MINIMUM REQUIREMENTS FOR LABORATORIES CONDUCTING ENGINEERING MATERIALS TESTING AND EVALUATION SERVICES FOR THE MINISTRY OF TRANSPORTATION

1. TERMS OF REFERENCE

For purposes of this document, “Engineering Materials Testing and Evaluation Services” means all aspects of laboratory and field testing required for Preliminary Design, Detail Design, and Construction Contract Administration.

The ministry reserves the right to monitor and/or inspect laboratory testing facilities and their operations by means of duplicate testing, testing of extra materials, and/or observing the testing directly. The laboratories shall provide the ministry with the necessary access to the facility, equipment, and personnel to carry out the monitoring activities.

Laboratory testing facilities shall participate in required correlation programs/proficiency sample testing programs conducted by the ministry or others.

Laboratory testing facilities providing quality assurance testing for construction contracts shall not have an affiliation with, or be providing services for, the contractor, sub-contractors, or suppliers to the contract after construction contract award.

See Appendix A for additional requirements for area testing lab contracts.

2. LABORATORY REQUIREMENTS

Laboratories must have previously participated in the ministry correlation/proficiency sample testing program or a ministry-recognized equivalent (e.g. AASHTO Materials Reference Laboratory) for the subject material/test.

Laboratories must be prepared to submit evidence of satisfactory performance in past ministry correlation/proficiency sample testing programs, or evidence of successful participation in a ministry-recognized industry proficiency sample testing program such as those run by the AASHTO Materials Reference Laboratory.

Laboratories must continue to participate in ministry or ministry-recognized equivalent correlation/ proficiency sample testing programs while providing services to the ministry.

Laboratories must hold applicable certification or accreditation from appropriate bodies as detailed in the specific discipline. Certification shall be valid while providing services to the ministry. Where equivalent certifications are allowed, equivalency shall be determined by the ministry.

Laboratories shall provide a copy of all laboratory inspection reports (CCIL, CSA, etc.) to the ministry upon request.

In the event that the testing is not carried out by the proponent and is subcontracted to another company or another laboratory owned by the proponent, the sub-contracting laboratory must be identified and must meet the requirements.

Test results submitted must be on the letterhead of the laboratory carrying out the test and signed by the person(s) within that laboratory meeting the qualification.

The proponent shall describe the quality management/audit process they have in place to ensure that the testing carried out by the contracted laboratories is satisfactory.

Certain testing services require inspection and acceptance of the laboratory by the ministry. It is the responsibility of the proponent to make arrangements for such inspection with the appropriate Heads within the Materials Engineering and Research Office, MTO, located at 1201 Wilson Avenue, Downsview.

Laboratories must have a Quality Control Manual describing, as a minimum, the following quality control practices, policies, and operational procedures:

- a quality policy statement and commitment,
- management structure and responsibility,
- job descriptions of key staff,
- training policies, health and safety practices,
- housekeeping practices,
- procedures for control of documentation including updating testing manuals and reporting results,
- procedures for protecting confidentiality of data,
- sample identification,
- instrument and equipment maintenance, calibration practices, and schedules,
- testing of duplicate samples, blind samples, or both,
- testing of reference materials,
- participation in internal/external proficiency sample testing programs,
- procedures for review of sample data and taking corrective action whenever testing discrepancies are detected,
- procedure for dealing with complaints.

As a minimum, this manual shall be updated annually. This Quality Control Manual shall be made available for review at the request of the ministry. A manual satisfactory to the ministry shall be required for award of work.

3. STAFF REQUIREMENTS

Work and testing shall be under the direction of a licensed professional engineer, with the following exceptions:

- petrographic examination of hardened concrete, aggregates (by thin section and LS-616), and rock cores shall be performed by or under the supervision of a geologist.

- aggregate resource prospecting and evaluation shall be performed by or under the supervision of a geologist or a professional engineer with demonstrated experience in aggregate resource prospecting and evaluation.
- chemical analysis of materials shall be performed under the supervision of a qualified analytical chemist.

The supervising engineer, geologist, or chemist shall have a minimum of 3 years experience in the material category in which the work is to be undertaken. This will be demonstrated by providing examples of work supervised or carried out by the professional within the past 5 years.

The technicians carrying out the work shall hold appropriate certificates for sampling and testing as noted in specific materials testing requirements.

4. MATERIALS TESTING REQUIREMENTS

Specific materials testing requirements are as follows:

4.1 Soils and Aggregates

4.1.1 Aggregates – Low Complexity Testing

The laboratory must be qualified to carry out all of the following tests:

LS-601 Materials Finer than 75 µm Sieve in Mineral Aggregates by Washing

LS-602 Sieve Analysis of Aggregates

LS-607 Percent Crushed Particles in Processed Coarse Aggregate

LS-621 Amount of Asphalt-Coated Particles in Coarse Aggregate

For low complexity aggregate testing, the laboratory requires, as a minimum, CCIL certification as a Type C laboratory, participation in the ministry aggregate proficiency sample testing program, and obtaining satisfactory laboratory ratings as determined by the ministry.

Technicians carrying out low complexity aggregate testing shall hold a current certificate from CCIL indicating their proficiency in these tests. A copy of the appropriate certificates shall be submitted.

4.1.2 Aggregates – High Complexity Testing

Laboratory tests in this category include:

LS-604 Relative Density and Absorption of Coarse Aggregate

LS-605 Relative Density and Absorption of Fine Aggregate

LS-606 Soundness of Aggregates by Use of Magnesium Sulphate

LS-608 Percent Flat and Elongated Particles in Coarse Aggregate

LS-609 Petrographic Analysis of Coarse Aggregate

LS-616 Petrographic Analysis of Fine Aggregate

LS-614 Freezing and Thawing of Coarse Aggregate

LS-615 Determination of Potential Alkali-Carbonate Reactivity of Carbonate Rocks by Chemical Composition (CSA A23.2)

LS-617 Percent Crushed Particles with Two or More Crushed Faces and Uncrushed Particles in Processed Coarse Aggregate

LS-618 The Resistance of Coarse Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus

LS-619 The Resistance of Fine Aggregate to Degradation by Abrasion in the Micro-Deval Apparatus

LS-620 Accelerated Detection of Potentially Deleterious Alkali-Silica Reactive Aggregate by Expansion of Mortar Bars

LS-623 One Point Proctor Test (OPT)

AASHTO T 84 Specific Gravity and Absorption of Fine Aggregate

AASHTO T 85 Specific Gravity and Absorption of Coarse Aggregate

AASHTO T 176 Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test

AASHTO T 304 Uncompacted Void Content of Fine Aggregate (Method A)

ASTM D4791 Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

ASTM D5821 Determining the Percentage of Fractured Particles in Coarse Aggregate

Laboratories providing high complexity aggregate testing require, as a minimum, CCIL Type D certification for each test listed above, with the exception of petrographic examination (LS-609, LS-616), alkali-reactivity (LS-615, LS-620), and specific gravity and absorption (AASHTO T 84, AASHTO T 85), as well as participation and satisfactory performance (as determined by the ministry) in the MTO aggregate proficiency sample testing program.

Technicians carrying out high complexity aggregate testing shall have demonstrated experience in aggregate testing and hold a current certificate from CCIL indicating their proficiency in Type C testing. Petrographic examination of coarse aggregate (LS-609) shall be done by an analyst certified by CCIL for this work. A copy of the appropriate certificates shall be submitted.

4.1.3 Field Compaction Testing

Where field compaction testing of earth and granulars is to be carried out using a nuclear moisture-density gauge, the operator of the gauge shall have been trained in the safe operation, transportation, and handling of the gauge. The registered owner of the gauge shall hold and maintain a valid radio isotope license for the gauge. The gauge shall have been calibrated within the last 12 months, either by the manufacturer or other qualified agent, against certified density and moisture reference blocks. The certificate of calibration for the gauge shall be available for inspection. Technicians carrying out the field compaction test shall demonstrate their ability to measure density and calculate Quality Index (QI) of compacted lots.

4.1.4 Aggregate Resources Prospecting and Evaluation

This service includes identification of potential glacio-fluvial and glacio-lacustrine sand and gravel, bedrock aggregates, earth borrows deposits, and assessment of aggregate suitability and quantity for aggregate use on ministry projects. This will be accomplished by field investigation (i.e. digging/ drilling, logging, and sampling of test pits and quarries), laboratory testing, evaluation of the materials tested, and of the aggregate/bedrock deposit.

Service providers shall demonstrate their competence in this field by submitting a list of previous investigations. The service provider shall also submit satisfactory references from 2 clients. The references shall be from the clients or projects shown on the list, and shall include the company's name, address, telephone number, contact person, and a detailed description of the services provided.

When work is performed under the supervision of a geologist or engineer, the person actually doing the work shall have a number of year's demonstrated experience in aggregate resources prospecting and evaluation.

4.1.5 Soil and Rock – Low Complexity Testing

Laboratories qualified in this category shall be capable of carrying out:

LS-701 Determination of Moisture Content of Soils (ASTM D2216)

LS-702 Determination of Particle Size Analysis of Soils

LS-703/704 Liquid Limit, Plastic Limit and Plasticity Index of Soils

LS-705 Determination of Specific Gravity of Soils

LS-706 Moisture-Density Relationship of Soils Using 2.5 kg Rammer and 305 mm Drop

The laboratory is required to participate in the ministry proficiency sample testing program for soils and obtain satisfactory ratings as determined by the ministry.

Laboratories capable of describing rock for engineering purposes (i.e. rock core description, per cent recovery, and RQD), and carrying out index tests on rock core samples are also included in this category. This testing will normally be done as part of pavement and/or foundation investigations and design.

Laboratories are subject to inspection and acceptance by the ministry. The inspection and acceptance procedure is a systematic evaluation of equipment and capability of technicians. Capability of the laboratories will be evaluated by periodically checking the availability and condition of the equipment. The competence of technicians carrying out the tests will be assessed by representatives from the Soils and Aggregates Section, Materials Engineering and Research Office, MTO. For this purpose, the technicians will be requested to perform the test(s) in their presence. Accepted laboratories will be placed on a list available from the Soils and Aggregates Section.

4.1.6 Soil and Rock – Medium Complexity Testing

Laboratories qualified in this specialty will be capable of carrying out all the tests that are covered in the Soil and Rock – Low Complexity Testing, as well as the tests listed below.

ASTM D2166 Unconfined Compressive Strength of Cohesive Soil

ASTM D2435 One-Dimensional Consolidation Properties of Soils

The laboratory is required to participate in the ministry proficiency sample testing program for soils and to obtain satisfactory ratings as determined by the ministry.

Laboratories are subject to periodic inspection and acceptance by the ministry. The inspection and acceptance procedure is a systematic evaluation of equipment and capability of technicians. Capability of the laboratories will be evaluated by periodically checking the availability and condition of the equipment. The competence of the technicians to carry out the tests will be assessed by representatives from the Soils and Aggregates Section, Materials Engineering and Research Office, MTO. For this purpose, the technicians will be requested to perform the test(s) in their presence. Accepted laboratories will be placed on a list available from the Soils and Aggregates Section.

4.1.7 Soil and Rock – High Complexity Testing

Laboratories qualified in this category will be capable of conducting all the tests that are covered in the Soil and Rock - Medium Complexity Testing, as well as the tests that are required to determine shear strength parameters, permeability of granular soils and hydraulic conductivity of low permeable soils. The tests are as follows:

ASTM D2434 (LS-709) Permeability of granular soils by constant head method

ASTM D2850 Unconsolidated undrained compressive strength of cohesive soils in triaxial compression

ASTM D3080 Direct shear test of soils under consolidated drained conditions

ASTM D4767 Consolidated undrained triaxial compression with pore pressure measurement during shearing

ASTM D5084 Hydraulic conductivity of low permeable soils using a flexible wall permeameter.

In addition, labs will be capable of carrying out one or more of the following tests on rock core samples:

Point Load Strength Index – ISRM Suggested Method

ASTM D2938 Uniaxial compression

ASTM D5607 Joint shear strength

This category of testing will normally be done as part of foundation investigations and design.

The laboratory is required to participate in the ministry proficiency sample testing program for soils and to obtain satisfactory ratings as determined by the ministry.

Laboratories are subject to periodic inspection and acceptance by the ministry. The inspection and acceptance procedure is a systematic evaluation of equipment and capability of technicians.

Capability of the laboratories will be evaluated by periodically checking the availability and condition of the equipment. The competence of the technicians to carry out the tests will be assessed by representatives from the Soils and Aggregates Section, Materials Engineering and Research Office, MTO. For this purpose, the technicians will be requested to perform the test(s) in their presence. Accepted laboratories will be placed on a list available from the Soils and Aggregates Section.

5. BITUMINOUS

5.1 Emulsions and Cutback Asphalt Testing

The laboratory must be qualified to carry out all of the following tests:

LS-200 Penetration of Bituminous Materials
LS-204 Solubility of Bituminous Materials in Trichloroethylene
LS-207 Float of Bituminous Materials
LS-217 Determination of Oil Portion of Distillate of Emulsified Asphalts
LS-219 Viscosity of Emulsified Asphalts
LS-220 Demulsibility of Emulsified Asphalts
LS-223 Sieve Test for Emulsified Asphalts
LS-226 High Float Emulsified Asphalt

Laboratories providing testing of emulsions and cutback asphalts shall have participated in the most recent ministry monthly correlation program for these materials, and shall have obtained satisfactory proficiency ratings (as determined by the ministry) in the program.

5.2 Recovered Penetration Testing

The laboratory must be qualified to carry out the following test:

LS-284 Recovery of Asphalt from Solution by Abson or Rotavapor

Laboratories providing testing for penetration of bituminous materials recovered from hot mix by the Abson or Rotavapor procedures shall have a minimum of CCIL Type E certification or ministry-recognized equivalent.

5.3 Hot Mix Asphalt Mix Design and Verification Testing (Marshall)

The laboratory must be qualified to carry out all of the following tests:

LS-261 Preparation of Marshall Specimens
LS-262 Bulk Relative Density of Compacted Bituminous Mixtures
LS-263 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
LS-264 Theoretical Maximum Relative Density of Bituminous Paving Mixtures
LS-265 Determination of Percent Air Voids in Compacted Dense Bituminous Pavement Mixtures
LS-283 Resistance to Stripping of Asphalt Cement in Bituminous Mixture by Marshall Immersion
LS-600 Dry Preparation of Aggregates for the Determination of Physical Constants
LS-602 Sieve Analysis of Aggregates
LS-604 Relative Density and Absorption of Coarse Aggregate

LS-605 Relative Density and Absorption of Fine Aggregate

Laboratories that do not have the capability to conduct MTO LS-283 – Marshal Immersion Test shall have access to a certified laboratory possessing the capabilities to performing this test.

Laboratories providing mix designs or mix design verifications shall have a minimum of CCIL Type A certification or ministry-recognized equivalent.

A minimum of 50% of the technicians, or 2 technicians (whichever is greater), performing mix design and/or mix verification testing shall be CCIL certified (or equivalent).

5.4 Hot Mix Asphalt Quality Assurance Testing (Marshall Mixes)

The laboratory must be qualified to carry out all of the following tests:

LS-262 Bulk Relative Density of Compacted Bituminous Mixtures

LS-263 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus

LS-264 Theoretical Maximum Relative Density of Bituminous Paving Mixtures

LS-265 Determination of Percent Air Voids in Compacted Dense Bituminous Pavement Mixtures

LS-282 Quantitative Extraction of Asphalt Cement and Analysis of Extracted Aggregate from Bituminous Paving Mixtures

LS-291 Quantitative Extraction of Asphalt Cement and Mechanical Analysis of Extracted Aggregate from Bituminous Paving Mixtures – Ontario Procedure

Laboratories providing quality assurance testing of hot mix to the ministry are required to have a minimum of CCIL Type B certification or ministry-recognized equivalent, to participate in the ministry's monthly hot mix correlation program, and to obtain satisfactory ratings (as determined by the ministry) in this program.

A minimum of 50% of the technicians, or 2 technicians (whichever is greater), performing quality assurance testing shall be CCIL certified (or equivalent).

5.5 Hot Mix Asphalt Referee Testing

Laboratories providing referee testing services for mix designs and for mix properties shall be on the ministry's current list for referee laboratories. Amongst other requirements detailed in the Referee Agreement, laboratories shall be CCIL certified (or ministry-recognized equivalent), participate in the ministry's scheduled hot mix correlation program, and obtain satisfactory ratings (as determined by the ministry) in the program.

All referee testing shall be performed by technicians who are CCIL certified (or equivalent).

5.6 Performance Graded Asphalt Cement Testing

The laboratory must be qualified to carry out all of the following tests:

AASHTO R 28 Standard Practice for Accelerated Aging of Asphalt Binder Using a Pressurized Aging Vessel (PAV)

AASHTO T 313 Standard Test Method for Determining the Flexural Creep Stiffness of Asphalt Binder Using the Bending Beam Rheometer (BBR)

AASHTO T 315 Standard Test Method for Determining the Rheological Properties of Asphalt Binder Using a Dynamic Shear Rheometer (DSR)

ASTM D4402 Standard Test Method for Viscosity Determinations of Unfilled Asphalts Using the Brookfield Thermosel Apparatus

Laboratories providing testing of performance graded asphalt cements shall have participated in the most recent AASHTO Materials Reference Laboratory Proficiency Sample Correlation Program (AMRL) for PGAC, and shall have obtained satisfactory proficiency ratings (as determined by the ministry) in the program. Alternatively, the laboratory shall have satisfactorily participated in the most recent ministry correlation program for PGAC, or in any equivalent correlation program acceptable to the ministry. Laboratories are subject to inspection and acceptance by the ministry.

5.7 Hot Mix Asphalt Mix Design and Verification Testing (Superpave)

In addition to the requirements specified under Section 5.3, the laboratory must be qualified to carry out all of the following tests:

AASHTO T 84 Specific Gravity and Absorption of Fine Aggregate

AASHTO T 85 Specific Gravity and Absorption of Coarse Aggregate

AASHTO T 166 Bulk Specific Gravity of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens

AASHTO T 176 Plastic Fines in Graded Aggregates and Soils by Use of the Sand Equivalent Test

AASHTO T 209 Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

AASHTO T 283 Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage

AASHTO T 304 Uncompacted Void Content of Fine Aggregate (Method A)

AASHTO T 312 Preparing and Determining the Density of Hot-Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor

ASTM D4791 Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate

ASTM D5821 Determining the Percentage of Fractured Particles in Coarse Aggregate

Laboratories providing Superpave mix designs or mix design verifications shall have a minimum of CCIL Type A certification (for Superpave) or ministry-recognized equivalent. Laboratories shall also have CCIL Type D certification for all the aggregate tests listed in this section, with the exception of specific gravity and absorption (AASHTO T 84, AASHTO T 85).

A minimum of 50% of the technicians, or 2 technicians (whichever is greater), performing mix design and/or mix verification testing shall be CCIL certified for Superpave testing (or equivalent).

5.8 Hot Mix Asphalt Quality Assurance Testing (Superpave Mixes)

In addition to the requirements specified under Section 5.4, the laboratory must be qualified to carry out all of the following tests:

AASHTO T 84 Specific Gravity and Absorption of Fine Aggregate

AASHTO T 85 Specific Gravity and Absorption of Coarse Aggregate

AASHTO T 166 Bulk Specific Gravity of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens

AASHTO T 209 Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

AASHTO T 283 Resistance of Compacted Asphalt Mixtures to Moisture-Induced Damage

AASHTO T 312 Preparing and Determining the Density of Hot-Mix Asphalt (HMA) Specimens by Means of the Superpave Gyratory Compactor

Laboratories providing hot mix quality assurance testing shall have a CCIL Type A or Type B certification (for Superpave) or ministry-recognized equivalent.

A minimum of 50% of the technicians, or 2 technicians (whichever is greater), performing quality assurance testing of Superpave mixes shall be CCIL certified for Superpave testing (or equivalent).

5.9 Penetration Graded Asphalt Cement Testing

LS-200 Penetration of Bituminous Materials

For penetration graded asphalt cement, laboratories shall have participated in the most recent ministry monthly correlation program for these materials, and shall have obtained satisfactory proficiency ratings (as determined by the ministry) in the program.

5.10 Hot Mix Pavement Smoothness

LS-293 Correlating Profile Measuring Devices and Conducting Surface Smoothness Measurements

Both profilograph equipment and operators shall be from approved lists provided by MTO for the current construction season.

6. CONCRETE

6.1 Field Testing of Plastic Concrete

The laboratory must be qualified to carry out all of the following tests:

CSA A23.2-1C Sampling Plastic Concrete

CSA A23.2-3C Making and Curing Concrete Compression and Flexural Strength Specimens

CSA A23.2-4C Air Content of Plastic Concrete by the Pressure Method

CSA A23.2-5C Slump of Concrete

Field testing and sampling shall be done by personnel certified by the Canadian Standards Association (CSA), or by the American Concrete Institute (ACI). Field testing technicians shall have successfully completed, as part of the certification requirements, written and practical examinations within the last 5 years verifying his/her competence to carry out field testing of concrete (slump, air content, temperature, and casting of cylinders), have in his/her possession, at all times field testing is to be performed, a card issued by the certifying agency verifying the currency of the individual's certification.

6.2 Compressive Strength of Normal Concrete

LS-407 Compressive Strength of Moulded Concrete Cylinders

CSA A23.2-9C Compressive Strength of Cylindrical Concrete Specimens

The laboratory is required to be certified by CSA, minimum Category 0, and shall have participated in the most recent ministry proficiency program for testing of concrete compressive strength with no rating less than 3. Participating laboratories receive a letter from the Concrete Section indicating the laboratory's rating.

6.3 Compressive Strength of High Performance Concrete Specimens

LS-426 Testing Compressive Strength of High Performance Concrete Cylinders

The laboratory is required to be CSA certified as a Category 0 laboratory or higher and to successfully participate in the ministry testing program for testing of high strength concrete. The successful laboratories are placed on the list of laboratories qualified for this testing. This list is available from the Concrete Section.

6.4 Flexural Strength of Concrete Using Simple Beam with Third-Point Loading (CSA A23.2-8C)

The laboratory is required to have CSA Category I certification plus CSA certification to carry out CSA standard test method A23.2-8C, Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).

6.5 Obtaining and Testing Drilled Cores for Compressive Strength Testing (CSA A23.2-14C)

The laboratory is required to be CSA Category I certified and to successfully participate in the Ministry Concrete Compressive Strength Proficiency Program (see above, under Compressive Strength of Cylindrical Concrete Specimens – Normal Concrete).

6.6 Accelerating the Cure of Concrete Cylinders and Determining their Compressive Strength (CSA A23.2-10C)

The laboratory is required to have CSA Category I certification plus certification to carry out CSA standard test method A23.2-10C, Accelerating the Cure of Concrete Cylinders and Determining Their Compressive Strength.

6.7 Air-Void System Testing

ASTM C457 Microscopical Determination of Parameters of the Air-Void System in Hardened Concrete

The laboratories shall have their operator(s) qualified by successful participation in the ministry annual proficiency test program. Qualified laboratories and their operators are placed on a list available from the Concrete Section.

6.8 Rapid Chloride Permeability Testing

ASTM C1202 Electrical Indication of Concrete’s Ability to Resist Chloride Ion Penetration (Rapid Chloride Permeability)

Successful participation in the ministry biennial proficiency program is required. The successful laboratories are placed on a list available from the Concrete Section.

6.9 Total Chlorides Testing

LS-417 Determination of Total Chloride Ion in Concrete (Acid Soluble)

Successful participation in the ministry proficiency program is required. The successful laboratories are placed on a list available from the Concrete Section.

6.10 Testing of Admixtures

LS-413 Non-Volatile Content of Chemical Admixtures, Latex Admixtures and Curing Compounds

LS-414 Relative Density of Chemical Admixtures, Air Entraining Admixtures, Latex Admixtures and Curing Compounds

LS-415 pH of Aqueous Solutions by Glass Electrode

Successful participation in the ministry annual proficiency program is required. The successful laboratories are placed on a list available from the Concrete Section.

6.11 Testing of Curing Compounds

LS-413 Non-Volatile Content of Chemical Admixtures, Latex Admixtures and Curing Compounds

LS-414 Relative Density of Chemical Admixtures, Air Entraining Admixtures and Curing Compounds

LS-416 Settling Rate - Curing Compound

Successful participation in the ministry annual proficiency program is required. The successful laboratories are placed on a list available from the Concrete Section.

6.12 Grout Testing

CSA A23.2-1B Testing of Flowable Grout (viscosity, bleeding, expansion and compressive strength) – Field and Laboratory Testing

6.12.1 Compressive Strength of Grout Specimens

CSA certification for Category 0 or higher and successful participation in the ministry proficiency program for testing of cube compressive strength is required. The successful laboratories are placed on the list of laboratories qualified to test compressive strength of grout specimens. This list is available from the Concrete Section.

6.12.2 Viscosity, Bleeding, Expansion and Making Grout Cube Specimens

The laboratory is required to demonstrate that they have the equipment necessary to carry out CSA Standard Test Method A23.2-1B, Viscosity, Bleeding, Expansion, and Compressive Strength of Flowable Grout. The required equipment includes sufficient number of stainless steel moulds to carry out testing in accordance with Special Provision No. 109S45. The laboratory is also required to demonstrate to ministry staff their ability to perform correctly the testing of viscosity, bleeding, and expansion. The successful laboratories are placed on the list of qualified laboratories for this testing. This list is available from the Concrete Section.

6.13 Concrete Pavement Smoothness Testing

LS-293 Correlating Profile Measuring Devices and Conducting Surface Smoothness Measurements

Both profilograph equipment and operators shall be from approved lists provided by MTO for the current construction season.

7. MISCELLANEOUS TESTING

7.1 Geosynthetics

Testing of geosynthetics shall be carried out by a laboratory acceptable to the ministry for the required test methods.

7.2 Metals

Laboratories are subject to inspection and acceptance by the ministry. The inspection/acceptance procedure is a systematic evaluation of equipment and technician capability. Laboratory capabilities are evaluated by meeting with the senior management and supervising technicians of the firm. The laboratories are assessed by checking the availability and condition of equipment and the competence of personnel carrying out the tests.

7.3 Paint and Coatings

Laboratories are subject to inspection and acceptance by the ministry. The inspection/acceptance procedure is a systematic evaluation of equipment and technician capability. Laboratory capabilities are evaluated by meeting with the senior management and supervising technicians of the firm. The laboratories are assessed by checking the availability and condition of equipment and the competence of personnel carrying out the tests. Laboratories providing testing of traffic paints and structural steel coatings shall participate in the AASHTO Materials Reference Laboratory paint proficiency testing program and shall have obtained a rating satisfactory to the ministry.

8. SUBMISSION REQUIREMENTS

When a company owns or operates more than one laboratory, or uses a sub-contractor, each laboratory or sub-contractor shall be listed separately. The requirements under submissions and qualifications of professional shall be fulfilled for each laboratory.

The following must be submitted as part of the Preliminary Design, Detail Design or Construction Contract Administration Proposal:

- A statement as to which testing and evaluation categories each laboratory is capable of;
- A copy of all the required accreditation or certification documents for each laboratory or sub-contractor laboratory;
- A copy of the individual test and laboratory ratings reports from proficiency sample testing programs for the past 2 years (where applicable). In addition, when required, letters or memoranda describing the investigation and resolution of low ratings shall also be attached;
- A copy of the description of the quality management/audit process that the proponent has in place to ensure that testing done by others is satisfactory;
- A statement and demonstration that the proponent or his/her sub-contractor has qualified engineers, geologists, and chemists to perform the required work;
- A statement that qualified/certified technicians, when required, will conduct the work (and a copy of the appropriate certificates);
- In the case of aggregate resources prospecting and evaluation, a statement of experience and 2 references; and
- A list of previous works, within each sub-category, carried out directly or indirectly for the ministry in the past 3 years. List the contract number (if applicable), region, type of work performed, and completion date.

Note: Alternatively, laboratories which are registered in RAQS do not have to submit evidence of compliance with these requirements.

Appendix A

The consultant shall not replace any of the persons named in their quotation without prior written approval of the ministry. The supervising engineer must be present in the primary laboratory a minimum of once per week:

The project manager must:

- be a company staff member with authority to act on behalf of the company;
- have proven ability to manage assignments of similar type and complexity and to deliver completed quality work on time.

The laboratory supervisor must have demonstrated knowledge of legislative requirements (Environmental, Occupational Health and Safety, etc.) and shall meet at least one of the following criteria:

- An individual with a minimum of 10 years of materials testing experience and demonstrated proficiency in performing the tests required; or
- An individual with a minimum of 3 years of materials testing experience and demonstrated proficiency in performing the tests required plus one of the following credentials:
  - Professional Engineer (P. Eng.) licensed by Professional Engineers Ontario,
  - Bachelor of Science Degree in Civil Engineering,
  - Diploma in Civil Engineering Technology or Construction,
  - Diploma in Geology.

The consultant's primary facility shall have:

- A minimum of 2 technicians with CCIL Type B certification plus applicable certification for Superpave testing,
- A minimum of 2 technicians with CCIL Type C certification,
- A minimum of 2 technicians with CSA certification.

The same technicians can be used to satisfy all 3 of the above requirements. These are minimum requirements only. The consultant shall provide appropriate staffing levels to meet turnaround times at all times taking into account the seasonal variations in testing volumes.

All testing shall be done under the direct and constant supervision of a certified technician.