



TBT ENGINEERING
CONSULTING GROUP

Statement of Qualifications

Infrastructure Engineering

Highway & Roadway Engineering – Bridge Engineering
Municipal Engineering - Contract Administration
Legal Surveys – Engineering Surveys



TBT Engineering Limited

1918 Yonge Street Thunder Bay, ON P7E 6T9

807-624-5160 | info@tbte.ca

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 Engineering.

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).

Infrastructure Engineering

TBTE provides complete infrastructure engineering services encompassing creative and practical solutions that meet and exceed the expectations of both clients and the communities we serve.

Utilizing local knowledge and technical expertise, TBTE's diverse and experienced infrastructure team looks forward to overcoming project challenges that tap into our passion for solving problems and our proven performance is evident through the numerous projects we've delivered for our clients.

The TBTE infrastructure team has proven success as a Prime Civil Engineering firm and is known for quality and responsiveness. We provide innovative approaches to help our clients and stakeholders meet their needs at each stage of a project, from concept to construction.

TBTE treats each project as a partnership with our clients and we are rooted in a longstanding approach of doing the right thing and going the extra kilometre in our efforts.

Core Competencies and Services

Infrastructure Engineering	Materials Engineering	Building Sciences	Earth & Environmental Engineering
<p><u>Highway & Roadway Engineering</u></p> <ul style="list-style-type: none"> ▶ Total Project Management ▶ Feasibility/Planning Studies ▶ Preliminary/Detailed Design of Highways/Roadways/Multi Purpose Trails ▶ Contract Preparation/Tender Management <p><u>Bridge Engineering</u></p> <ul style="list-style-type: none"> ▶ Total Project Management ▶ Structural Evaluations of Existing Structures ▶ Preliminary/Detailed Design of Bridges and Culverts ▶ Biennial Inspections ▶ Contract Preparation/Tender Management <p><u>Municipal Engineering</u></p> <ul style="list-style-type: none"> ▶ Total Project Management ▶ Site Grading Designs ▶ Drainage/Floodplain Designs ▶ Site Servicing Designs ▶ Sewage/Septic Designs <p><u>Contract Administration</u></p> <ul style="list-style-type: none"> ▶ Project Management & Administration ▶ Inspection/Documentation ▶ Quantity/Quality Verification ▶ Dispute Resolution <p><u>Legal Surveys</u></p> <ul style="list-style-type: none"> ▶ Boundary Retracement ▶ Surveyor's Real Property Reports ▶ Reference, Crown Lands, Subdivision, Condominium, Highway & Mining Claim Plans <p><u>Engineering Surveys</u></p> <ul style="list-style-type: none"> ▶ Topographical & Volume Surveys ▶ Bathymetric Surveys ▶ Remote Surveys ▶ GIS Mapping & Databases ▶ Remotely Piloted Aircraft Systems (RPAS/UAS (Drone)) Surveys 	<p>Engineering Material Testing Laboratory</p> <p>Field Testing & Inspection</p> <p>Drilling Services</p> <p>Mobile Laboratory Services</p>	<p>Structural Engineering</p> <p>Electrical Engineering</p> <p>Mechanical Engineering</p> <p>Commissioning</p> <p>Project Management</p>	<p>Geotechnical Engineering</p> <p>Pavement Engineering</p> <p>Environmental Services</p> <p>Geological Services</p>
<p>*Statement of Qualifications for remaining TBTE divisions are available upon request.</p>			

Vice President of Infrastructure Engineering and Manager of Highway & Roadway Engineering

Gary Thoms, P. Eng.



As Vice President of the Infrastructure Engineering group, Gary oversees services for provincial, municipal, industrial/commercial/institutional clients and First Nation projects throughout Northwestern Ontario. As an Engineer with 29 years of experience in the industry, Gary provides senior leadership for projects and is responsible for linking with other functional managers, acting as a senior resource for technical staff, field reviews, design correspondence, evaluations, developing design recommendations, contract specifications, drainage designs, scheduling and cost control, reviewing contract documents and drawings, quantity calculations and reports prepared by technical staff. Gary is also active in dealing with utility, property, stakeholders and corridor issues to determine risks and mitigation measures. Gary has managed over 100 preliminary and detail design assignments for MTO Northwestern Region. Gary is a leader in the development and management of TBTE's engineering services, acting as the Manager of all Highway Engineering projects completed to date since 1999. One of Gary's passions is growing and mentoring team members as well as being considered an excellent engineer/manager by those within TBT Engineering and industry partners.

Highway & Roadway Engineering

Assistant Manager of Highway & Roadway Engineering: Brad DesRochers, P.Eng.

Brad DesRochers, P.Eng. is the Assistant Manager of the Highway Engineering department at TBTE, where he assists with the direction, supervision, operation, maintenance, planning, development, health and safety, and administration of the day-to-day operation of projects. Brad has designed and managed all types of highway and roadway projects through various project phases including feasibility studies, preliminary and detailed design. These include highway rehabilitation and new construction, roadway drainage improvements, First Nation community/access roads, and mine site roads. Brad completes designs, reports, letters, specifications, contract documents, and detailed cost estimates and memoranda for projects assigned. Brad networks with consultants, developers, government agencies, contractors, and industry. Brad performs field reviews documenting existing conditions of project components and assesses the impacts of proposed design on utilities, property, and other potential conflicts. Brad oversees roadway and highway engineering for provincial, municipal, commercial as well as First Nations projects throughout Northwestern Ontario.

TBTE Highway and Roadway Engineering Services

At TBTE, we provide complete engineering services for road improvements, new road construction and highway maintenance systems. We manage all aspects of roadway and highway engineering projects, including consulting, research and planning, design, and construction.

TBTE provides clients with feasibility studies that outline the scope of the project, summarizing preferred routes, possible alternatives, assumptions, any environmental and social considerations, economic justification, as well as interim and final reporting. We complete preliminary and detailed designs including contract preparation and tender management incorporating design recommendations and ensuring a complete and cost-effective contract package. With every project, extensive research and planning are key. TBTE has the expertise to manage and coordinate large teams or industry professionals, incorporating multiple disciplines into a final contract package.

A summary of TBTE's roadway and highway services includes:

Highway and Roadway Engineering Services

- ▶ Total Project Management
- ▶ Feasibility Studies and Route Planning
- ▶ Preliminary Design
- ▶ Engineering Surveys and Plan Preparation
- ▶ Detailed Roadway Investigations
- ▶ Detailed Assessment of Existing Culverts and Drainage Facilities
- ▶ Preparation of Design Criteria
- ▶ Develop and Analyse Alternatives for Improvements
- ▶ Traffic Staging Design
- ▶ Construction Cost Estimating including Working Day Schedules
- ▶ Traffic Investigations
- ▶ Roadside Safety Evaluation and Design
- ▶ Intersection Design
- ▶ Auxiliary Lane Design
- ▶ Cross-Section Design
- ▶ Drainage Design
- ▶ Multi Purpose Trail Design
- ▶ Detailed Design
- ▶ Contract Preparation
- ▶ Tender Management

Notable Projects

Mitaanjigamiing First Nation – Access Road Improvements

TBTE was retained by Mitaanjigamiing First Nation to complete a preliminary and detailed design for the Mitaanjigamiing First Nation Access Road. The community is located approximately 12 km north of Fort Frances on Mitaanjigamiing Bay. Approximately 100 people residing in the community rely on the road for daily commuting. The purpose of the project was to address substandard alignment, grade, base and drainage elements, improve traffic safety and ultimately reducing travel time. The preliminary design study evaluated the condition of the existing roadway and drainage facilities, developed alternative improvement strategies and associated costs, and recommended improvements.



As the consultant of record, TBTE was tasked with assessing the existing road and propose improvements based on available construction budget. Revision areas were then identified, prioritized and incorporated into contract packages for construction. TBTE completed field reviews along with geotechnical investigations, natural science studies and an engineering survey of the existing roadway to assist with the analysis of existing conditions and development of proposed roadway improvement strategies.

Review of the existing roadway conditions revealed the existing granular base, drainage elements and roadway geometrics required significant improvement to safely accommodate road users. Based on the existing roadway geometrics and the anticipated construction budget, it was determined improving to a 40 km/h design speed will be desirable standard for roadway improvements.

A geometric rating system was developed using the RLU 40 Design Standard and applied to the existing roadway to aid in determining the sections of road that were most substandard. Three categories of revisions were developed based on availability of information and the revision strategy. The final report provided recommendations for the rehabilitation of the existing access road horizontal and vertical alignment revisions to address substandard geometrics, widening, drainage improvements, granular base, and the application of a low-class bituminous surface treatment to increase surface friction and reduce future maintenance costs.

Based on this final report TBTE completed individual detailed design assignment incorporating horizontal and vertical alignment, roadside safety design, cross section and drainage improvements to accommodate available funding constraints. In total, TBTE prepared and successfully completed six (6) individual contracts for access road improvements to date for Mitaanjigamiing First Nation.

Greenstone Gold Mines – Highway 11 Realignment

TBTE was retained by Greenstone Gold Mine to complete the detailed design of Highway 11 realignment required for future mine development. Included in this assignment was the detailed design of two new intersections, one for mine access and maintenance patrol yard entrance and one for Highway 11 and Michael Power Boulevard. TBTE incorporated recommendations contained in the Traffic Impact Study to develop appropriate intersection geometry including auxiliary lane, illumination, and ramps.



A design criteria summarizing the proposed roadway engineering standards was established through consultation with Greenstone Gold, MTO and in consideration of applicable road design guidelines and standards. A horizontal and vertical alignment was developed in Autodesk's Civil3D to satisfy the design criteria and safety requirements. Full cross-sectional design incorporating drainage requirements and geometric elements contained in the design criteria including lane widths, crossfall, superelevation, foreslopes/back-slopes and ditch depths was completed in Bentley InRoads. To accommodate construction staging operations and the future commissioning of the new highway, traffic staging plans were prepared to ensure minimal disruption to the public throughfare. As part of the detailed package, TBTE completed roadside safety, drainage, and foundation engineering designs. Included in the detailed design was the coordination and permit preparation to facilitate highway construction and new highway features include entrance, encroachment and land use permits. TBTE is completing the contract administration and inspection duties for construction and included quantity and quality verification and overall project management.

New Gold – Highway 600 Realignment

TBTE was retained by Rainy River Resources Limited to complete a Feasibility Study, Preliminary and Detailed Design for the construction of a realignment for an existing transportation route. The current route traversed through a mineral exploration area being developed by the company and was located near a community, which raised safety concerns.



The first phase of the final project deliverables to the client included an overview of the study area, design criteria in draft stage, outline of the anticipated environmental assessment process and associated timelines, information regarding provincial and federal permitting and approvals, explanation of natural science/existing environmental conditions, and outline of steps to be completed for a cultural heritage (archaeological) assessment.

TBTE then provided a study plan showing the nature of assumed geotechnical conditions and presented plan drawings of the alignment options with terrain features and contours and claims map information. A defined quantitative and qualitative method of comparative evaluation was developed, presented, and explained. A brief summary for each realignment alternative was presented along with associated construction cost estimates. In addition to quantitative analysis factors, alternative evaluations were extended to include factors such as property acquisitions, aggregate sources, permitting, travel distances for motorists, and anticipated road maintenance costs. All analysis was summarized for each alternative route in terms of costs, constructability, and timelines. The optimal route realignment alternative was recommended based on completed analysis.

Following the completion of the Feasibility Study, TBTE carried the project through preliminary and detailed design phases including engineering surveys, environmental services, geotechnical engineering, highway engineering and contract administration. Included in the detailed design was the coordination and permit preparation to facilitate highway construction as well as highway crossings (roadway and buried utilities). To accommodate construction operation and future mine operations TBTE prepared traffic staging plans in accordance with regulatory requirements.

Ministry of Transportation – Highway 17 Rosspoint Realignment and Truck Climbing Lanes

TBTE was retained by the Ministry of Transportation Ontario (MTO) for total project management including highway engineering, geotechnical engineering, and environmental services for the preliminary and detailed design of road highway improvements.

Preliminary design and consultation were carried out to determine and evaluate alignment alternatives. TBTE completed the detailed design for the selected improvements once the preferred alternative was selected.



The Highway improvements for this major reconstruction assignment included eastbound and westbound truck climbing lanes, select horizontal and vertical alignment revisions, hazard rock removal, fully paved shoulders, and highway resurfacing to address safety and operations concerns. Vertical and horizontal alignment of Highway 17 was improved to provide a design speed of 110 km/h. As part of the detailed package TBTE completed roadside safety, drainage, traffic staging and excess material management designs. In addition, TBTE incorporated rock hazard and foundation engineering design recommendations into the final design package, ensuring a complete package. Hydro One and Bell Canada groups were consulted to facilitate the relocation of existing overhead utilities. Property plans were prepared by TBTE for the acquisition of Crown Land required to accommodate the new highway alignment. As part of this assignment TBTE completed consultation with appropriate shareholders including CP Rail due to the vicinity to their infrastructure. TBTE successfully incorporated railway flagging and design requirements into the tender package.

Ministry of Transportation – Highway 17 Hawk Lake Realignment

TBTE was retained by the Ministry of Transportation Ontario (MTO) for the replacement of a deteriorating restrictive underpass (CPR Subway) with a new structure highway and grade separated crossing bridge over the railway. The new highway and bridge structure would allow for the travel of oversize loads (bulk cargo) on this portion of the Trans Canada Highway, where previously there was a height restriction of less than 5 metres. Advanced engineering design and building materials to account for heavy traffic flow were project requirements, as was quickly and efficient



construction of the new infrastructure (and demolition of the existing infrastructure) to minimise interruption to land and rail traffic. The solution involved realignment of 2.0 km of highway and a 26m prestressed concrete box girder bridge. The realigned highway included 3.75 metre main lanes, 2.5 metre fully paved shoulders, 1 metre rounding and rumble strips. As well, a 3.5 metre truck climbing lane and existing snow plow turnaround where reconstructed. Bridge components included piles set on rock points, RSS wall, prestressed concrete box girders, prestressed/precast concrete curbs, precast concrete approach slabs, metal railing system and GFRP reinforcing and UHPC with steel fibers for pre-cast connections.



TBTE provided Total Project Management for the highway realignment and new grade separated crossing including all engineering and construction administration for the project. Vertical and horizontal alignment of Highway 17 was improved to provide geometrics consistent with a design speed of 110 km/h. All project objectives were achieved on time and within budget. As a separate TPM project, TBTE provided similar services for an innovative rapid demolition of the deteriorating CPS underpass, plus embankment construction so that CPR could rebuild track. Unlimited clearance to highway traffic now allows for over-heights loads and bulk cargo and has resulted in more efficient

and cost-effective flow of goods between Eastern and Western Canada.

Bridge Engineering

Manager of Bridge Engineering: Eric Mickelson, M.Eng., LEED AP

Eric Mickelson, M.Eng., LEED AP is TBTE's Manager of the Bridge Engineering department at TBTE and possesses over 27 years of experience providing structural and civil engineering analysis and design, contract administration, project management and field inspection work for a variety of clients in Northwestern Ontario. Eric specializes in buildings, foundations, simple span bridgework and roofing. He has extensive experience working on manufacturing, commercial, municipal and institutional projects.

In addition to the above, Eric is a LEED AP (Leadership in Energy and Environmental Design Accredited Professional).

Assistant Manager of Bridge Engineering: Dani Rhodes, P. Eng.

Dani is the Assistant Manager of Bridge Engineering at TBTE, with over 10 years of experience in the engineering industry. Dani is responsible for leading bridge related projects including preliminary and detailed designs of bridge and culvert replacements, entirely new structures and rehabilitations, biennial bridge inspections in accordance with the Ontario Structure Inspection Manual, and evaluation of existing structures in accordance with the Canadian Bridge Design Code Section 14. Dani leads bridge engineering services for a variety of clients throughout

Northwestern Ontario including federal, provincial, and municipal governing bodies, First Nations, contracting and mining companies. Dani has completed planning and design of structural crossings for mine access roads and large-scale utility construction projects including temporary structures as required. Dani has completed nearly 200 bridge inspections including highway structures and remote natural resource access structures. Dani is RAQS qualified with the Ministry of Transportation Ontario for Biennial Bridge Inspections under the Bridge Engineering Category. All the bridge engineering projects led by Dani require her to practice cost and schedule control as well as time management and allocation of resources. Dani's computer skills include CSiBridge and S-Frame finite element modelling software allowing efficiency in the process and optimization of the design. Dani has developed a well-rounded knowledge of various types of bridge and culvert structures as part of a variety of different transportation systems allowing her to provide practical, and cost-effective constructable solutions.

TBTE Bridge Engineering Services Provided

TBTE provides complete bridge engineering services for entirely new structures in undeveloped areas, and for rehabilitation or replacement of existing structures. For bridge design projects services would typically include identification of project requirements and alternative solutions, development of preliminary design based on the preferred solution, development of detailed design and tender documents as well as tendering support to the Client as required. Bridge engineering projects are multidisciplinary projects that can require surveys (bathymetric and topographic), geotechnical investigations, drainage and hydrology analysis and reporting, and environmental services. TBTE's capacity encompasses all of these multi-disciplinary requirements which are managed by a lead bridge engineer who directs and coordinates all efforts on bridge design projects.

A summary of TBTE's most frequently requested Municipal Engineering services includes:

Bridge Engineering Services

- ▶ Bridge Inspections and Reporting
- ▶ Design of Bridge Rehabilitations
- ▶ Design of New and Replacement Structures
- ▶ Abutment Designs for Pre-engineered Superstructures
- ▶ Structural Evaluations of Existing Structures (load capacity, posting)
- ▶ Enhanced Bridge Inspections
- ▶ Preliminary Design and Planning Studies– Resource Extraction Access Road Structures
- ▶ Construction Access Structures
- ▶ Evaluation of Existing Structures for Construction Access (Heavy Equipment Loads)
- ▶ Feasibility Studies
- ▶ Preliminary Design
- ▶ Detailed Design
- ▶ Contract Administration

Notable Projects

Colonization Road Culvert Replacement



TBT Engineering was retained by the Township of Dawson to provide engineering services including structural engineering, surveying, environmental services and drainage and hydrology for the replacement of Colonization Road Culvert. The existing corrugated steel pipe culvert was collapsing and being temporarily supported from the inside with a steel beams and posts. The road had to be closed due to the condition of the culvert. The project involved a full scope of services from design development, detailed drawings and specifications,

tender package preparation, tendering support, bid review and recommendation and contract administration. The culvert was replaced with a 4.8m span horizontal ellipse Structural Plate Corrugated Steel Pipe Culvert to meet the project requirements.

Other projects our team has completed include:

- Farm and Pardee Rd. Bridge Replacements, Neebing, ON
- City of Thunder Bay Pedestrian Bridge Preliminary Design
- Anjigami Bridge in Support of E-W Transmission Line
- E-W Transmission Line Temporary Timber Access Bridges, Various Locations
- Anjigami Dam Structural Evaluation
- Design of Temporary Bridge over Anjigami Bridge
- MTO Bridge Inspections 2018-2021
- Kinghorn Bridge Rehabilitation, Jellico, ON
- Snake Falls Bridge Rehabilitation, Ear Falls, ON
- Resolute FP Bridge Evaluations 2021 and 2022, Various Locations
- MNRF Bridge Inspections 2021, Various Locations
- Township of Dawson and Township of Lake of the Woods Bridge Inspections, 2021
- 2018 LRCA Marine Structure Inspections
- Township of Gillies Bridge Inspections 2015 and 2017
- MNRF Bridge Evaluations 2021, Various Locations
- H2O Power Access Ramp (Bridge), Fort Frances, ON

Municipal Engineering

Manager of Municipal Engineering: Don Bowes, P. Eng.

Don is the Manager of the Municipal Engineering department at TBTE, with over 14 years of experience delivering civil infrastructure designs, contract administration, and project management services. Don is responsible for leading highway engineering, municipal engineering, water resources, and land development for capital projects, as well as project scheduling, cost control, and provision of engineering recommendations, technical reports, tenders, and construction documents. Don oversees engineering services for federal, provincial, municipal, and commercial/institutional clients, as well as for First Nations throughout Northwestern Ontario. Don has developed extensive knowledge in various areas of civil infrastructure, such as highway design, hydrology and hydraulics for roads and highway, stormwater management, site grading and services, environmental control and mitigation, and construction methods. Don has a wide range of computer skills and an abundance of experience operating programs such as Civil 3D, HY-8, HEC-RAS, PCSWMM, HEC-HMS, HEC-SSP, QGIS, Contract Preparation System (CPS), and Highway Costing System (HiCo).

Municipal Engineering Services Provided

TBTE provides complete civil engineering services for water & sewer, septic fields, site plan control agreements, site drainage approvals, surveying & topographical data, parking lots, road improvements, new road construction and highway maintenance systems. We manage all aspects of civil engineering projects, including consulting, researching and planning, designing, and construction. We can provide feasibility studies to outline project scope, summarize possible alternatives, assumptions, any environmental and social considerations, economic justification, as well as interim and final reports.

A summary of TBTE's most frequently requested Municipal Engineering services includes:

Municipal Engineering Services

- ▶ Site Grading & Drainage Design
- ▶ Site Servicing Designs – Water (Domestic & Fire), Sanitary, Storm
- ▶ Large Subsurface Sewage Disposal Systems & Septic System Design
- ▶ Stormwater Management & Modelling
- ▶ Rural and Urban Road Design
- ▶ Drainage & Flood Plain Studies
- ▶ Feasibility Studies
- ▶ Preliminary Design
- ▶ Detailed Design
- ▶ Contract Administration

Notable Projects

Lakehead Public School Board – École Elsie Macgill Public School

TBTE provided engineering services including mechanical, electrical, structural, civil, environmental, geotechnical, and legal survey services for the construction of a new 8,400 m²

elementary school building. The project involved a full scope of services from conception to 100% design documents, tendering phase, and contract administration. The contract administration phase included implementation of robust quality assurance field and material testing program to verify results of quality control testing and ensure material properties and workmanship met contract requirements.



Municipal engineering services included stormwater management, site grading, services, pavement engineering and contract administration. The grading design was completed using Civil 3D to minimize earthworks volumes while achieving AODA compliant grades and positive drainage for stormwater runoff. The drainage design included an on-site network of catch basins and storm sewers including a new outfall to the Neebing River. TBTE completed the public consultation, environmental assessment and ECA permitting in support of the new storm sewer outfall. Stormwater quantity and quality objectives were achieved for the 5.4 hectare site using low impact development techniques including bioretention cells and infiltration trenches. The stormwater modeling was completed using PCSWMM to optimize the configuration and size of stormwater infrastructure.

Biigtigong Nishnaabeg First Nation – Community Road Improvements & New Multi-Use Trail

TBTE provided engineering services including civil, geotechnical and topographic survey for the design of road improvements and a new multi-use trail throughout the community. Road improvements included resurfacing of major community roads with additional excavations and improvements where road distortions were observed. The new multi-use trail was required to improve pedestrian safety, promote active lifestyle and provide an alternative transportation option. The project scope included a preliminary design, community consultation, development of 100% design documents, tendering phase and contract administration.



Municipal engineering services included grading design for roadway reconstruction and widening, pavement engineering, drainage design, traffic staging, roadside safety and contract administration. A preliminary design and community consultation was carried out to evaluate trail location alternatives and address community questions. Consultation with utility owners was carried out to address conflicts and facilitate required utility relocations. Deliverables included construction drawings including new construction plans, details, sections, and construction specifications. A 3D model was developed in Civil 3D for assessing multi-use trial alternatives, producing detailed cross sections and calculating quantity

take-offs. TBTE completed the contract administration, review of QC material and field testing, and conformance inspections.

Netmizaaggamig Nishnaabeg – Subdivision Development

TBTE provided engineering services including civil, electrical, environmental, geotechnical and surveys for the new subdivision development in Netmizaaggamig Nishnaabeg First Nation (NNFN). The scope of work included engineering support for the capital planning study and preliminary design, detail design, tender management, and contract administration for the subdivision development.

Civil engineering services included subdivision planning, roadway design, drainage & hydrology, and contract administration. TBTE also completed NNFN's capital planning study to guide future developments within the community. The subdivision layout was developed to maximize the number of lots while meeting the requirements of the D-5-4 Technical Guideline for Individual On-Site Sewage Systems: Water Quality Impact Risk Assessment. The development required a new 1,100m road to access part of the new subdivision. The road was designed in accordance with TAC Geometric Design Guide for Canadian Roads and was completed using Civil 3D to optimize cut and fill volumes. TBTE consulted with the Ministry of Natural Resources and Forestry (MNR) to obtain work and land use permits required to complete the work. Hydro One Subdivision and Field Business Centre groups were consulted to facilitate the relocation of existing overhead utilities as well as to service the new development. TBTE performed full tender management which included the creation of lead documents, specifications, operational constraints and provided oversight to address bid inquiries during tendering.

Contract Administration

Manager of Contract Administration: John Nuorala, A.Sc.T., rcca

John Nuorala has been working with TBTE since 1998 and was a Contract Administrator with TBTE since 2007. Since 2015 John has been TBT Engineering's Project Manager of Construction Administration.

As the Project Manager on all MTO Construction Administration projects as well as construction projects for municipalities, mining and Parks Canada, John has been the principle point of contact with the Ministry of Transportation, external agencies and the public at large; effectively managing internal and external team members on numerous projects to ensure successful completion of the work.

TBTE Contract Administration Services

TBTE provides construction management services throughout Northwestern Ontario in provincial, municipal, First Nations, mining and other private sectors. Our services include complete project management and contract administration services, design and planning, scheduling, verification of plan quantities for payment purposes, verification of bid item quantities for payment purposes, survey work to determine accurate quantities for payment purposes, cost estimation services, change order preparation, quality control, quality assurance, liaison between stakeholders and contractors, dispute resolution and community relations.

TBTE is a RAQS certified construction administration (low, medium, and high complexity) firm. A summary of TBTE's Contract Administration services includes:

Contract Administration Services

- ▶ **Project Management and Contract Administration**
 - Manage and Administer the terms of Construction Contracts on behalf of the Owner
- ▶ **Construction Inspection**
 - Routine Inspections, Documentation, Reporting of all Contractor activities
- ▶ **Construction Documentation**
 - Front line interpretation of Contract Drawings, Specifications and Standards
- ▶ **Construction Quantity Verification and Cost Estimation and Control**
 - Quantity verifications and surveys to track project progress and control costs.
 - Expenditure Forecasting for budgeting purposes
- ▶ **Construction Dispute Resolution**
 - Proceed in good faith to resolve disputes at field level prior to elevating dispute to alternative levels
- ▶ **Construction Quality Verification – Workmanship**
 - Detailed inspections of the quality of workmanship and installations, verifying that they comply to standards and specifications of the Contract
- ▶ **Construction Quality Verification – Material Testing**
 - Field testing and materials sampling of soils, asphalt, concrete, coatings, etc to ensure that the Construction materials comply with the requirements

A summary of TBTE's past Contract Administration projects include:

Contract Administration Projects

- ▶ **CA services on over 100 MTO Construction Contracts including:**
 - Grading,
 - Drainage,
 - Granular Base,
 - Hot Mix & Concrete Paving,
 - Electrical,
 - Airfield and
 - Structural projects
- ▶ **Argonaut Gold/Magino Project**
 - Plant Access Road
- ▶ **Greenstone Gold Mines**
 - Hwy 11/584 Realignment,
 - New Geraldton Patrol Yard,
 - Demolition of existing Patrol Yard
- ▶ **New Gold**
 - Hwy 600 Realignment
- ▶ **Mitaanjigamiing First Nation**
 - Community Access Road
- ▶ **Ontario Power Generation – Whitedog and Caribou Generating Stations**
 - Whitedog and Caribou Generating Stations

Notable Projects

Transportation

Hodder Ave Overpass, Hwy 11/17 Four Laning, Thunder Bay, ON

The project included four-laning of Highway 11/17 from west of Hodder Avenue / Copenhagen Road to east of Highway 527, including construction of a new grade-separated Parclo A3 interchange at Hodder Avenue / Copenhagen Road, realignment of the Terry Fox Scenic Lookout Access Road with an at-grade intersection and a new at-grade intersection at Highway 527/Spruce River. All highway cross-culverts were replaced or removed. The interchange at Hodder Avenue/Copenhagen Road and the intersections with the Terry Fox Scenic Lookout and Highway 527/Spruce River Road received new partial illumination.



Infrastructure

Commercial Vehicle Inspection Facility (CVIF), Hwy 11/17, Thunder Bay, ON



The project included construction of a new Commercial Vehicle Inspection Facility (CVIF) based on a province-wide strategy to support improved commercial driver and vehicle safety.

The CVIF also included a building for MTO staff and a new truck lay-by facility on the south side of Highway 11/17, opposite from the CVIF. A new utility service corridor to provide 3-phase electrical power and telecommunication services from Lakeshore Drive north to the new CVIF was constructed.

Mining Developments

Greenstone Gold Mine Hwy 11 Realignment, Geraldton, ON

The project involved the realignment of a new section of Highway 11 2.2 km west of the existing intersection at Michael Powers Boulevard extending easterly for 4.7 km around the Greenstone Gold Mine Project. The new alignment included construction over approximately 1.2 km of existing mine tailings, new at grade intersection and illumination for Michael Power Boulevard, turn Lanes and illumination for the Mine and new patrol yard entrance and a new truck layby.



Indigenous Communities

Community Access Road, Mitaanjigamiing First Nation, ON



The project included road improvements to the Mitaanjigamiing First Nation community access road on a 22 km section of the road extending Easterly from Township of Miscampbell and Gresinger Township border to the Gresinger Township and Mitaanjigamiing First Nation Boundary. The work completed consisted of 12 horizontal revision areas that tie into the existing alignment with a new granular driving surface. The revisions reduced gradient, improved the horizontal alignment, improved sight distances and the overall safety of the road

Legal Surveys

Manager of Legal Surveys: Peter de Haan, OLS

Peter oversees the co-ordination of all office and field activities. Peter engages in discussions with clients, prepares proposals, project reports, and plans of survey, and ensures the timely deliverable of the returns of survey. Peter is vastly knowledgeable in various areas of surveying, including civil, cadastral, topographic, mining, and highway surveys. Peter is involved in all aspects of the land development process, from the preliminary consultation with clients to the deposition of reference plans, or the registration of subdivision and condominium plans.

TBTE Legal Surveys Services

TBTE provides survey services for projects of various size and complexity. We survey property boundaries and prepare plans to aid in land development, land use changes, and transfers of ownership. We work closely with private owners, land developers, planners, public agencies, and businesses to assist in land development projects.

A summary of TBTE's most relevant Legal Surveys services includes:

Legal Surveys Services

- ▶ Boundary Retracement to locate property limits
- ▶ Surveyor's Real Property Reports to verify property limits and the location of structures on the property
- ▶ Reference Plans for land severances, easement creations, property additions, etc.
- ▶ Crown Lands Plans for crown land dispositions, license of occupations, etc.
- ▶ Subdivision Plans
- ▶ Condominium Plans
- ▶ Highway Plans
- ▶ Mining Claim Plans

Notable Projects

Wataynikaneyap, Northwestern Ontario, 2020-present – Valard

TBTE is surveying more than 1600 km of a utility corridor for power transmission lines that will service 17 remote communities. We are preparing Crown Land Reference Plans for the establishment of an easement/license of occupation across remote Northern Ontario. This involved setting survey monuments every 300 metres at minimum for over 1600 km, boundary retracements on patented land, thorough title and record searches, and intense project planning for the scale and vastness of this project.



EWT, Northwestern Ontario, 2018-2021 – Nextbridge

TBTE surveyed a 450 km corridor survey of a power transmission line from Wawa to Thunder Bay. Crown Land Reference Plans were prepared for the creation of easements/license of occupation. This involved boundary retracement/re-establishment, accessing and monumenting very rugged areas and project management.



CLM 569, Pick Lake, 2021 – Metallum Resources

TBTE surveyed a group of 25 claims in the area north of Schrieber, Ontario. This project involved the retracement of existing surveyed claims, monumenting claim limits, and accessing very rugged terrain bodies of water.

Engineering Surveys

TBTE Engineering Surveys Services

TBTE provides engineering survey services throughout Northwestern Ontario in provincial, municipal, First Nations, mining and other private sectors. Our services include all levels of engineering surveys including pipelines, hydro, roadways, mining, municipal infrastructure, construction surveys. TBTE uses the most up to date equipment and methods to provide high level surveys matched to the requirements of the client. TBTE is also able to provide specialized surveying using Remotely Piloted Aircraft Systems (RPAS) for large scale topographic and air photogrammetric surveys and bathymetric (water floor) surveys using RTK GPS controlled sonar instrumentation.

TBTE is a MTO RAQS certified engineering surveys firm.

A summary of TBTE's most relevant Engineering Surveys services includes:

Engineering Surveys Services

- ▶ Topographical Surveys and Mapping
- ▶ Volume Surveys (Aggregate Quantities)
- ▶ Digital Terrain Modeling
- ▶ Site Plans/Building Layout
- ▶ Municipal Design & Drainage Services
- ▶ Land Development Services
- ▶ Bathymetric Surveys
- ▶ Remote Surveys
- ▶ Remotely Piloted Aircraft Systems (RPAS/UAS (Drone)) Surveys
- ▶ GIS Mapping & Databases

Notable Projects

Airport Infrastructure Surveys

Thunder Bay International Airport, Thunder Bay, ON



TBTE provided engineering survey services for survey of existing conditions of the main runway 07-25 to assist with design of a new runway. Surveys were required to be conducted to high level (10mm +/- accuracy) and was completed with robotic total stations with full site control calibration. Above and below ground utilities, drainage, and attaching taxiways were also included. Approaches were also surveyed to verify heights of infrastructure along the approach paths to the

runway. Plans were developed using Civil3d and coordinated with the design group to include all field inspection data that was captured separately. Plans were used to develop the new runway design. Construction was completed in 2022.

Municipal Engineering Surveys (Roadway Infrastructure)

Municipality of Oliver Paipoonge, Paipoonge, ON



TBTE provided engineering and layout survey services for the reconstruction of a portion of Rosslyn Road in the town of Paipoonge, ON. TBTE worked closely with the Municipality to develop a survey plan to capture existing road infrastructure, drainage, adjacent properties and entrances and underground utilities to assist with road design for the planned future construction. Private property owners were contacted to allow for access on

properties. Both private and public infrastructure was also surveyed and detailed to assist with road design. Control for construction surveys was developed. Full road plans were prepared for use by the road design group.

Mining Construction Surveys and Remotely Piloted Aircraft Systems Surveys (RPAS)

Wesdome Eagle River Gold Mine, Wawa, ON



TBTE provided engineering and construction layout survey services for the expansion of dam infrastructure at the Wesdome Eagle River Gold Mine from 2020 to present. Survey responsibilities included construction layout, volumetrics, as-built, infrastructure surveys, and survey of existing conditions. TBTE worked closely with the engineering design group and contractors throughout the design and construction process.

Monthly construction volume verification (quality assurance) throughout the construction phases and final as-built plans were developed verifying construction to the design model.

TBTE introduced Remotely Piloted Aircraft System Surveys (RPAS) to the mine to verify existing and past construction of the entire dam and tailing site. The RPAS surveys were used to produce orthomosaic imagery and digital surface models. This data was used to verify earlier construction of dams and spillways and provide the mine with large scale, high accuracy surveys and imagery for future design work.