 5.4%	85%
4.5% - 4.9%	70%
4.0% - 4.4%	50%
3.5% - 3.9%	20%
less than 3.5% or greater than 9.0%	No Payment. Concrete Must be removed. No Payment for Concrete Removed.

Machine Placed Concrete

<u>Air Entrainment</u>	<u>Payment</u>
5.0% - 8.0%	100%
4.5% - 4.9%	95%
4.0% - 4.4%	75%
3.5% - 3.9%	30%
less than 3.5% or greater than 9%	No Payment. Concrete must be Removed. No Payment for Concrete Removed.

The first concrete test will be taken after the first cubic metre has been removed from the truck. This test result will represent all of the concrete from that truck and all concrete placed in this location until the next test.

Any additional tests for air entrainment done on this truck load shall be at the request of the Contractor and shall be at the expense of the Contractor. The result of this concrete test plus any additional tests on that load shall be averaged and used as the basis for payment. If the test results for the air entrainment do not meet specifications, the Contractor may make adjustments at the plant or request further air entrainment in the field. The cost of any additional tests shall be the responsibility of the Contractor.

06005-16 PAYMENT REDUCTIONS FOR LOW STRENGTH CONCRETE

When the average 28 day compressive strength is less than 5.0 MPa below the specified strength, the price paid for the work performed will be; the contract unit price multiplied by the average strength, divided by the specified strength.

Example:

Contract unit price \$12.00. Specified strength 32 MPa.

Average measured 28 day compressive strength of 28 MPa.

New unit price payable to Contractor = $\$12.00 \times \frac{28}{32} = \10.50

When the average 28 day compressive strength of the test cylinders is more than 5.0 MPa below but less than 7 MPa below the specified strength, the price paid for the work performed will be 50% of the contract unit price. The Contractor shall be responsible for maintenance of the work as outlined in Section 00700-17 of the General Conditions.

When the average 28 day compressive strength of the test cylinders is 7 MPa or more below the specified strength, the work shall be replaced at the expense of the Contractor.

The limits of work included in the price reduction or replacement shall be the entire construction represented by the low test(s), but shall not exceed a volume of 60 m³ of concrete produced in any one day.

END OF SPECIFICATION 06005

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06010-1 GENERAL DESCRIPTION OF WORK

The Contractor shall provide all labour, plant, equipment and material together with all proper and required facilities for the construction in an expeditious manner of sidewalks, curbs and other related work all in accordance with the Contract Documents and detail drawings.

06010-2 CONSTRUCTION WITH EXTRUDING EQUIPMENT

2.1 Concrete Extruding Equipment

Slip-form concrete extruding machines may be used for placing concrete provided they meet the following:

1. The machine is one of the well known models with a proven performance record.
2. The use of the machine has received approval of the Engineer prior to commencement of any work.
3. The machine is to be operated by an experienced operator.
4. Vibrators on the equipment shall be adequate to produce a dense mass with a smooth surface free of honeycombing.
5. The equipment shall include automatic grade and line control

6. Should the machine be of a type where the trimmer and extruder are one unit, it is essential that no deleterious material from the trimmer affect the quality of the concrete.
7. All moulds used in producing the required extruded sections must be in metric dimensions, having a longitudinal deep cut tool mounted in the proper location at a depth of 50 mm and width 10 mm.
8. Any deviation from the specifications shall be approved by the City Engineer in writing.

2.2 Continuity of Work

Whenever possible, the forming and placing of concrete by conventional methods that may be required to complete corners, catch basins, driveways, crossings and other work, shall be carried out before the concrete's initial set time in conjunction with the extruding machine.

When this procedure is not followed, the completion shall be done within 5 days after the adjacent extruded section is completed.

Workmanship for both the slip-form and conventional method shall be equal quality.

2.3 Retempering Concrete

Concrete arriving on the job site shall not be retempered if test values are within specification at the time of delivery.

The addition of water to the mix when the truck arrives on the job shall be permitted provided the following conditions are met:

1. Upon arrival at the job site, the slump is less than that required in the specifications.
2. The water shall be injected into the mixer under such pressure and directions that uniformity of mix will result.
3. The slump after re-tempering shall not exceed the specified limit.
4. Mixing time after the water has been added shall not be less than 3 minutes at mixing speed.
5. The on-site additions of air entrainment agent or admixtures shall be permitted as indicated in Section 06005-15.

2.4 Tolerances and Enforcement

- 2.4.1** Straight Edge - 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 6 mm shall be corrected immediately.
- 2.4.2** Elevation - Differences in elevation at any given point from that given on the survey stakes shall not exceed ± 10 mm and the maximum variation from the given elevation between two consecutive stakes shall not be greater than 10 mm.

- 2.4.3 Alignment - Deviations in alignment at any given point from that given on the survey stakes shall not exceed 25 mm in a 30 m section.
- 2.4.4 Crossfall - The crossfall shall not vary more than 5 mm per metre of walk width from that specified or shown on the drawings.
- 2.4.5 Dimensions - Thicknesses and widths of extruded structures shall meet the dimensions shown on the drawings.

Sidewalk or curb not meeting the above criteria shall be replaced. If in the opinion of the Engineer it is not practical to remove and replace the concrete then a reduced payment may be substituted. This payment will be at a percentage of the bid price as detailed in the "Payment" section.

06010-3 OPENINGS AND ALTERATIONS

When the Engineer or Owner of a utility requires to make alterations to underground services, poles, hydrants, valves, curb boxes, catch basins and other structures, the Contractor shall leave openings in the sidewalk or curb to facilitate these alterations. The length of such openings shall be determined by the Engineer but generally 3 m shall be left open. Such openings shall be initially backfilled with gravel to make the sidewalk safe for public use. 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. After alterations have been completed, the Contractor will close the opening with the proper structure.

For catch basins, the Contractor shall be responsible for leaving openings as determined by the Engineer. These openings shall be well framed and shall be 3 m in length. It is essential that all openings to be left for catch basins are to be in line with the existing catch basin lead or as directed by the Engineer. All openings left for catch basins shall be filled by the Contractor within a period of 5 days.

Where additional concrete is to be placed at a later date, such as at the end of a block, curb returns or openings, 10M reinforcing steel dowels, 250 mm long shall be installed. Two dowels are to be installed along the curb and one every 300 mm on centre along the sidewalk. Supplying and installing the dowels shall be the Contractor's responsibility.

The Contractor shall accommodate cross drains in the sidewalk or curb. Material required for cross drains will be supplied by the City. When required, the City will hire a plumber to make proper roof drain connections.

06010-4 METHOD OF REMOVING SIDEWALK AND CURB

Unless a clean, straight break already exists along a joint, the ends of the concrete to be removed shall be cut with a concrete saw. The cut shall be of sufficient depth to permit removal without damage to the remaining structure.

During the removal of existing sidewalk, the Contractor shall carefully remove the concrete around existing utilities, services, structures, sign posts, parking meter posts, private sidewalks, driveways, buildings and building entrances. Any damage incurred shall be repaired at the Contractor's expense to the satisfaction of the Engineer.

In removing sidewalk or curb, the Contractor shall only use equipment that will not damage the existing finished roadway surface.

When monolithic curb and gutter is removed, and replaced with vertical curb, the Contractor will be responsible for roadway damage beyond the gutter width. In other areas, the maximum permissible road surface removed shall not be more than 200 mm from the face of the construction. For pavement removal, the Contractor shall use a pavement cutter and have a neat vertical cut. Cuts of greater width shall be repaired at the Contractor's expense.

Sidewalk, curb and pavement removed shall be hauled to the disposal site within 24 hours after removal. No payment will be made for overhaul.

Where the existing curb and asphalt walk is to be reconstructed, the Contractor will be paid for curb removal only. Asphalt walk will be considered as common excavation.

Where existing curb is to be reconstructed only and the asphalt walk is to remain, the Contractor shall be permitted to remove a maximum of 300 mm of asphalt walk. The Contractor shall be responsible to cut the asphalt walk and compact the curb backfill. Work of this nature shall be included in the unit price for curb construction.

Where pavement is required to be removed before construction proceeds and when approved for removal by the Engineer, the Contractor shall carefully cut and remove asphalt within the bounds set by the Engineer and haul it to an area designated for this type of material. Should an excess amount be removed outside the boundary set for removal, it will be replaced by the City crews and all charges shall be paid by the Contractor.

06010-5 FORMS

For sidewalk reconstruction, if the buildings have a sidewalk ledge or have reinforcing rods protruding from the foundation of the buildings into the old sidewalk, the new sidewalk shall be constructed in one section from the building wall to the curb face.

The Contractor shall be responsible to ensure that there is positive slope on the sidewalk from the building towards the roadway. The normal slope is 30 mm per metre. Any slope less than 20 mm per metre shall be approved by the Engineer before the concrete is placed.

The forms used for each type of construction shall be the same as the dimensions on the drawings. The forms shall be of metal or 40 mm properly-seasoned lumber. They shall be free from warps or other defects and shall have smooth, clean surface adjacent to the concrete. The forms shall be thoroughly cleaned and oiled before any concrete is deposited within them.

The forms shall be well staked, braced and held rigidly to the established line and grade to enable the use of mechanical concrete vibrators and vibrator screeds when placing concrete for curb and sidewalk construction.

Any forms which have lost their shape or dimensions or where surfaces have become dented or rough shall not be used. The Engineer may at any time condemn the forms he considers unsatisfactory to secure the proper quality of work. Inferior workmanship, as a result of poor forming shall be replaced at the cost of the Contractor.

06010-6 LEVELLING COURSE

The levelling course shall consist of base aggregate meeting the requirements of Division 2, Section 02060-2.2. For fills of less than 30 mm, a smaller sized well-graded aggregate may be substituted after the Engineer has approved the sieve analysis of the material.

The levelling course shall be supplied by the Contractor and compacted to not less than 98% of the Standard Proctor Density for the material. The levelling course shall be used on all hand work.

06010-7 PLACING OF CONCRETE

Placing of concrete will be permitted when the compacted levelling course meets the following requirements:

- (a) The levelling course is within ± 6 mm from the design elevation.
- (b) The minimum concrete depth shall be 115 mm for separate sidewalk, and sidewalk with combined curb and gutter; 125 mm for sidewalk with rolled curb and gutter; 180 mm for crossings.

No concrete shall be placed before the Engineer has inspected the subgrade or levelling course and approved the same, and the inspection shall take place immediately prior to the placing of the concrete.

The work shall be performed in a manner which results in a curb, sidewalk, combined curb and sidewalk or rolled curb and sidewalk constructed to specified line and grade, uniform in appearance and structurally sound. When checked with a 3 m straight

edge, the finished surface shall not deviate more than 6 mm and the alignment shall not vary more than 6 mm. The rolled curb, gutter and sidewalk finished profile when checked with a template, shall not deviate more than 6 mm.

The minimum compressive strength of the concrete shall be 32.0 MPa at 28 days. Placing of concrete shall be a continuous operation until the section, panel or scheduled pour is completed. The rate of delivery of the mixed concrete shall be such that the interval between placing successive batches shall not exceed 30 minutes, unless the last load completed the work to a proper construction joint. The lapse of time between the introducing of mixing water to the cement and the aggregates and depositing concrete in the work, shall not exceed 60 minutes.

The material on which concrete is to be laid must be moistened with potable water immediately preceding concrete extruding.

The point of delivery of concrete shall be as close to the work as possible and in no case more than 1 m from the point of final deposit in the horizontal and vertical direction. Re-handling of concrete will not be permitted.

Concrete shall be deposited in a manner to prevent segregation of the aggregate. Special care shall be taken in placing concrete to prevent voids, pockets, rough areas and honeycombing. The concrete shall be tamped by using mechanical concrete vibrators or vibrator screed in such a manner as to work the coarse aggregate away from the forms and exposed surfaces. Vibrators or vibrator screeds used in placing concrete shall have a minimum of 5,000 cycles per minute. The vibrator screed shall be used in accordance with the manufacturer's recommendations. Special care shall be taken to prevent over-vibration of the concrete to eliminate concrete bleeding. In combined curb and sidewalk, or curb, the curb and sidewalk crossings portion shall be vibrated by a concrete vibrator.

In rolled curb and sidewalk construction, a steel vibrating screed having the required cross-section shall be used. The rolled curb mold shall be of sufficient longitudinal length to vibrate and compact the plastic concrete to a proper cross-section.

Excess Concrete - All waste concrete including that which is pushed out from the ends of the mould at the front or back of the sidewalk and curb during construction must be removed from the site.

Transit mixers shall not be washed out on any improved roadway.

06010-8 SCREEDS AND TEMPLATES

The Contractor shall make and use any templates or screeds that may be required by the Engineer to control construction procedures and methods.

Screeds shall be of rigid construction and equipped with suitable handles. Templates may be of ply board or metal construction. Adjustable screeds and templates will not be permitted. Damaged, bent or worn templates and screeds shall be replaced. An adequate number of replacement screeds and templates shall be maintained.

All screeds and templates shall be checked and approved by the Engineer.

After the forms are set to grade, the correct screed shall be used to check the subgrade elevation to ensure the proper thickness of sand or granular levelling course and concrete. When the subgrade preparation is approved, the Contractor will be permitted to place and compact the levelling which will give the required sidewalk thickness. Thereafter, the back of the sidewalk form shall be checked for final grade and alignment. The sidewalk cross-fall and face of curb slope shall be checked with a level every 8 m.

After the forms are adjusted to final grade alignment, the final elevation of the levelling course shall be checked with a screed.

06010-9 EPOXY - COATED STEEL DOWELS

Where required by the Engineer, sidewalks must be reinforced in accordance with the drawing provided.

Reinforcing must be 10M epoxy-coated deformed bars of the length shown on the drawings.

This will include drilling a hole of suitable size in existing concrete to accept installation of a minimum of 100 mm of dowel.

Bar reinforcing must meet A.S.T.M. A184 and A.S.T.M. A304 intermediate grade new billet deformed steel.

06010-10 EXPANSION JOINTS

Expansion joints will not be used in the construction of sidewalks, curbs and gutters unless specified by the Engineer.

Where expansion joints are requested, the Contractor will supply the material and install the expansion joints. Supply and installation will be included in the unit price of the sidewalk or curb.

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 3 mm below the sidewalk level. The edges shall be rounded off to a 6 mm radius or as approved by the Engineer.

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. This work is to be included in the unit price for sidewalks and curb.

06010-11 CURB RETURNS

In general, a standard 8 m radius curb return will be used where practical and possible, but the Engineer may change the radius to meet field requirements.

The end of the curb return shall be constructed to grade and form a smooth curve. The length of return constructed shall be determined by the Engineer.

Curb returns shall be poured simultaneously with the separate curb and gutter or combined sidewalk and curb and gutter. Payment will not be made for any work where curb returns are not completed.

06010-12 ROLLED CURB AND GUTTER AT CORNERS

Rolled curb and gutter at corners may be machine poured, providing that an acceptable corner can be extruded. Should the corners require to be hand formed and poured, payment will be made at unit tender prices for the rolled curb and gutter.

06010-13 SIDEWALK, CURB AND GUTTER CROSSING CROSS-SECTIONS

The Contractor shall construct the standard sidewalk, curb and gutter crossings and the rolled curb and gutter sidewalk to dimensions and slopes as indicated on the appropriate plans.

06010-14 FINISH OF SIDEWALK, CURB AND GUTTER

The sidewalk surface shall be levelled with a concrete vibrator screed. 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.

After the concrete has sufficiently set to permit further finishing without concrete bleeding, the surface shall be brought to a true surface with a wood float. The surface shall be marked as shown on drawings using approved tools. After marking, the surface shall be trowelled smooth with a steel trowel and a uniform brush finish applied with a soft-bristled push broom to the satisfaction of the Engineer.

After the initial concrete set, the curb form shall be removed and the exposed surface of the curb shall be worked to a true surface, trowelled smooth and then given a uniform brush finish to a depth of 200 mm from the top of the curb.

The sidewalk to be constructed shall have a contraction joint every 1.5 m. In commercial or industrial areas where the sidewalk is over 3 m wide, the sidewalk shall be divided into square blocks of approximately 1.5 m. Where other features make a different type of division desirable, the sidewalk divisions shall be laid out as directed by the Engineer. Each separate block shall be marked on all edges with an approved

marking tool that will round off the edges to a radius of 6 mm. The edges of the walk and all dividing lines shall be rigidly straight. Warped lines and ragged edges will not be permitted.

In combined sidewalk, curb and gutter or curb and gutter construction, the top face of curb shall be rounded off to a radius of 25 mm. In separate curb and gutter, the top back of curb shall be rounded off to a radius of 6 mm. For separate curb and gutter, contraction joints shall be constructed every 1.5 m. All sidewalk and curb markings and contraction joints shall be no less than 25 mm deep, no more than 10 mm in width and have a 6 mm radius finish. Longitudinal contraction joints shall be no less than 35 mm deep, 10 mm wide with a 6 mm radius finish. When the joint or marking is finished, it shall have a dense, tight concrete finish.

Any substandard construction or finish 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 Engineer.

06010-15 LANE AND DRIVEWAY CROSSING

Sidewalk crossing shall have a concrete slab 180 mm thick and the crossing wing shall have concrete thickness increasing from 125 mm to 180 mm or as indicated on plans. Single family dwellings shall have a concrete slab 125 mm thick. The crossings and curb returns shall be constructed and marked as shown on the attached sidewalk plans. The crossings shall be constructed by the Contractor for the locations and width as shown on the plans or staked in the field.

06010-16 PRIVATE DRIVEWAYS AND SIDEWALKS

During sidewalk or curb construction, the Contractor shall be responsible for any damage to private sidewalks and driveways. When modifications are required to private driveways and sidewalks, the Contractor shall carry out the required work at applicable tender prices.

06010-17 RECONSTRUCTION OF PRIVATE SIDEWALKS, STEPS AND DRIVEWAYS

Under this Contract, any work associated with making modifications or repairs to private concrete sidewalks, curb and driveways shall be carried out at applicable contract prices, within a period of 5 days.

Payment for construction of steps will be on Force Account basis.

06010-18 SIDEWALK CONSTRUCTION ADJACENT TO BUILDINGS

Where sidewalk is being constructed adjacent to buildings, the sidewalk shall be poured as one piece from the curb to the building.

06010-19 METHOD OF CONSTRUCTION CENTRE MEDIANS AT TURNING BAYS

Along centre median roadways, where the median has a total width of less than 2 m, the slab shall be poured monolithically with the curb and gutter, or rebar shall be placed every 500 mm at back of curb to hold slab from settling.

06010-20 SIDEWALK RAMPS

Sidewalk ramps shall be constructed as shown on the plans or as staked in the field. The Contractor must pour the ramps at the time of the sidewalk construction.

06010-21 BORROW AREAS, COAL CHUTES AND EXISTING OPENINGS

Any additional work involved over normal sidewalk reconstruction regarding coal chutes and various other openings that require to be reconstructed, modified or backfilled shall be carried out under unit bid prices where applicable or on "Force Account" basis. Under most circumstances, the work of this nature will be carried out at the expense of the Property Owner or the Property Owner may carry out the required alterations.

Complete reconstruction of borrow areas (area that forms part of the building's basement and extends under the sidewalk) will not be part of the Contract. Work of this nature will be negotiated by the Engineer with the Property Owner to have the area reconstructed.

However, if the borrow area is structurally sound and the top is poured in two separate lifts, the Contractor will be responsible to reconstruct the sidewalk. If the top lift is less than 100 mm, the Contractor shall apply an epoxy adhesive as recommended by the manufacturer on the old concrete. A special fine mix concrete shall be used when requested by the Engineer. Work of this description shall be carried out by the Contractor under unit bid prices.

06010-22 CURING COMPOUNDS

Curing compound will be supplied by the Contractor and will be in accordance with the City of Saskatoon Specifications for Curing Compound.

The curing compound shall be applied at the rate of 0.166 litres per square metre or 1 litre per 6 square metres unless otherwise recommended by the manufacturer. The curing compound shall be applied immediately after the surface has been finished and broomed. The compound shall be applied with a pressure sprayer distributor so that the concrete surface is completely coated and sealed in one application.

The Contractor will be responsible to provide a means of checking application rate of curing compound used on any specific site at the request of the Engineer or his representative.

06010-23 PROTECTION

Concrete walk shall be allowed to set a minimum of 24 hours before pedestrian traffic is permitted. Commercial and industrial lane crossings shall be barricaded for 7 days from vehicle traffic and 5 days for residential crossings. Any work damaged within the time period specified shall be replaced at the Contractor's expense.

06010-24 CONCRETING IN SUB-NORMAL CONDITIONS

During cold weather, concrete may be placed when the air temperature in the shade is 1° C and rising. Concrete shall not be placed when the air temperature is 5° C and falling. Freshly placed concrete shall be adequately covered and protected or heated to maintain a minimum temperature of 5° C for 36 hours. Covering is to be maintained for 72 hours. The cost of all heating and protection shall be borne by the Contractor.

In no case shall concrete be deposited on or against any surface which is at a temperature of less than 5° C.

Concrete damaged by freezing shall be replaced at the Contractor's expense. All concrete pouring shall be terminated on or before October 31st, unless written permission is received from the Engineer.

During hot weather, with low relative humidity and gusting winds, the Engineer shall have the right to terminate the concrete pour to prevent plastic shrinkage cracking of the sidewalk. A moisture loss of 0.5 litres/square metre/hour shall be considered such grounds as to terminate the pour (determined from the Portland Cement Association rate of moisture loss graph). If the Contractor continues to pour concrete after the said termination he shall be held responsible for any cracking which appears within a 2 year warranty period and replacement of the sidewalk shall be at his cost.

Before a concrete set-retarder is used, the Contractor shall submit a letter certifying that the set-retarder meets the A.S.T.M. standards and shall be used in accordance with the manufacturer's recommendation.

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 Engineer. Protective cover material shall be maintained and used as required to prevent the concrete from setting too quickly. The Engineer 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.

Whenever deemed necessary by the Contractor and approved by the Engineer, the Contractor may detour traffic from a street when dust caused by local traffic has become injurious to the sidewalk finish. 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 or other adverse weather conditions.

06010-25 CONSTRUCTION RECORD IMPRINTS

Each block or portion of block of sidewalk constructed shall be marked at each end with a suitable tool showing legibly the name of the Contractor and year of construction.

Curb box locations are to be marked at right angles along the back of sidewalk. Imprint is to be 200 mm from the back of sidewalk and have initials C.C. (curb connection).

06010-26 20 MPa LEAN CONCRETE

During sidewalk or curb reconstruction along paved streets, the Contractor shall

provide concrete backfill in the pavement area removed along the gutter. When short sections are reconstructed, the concrete shall be filled level with the pavement and trowelled to form a continuous smooth gutter. When longer sections are involved, the concrete shall be finished to form a smooth gutter 25 mm below the pavement surface. The existing pavement edge shall be cut straight and be free from dirt or broken edges.

The base shall consist of a minimum of 50 mm of well compacted gravel base. The concrete thickness shall be 150 mm or as directed by the Engineer. The concrete backfill shall be vibrated mechanically and placed 1 day after the curb pour. In residential streets, the concrete gutter shall be barricaded for 3 days, and barricade for 5 days along heavy traffic routes.

The concrete backfill used shall have a minimum strength of 20.0 MPa in 28 days and shall meet all other requirements as specified in this specification.

06010-27 CONSTRUCTION AND MODIFICATIONS TO CATCH BASINS

Catch basin construction and modifications to existing catch basins shall be completed within 7 days after completion of the sidewalk or curb.

To facilitate catch basin construction after the curb or sidewalk has been poured, a 3 metre length shall be left open.

To prevent vertical or horizontal displacement of the curb or sidewalk, 10M epoxy-coated reinforcing bars, 250 mm long shall be installed, two along the curb and one every 300 mm on center along the sidewalk. Supplying and installing of the reinforcing bars shall be included in the cost of catch basins construction. The catch basin frame shall be sloped to match gutters.

06010-28 ADJUSTING CURB BOXES

Should the curb box fall within 0.5 m from the back of the sidewalk, or within the sidewalk and require to be adjusted in elevation to facilitate the extruder, the Contractor will be paid the tender unit price.

The adjustment of the curb box shall be performed by a qualified person and under supervision of an inspector. The curb box shall be adjusted to 150mm below back of the walk.

A record for payment purposes, specifying the location and number adjusted shall be submitted by the Contractor the following day.

06010-29 SALVAGE MATERIAL

All salvaged material being a result of work done under this Contract shall be returned to the designated disposal site.

06010-30 BACKFILL

When excavation or grade preparation is done by the sidewalk contractor, the Contractor shall arrange to supply backfill material at his cost, from surplus excavation material encountered in the work. If backfill is brought in by the City, the Contractor shall be responsible for cleaning up any excess backfill supplied to him.

All backfill for sidewalk, combined sidewalk or curb and gutter must be at a slope of 3%. Any slope greater than 3% must be approved by the Engineer. The backfill must start from the top of the walk or curb and meet the existing ground elevations within the street right-of-way (unless otherwise directed by the Engineer).

The backfill must be compacted to a density of not less than 98% of Standard Proctor Density. Material used for backfill must be a soil substantially free from any granular material.

Backfill for lane crossings or private driveways must be at a slope of 1:10 or flatter. A slope greater than 1:10 must be approved by the Engineer. Backfill for lane crossings shall be base gravel or material approved by the Engineer. The curb on reconstruction shall be backfilled with base gravel to adequately ensure safe parallel parking adjacent to the curb and to provide positive drainage.

Backfill operations must be completed not later than 5 days, but not before 1 day after the completion of the curb or sidewalk. If backfilling is not carried out within 5 days, the Engineer may hire equipment and labour to carry out the required work at the expense of the Contractor.

Any curb that has moved within a period of one year after construction due to poor compaction or not enough backfill material placed, shall be replaced by the Contractor at his expense. Re-alignment of the curb by a jacking procedure will not be permitted unless approved by the Engineer.

06010-31 BOULEVARD

Improvements shall be carried out in accordance with Boulevard Construction (Specification 13055).

When construction is carried out adjacent to an improved boulevard, a maximum of 150 mm will be permitted to be removed beyond the curb or sidewalk. Boulevard removed beyond this limit shall be restored at the Contractor's expense. Topsoil will be used for backfill.

06010-32 PROGRESS OF WORK

The Contractor shall carry out the work in accordance with an approved program as outlined by the Engineer. Whenever the progress of construction is unsatisfactory, the Contractor shall increase the working force when requested by the Engineer.

06010-33 COMPLETION OF WORK

Sidewalk, curb and gutter, catch basins, backfilling and clean up will be considered as one unit. Should the Contractor be required to construct new catch basins or modify the existing catch basins, this work shall be completed within 5 days after the completion of the sidewalk or curb. Similarly, the backfilling shall be completed within 5 days. If the work including clean up is not completed within the specified time, payment for the entire block of sidewalk or curb, boulevard and catch basin construction will be withheld from the monthly progress estimate.

06010-34 MEASUREMENT

34.1 Combined sidewalk, curb and gutter, and combined sidewalk and curb will be measured on the center line of the structure in lineal metres.

34.2 Separate curb and gutter, and separate curb will be measured along the face of the curb in lineal metres.

34.3 Concrete walkway 1500 mm wide will be measured in lineal metres which shall include topsoil backfill 115 mm deep and 1500 mm wide.

- 34.4** Variable width concrete sidewalk, median slab and sidewalk crossing will be measured in square metres. Crossing areas are based on the length of the crossing (excluding the two wings) and the overall width including any combined curb and gutter.
- 34.5** Mountable median tip will be measured by each complete unit of median slab, curb and gutter extending from the end of the tip to 2 m beyond the radius point (R.P.).
- 34.6** Sidewalk ramp measurement will be by the number of complete units.
- 34.7** Concrete removal will be measured and calculated as per bid items.
- 34.8** 10 M epoxy-coated dowels will be measured by the number of dowels installed.
- 34.9** Asphalt cutting will be measured in lineal metres of single lines cut.
- 34.10** Asphalt removal will be measured in square metres for asphalt designated by the Engineer to be removed and wasted separately from excavation of waste material.
- 34.11** Extra gravel fill supplied will be measured in cubic metres based on tickets provided by the Contractor.
- 34.12** Extra base gravel placed and compacted will be measured in cubic metres.
- 34.13** Concrete backfill will be measured in cubic metres.

34.14 Saw cutting concrete (minimum depth of 50 mm) will be measured in lineal metres.

34.15 Curb box adjustments will be measured by the number of units.

34.16 Under-strength concrete will be measured in the units for the structure containing concrete, with a compressive strength less than the specified 28 day strength.

06010-35 PAYMENT

35.1 Payment for combined sidewalk curb and gutter, and for combined sidewalk and curb will be made at the contract unit price per lineal metre. The unit price will be full compensation for final trimming, forming, supply and placing of levelling course, supply and placing of concrete, vibrating, jointing, finishing, supply and application of curing compound placing and compacting backfill, and all other related work including clean up.

35.2 Payment for separate curb and gutter and for separate curb will be made at the contract unit price per lineal metre. The unit price will be full compensation for final trimming, forming, supply and placing of levelling course, supply and placing of concrete, vibrating, jointing, finishing, supply and application of curing compounds placing and compacting backfill, and all other related work including clean up.

35.3 Payment for concrete walkway 1500 mm wide will be made at the contract unit price per lineal metre. The unit price will be full compensation for final trimming, forming, supply and placing of levelling course, supply and placing of concrete, vibrating, jointing, finishing, supply and application of curing

compound, hauling and placing of topsoil backfill, clean up and related incidental work.

- 35.4** Payment for 115 mm thick concrete sidewalk of variable width, 100 mm concrete median slab and 180 mm sidewalk crossing, will be made at the contract unit price per square metre. The unit price will be full compensation for final trimming, forming, supply and placing of levelling course, supply and placing of concrete, vibrating, jointing, finishing, supply and application of curing compounds, backfilling and all related work including clean up.
- 35.5** Payment for mountable median tip with gutter, will be made at the contract unit price for each complete tip. The unit price will be full compensation for final trimming, forming, supply and placing of levelling course, supply and placing of concrete, vibrating, jointing, finishing, supply and application of curing compounds, and all other related work.
- 35.6** Payment for sidewalk ramp will be made at the contract unit price for each complete ramp.
- 35.7** Payment for concrete removal will be made at the contract unit price per lineal metre or square metre as per bid item. The unit price will be full compensation for the removal, disposal, any charges associated with the disposal, clean up and any related work.
- 35.8** Payment for dowels will be made at the contract unit price per each. The unit price will be full compensation for each dowel supplied and installed.

- 35.9** Payment for asphalt cutting will be made at the contract unit price per lineal metre. The unit price will be full compensation for all labour and equipment required for cutting asphalt concrete full depth to permit clean removal.
- 35.10** Payment for asphalt removal will be made at the contract unit price per square metre. The unit price will be full compensation for the removal, disposal, any charges associated with the disposal, clean up and any related work. If asphalt is not cut before removal or has not been designated by the Engineer to be wasted separately it will be considered as part of common excavation.
- 35.11** Payment for extra base gravel fill supplied only, will be made at the contract unit price per cubic metre. The unit price will be full compensation for supply, hauling, and dumping.
- 35.12** Payment for extra base gravel placed and compacted to 98% Standard Proctor will be made at the contract unit price per cubic metre. The unit price will be full compensation for any work involved in placing and compacting the base, and clean up.
- 35.13** Payment for 20 MPa lean concrete will be made at the contract unit price per cubic metre. The unit price will be full compensation for supply, placing, vibrating, finishing and all other related work including clean up.
- 35.14** Payment for saw cutting concrete 50 mm deep will be made at the contract unit price per lineal metre. The unit price will be full compensation for all equipment, material and labour.

35.15 Payment for adjusting curb boxes will be made at the contract unit price for each unit adjusted. The unit price will be full compensation for the labour and equipment needed to do the work.

35.16 Payment for curb on pavement will be made at the contract unit price per lineal metre. The unit price will be full compensation for all equipment, material and labour including the patching of stake holes from forms and string lines.

35.17 Reduction of payment for under-strength concrete shall be calculated and applied in the following manner:

When the average 28 day compressive strength of the two test cylinders for any test equals or exceeds the specified strength, the complete work will be paid for at the contract unit prices.

35.18 Reduction of payment for not meeting specified dimensions or tolerances shall be calculated and applied in the following manner:

1. Where tolerances specified in Sections 06010-2.4 or 06010-8 are exceeded and the Engineer decides that replacement is not practical, payment will be made at 50% of the bid price for the entire quantity which would otherwise require replacement.
2. Where thicknesses and widths of structures are constructed less than, but within 10% of the specified dimensions, payment will be made at 50% of the bid price for the entire quantity which would otherwise require replacement. Structures on which dimensions are more than 10% below those specified shall be removed and replaced at the Contractor's cost.

END OF SPECIFICATION 06010

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06015-1 GENERAL

1.1 Description

1.1.1 This Section specifies requirements for supply of ready mix concrete to the City of Saskatoon for placement by its own forces or its agents.

1.1.2 The work includes the supply of all constituent materials, handling, mixing, delivery and discharge at the construction site(s).

1.2 Related Work

1.1.2 Ready Mix Concrete - Section 06005

06015-2 SPECIFIC REQUIREMENTS

2.1 Materials

2.1.1 Ready Mixed Concrete

To the requirements as per Section 06005, Ready Mixed Concrete.

2.2 Supply

2.2.1 Days of Work

Normal days of work for the supply of ready mixed concrete shall be 5 days a week, Monday to Friday.

2.2.2 Hours of Work

Hours of delivery will be between 7:00 a.m. and 5:00 p.m., Monday through Friday. Exceptions to the scheduled hours of work will be agreed upon by both parties 24 hours prior to the time of supply. During inclement weather, deliveries will be confirmed on the day of delivery. The number of delivery trips will be minimized by using the largest truck reasonable for that size of a load, unless smaller trucks are specified for a delivery location due to access constraints.

2.2.3 Ordering of Ready Mixed Concrete

The City will place orders for concrete before 4:30 p.m. prior to the day of delivery, specifying quantity, location(s), and time when concrete is to be delivered.

2.2.4 Truck Routes for Heavy Loads

Vehicles used in the delivery of Ready Mix Concrete will be governed by the City of Saskatoon Traffic Bylaws. A plan marked Schedule No. 8 in Division 0, Section 00705 (General Conditions) shows routes to be used by vehicles with a gross weight in excess of 5,000 kg.

Concrete delivery trucks will use the routes on Schedule No. 8, City of Saskatoon Truck Route Map for deliver of concrete from the plant to a point closest to the delivery site. The Engineer reserves the right to establish the truck routes.

2.2.5 Supply

Further to General Conditions Section 00705-22, if the Seller fails to supply the specified materials or meet provisions under this section, the City may without terminating this contract;

1. Secure other sources of supply immediately upon written notice to the Contractor, until the Contractor can demonstrate that their product meets specifications and provision under this Section. The City shall deduct from the Contractor's payment an incremental cost to secure an alternate supply. The total contract price shall be reduced accordingly.
2. Terminate acceptance of materials immediately upon written notice to the Contractor until the Contractor can demonstrate that their product meets specifications and provisions under this section. The City shall deduct from the payment due the Contractor damages resulting from lost production and or delay in schedule.
3. Deduct from the payment due the Contractor damages resulting from lost production and or delay in schedule for plant breakdown.

2.2.6 Waiting Time

Discharge time will include a time allotment on a site the greater of 15 minutes or 10 minutes per cubic metre. Site arrival times will

be noted on the delivery slip and verified by a City representative on site.

2.3 Payment Adjustments

2.3.1 Materials

Payment reductions will be used to adjust the contract unit price for materials not complying with the specification limits. Payment reductions and specification limits are specified in Section 06005, Ready Mixed Concrete.

All payment adjustments will be determined on the basis of individual test results. The quantity of material represented by a single test lot will not exceed the quantity of material delivered on the test day, up to and including the test load. Reduced payment for more than one deficiency on any test lot will be based on the reduced payment and not the original price.

06015-3 MEASUREMENT AND PAYMENT

3.1 Type 10 Concrete

Two payment items have been included for the supply and delivery of Type 10 ready mixed concrete based on an order equal to, or greater than 3 cubic metres and an order less than 3 cubic metres.

Measurement and payment of Type 10 ready mixed concrete will be by the cubic metre at the unit price per cubic metre (base price). The unit price per cubic metre will be based on the corresponding payment item.

3.2 High-Early Strength Additive

Measurement and payment for high-early strength additive will be at the tendered unit price per each 1% by weight per cubic metre and will be paid in addition to the base unit price for Type 10 Concrete.

3.3 Excess Waiting and Discharge Time

Waiting and discharge time in excess of that specified in Section 2.2.6 will be paid as “waiting time” at the unit price per hour. Excess waiting and discharge time will be measured to the nearest minute.

06015-4 QUALITY CONTROL DOCUMENTATION

An integral part of the quality assurance testing program is the ongoing verification of concrete quality by the Contractor as part of a daily quality control program. The basis of payment adjustment as per Section 06015-2.3 includes only the concrete supplied on the day of the quality assurance test. This means that more emphasis will be placed on documented procedures that the Contractor has in place for ongoing monitoring of concrete quality.

Of primary interest is the daily verification of air entrainment. As part of the tender submission the Contractor will be required to submit:

1. A brief summary of their quality control program that will be in place during the contract.

2. A sample of daily logs for air entrainment testing and/or other quality control testing initiated by the Contractor.

The proposed quality control program will be considered in the evaluation of the tenders.

06015-5 DUMPING OF EXCESS MATERIAL

Excess material is to be properly disposed of. Dumping of material in back lanes or vacant lots will not be allowed.

END OF SPECIFICATION 06015

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06020-1 GENERAL

The General Conditions, Specific Conditions and Instructions to Bidders form an integral part of this Specification and are to be read in conjunction herewith.

06020-2 SCOPE

The Contractor shall provide all materials, labour, equipment and incidentals necessary to complete the work of this trade. The work shall consist of supplying and storing aggregates, reinforcing steel, cement and admixtures, building forms and falsework, placing reinforcing steel, mixing concrete and placing in forms, finishing surfaces, protection, curing and cleanup all as specified.

06020-3 CONCRETE PRODUCTION AND DELIVERY

All concrete shall be centrally manufactured with a controlled mix designed to produce the requirements specified herein. Components shall be separately measured by dry weight and batched at a batching plant. Concrete components, admixtures, storage, handling, mixing and delivery shall all be in accordance with CSA Specification A23.1.

The Contractor shall submit a copy of all delivery slips to the Engineer.

- All concrete at or below ground level shall be made with Portland Sulphate Resisting Cement.

- Concrete shall develop a 28 day compressive strength as shown on the drawings or stated elsewhere in the Specifications.

- The maximum size of aggregate for all concrete shall be 38 mm except where a reduction in size is required for proper finishing or is otherwise specified.
- Air entraining agent shall be added to all concrete to produce an air content of 5% - 7% by volume.
- Water/cement ratio shall not exceed 0.50 by weight.
- Slumps shall be in accordance with Table 8 of CSA Specification A23.1.

06020-4 CONCRETE CONSTRUCTION

All phases of concrete construction work including forming, bedding, placement, finish, curing and protection shall be in accordance with CSA Specification A23.1.

Type of finish shall be as specified on the drawings. Approved curing compound shall be used on all concrete placed at or above ground level.

06020-5 REINFORCING STEEL

Reinforcing steel shall be as shown on the drawings. Before ordering steel, all order lists and bending diagrams shall be submitted for approval by the Engineer, and no materials shall be ordered until such lists and bending diagrams have been approved.

Bars shall be intermediate grade deformed steel billet bars conforming to current CSA Specifications.

Mesh shall be welded steel wire fabric for concrete reinforcement conforming to the current CSA Specifications.

Details of construction with reinforcing steel including care and handling, cleaning, bending, placing, spacing, splicing and concrete protection shall be in accordance with CSA Specification A23.1.

06020-6 TESTING

All testing shall be carried out in accordance with CSA Specification A23.2.

The Contractor shall, at his own expense, undertake all tests necessary for concrete mix design, and for this purpose shall engage an independent testing laboratory approved by the Engineer. Test results shall be submitted to the Engineer not less than 7 days prior to commencement of concrete construction.

Field Tests for concrete quality shall be the responsibility of the Engineer. The Contractor shall provide unhindered access to the work for purposes of inspection and selection of samples. The Owner shall pay for all field testing but there shall be no charge to the Owner for any materials taken for testing purposes.

All aspects of field tests for concrete quality shall be in accordance with CSA Specification A23.1.

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06025-1 **MATERIAL**

(a) Composition and Properties

The ingredients of liquid membrane-forming compounds (curing compounds) shall not be toxic or dangerously inflammable. Use of benzene, toluene, carbon tetra-chloride, ethyl alcohol, or other toxic materials shall not be permitted.

The compound shall contain a temporary colour indicator which shall be readily distinguishable from the concrete surface for at least four hours after application. The colour shall become inconspicuous within seven days after application.

(b) Character of the Film

The compound shall adhere to damp concrete and shall form a continuous coherent film when applied at the specified rate of application.

When dry, the covering shall be continuous, flexible, and without breaks or pin-holes and shall remain as unbroken film for at least seven days after application to the laboratory specimen. The liquid membrane-forming compound shall not react deleteriously with the concrete.

(c) Consistency

The liquid membrane-forming compound (curing compound) shall be of such consistency that it can be readily sprayed to a uniform coating at temperatures above 5 C by means of atomizing nozzles. When sprayed on the vertical face of a damp concrete block in the laboratory at the manufacturer's specified rate of application, it shall not run or sag.

(d) Storage Stability

The membrane-forming compound shall be storable for at least three months without deterioration and shall resist freezing.

The compound shall not settle to the extent that it cannot be readily restored to uniformity by moderate stirring or agitation by compressed air.

(e) Drying Time

When applied to a damp concrete surface at the specified rate of application, the membrane-forming compound shall feel dry to touch in not more than four hours.

When dried, the compound shall not be tacky or track off the concrete when walked upon, or impart a slippery surface to the concrete.

(f) Moisture Retention

When tested in the water retention test, the liquid membrane-forming compound shall restrict the loss of water present in the test specimen at the time of application of the curing compound to not more than 0.04 grams per square centimetre of area.

06025-2 CERTIFICATION OF MATERIAL

Bidders shall submit a letter, in duplicate, from the manufacturer and from an approved testing laboratory certifying that the curing membrane meets the accompanied specification. Bidders shall also provide the following information:

- (a) percentage of solids.
- (b) specific gravity at 25 C.
- (c) reflective index at 25 C.
- (d) flash point.
- (e) viscosity at 5 C.
- (f) resistance to early rainfall.
- (g) moisture loss in grams per square centimetre, for periods of one to seven days exposure time with various rates of applications in square metres per litre at 40 C and 30% relative humidity.

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06030-1 GENERAL

1.1 Work Included

This Section covers the supply and placing of unit paving required for the work.

1.2 Examination

1.2.1 Examine the work of other Sections upon which the work of this Section depends and correct any defects that exist before the work commences.

1.3 Layout Work

1.3.1 All work shall be laid out by the Contractor who shall be fully responsible for the accuracy thereof.

1.4 Testing

1.4.1 Testing shall be carried out as indicated in General Conditions.

1.4.2 Test may include a Standard Proctor Density.

06030-2 PRODUCTS

2.1 Unit Pavers

2.2.1 Pavers set in sand shall be as specified on the detail sheet and Drawings

2.2.2 Pavers shall have a minimum compressive strength of 50 MPa and a maximum water absorption of 5%.

2.2 Granular Particles

2.2.1 Bedding Sand shall be normal weight sand (particle size 0-3mm with 30% of 3 mm. Masons sand or dune sand are unacceptable.

2.2.2 Specifications for base course aggregate are contained in Aggregates Specifications Section 03001-3.2.2.

06030-3 EXECUTION

3.1 Construction of the Base Course

3.1.1 The finished subgrade shall be approved before placement of any base course.

3.1.2 The base course shall be spread in layers which, when compacted, will not exceed 150 mm.

3.1.3 The base course shall be compacted with suitable compaction equipment that will ensure a minimum 98% of ASTM Designation D1557.

3.1.4 The base course shall be shaped to grade and cross-section with an allowable local tolerance of 15 mm.

3.2 Paver Installation

3.2.1 Spread sand to ensure a 25 mm depth of the sand bed after installation of unit pavers.

3.2.2 Avoid walking on screeded surface.

3.2.3 Install pavers true to grade and free of any movement.

3.2.4 Verify paver patterns with Project Manager prior to installation.

3.2.5 Begin installation from a base line for pavers laying pavers directly on the screened sand in the patterns indicated.

3.2.6 Joint between pavers and edges should be as shown on the detail sheets and drawings to achieve the design pattern shown.

3.2.7 Where required, cut paver units to fit accurately, neatly, and without damaged edges.

- 3.2.8** Vibrate the pavers to their final level with two or three passes of a vibrating plate compactor.
- 3.2.9** Spread and sweep, dry, sharp sand into the joints and vibrate down.
- 3.2.10** Spread sand over surface of pavers and broom sand into joints.
Finish by gently washing and sweeping clean.

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06040-1 GENERAL

1.1 Description

The Contractor, unless otherwise specified, shall provide all labour, plant, equipment and material together with all proper and required facilities for the construction in an expeditious and workmanlike manner of cast-in-place concrete sign bases and other related work all in accordance with these specifications and accompanying plans.

1.2 Related Work Elsewhere

Ready Mixed Concrete: Section 06005.

06040-2 MATERIALS

All materials used for the sign base construction shall be approved by the Engineer.

Reinforcing bars must be deformed bars of the dimensions shown on the drawings. It must be clean and free from defects, kinks, loose rust or mill scale at the time the concrete is placed. Any coatings of hardened concrete are to be removed from the steel.

Bar reinforcing must meet C.S.A. G30.12, deformed bars; grade 400 for all bars except ties may be grade 300.

06040-3 EQUIPMENT

All tools, machinery, plant and equipment used in handling materials and executing any part of the work, shall be subject to the approval of the Engineer. All such equipment shall be maintained in efficient working order and where any of the machinery, plant or equipment is found to be unsatisfactory, it shall be improved or replaced by the Contractor to the satisfaction of the Engineer.

06040-4 EXECUTION

The City of Saskatoon will carry out the necessary survey work to provide sign base locations and elevations.

The Contractor shall sawcut the asphalt surface or concrete sidewalk (where necessary) to provide a smooth, well defined limit at the surface of the excavation. All underlying material shall be removed to the depth and limits set out in the drawings or specified by the Engineer. The sides and floor of the excavation shall be hand shaped to provide smooth, true vertical surfaces to act as the concrete form. The Contractor shall ensure that sufficient clearance is provided between the reinforcing bars and the excavation walls and floor.

The Contractor shall supply, place and secure the reinforcing steel assemblies in the excavation. The anchor rods, which form part of each assembly will be supplied by the Owner. They shall be placed and maintained by the Contractor in correct vertical and horizontal alignment. Tolerances shall be ± 10 mm in horizontal location and ± 6 mm in vertical elevation. Failure to meet these tolerances will result in the Contractor, at his own expense, removing and reconstructing the concrete sign base.

Prior to concrete placement, the Contractor shall place the required plastic pipe and electrical ground rod as per the plans or Engineer's direction. The ground rod wire leading to the top of the base through the 50 mm plastic pipe shall also be installed. Care must be taken to ensure that the ends of the plastic duct are not plugged with concrete during pouring. The ground rod assembly will be supplied by the Owner.

The Engineer shall be informed upon completion of setting the rebar cage and anchor bolts and prior to concrete placement so as an inspection can be carried out.

The Contractor shall supply and place 30.0 MPa, Type 5 (sulfate resistant) concrete for the bases. If required, calcium chloride may be added to prevent freezing; the amount not to exceed 2%.

The Contractor shall properly vibrate the concrete during placing to prevent voids. The upper surface shall be placed flush with the surrounding asphalt or concrete surface. The exposed surfaces shall be trowelled smooth then given a fine brushed finish. The Contractor shall spray all exposed concrete surfaces with Tri-Cote (or approved equal) concrete curing compound.

During freezing weather, the Contractor shall cover each base with an insulating material for a period of 7 days to prevent the concrete from freezing.

06040-5 UTILITIES CLEARANCE

Before starting any construction or excavation, the Contractor shall be responsible for determining, at his expense, the actual location and elevation of all sewer, water and gas mains or lines, electric light, power, telephone or telecommunications, duct or other such structures or utilities which may exist in the area of the proposed work.

The Contractor shall be responsible for notifying the respective utility at least 48 hours in advance of his intention to carry out operations in the vicinity of the said utility and if required, shall pay for any services supplied for locating of these utilities.

Where construction is required over or adjacent to other services, the method of construction used shall be agreeable to the Engineer and the Utility Authorities concerned.

The Contractor shall be responsible for any damage to existing buried or overhead services resulting from the failure of the Contractor to obtain appropriate clearances or take appropriate precautions when working in the presence of existing services.

06040-6 MAINTENANCE OF SITE CONDITIONS

During construction, the Contractor shall keep the construction site properly signed and as neat and tidy as possible for the safety of the general public. Where, in the opinion of the Engineer, the Contractor fails to provide proper site maintenance, he shall clean up the site before any additional work is done.

Before leaving the job site, the Contractor shall ensure that all surfaces involving trenching or excavating are restored to their original condition.

The Contractor shall remove any excess material and ensure the construction area is left neat and tidy.

In addition, the Contractor shall furnish the City of Saskatoon with one set of plans suitably marked to show the as built layout for all underground construction.

06040-7 MEASUREMENT AND PAYMENT

Payment for the construction of the required concrete sign bases will be on a lump sum basis for the price stipulated. This price shall be full compensation for saw cutting, excavation and disposal of underlying material, supply and placing rebar and concrete, placing anchor bolts, ground rods and plastic pipe and maintaining and cleaning the site.

END OF SPECIFICATION 0604

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06041-1 GENERAL

1.1 Description

The Contractor, unless otherwise specified, shall provide all labour, plant, equipment and material together with all proper and required facilities for the construction in an expeditious and workmanlike manner of cast-in-place concrete sign bases and other related work all in accordance with these specifications and accompanying plans.

1.2 Related Work Elsewhere

Ready Mixed Concrete: Section 06005.

06041-2 MATERIALS

All materials used for the sign base construction shall be approved by the Engineer.

Reinforcing bars must be deformed bars of the dimensions shown on the drawings. It must be clean and free from defects, kinks, loose rust or mill scale at the time the concrete is placed. Any coatings of hardened concrete are to be removed from the steel.

Bar reinforcing must meet C.S.A. G30.12 M, plain finish new billet deformed steel.

06041-3 EQUIPMENT

All tools, machinery, plant and equipment used in handling materials and executing any part of the work, shall be subject to the approval of the Engineer. All such equipment shall be maintained in efficient working order and where any of the machinery, plant or equipment is found to be unsatisfactory, it shall be improved or replaced by the Contractor to the satisfaction of the Engineer.

06041-4 EXECUTION

The City of Saskatoon will carry out the necessary survey work to provide sign base locations and elevations.

The Contractor, where necessary, shall sawcut asphalt surfaces or concrete sidewalk to provide a smooth, well defined limit at the surface of the excavation. All underlying material shall be removed to the depth and limits set out in the drawings or specified by the Engineer. The Contractor shall supply, place and secure the reinforcing steel assemblies in the excavation. The anchor rods, which form part of each assembly will be supplied by the Owner. They shall be placed and maintained by the Contractor in correct vertical and horizontal alignment. Tolerances shall be ± 10 mm in horizontal location and ± 6 mm in vertical elevation. Failure to meet these tolerances will result in the Contractor, at his own expense, removing and reconstructing the concrete sign base.

The Engineer shall be informed upon completion of setting the rebar cage and anchor bolts and prior to concrete placement so as an inspection can be carried out.

The Contractor shall supply and place 25.0 MPa, Type 5 (sulfate resistant) concrete for the bases. If required, calcium chloride may be added to prevent freezing; the amount not to exceed 2%.

The Contractor shall properly vibrate the concrete during placing to prevent voids. The upper surface shall be placed flush with the surrounding asphalt or concrete surface. The exposed surfaces shall be trowelled smooth then given a fine brushed finish. The Contractor shall spray all exposed concrete surfaces with Tri-Cote (or approved equal) concrete curing compound.

During freezing weather, the Contractor shall cover each base with an insulating material for a period of 7 days to prevent the concrete from freezing.

06041-5 UTILITIES CLEARANCE

Before starting any construction or excavation, the Contractor shall be responsible for determining, at his expense, the actual location and elevation of all sewer, water and gas mains or lines, electric light, power, telephone or telecommunications, duct or other such structures or utilities which may exist in the area of the proposed work.

The Contractor shall be responsible for notifying the respective utility at least 48 hours in advance of his intention to carry out operations in the vicinity of the said utility and if required, shall pay for any services supplied for locating of these utilities.

Where construction is required over or adjacent to other services, the method of construction used shall be agreeable to the Engineer and the Utility Authorities concerned.

The Contractor shall be responsible for any damage to existing buried or overhead services resulting from the failure of the Contractor to obtain appropriate clearances or take appropriate precautions when working in the presence of existing services.

06041-6 MAINTENANCE OF SITE CONDITIONS

During construction, the Contractor shall keep the construction site properly signed and as neat and tidy as possible for the safety of the general public. Where, in the opinion of the Engineer, the Contractor fails to provide proper site maintenance, he shall clean up the site before any additional work is done.

Before leaving the job site, the Contractor shall ensure that all surfaces involving trenching or excavating are restored to their original condition.

The Contractor shall remove any excess material and ensure the complete construction area he is working in is left neat and tidy.

In addition, the Contractor shall furnish the City of Saskatoon with one set of plans suitably marked to show the as built layout for all underground construction.

06041-7 MEASUREMENT AND PAYMENT

Payment for the construction of the required concrete sign bases will be on a lump sum basis for the price stipulated. This price shall be full compensation for saw cutting, excavation and disposal of underlying material, supply and placing rebar and concrete, placing anchor bolts, and maintaining and cleaning the site.

END OF SPECIFICATION 06041

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06050-1 DESCRIPTION

The work shall consist of supplying all labour, plant, equipment and material for the fabrication and installation of precast concrete barriers in accordance with this Specification, the construction drawings provided herein and the General Requirements.

06050-2 MATERIALS

2.1 Qualifications

The manufacturer is to be CSA certified for Precast Structural Concrete Products under CSA A251 or shall adhere to the specifications as set out under CSA A251. Adherence to the CSA A251 specifications shall be monitored by an independent consultant supplied by the City.

2.2 Concrete

A minimum compressive strength of 35 mPa shall be used in fabricating precast concrete barriers.

Cement used on the work shall be Type 1 Portland Cement and conform to current CSA Specifications.

The consistency for hand placed concrete shall be such that the slump shall not exceed 80 mm or be less than 25 mm.

An approved air entraining agent shall be used in all concrete and shall comply with the Specifications for Air Entraining Admixture for Concrete (A.S.T.M. Designation: C-260) and used in strict accordance with the manufacturer's recommendations. The air entrainment limits shall be between five (5) to seven (7) percent by volume as determined in accordance with C.S.A. A 23.2.18.

Ready mixed concrete shall conform in every respect to all specifications herein contained and with the "Standard Specifications for Ready Mixed Concrete" (A.S.T.M. Designation: C-94 or C.S.A. A 23.1.13) and shall further be subject to any additional written directions that the Engineer may deem necessary to ensure the obtaining of concrete of the quality specified.

2.3 Concrete Testing

During the progress of the work, test cylinders will be taken to determine the quality of the concrete. Concrete tests will be done by a Testing Laboratory approved by the Engineer.

The Contractor shall, at his own expense, supply the following tests.

- 1) Slump Test
- 2) Air Entraining Test
- 3) Set of three (3) test cylinders. One cylinder will be broken at seven (7) days and two test cylinders will be broken at twenty-eight (28) days.

The Contractor shall provide, at his own expense, materials and facilities as the Engineer may require for carrying out the above mentioned tests.

The fresh concrete will be sampled in accordance with A.S.T.M. Designation: C-172 or C.S.A. A 23.2.21.

Concrete with a slump greater than 75 mm shall be rodded. Concrete with slump of 25 mm to 75 mm may be rodded or vibrated. Concrete with slump of less than 25 mm shall be consolidated by vibration.

The concrete supplied shall have a basic minimum specified compressive strength of twenty-eight (28) days. The average of the two (2) cylinders of any single test broken at twenty-eight (28) days shall be equal to or greater than the specified strength at twenty-eight (28) days. No more than one (1) test in ten (10), and no two (2) consecutive tests shall be below the specified strength.

2.4 Reinforcing Steel

Reinforcing steel shall be fabricated from deformed bars and/or welded wire mesh conforming to the requirements of CSA Standard G30.12-M and conforming to the grade shown on the plans. (A.S.T.M. Designation: A-615, Grade 40).

2.5 Miscellaneous Metals

Miscellaneous metals shall conform to the requirements of A.S.T.M. Designation: A-36 or better.

2.6 Protective Coatings for Exposed Metal

Connectors - coupling inserts shall be completely galvanized with not less than 600 g/m² as per C.S.A. G164-M.

06050-3 CONSTRUCTION, WORKMANSHIP AND PROCEDURES

3.1 Forms

Forms shall be true to shape, lines and dimensions as called for on the drawings. They shall be substantial and tight to prevent leakage of moisture. Maximum tolerance for final dimensions is as indicated on plans, or where not indicated ± 3 mm.

The face of the forms shall be treated with a release agent to ensure that stripping of the forms may be carried out without damage to the concrete. Care shall be taken to maintain all embedded steel will be free of the release agent.

3.2 Reinforcing Steel

All reinforcing steel shall be accurately placed in the positions shown on the plans, and shall be retained in such positions by means of bar accessories and wires so that the bars shall not be moved out of alignment during or after the pouring of concrete. The reinforcing steel shall be free from mud, oil, releasing agents or other nonmetallic coatings that adversely affect the bonding capacity.

The maximum permissible tolerance for location of the reinforcing steel shall be ± 5 mm of the location shown on the plans.

The minimum clear cover for reinforcing steel in concrete shall be 40 mm or as stated in CAN3-A23.3-M84.

3.3 Concrete Compaction (Vibration)

The concrete shall be thoroughly compacted by mechanical vibrators during casting. The concrete will be worked around reinforcement, embedded fixtures and into the corners of the forms. Internal vibrators or form vibrators may be used at the manufacturer's discretion. Care shall be exercised to avoid over vibration that causes aggregate segregation.

3.4 Curing

Moist Curing

The surfaces of fresh concrete shall be kept continuously moist for a period of at least 7 days and are protected against the harmful effects of sunshine, drying winds, cold running water, surface water and mechanical shock. The temperature of the concrete shall be kept at 20°C for not less than 7 days.

Steam Curing

If steam curing is used to maintain a daily cycle of casting, the following criteria for curing shall be adhered to:

1. The maximum rate of temperature rise of the concrete is 20°C per hour.
2. The maximum temperature to which the concrete is raised is 70°C.
3. The maximum rate of cooling is 20°C per hour.

Immediately after stripping of forms, the members shall be steam cured for an additional 12 hours at a temperature of not less than 65°C.

After completion of moist curing or steam curing, the members are stored and allowed to dry out for a further period of 7 days prior to being put into service.

3.5 Concrete Finishing

Honeycomb spots, holes, broken corners and edges, and other concrete spalls shall be repaired by thoroughly cleaning the area, applying an approved bonding agent, and carefully filling with a grout of cement and fine aggregate mixed in proportions to obtain a strength equivalent to that of the concrete being repaired. (35 mPa) The resulting surfaces shall be smooth and uniform.

3.6 Concrete Sealer

The concrete barrier shall be sealed using penetrating sealer specified by the Engineer. The entire surface area shall be sealed.

The concrete surface should be dry and free of oils, grease, dirt, wax and other contaminants considered as detrimental to the penetration of the sealer. New concrete shall be cured to at least 80% of the design strength before the first coat of the sealer is applied. New concrete shall be satisfactorily cleaned using forced air or water.

Application: The penetrant sealer may be applied with a roller, brush or sprayer. At least two coats will be required for a proper coverage. All manufacturer's specifications shall be adhered to with inspection to application.

Product:	Duralane	40
	Chemtrete	BSM-40
	Permaseal	444
	Drytrete	40
	Hydrozo Silane	40 m
	Hydrozo Silane	40 IPA
	Capseal	X
	Capseal	U

06050-4 HANDLING, STORAGE AND DELIVERY

Care shall be taken in the handling, storage and delivery of completed precast units to avoid damage. Damage to units prior to acceptance by the City at the point of installation, shall be rectified by the supplier at no extra cost to the City.

06050-5 INSTALLATION

The units shall be installed as shown on the construction drawings.

A smooth vertical profile shall be maintained along the top of the concrete barriers. It may be required to place steel shims underneath the units to compensate for any depressions in the roadway's profile. Hand pack grout will be required where a gap of more than 10 mm results between the underside of the unit and the roadway surface.

06050-6 PAYMENT

Precast concrete barriers are paid for at the unit rate per 2.5 metre unit. A separate unit price will apply to the supply of the transition and terminal ends. Payment for the supply shall be full compensation for all labour, materials and equipment required to fabricate the barriers and deliver to installation site.

A separate unit price will cover the installation of each unit at the location specified by the Engineer.

END OF SPECIFICATION 06050

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06051-1 DESCRIPTION

The work shall consist of supplying all labour, plant, equipment and material for the fabrication and installation of precast concrete curbing in accordance with this Specification, the construction drawings provided herein and the General Requirements.

06051-2 MATERIALS

2.1 Concrete

A minimum compressive strength of 35 mPa shall be used in fabricating precast concrete curbing.

Cement used on the work shall be Type 1 Portland Cement and conform to current CSA Specifications.

The consistency for hand placed concrete shall be such that the slump shall not exceed 80 mm or be less than 25 mm.

An approved air entraining agent shall be used in all concrete and shall comply with the Specifications for Air Entraining Admixture for Concrete (A.S.T.M. Designation: C-260) and used in strict accordance with the manufacturer's recommendations. The air entrainment limits shall be between five (5) to seven (7) percent by volume as determined in accordance with C.S.A. A 23.2.18.

Ready mixed concrete shall conform in every respect to all specifications herein contained and with the "Standard Specifications for Ready Mixed Concrete" (A.S.T.M. Designation: C-94 or C.S.A. A 23.1.13) and shall further be subject to any additional written directions that the Engineer may deem necessary to ensure the obtaining of concrete of the quality specified.

2.2 Concrete Testing

During the progress of the work, test cylinders will be taken to determine the quality of the concrete. Concrete tests will be done by a Testing Laboratory approved by the Engineer.

The Contractor shall, at his own expense, supply the following tests.

- 1) Slump Test
- 2) Air Entraining Test
- 3) Set of three (3) test cylinders. One cylinder will be broken at seven (7) days and two test cylinders will be broken at twenty-eight (28) days.

The Contractor shall provide, at his own expense, materials and facilities as the Engineer may require for carrying out the above mentioned tests.

The fresh concrete will be sampled in accordance with A.S.T.M. Designation: C-172 or C.S.A. A 23.2.21.

Concrete with a slump greater than 75 mm shall be rodded. Concrete with slump of 25 mm to 75 mm may be rodded or vibrated. Concrete with slump of less than 25 mm shall be consolidated by vibration.

The concrete supplied shall have a basic minimum specified compressive strength of twenty-eight (28) days. The average of the two (2) cylinders of any single test broken at twenty-eight (28) days shall be equal to or greater than the specified strength at twenty-eight (28) days. No more than one (1) test in ten (10), and no two (2) consecutive tests shall be below the specified strength.

2.3 Reinforcing Steel

Reinforcing steel shall be fabricated from deformed bars conforming to the requirements of CSA Standard G30.12-M and conforming to the grade shown on the plans. (A.S.T.M. Designation: A-615, Grade 40).

2.4 Miscellaneous Metals

Miscellaneous metals shall conform to the requirements of A.S.T.M. Designation: A-36 or better.

06051-3 CONSTRUCTION, WORKMANSHIP AND PROCEDURES

3.1 Forms

Forms shall be true to shape, lines and dimensions as called for on the drawings. They shall be substantial and tight to prevent leakage of moisture. Maximum tolerance for final dimensions is ± 5 mm.

The face of the forms shall be treated with a release agent to ensure that stripping of the forms may be carried out without damage to the concrete. Care shall be taken to maintain all embedded steel will be free of the release agent.

3.2 Reinforcing Steel

All reinforcing steel shall be accurately placed in the positions shown on the plans, and shall be retained in such positions by means of bar accessories and wires so that the bars shall not be moved out of alignment during or after the pouring of concrete. The reinforcing steel shall be free from mud, oil, releasing agents or other nonmetallic coatings that adversely affect the bonding capacity.

The maximum permissible tolerance for location of the reinforcing steel shall be ± 5 mm of the location shown on the plans.

The minimum clear cover for reinforcing steel in concrete shall be 40 mm or as stated in CAN3-A23.3-M84.

3.3 Concrete Compaction (Vibration)

The concrete shall be thoroughly compacted by mechanical vibrators during casting. The concrete will be worked around reinforcement, embedded fixtures and into the corners of the forms. Internal vibrators or form vibrators may be used at the manufacturer's discretion. Care shall be exercised to avoid over vibration that causes aggregate segregation.

3.4 Concrete Finishing

Honeycomb spots, holes, broken corners and edges, and other concrete spalls shall be repaired by thoroughly cleaning the area, applying an approved bonding agent, and carefully filling with a grout of cement and fine aggregate

mixed in proportions to obtain a strength equivalent to that of the concrete being repaired. (35 mPa) The resulting surfaces shall be smooth and uniform.

3.5 Concrete Sealer

The concrete barrier shall be sealed using a two component epoxy resin penetrating sealer specified by the Engineer. The entire surface area shall be sealed.

The concrete surface should be dry and free of oils, grease, dirt, wax and other contaminants considered as detrimental to the penetration of the sealer. New concrete shall be cured to at least 80% of the design strength before the first coat of the sealer is applied. New concrete shall be satisfactorily cleaned using forced air or water.

Application: The penetrant sealer may be applied with a roller, brush or sprayer. At least two coats will be required for a proper coverage. All manufacturer's specifications shall be adhered to with inspection to application

Product: Niklepoxy Penetrant Sealer Product #1

Sikagard 70 Penetrant Sealer - polysiloxane resin

Sikagard 619 Penetrant Sealer

Concrete chemicals #905

06051-4 HANDLING, STORAGE AND DELIVERY

Care shall be taken in the handling, storage and delivery of completed precast units to avoid damage. Damage to units prior to acceptance by the City at the point of installation, shall be rectified by the supplier at no extra cost to the City.

06051-5 INSTALLATION

The units shall be installed as shown on the construction drawings.

A smooth vertical profile shall be maintained along the top of the concrete curbs. It may be required to place steel shims underneath the units to compensate for any depressions in the roadway's profile. Hand pack grout will be required where a gap of more than 10 mm results between the underside of the unit and the roadway surface.

06051-6 PAYMENT

Precast concrete curbs are paid for at the unit rate per 2.5 metre unit. A separate unit price will apply to the supply of the median ends. Payment for the supply shall be full compensation for all labour, materials and equipment required to fabricate the barriers and deliver to installation site.

A separate unit price will cover the installation of each unit at the location specified by the Engineer.

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06060-1 GENERAL

Supply all material, equipment, labour and supervision necessary to bore pavement, to supply and install pressurized grout as well as filling of bore holes.

06060-2 SCOPE

The general intent of this work is to stabilize the subgrade only. This work is not intended to slabjack the asphalt or change the cross section.

06060-3 MATERIAL

The maximum strength of the cement grout shall be 0.5 mPa at 28 days, with a minimum strength of 0.3 mPa at 28 days.

The maximum size aggregate to be used in the grout shall be 2.5 mm.

The grout shall contain a minimum of 25 kg of cement per cubic metre.

The use of fly ash shall be permitted in the cement grout.

Prior to the beginning of work, a mix design must be supplied to the Engineer which in part indicates, a 7 day and a 28 day compressive strength.

The Contractor must also provide the Engineer with the results of a concrete yield test.
(SCA A 23.1.2-6C)

06060-4 CONSTRUCTION

The Contractor shall supply, erect and maintain all barricades and signs required to ensure the safe passage of vehicles and pedestrians.

If the roadway being grouted cannot be maintained open to traffic, the City shall divert traffic as required.

The Contractor shall ensure all underground utilities are located before any drilling takes place.

The Contractor shall core through the pavement structure to a point 1.2 metres into the roadbed.

Grout will be forced under pressure into the core holes until refusal.

Upon completion of the grouting the bore hole is to be struck off level or filled with asphalt mix.

The Contractor will be required to supply and install a minimum of 15 m³ of grout each working day.

06060-5 MEASUREMENT AND PAYMENT

Measurement and payment for pressurized grout injection will be on a two part basis. Payment for drilling of injection bore holes will be based on a unit cost per each hole drilled. Payments shall include drilling the 1.2 metre deep hole, disposing of all cuttings and finishing the hole level with an impervious material.

Payment for supplying and injecting grout will be based on a unit cost per cubic metre of grout injected. Measurement will be based on weigh tickets produced at the production plant as well as summary of the weights of each component used in producing the final product. The result of the concrete yield test will provide the conversion used to convert the weights to a volume for the payment.

END OF SPECIFICATION 06060

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06070-1 SCOPE

The Contractor shall supply all labour, plant, equipment and materials for the construction of sidewalks, curbs and unit pavers complete as shown and detailed on the drawings and as described in these Specifications.

06070-2 METHOD OF REMOVING SIDEWALK AND CURB

Concrete will be removed to the nearest control joint. No partial squares of sidewalk will be permitted. Unless a clean, straight break already exists along a joint, the ends of the concrete to be removed shall be cut with a concrete saw. The cut shall be of sufficient depth to permit removal without damage to the remaining structure.

06070-3 ASPHALT, CONCRETE AND RUBBLE DISPOSAL

Concrete asphalt and rubble may be disposed at the City of Saskatoon disposal site as specified by the Engineer or as written in the contract.

06070-4 SUBGRADE PREPARATION

150mm of material shall be removed and base shall be placed to a depth not less than 150 mm below the bottom of the concrete structure. The material shall be mixed, wetted or dried as required.

The subgrade shall be compacted to a minimum of 98% Standard Proctor Density by means of approved mechanical compaction equipment. Sheepsfoot rollers may be required by the Engineer in locations with cohesive soil.

Where concrete is hand poured final grade preparation and compaction shall be carried out after the forms are placed. The subgrade elevation shall be checked to ensure adequate thickness of the granular base and concrete. When the subgrade preparation is approved, the Contractor will be permitted to place and compact the levelling which will give the required sidewalk thickness.

The surface of the subgrade after final trimming and rolling shall be within ± 10 mm of the design cross section and staked elevations.

06070-5 FORMS

The forms shall be free from warps or other defects and shall have smooth, clean surface adjacent to the concrete. The forms shall be thoroughly cleaned and oiled before any concrete is deposited within them.

The forms shall be well staked, braced and held rigidly to the established line and grade to enable the use of mechanical concrete vibrators and vibrator screeds when placing concrete.

06070-6 PLACING CONCRETE

Concrete shall be placed in a continuous operation. The interval between placing successive batches shall not exceed 30 minutes unless the last load completed the work to an expansion joint. Maximum mixing time of concrete after water has been added shall be 60 minutes.

Concrete shall be placed as close as possible to but no further than one metre from its final position in the forms. Rehandling of concrete shall not be permitted.

It shall be deposited in such a manner that segregation of the aggregates shall not occur.

After placing, the concrete shall be tamped, vibrated or otherwise consolidated to eliminate all voids and honeycombing. Vibrating screeds, shall be operated in accordance with the manufacturer's instructions. Over vibration resulting in bleeding shall not be allowed.

In combined rolled curb and sidewalk areas, a steel vibrating screed shall be used in such a manner as to obtain dense concrete and the required cross section continuously.

Where combined curb and sidewalks are poured, concrete shall be placed by hand in the curb excavation in advance of placing the sidewalk concrete so that subgrade material will not be forced into it from beneath the sidewalk section.

Concrete may be placed when the atmospheric temperature is 1° C and rising. Concrete shall not be placed when the temperature is 5° C and falling. concrete shall be covered and heated, if necessary, to maintain a temperature of 5° C for at least 36 hours. Covering shall not be removed for 72 hours. Cost of heating and covering shall be borne by the Contractor.

Concrete damaged due to freezing shall be replaced by the Contractor at his expense.

During hot weather, an approved set retarder may be used. Sidewalk and curb shall be poured at a rate such that finishing as specified can be accomplished. Surface wetting shall not be permitted during finishing. The Engineer may terminate the work temporarily if, in his opinion, the work cannot be properly finished.

06070-7 CONCRETE

Concrete materials, method of concrete handling and construction shall conform to the latest edition of CAN3-A23.1 as published by the Canadian Standards Association.

Minimum compressive strength of the concrete at 28 days shall be 32 MPa.

Aggregates shall comply with Section 5, CAN3-A23.1.

Nominal aggregate size shall be 30 mm.

Cement shall be Type 10 Normal Portland Cement complying with Section 3, CAN3-A23.1. A minimum of 300 kg of cement per cubic metre of mixed concrete shall be used.

Slump shall not exceed 70 mm or be less than 25 mm.

An approved air entraining agent complying with Section 6, CAN3-A23.1 shall be used. Air entrainment shall be 5 to 7 percent by volume.

Water cement ratio shall not exceed 0.38 by weight.

Reinforcing steel shall conform with CSA G30.12-M77 and CSA G30.6.

Calcium chloride may be used as an accelerating agent on the approval of the Engineer. It shall conform to ASTM D-98. Maximum amount of calcium chloride in the mix shall not exceed 2% of cement by weight.

06070-8 CONCRETE TESTS

Ready mixed and transit mixed concrete should conform to CSA A23.1.13.

After the award of the work, the Contractor shall submit the following information in writing relating to the ready mix concrete supplier.

- (a) Name, address and contact person.
- (b) Recent concrete mix design on results of six concrete test cylinders of the same concrete which will be used for the work.

During the progress of the work, the Contractor shall hire an approved materials testing laboratory and take one set of three concrete test cylinders for each concrete pour. One cylinder will be tested after 7 days of curing and two cylinders will be tested after 28 days of curing. No more than one test in five nor two consecutive tests shall be below the specified concrete strength.

One copy of the test results shall be submitted to the Owner.

06070-9 FINISH OF SIDEWALK, CURB AND GUTTER

Concrete shall be deposited in a manner to prevent segregation of the aggregate. Special care shall be taken in placing concrete to prevent voids, pockets, rough areas and honeycombing. The concrete shall be consolidated by using mechanical concrete vibrators or vibrator screed in such a manner as to work the coarse aggregate away from the forms and exposed surfaces.

After the concrete has sufficiently set to permit further finishing without concrete bleeding, the surface shall be brought to a true surface with a wood float. The surface shall be marked and finished as shown on drawings using approved tools. After marking, the surface shall be trowelled smooth with a steel trowel and a uniform brush finish applied with a soft bristled push broom to the satisfaction of the Engineer.

After the initial concrete set, the curb form shall be removed and the exposed surface of the curb shall be worked to a true surface, trowelled smooth and then given a uniform brush finish.

Substandard work or finished surfaces which are marred or damaged prior to setting shall be replaced by the Contractor at his expense.

Each block or portion of block of sidewalk constructed shall be marked at the end with a suitable tool showing the name of the Contractor and the year of construction.

Curb returns shall be smooth, continuous curves and shall be tangent where they join the straight sections or another curve.

06070-10 CURING COMPOUND

Apply a curing compound to all exposed surfaces. Curing compound shall comply with ASTM C309, Liquid Membrane - Forming Compounds for Curing Concrete. The rate of application shall be as recommended by the manufacturer or as directed by the Engineer. The pressure spray distributor shall be such that a continuous even coating is applied.

Concrete placed after September 30 will be cured with an application of a penetrating sealer to prevent de-icing agents from spalling the concrete.

The cost of supplying and applying curing compound is to be included in the respective sidewalk and curb unit prices.

06070-11 PROTECTION

Pedestrian traffic shall not be allowed on the walks for 24 hours after the concrete is poured. Lane and driveway crossings shall be barricaded and not used for a period of 5 days after the concrete is poured.

06070-12 PAVEMENT REMOVAL AND REPAIRS

To facilitate the removal and construction of the sidewalk, curb, or curb and gutter, the Contractor shall jack hammer or saw cut the adjacent pavement. Extent of removal shall be kept to a minimum but adequate to enable the work to be performed correctly.

Payment for patch paving will be made on the Contract bid price either included in the curb unit price or on a square metre basis.

06070-13 SIDEWALK SUPPORT ADJACENT TO BUILDINGS

At concrete foundations, steps, or sidewalks on property the new sidewalk needs to be dowelled in to the existing concrete structure. The Contractor shall install 250 x 10 rebar into the concrete building foundation. Rebar is to be installed 100 mm into the foundation, 50 mm from the bottom of the sidewalk.

This work is included in the unit price payment for the sidewalk.

06070-14 CONCRETE PAVERS

Concrete pavers shall be as specified in the Contract. Type 10 Normal Portland cement shall be used having a minimum strength of 55 MPa in 28 days. The maximum water absorption shall be 5%.

The Contractor shall supply the required test data for each project. Test data may be on the pavers manufactured or most current test results obtained in manufacturing similar pavers. If applicable data is not available, appropriate tests as required in the industry shall be performed and one copy provided to the Owner.

Should a special penetrating sealer be required to be applied to provide a minimum of twenty years of service, without spalling, it shall be included in the unit price.

06070-15 PLACING OF UNIT PAVERS

After the excavation is completed to the correct elevation, the top 150 mm of the subgrade and the 150mm of granular base are to be compacted to a minimum of 98% Standard Proctor Density.

After the granular base has been approved, spread and screed sand to ensure 25 mm depth prior to the installation of unit pavers.

Pattern of paver installation to be as shown on plans and verified by Owner.

Pavers are to be installed from a straight edge, laying pavers directly on the screeded sand in the patterns as shown. Install unit pavers true to grade and free of any movement. Joints between pavers should be a maximum of 3 mm or as required to achieve the design pattern. The spacing on a curved area shall be equal.

Where required, pavers are to be saw cut neatly to fit accurately.

After the pavers are placed, the pavers are to be vibrated to the final level with two or three passes of a vibrating plate compacter. Spread and sweep dry sharp sand into the joints and vibrate down. Finish by washing and sweeping clean.

It shall be the responsibility of the Contractor to maintain the appropriate level of the pavers including the filling between the joints with sand during the two year maintenance period.

06070-16 SIDEWALK, CURB AND GUTTER CONSTRUCTION

All work performed shall meet the current standards as outlined for concrete sidewalk, curb and gutter construction, Specification 06010 and as shown on cross section drawings.

END OF SPECIFICATION 06070

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06080-1 **SCOPE**

The Contractor shall supply all labour, plant, equipment and materials for the construction of sidewalks, and curbs complete as shown and detailed on the drawings and as described in these Specifications.

06080-2 **METHOD OF REMOVING SIDEWALK AND CURB**

Concrete will be removed to the nearest control joint or saw cut. Unless a clean, straight break already exists along a joint, the ends of the concrete to be removed shall be cut with a concrete saw. The cut shall be of sufficient depth to permit removal without damage to the remaining structure.

06080-3 **ASPHALT, CONCRETE AND RUBBLE DISPOSAL**

Concrete asphalt and rubble may be disposed at the City of Saskatoon disposal site as specified by the Engineer or as written in the contract.

06080-4 **SUBGRADE PREPARATION**

150mm of material shall be removed and base shall be placed to a depth not less than 150 mm below the bottom of the concrete structure and extending 125 mm beyond each side of the proposed concrete structure. The material shall be mixed, wetted or dried as required.

The subgrade shall be compacted to a minimum of 98% Standard Proctor Density by means of approved mechanical compaction equipment. Sheepsfoot rollers may be required by the Engineer in locations with cohesive soil.

Transverse or longitudinal service trenches that have not thoroughly settled shall be excavated and backfilled with approved material and compacted to a minimum 98% Standard Proctor Density. The type of mechanical compactor to be used shall be approved by the Engineer.

Where concrete is hand poured final grade preparation and compaction shall be carried out after the forms are placed. The subgrade elevation shall be checked to ensure adequate thickness of the granular base. When the subgrade preparation is approved, the Contractor will be permitted to place and compact the levelling which will give the required sidewalk thickness.

The surface of the subgrade after final trimming and rolling shall be within ± 10 mm of the design cross section and staked elevations.

06080-5 **GRANULAR BASE COURSE**

The Contractor shall supply the base course material.

The base aggregate shall be composed of fragments of durable rock free from undesirable quantities of soft or flaky particles, loam, organic or other deleterious material.

Specifications for base course aggregate are contained in Aggregates Specifications Section 03001-3.2.2.

06080-6 TEMPLATES

Templates shall be supplied and used by the Contractor to check the subgrade finish prior to placing of the concrete and to check the shape of completed work. Templates shall be full scale and represent the true cross section of the concrete for the type of curb or curb and walk being constructed.

If other templates are required, they shall be constructed and used by the Contractor to control the work.

Templates shall be of rigid construction with suitable handles. Damaged or worn templates shall not be used and all templates shall be checked and approved by the Engineer.

No concrete shall be placed until the Engineer has checked and approved subgrade and base course.

06080-7 FORMS

The forms used for each type of construction shall be the same as the dimensions on the drawing.

They shall be free from warps or other defects and shall have smooth, clean surface adjacent to the concrete. The forms shall be thoroughly cleaned and oiled before any concrete is deposited within them.

The forms shall be well staked, braced and held rigidly to the established line and grade to enable the use of mechanical concrete vibrators and vibrator screeds when placing concrete.

06080-8 PLACING CONCRETE

Concrete shall be placed in a continuous operation. The interval between placing successive batches shall not exceed 30 minutes unless the last load completed the work to an expansion joint. Maximum mixing time of concrete after water has been added shall be 60 minutes.

Concrete shall be placed as close as possible to but no further than one metre from its final position in the forms. Rehandling of concrete shall not be permitted.

It shall be deposited in such a manner that segregation of the aggregates shall not occur.

After placing, the concrete shall be tamped, vibrated or otherwise consolidated to eliminate all voids and honeycombing. Vibrating screeds, shall be operated in accordance with the manufacturer's instructions. Over vibration resulting in bleeding shall not be allowed.

In combined rolled curb and sidewalk areas, a steel vibrating screed shall be used in such a manner as to obtain dense concrete and the required cross section continuously.

Where combined curb and sidewalks are poured, concrete shall be placed by hand in the curb excavation in advance of placing the sidewalk concrete so that subgrade material will not be forced into it from beneath the sidewalk section.

Concrete may be placed when the atmospheric temperature is 1° C and rising. Concrete shall not be placed when the temperature is 5° C and falling. Concrete shall

be covered and heated, if necessary, to maintain a temperature of 5° C for at least 36 hours. Covering shall not be removed for 72 hours. Cost of heating and covering shall be borne by the Contractor.

Concrete damaged due to freezing shall be replaced by the Contractor at his expense.

During hot weather, an approved set retarder may be used. Sidewalk and curb shall be poured at a rate such that finishing as specified can be accomplished. Surface wetting shall not be permitted during finishing. The Engineer may terminate the work temporarily if, in his opinion, the work cannot be properly finished.

06080-9 **CONCRETE**

Concrete materials, method of concrete handling and construction shall conform to the latest edition of CAN3-A23.1 as published by the Canadian Standards Association.

Minimum compressive strength of the concrete at 28 days shall be 32 MPa.

Aggregates shall comply with Section 5, CAN3-A23.1.

Nominal aggregate size shall be 30 mm.

Cement shall be Type 10 Normal Portland Cement complying with Section 3, CAN3-A23.1. A minimum of 300 kg of cement per cubic metre of mixed concrete shall be used.

Slump shall not exceed 70 mm or be less than 25 mm.

An approved air entraining agent complying with Section 6, CAN3-A23.1 shall be used. Air entrainment shall be 5 to 7 percent by volume.

Water cement ratio shall not exceed 0.38 by weight.

Reinforcing steel shall conform with CSA G30.12-M77 and CSA G30.6.

Calcium chloride may be used as an accelerating agent on the approval of the Engineer. It shall conform to ASTM D-98. Maximum amount of calcium chloride in the mix shall not exceed 2% of cement by weight.

06080-10 CONCRETE TESTS

Ready mixed and transit mixed concrete should conform to CSA A23.1.13.

After the award of the work, the Contractor shall submit the following information in writing relating to the ready mix concrete supplier.

- (a) Name, address and contact person.

- (b) Recent concrete mix design on results of six concrete test cylinders of the same concrete which will be used for the work.

During the progress of the work, the Contractor shall hire an approved materials testing laboratory and take one set of three concrete test cylinders for each concrete pour. One cylinder will be tested after 7 days of curing and two cylinders will be tested after 28 days of curing. No more than one test in five nor two consecutive tests shall be below the specified concrete strength.

Once copy of the test results shall be submitted to the Owner.

06080-11 FINISH OF SIDEWALK, CURB AND GUTTER

Concrete shall be deposited in a manner to prevent segregation of the aggregate. Special care shall be taken in placing concrete to prevent voids, pockets, rough areas and honeycombing. The concrete shall be consolidated by using mechanical concrete vibrators or vibrator screed in such a manner as to work the coarse aggregate away from the forms and exposed surfaces.

After the concrete has sufficiently set to permit further finishing without concrete bleeding, the surface shall be brought to a true surface with a wood float. The surface shall be marked and finished as shown on drawings using approved tools. After marking, the surface shall be trowelled smooth with a steel trowel and a uniform brush finish applied with a soft bristled push broom to the satisfaction of the Engineer.

After the initial concrete set, the curb form shall be removed and the exposed surface of the curb shall be worked to a true surface, trowelled smooth and then given a uniform brush finish

Substandard work or finished surfaces which are marred or damaged prior to setting shall be replaced by the Contractor at his expense.

Each block or portion of block of sidewalk constructed shall be marked at the end with a suitable tool showing the name of the Contractor and the year of construction.

All curb box locations shall be marked at right angles to the back line of the sidewalk and 200 mm from the back of the walk with an imprinted "C.C." with an arrow pointing to the curb box.

Curb returns shall be smooth, continuous curves and shall be tangent where they join the straight sections or another curve.

06080-12 **CURING COMPOUND**

Apply a curing compound to all exposed surfaces. Curing compound shall comply with ASTM C309, Liquid Membrane - Forming Compounds for Curing Concrete.

The rate of application shall be as recommended by the manufacturer or as directed by the Engineer. The pressure spray distributor shall be such that a continuous even coating is applied.

Concrete placed after September 30 will be cured with an application of a penetrating sealer to prevent de-icing agents from spalling the concrete.

The cost of supplying and applying curing compound is to be included in the respective sidewalk and curb unit prices.

06080-13 **TOLERANCES**

All exposed concrete surfaces shall not deviate in line or grade more than 5 mm in 4 metres.

Sidewalk elevation shall not vary more than 6 mm from that established by the Engineer's grade stakes and the maximum variation from the given elevation between two consecutive stakes shall not exceed 6 mm.

Deviation in alignment shall not exceed 10 mm in 10 metres from that established by the survey stakes in one direction only.

Crossfall shall not vary more than 4 mm per metre from that specified or shown on the drawings, unless approved by the Engineer.

In no case shall the thickness of the concrete be more than 8 mm less than the specified thickness.

06080-14 **PROTECTION**

Pedestrian traffic shall not be allowed on the walks for 24 hours after the concrete is poured. Lane and driveway crossings shall be barricaded and not used for a period of 5 days after the concrete is poured.

06080-15 **PAVEMENT REMOVAL AND REPAIRS**

To facilitate the removal and construction of the sidewalk, curb and curb and gutter, the Contractor shall jack hammer or saw cut the adjacent pavement. Extent of removal shall be kept to a minimum but adequate to enable the work to be performed correctly.

Payment for patch paving will be made on the Contract bid price either included in the curb unit price or on a square metre basis.

06080-16 **SIDEWALK SUPPORT ADJACENT TO BUILDINGS**

At concrete foundations, steps, or sidewalks on property the new sidewalk needs to be dowelled in to the existing concrete structure. The Contractor shall install 250 x 10 rebar spaced at 300 mm, into the concrete building foundation. Rebar to be installed 100 mm into the foundation, 50 mm from the bottom of the sidewalk.

This work is included in the unit price payment for the sidewalk.

06080-17 SIDEWALK, CURB AND GUTTER CONSTRUCTION

All work performed shall meet the current standards as outlined for concrete sidewalk, curb and gutter construction, Specification 06010 and as shown on cross section drawings.

END OF SPECIFICATION 06080