



**TBT ENGINEERING**  
CONSULTING GROUP

# Statement of Qualifications

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## Materials Engineering

Field Testing and Inspection – Laboratory Testing – Drilling Services



TBT Engineering Limited

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## Company Overview

TBT Engineering Limited (TBTE) is a multidisciplinary engineering and consulting firm located in Thunder Bay Ontario, specializing in Material Engineering, Earth and Environmental, Building Sciences, and Infrastructure.

TBTE holds Certificates of Authorization with the Professional Engineers of Ontario, Professional Geoscientist of Ontario, and Association of Ontario Land Surveyors. Our certified materials testing laboratory is qualified to provide services in accordance with CSA, CCIL, MTO-LS, OPSS, AASHTO, and ASTM. We are also members in good standing with associations including PEO, ACEC, CEO, CGWA, IHSA, AOLS, and PGO. We deliver highly personalized services to all clients through all phases of their projects. Our ability to consistently complete projects on time and within budget is demonstrated through high client satisfaction ratings and returning clients which has resulted in the longevity and success of TBTE.

TBTE is committed to supporting Indigenous groups and communities through engagement and meaningful participation in partnerships and Agreements with First Nation and Metis communities across Northern Ontario. TBTE is a Corporate Member of the Canadian Council for Aboriginal Business (CCAB) and the Anishnawbe Business Professional Association (ABPA).

## Core Competencies and Services

Materials Engineering	Earth & Environmental	Building Sciences	Infrastructure
<p><b><u>Laboratory Services</u></b></p> <ul style="list-style-type: none"> <li>▶ Soils &amp; Aggregate</li> <li>▶ Asphalt</li> <li>▶ Concrete</li> <li>▶ Mobile Laboratories</li> </ul> <p><b><u>Field Testing &amp; Inspection</u></b></p> <ul style="list-style-type: none"> <li>▶ Site inspection</li> <li>▶ Compaction Testing</li> <li>▶ Concrete Fielding Testing</li> </ul> <p><b><u>Drilling Services</u></b></p> <ul style="list-style-type: none"> <li>▶ Geotechnical Investigations</li> <li>▶ Environmental Assessments</li> <li>▶ Aggregates</li> </ul>	<p>Environmental Services</p> <p>Geotechnical Engineering</p> <p>Pavement Engineering</p> <p>Archaeological Cultural Heritage</p>	<p>Structural Engineering</p> <p>Electrical Engineering</p> <p>Mechanical Engineering</p> <p>Commissioning</p> <p>Project Management</p>	<p>Contract Administration</p> <p>Highway &amp; Roadway Engineering</p> <p>Municipal Engineering</p> <p>Legal Surveys</p> <p>Engineering Surveys</p>
<p>*Statement of Qualifications for remaining TBTE divisions are available upon request.</p>			

## **Vice President of Materials Engineering Doug Otto, C.E.T.**



**Doug has over 25 years of experience in the construction and materials testing industry. Doug has extensive experience providing laboratory, field testing, inspection services, including concrete, granular and asphalt materials, reinforcing steel, grout/mortar, and structural steel testing and inspection. As Vice President of the Materials Engineering group, Doug oversees all laboratory, field and drilling services. Doug is involved in various corporate administration procedures and develops, coordinates, and enforces policies and procedures. Doug has been an OACETT Certified Engineering Technologist since 1999. He sits on the board of directors as Vice President of CCIL, and has been a member of CCIL since 2013.**

## **Materials Testing Services**

### **Laboratory Supervising Engineer: Sam Molendijk, P.Eng.**

Sam Molendijk, P.Eng. is TBTE's Laboratory Supervising Engineer and oversees all of TBTE's laboratory operations for both the main and mobile labs. Sam has over 13 years of experience in materials engineering, design and construction activities, and has successfully served as TBTE's laboratory supervising engineering since 2016. In addition, Sam also serves as Manager of TBTE's Pavement Engineering and Geological Services division.

Sam is responsible for certification, quality control, and deliverables of all laboratory operations. Sam ensures that technician certifications are up to date, equipment is properly calibrated, and that the TBTE lab operations are compliant with the latest standards and specifications. Sam is extremely familiar with MTO highway standards for materials and asphalt, specifications, and testing equipment and requirements. Sam performs quality control audits of all laboratory procedures, equipment calibrations, and reporting templates.

In addition to the above, Sam is an RMCAO certified plant auditor and regularly completes Concrete Plant Audits throughout the Northwestern Ontario region.

### **TBTE Materials Testing Laboratory**

Our CCIL certified materials testing laboratory is 6,100 sq. ft. and specially outfitted for testing concrete, aggregates, soils, and asphalt to the applicable CSA, MTO-LS, AASHTO, and ASTM standards. Our suite of testing capabilities is unparalleled in Northern Ontario, and our highly trained staff have vast experience providing materials and field-testing services for a wide variety of clients and project assignments.

Our state of the art in-house design and implementation of mechanical systems works to reduce airborne dust through customized ventilation and filtration, eliminating particulate emissions with accompanying heat recovery for energy efficiency and cost reduction.

Since the closure of the MTO regional laboratory in 1997, TBTE has demonstrated an unparalleled capacity for the provision of quality assurance and quality control materials testing, including, but not limited to, the recent award of our sixth 3-year agreement for the sole provision of all QA testing services on all MTO projects within the Northwest region from Manitoba to White River.

TBTE's laboratory facility is certified by the Canadian Council of Independent Laboratories (CCIL) for Type A and B (Asphalt), Type C and D (Aggregates and Soils), and Type SL (Advanced Concrete). CCIL facility inspections and certifications for both the facility and technicians are always completed at the required intervals.

TBTE laboratory operations adhere to an approved Quality Manual, which is available for review upon request. The laboratory manual outlines the procedures to ensure that all aspects of the samples, including logging, preparation, testing, reporting, and storage comply with the appropriate specification

In addition to our ongoing internal Quality Control practices, TBTE participates in all MTO and CCIL administered correlations to ensure that a high-quality product is being produced, and to identify any possible errors or admissions which may be generated. If low ratings are identified through the correlations, TBTE will complete a full Quality Control review of the equipment, testing procedures, and reporting to identify the source of error. A report is then issued summarizing the findings and any corrective action taken.

A summary of TBTE's most frequently requested materials Testing services includes:

### **Aggregate, Soils and Rock Testing**

- ▶ Grain Size Analysis (Coarse and Fine Aggregate)
- ▶ Asphalt Coated Particle Testing
- ▶ Percent Crushed Particles
- ▶ Percent Flat and Elongated Particles
- ▶ Proctors (Standard and Modified)
- ▶ Relative Density and Absorption (Coarse and Fine Aggregate, and Soils)
- ▶ Micro-Deval Testing (Coarse and Fine Aggregate)
- ▶ Freeze-Thaw Testing
- ▶ Hydrometer Particle Size Analysis
- ▶ Atterberg Limit Testing
- ▶ Petrographic Examination (Coarse Aggregate)
- ▶ Petrographic Analysis (Fine Aggregate)
- ▶ WipFrag Photo Analysis
- ▶ Hot-Mix Asphalt Aggregate Quality Testing
- ▶ Rock Core Logging
- ▶ Rock Core Point Load Testing
- ▶ Permeability Testing (Falling and Constant Head)
- ▶ T-time Analysis
- ▶ Consolidation Testing
- ▶ Direct Shear Testing

### Concrete and Grout Testing

- ▶ Concrete Cylinder/Core Compressive Strength Testing (Regular and High-Performance Concrete)
- ▶ Grout Cube Compressive Strength Testing
- ▶ Rapid Chloride Permeability of Concrete Cores
- ▶ Hardened Air-Void Testing
- ▶ Concrete Mix Designs
- ▶ Admixture and Curing

### Hot-Mix Asphalt Testing

- ▶ SuperPave Volumetrics (Complete) & Gyratory Mix Design
- ▶ Asphalt Extraction and Gradation (Ignition Oven or Trichloroethylene)
- ▶ Marshall Mix Design
- ▶ Marshall Values (Air-voids, Stability, Flow)
- ▶ Pavement Core Compaction
- ▶ Cold-Mix Evaluation

### Mobile Laboratory Services

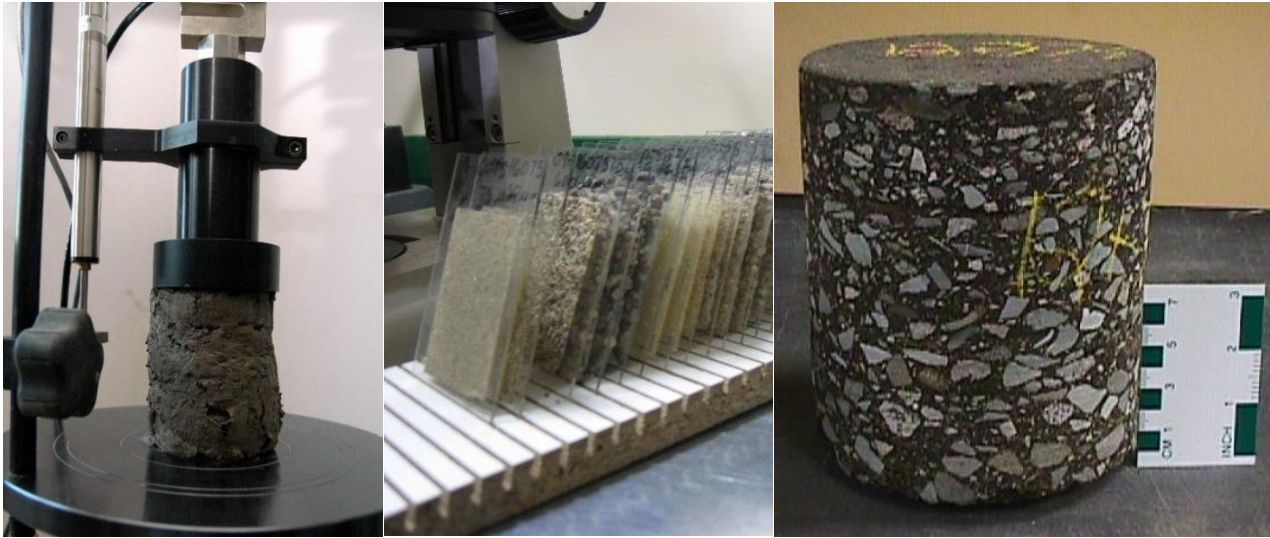
TBTE provides mobile laboratory testing services across Northern Ontario equipped to offer on-site Type C Aggregate and Basic Concrete – Type QL testing services. CCIL certifications and quality control of our mobile laboratories are completed similarly to the main laboratory facility.

### Mobile Laboratory Services:

- Gradation Testing (Sieve Analysis)
  - ▶ Proctor Compaction Testing
  - ▶ Compression Testing on Concrete Cylinders
  - ▶ Compression Testing on Grout Cubes
  - ▶ Field Compaction Testing
  - ▶ Field Concrete and Grout Testing

### Types of Testing Offered:

- ▶ Concrete Testing (CSA A23.1/A23.2, CCIL Standards)
- ▶ Compaction Testing (MTO LS, ASTM)
- ▶ Tensile Bond Testing (CSA, MTO LS, ASTM)
- ▶ Dowel Pull Testing (MTO)
- ▶ Concrete Investigations (Coring, Half-Cell Survey and Delamination)
- ▶ Bolt Torque Testing, Column Plumbness/Decking Inspection
- ▶ Subgrade Inspection
- ▶ Inertial Profilograph and Analysis
- ▶ Material Sampling
- ▶ Macrotexture Ratio Testing
- ▶ Asphalt Testing and Inspection
- ▶ Reinforcing Steel Inspection
- ▶ Fireproofing Application Testing
- ▶ Structural Steel Coating Testing and Inspection (SSPC Standards)
- ▶ Painting Inspection (NACE Level 1 Qualifications)



## Recent Projects

### **2000–2013; 2016 - Present: MTO NWR Material QA Testing Services Retainer Assignment**

TBTE has been the MTO Northwestern Region's Area QA service provider for over 20 years. The assignment consists of completing all quality assurance samples for concrete, asphalt, and aggregate materials for the various MTO Capital Contracts within the Northwest region. Throughout the assignment, TBTE has displayed a high level of quality and efficiency to turn-around sample results in a quick and effective manner.

TBTE is required to participate in all MTO and CCIL certifications and correlations to ensure accuracy of testing and reporting and is subject to yearly MTO audits. Additionally, TBTE supplies mobile laboratories for aggregate or hot-mix asphalt testing, and a variety of field-testing services as required.

### **2019- Ongoing–MTO Referee Assignment–Material Testing Services (Outside Region)**

This project consists of laboratory referee testing assignments from MTO Contract Quality Control whenever there is a discrepancy between the contractor and QA test results. The contractor and MTO representatives are often present to witness the handling and testing of samples. TBTE has successfully executed dozens of referee test samples to the satisfaction of clients and contractors.

### **2021 to Present – Laboratory Testing Services at Greenstone Gold Mines**

TBTE is currently providing laboratory testing services at Greenstone Gold Mines through an on-site mobile laboratory that is fully equipped to complete Basic Concrete (Type QL) and Aggregate Testing (Type C) services. Greenstone Gold Mines is located in the Geraldton-Beardmore Greenstone Belt.

The on-site laboratory is CCIL certified, with certified TBTE technicians completing all sample handling, testing, and reporting. The lab undergoes regular audits and inspections from TBTE's supervising engineer and senior staff and participates in regular correlations with the main lab to ensure accuracy.

## Field Testing and Inspection

### Manager of Field Services: Ernie Krause, C.E.T.

Ernie has over 25 years of experience in conducting, supervising, and training staff in field and laboratory testing and inspection services, including concrete, granular, asphalt, pipe installation, rebar and grout, while ensuring conformance to specifications and design criteria, compliance to industry and government standards, and corporate administration procedures. Ernie also has extensive experience providing geotechnical and environmental drilling and sampling.

### TBTE Field Testing and Inspection

TBTE's fully trained staff possess extensive technical capabilities and experience in engineering field testing and inspection projects. Our team is highly trained in the safe usage of our field-testing equipment and working at construction sites. Our technicians and technologists are trained in CSA, CCIL, CNSC, ASTM, and OPSS standards to meet the needs of our clients.

TBTE's field testing and inspection services provide a wide range of quality assurance and quality control material testing and inspection services (e.g., aggregate, concrete, asphalt, structural steel) to a large variety of clients across a broad cross-section of projects (E.g. highway, municipal, commercial, industrial, airport, railway, mining, and energy/renewable energy).

Our field department supports TBTE's other 15 divisions by providing testing and assistance wherever and whenever required. For example, we provide fully equipped and staffed mobile quality control/quality assurance laboratories in remote locations to expedite testing services. See above for mobile laboratory information.

### Types of Testing Offered:

- ▶ Concrete Testing (CSA A23.1/A23.2, CCIL Standards)
- ▶ Compaction Testing (MTO LS, ASTM)
- ▶ Tensile Bond Testing (CSA, MTO LS, ASTM)
- ▶ Dowel Pull Testing (MTO)
- ▶ Concrete Investigations (Coring, Half-Cell Survey and Delamination)
- ▶ Bolt Torque Testing, Column Plumbness/Decking Inspection
- ▶ Subgrade Inspection
- ▶ Inertial Profilograph and Analysis
- ▶ Material Sampling
- ▶ Macrotecture Ratio Testing
- ▶ Asphalt Testing and Inspection
- ▶ Reinforcing Steel Inspection
- ▶ Fireproofing Application Testing
- ▶ Structural Steel Coating Testing and Inspection (SSPC Standards)
- ▶ Painting Inspection (NACE Level 1 Qualifications)

### Instrumentation:

- ▶ Tensile Bond Machine
- ▶ Dowel Testing Apparatus
- ▶ Thermocouples/Data Loggers
- ▶ Portable Nuclear Gauges
- ▶ Concrete Testing and Coring Equipment
- ▶ Half-Cell Survey Equipment
- ▶ Chain Dragging Equipment
- ▶ Moisture Testing Equipment
- ▶ Torque Wrench
- ▶ High-Speed Inertial Profilograph
- ▶ Macrotexture Ratio Testing Equipment
- ▶ QA/QC Mobile Laboratories for Aggregates and Concrete Testing



## Recent Projects

### MTO, Quality Assurance Services (2001 – 2012 and 2016 to present)

- ▶ Successfully completed Quality Assurance testing for all MTO capital construction projects.
- ▶ Conducted various field services including compaction, tensile bond, and dowel pull.
- ▶ Performed inertial profiling and data analysis (surface smoothness testing) on new asphalt.

### M Builds, Salvation Army Thunder Bay Journey to Life Centre (2019 to 2021)

- ▶ Performed sub-grade inspection.
- ▶ Performed compaction testing.
- ▶ Performed concrete testing.
- ▶ Perform asphalt compaction testing.

### North Rock Construction Projects, Detour Gold Mine (2011 to 2021)

- ▶ Performed compaction testing on various placed materials on tailings management area.
- ▶ Performed concrete/grout testing.



- ▶ Conducted aggregate/till materials testing on a variety of materials for tailings management area.
- ▶ With staff and mobile laboratory resources on site, performed additional field and laboratory materials testing for a variety of contractors working on site to minimize costing to mine owner.

### Greenstone Gold Mine, Greenstone Mine (2021 to Currently)

- ▶ Performed aggregate materials sampling and testing on various materials which were tested in the on-site at TBTE's mobile laboratory.
- ▶ Performed compaction testing on various materials.
- ▶ Conducted aggregate material sampling.

## Drilling Services

### Manager Drilling Services: Jamie Clements

Jamie has over 15 years of drilling and management experience and demonstrates knowledge of principles and practices related to civil engineering technology. Jamie is familiar with testing techniques, procedures, and proper application due to his past experience as both a field and laboratory technician. Jamie has gained experience drilling for geotechnical investigations, as well as completing technical duties, including highway investigations, soils sampling and identification, and asphalt coring. Jamie is strongly focused on health and safety practices and possesses sound mechanical knowledge of automotive, equipment repairs, and maintenance, which is often required in the field to reduce downtime.

### TBTE Drilling Services

TBTE's Drilling Services department offers comprehensive drilling services using TBTE's in-house drilling equipment to ensure optimal project scheduling and performance. TBTE's Drilling division is comprised of a team of qualified drillers and driller assistants who hold the experience and certifications required to carry-out a diverse array of drilling programs. In an effort to ensure quality, safety, and compliance with relevant legislation, all drilling staff members are required to complete various training initiatives, including:

- ▶ **Ministry of Environment and Climate Change (MOECC) Well Technician Certification and Training:** TBTE drillers are MOECC certified well technicians and have completed a comprehensive well technician training program, focusing on Ontario Regulation 903.
- ▶ **Common Core Training:** Drillers have completed the three (3) mandatory common core modules required for anyone wanting to work in a surface mine environment. Common core is a modular training program which is designed to ensure that all of the core competencies identified in the Ministry of Training, Colleges and Universities (MTCU) Modular Training Standards are met.
- ▶ **TBTE In-House Drilling Safety Program:** TBTE believes that health and safety are paramount on all projects. All employees in the drilling division are provided with general drilling safety training as part of our graduated orientation system. This initial safety training is complimented by consistent on-the-job training and other safety and professional development initiatives.

TBTE has a fleet of specialized equipment for a variety of soils and bedrock conditions. The following provides a brief overview of our commonly used exploration equipment for various applications in Northwestern Ontario.

### Services Offered:

- ▶ Augering – Solid Stem and Hollow Stem Methods
- ▶ Diamond Drilling – Coring and Casing Advancer
- ▶ O. Reg. 903 Certified Groundwater Monitoring Well Installations/Decommissioning
- ▶ Geotechnical Subsurface Condition Investigations
- ▶ Roadway/Highway/Pavement Investigations
- ▶ Environmental Soil Sampling & Investigations
- ▶ Aggregate Source Investigations (ASIs)
- ▶ Rock Quarry Investigations
- ▶ Environmental & Geotechnical Marine Investigations
- ▶ Construction Site Assessments

### Inventory:

- ▶ Diedrich D70 Track Mounted Drill Rig
- ▶ Diedrich D50 Track Mounted Drill Rig
- ▶ Skidder Tire Mounted CME 750 All Terrain Rig
- ▶ CME 55 Track Mounted Drill Rig
- ▶ Simco 2400 SK-1 Heli-Portable Track Mounted Drill Rig
- ▶ Pioneer Track Mounted Drill Rig
- ▶ Acker Bushmaster Track Mounted Drill Rig
- ▶ Truck Mounted Sterling Solid Stem Kelly Bar Power Auger
- ▶ Tri-Pod Portable Cathead Equipment
- ▶ Drill Barge
- ▶ PEDO Hand Auger Equipment
- ▶ Support Vehicles including Trucks, Floats, Snowmobiles & ATVs/UTVs



## Recent Projects

### Rock Tech Lithium, Georgia Lake Project (Beardmore, ON)

- ▶ Performed geotechnical/environmental drilling for mine infrastructure.

### Valard Construction, Watay Transmission Line

- ▶ Performed substation geotechnical drilling.
- ▶ Performed transmission line geotechnical drilling.
- ▶ Project included 100's of sites and 1000's of metres of drilling across a challenging remote terrain.

### Valard Construction, OEWTL

- ▶ Performed transmission line geotechnical drilling.

### Greenstone Gold Mines Ltd., Geraldton, ON

- ▶ Performed geotechnical/environmental drilling for mine infrastructure.

### Generation PGM, Marathon, ON

- ▶ Performed geotechnical/environmental drilling for mine infrastructure.

### Agnico Eagle Mines Ltd., Atikokan, ON

- ▶ Performed geotechnical drilling for mine infrastructure.

### Impala Canada Ltd., Lac des Iles Mine

- ▶ Performed geotechnical/environmental drilling for gold mine infrastructure.

