

Sustainable Winter Service in a P3 Contract in New Brunswick

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ABSTRACT

This paper provides an overview of the perspectives of the Owner and the Operator of the implementation of winter maintenance requirements for a Public Private Partnership agreement and outlines how these requirements are met by the Operator and confirmed by the Owner, the Province of New Brunswick.

The Trans-Canada Highway Project consists of 275 km of Route 2, a four-lane highway between Longs Creek, New Brunswick and the Québec border as well as Route 95 between Woodstock, New Brunswick and the U.S.A. Border. The Operations, Maintenance and Rehabilitation (OMR) Agreement [1] is a 25 year contract being carried out by Brun-Way Highway Operations Inc. (BHOI).

An overview of the OMR Agreement including the responsibilities of the Province and BHOI is provided. The winter maintenance standards will be outlined as will detail how the Operator's winter maintenance plan will meet these requirements. The quality management requirements including compliance monitoring will be explained to demonstrate how winter maintenance activities are to comply with the Project Agreements.

KEYWORDS

P3 / NEW BRUNSWICK / BRUN-WAY / WINTER STANDARDS / OMR

1. BACKGROUND

New Brunswick is considered to be the transportation hub of the Maritime Provinces connecting Atlantic Canada with the rest of North America. The Trans-Canada Highway (TCH), which is the main corridor through the province, connects a number of major cities in New Brunswick, the adjoining provinces of Québec, Prince Edward Island, Nova Scotia and Newfoundland and the eastern U.S.A.

In the 1980's, due to increased traffic on the TCH, the Province of New Brunswick began to develop plans to twin Route 2 between the Nova Scotia and Québec borders. Part of this upgrade began in the early 1990's with construction of sections of Route 2 between Moncton and Nova Scotia and from the Québec border south towards Grand Falls. These sections were designed and built by the New Brunswick Department of Transportation (NBDOT) using a traditional model whereby NBDOT administers the design process and

tenders the construction in numerous small contracts. The timelines required to construct the remaining sections of Route 2 the using a traditional model created the necessity for an accelerated model.

In 1996, the Provincial Government in cooperation with the private sector initiated an alternate service delivery model for the design, construction and finance of 195 kilometres of Route 2 between Fredericton and Moncton. To ensure quality on the part of the developer, the Province included as part of the project the operation, maintenance and rehabilitation of the new facility for a 30 year concession period. In October 2001, the Fredericton-Moncton (F-M) Highway opened to traffic and proved to be the first public private partnership (P3) highway model implemented in North America.

The success of the F-M Highway Project has led to the inception of the Trans-Canada Highway Project (TCHP) which incorporated a similar model for the completion of the TCH between the Quebec border and Fredericton. The operation, maintenance and rehabilitation (OMR) portion of the project is for 275 kilometres of Route 2 and Route 95 which includes a 25 year concession period.

The Trans-Canada Highway Project, with an overall project cost of \$1.05 billion dollars, would be one of the largest P3 initiatives in Canada and the largest P3 ever financed under a completion-financed approach. The financing cost of \$543.8 million for the design and construction of the Design-Build (DB) portion of the project and selective upgrades to the existing sections was only paid once the project was complete and available for traffic.

Once complete, the new sections and 130 kilometres of existing sections would be added to the OMR portion of the P3 initiative. The total project length is 275 kilometres of four-lane highway with an \$18.8 million annual fixed OMR cost, which is adjusted with inflation.

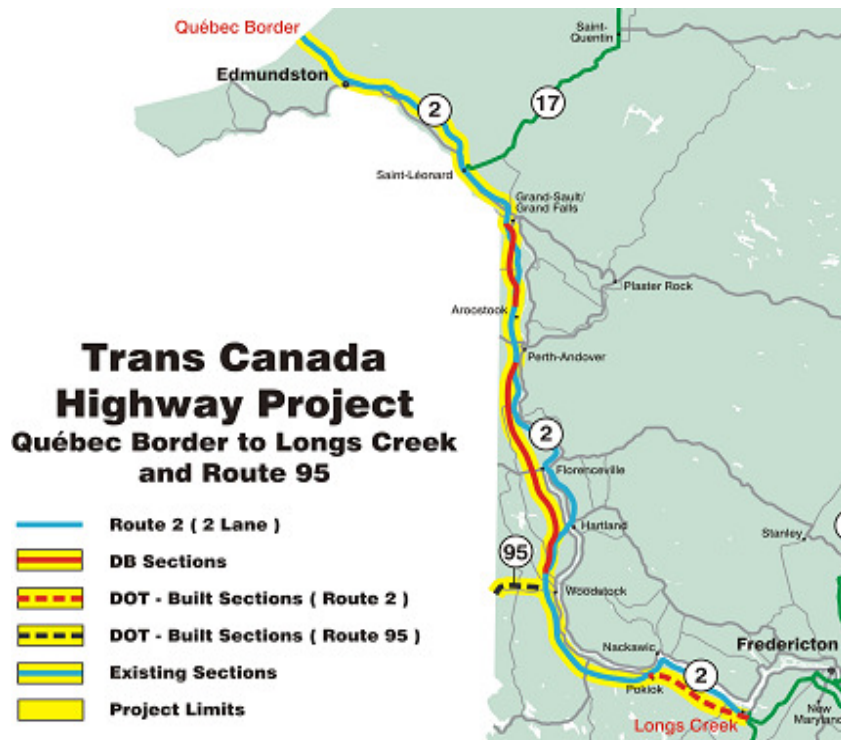


Figure 1 – TCHP

In February 2005, Brun-Way Group, a grouping consisting of SNC Lavalin Inc. and Atcon Construction, was awarded the TCHP. It created Brun-Way Construction Inc. to design, build and finance, under a fixed price contract, 98-kilometres of highway between Grand Falls and Woodstock, and carry out selected upgrades to the existing sections of the four-lane highway.

It also incorporated Brun-Way Highways Operations Inc. (BHOI) which would be responsible under a fixed price contract for the OMR of 275 kilometres of highway until 2033. The TCHP was fully opened to traffic in November 2007.

The chart in Figure 2 shows organizational structure of the TCHP.

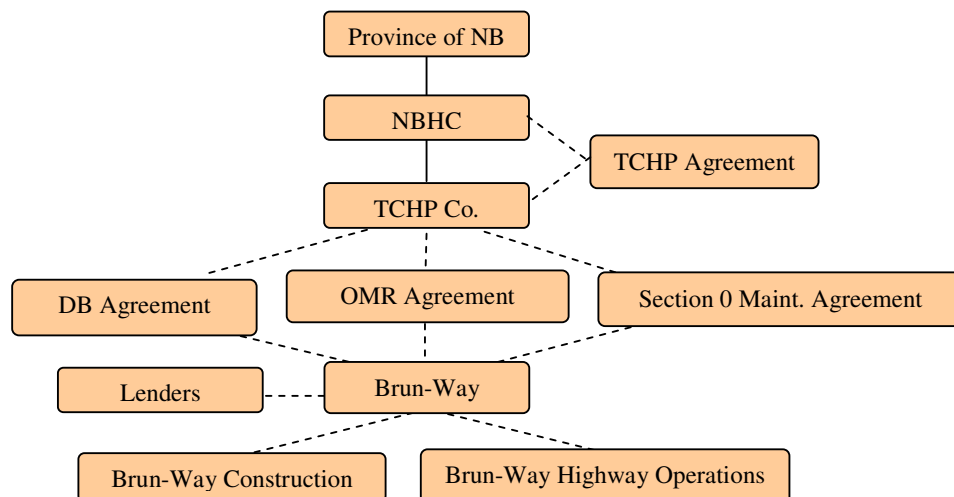


Figure 2 – Organization chart

2. PROJECT AGREEMENTS

The Project Agreements were developed to establish the Province’s requirements for the Brun-Way Group in carrying out the TCHP.

The OMR Agreement is the part of the Project Agreements that contains the winter maintenance requirements and identifies the rights and obligations of BHOI and TCHP Co. / NBHC.

Under the Project Agreements TCHP Co. / NBHC is defined as the Subsidiary while BHOI is defined as the Operator.

2.1. OMR Standards and Requirements

The OMR standards and requirements are performance based specifications that are measurable and auditable that defines the maximum condition allowed on the facility and the response time for which the Operator has to respond.

The OMR standards are organized in a manner that requirements are defined through a specification and an operation performance measures (OPM). The OPM defines a minimum tolerable condition (MTC) or the minimum level of service that shall be maintained and where the Operator must respond within a maximum response time (MRT) to address or remedy a particular condition that exceeds the MTC. An example of a detailed specification and OPM for snow plowing is noted in Table 2.1.

Table 1 – Detailed specification for plowing

Plowing	SPECIFICATION	Plowing shall commence prior to snow accumulations reaching twenty (20) mm on any travelled lanes including interchange ramps. The maximum allowable accumulation of snow on travelled lanes is forty (40) mm.
	OPM	MTC – Plowing commenced prior to snow accumulations of greater than twenty (20) mm.
		MRT – Ongoing.
		MTC – No snow accumulations greater than forty (40) mm.
		MRT – Ongoing.

2.2. Winter Standards

The winter standards ensure that an adequate level of service is provided by the Operator on the highway through out the winter season. Standards have been developed for the following areas:

Winter Control: This standard defines the required infrastructure that must be in place in order to carry out winter operations. It also requires the Operator to submit an annual winter operations plan detailing how they will meet the requirements of the OMR Standards. The Operator is also required to establish an operations center to deal with road condition reporting, deployment of equipment and public communications.

Snow Plowing: This standard ensures that snow plowing operations are deployed in a timely and systematic manner to remove ice and snow from the highway. The detailed specifications for this standard pertain to accumulation, response times, deployment of plows, plowing coverage, achieving bare pavement and contingency equipment in case of severe storms.

Sand and Salt Spreading: This standard ensures that sanding and salting operations are deployed in a timely and systematic manner to remove ice and snow from the highway. The detailed specifications for this standard pertains to the highway being kept opened and safe at all times, response times, deployment of spreader units, achieving bare pavement and addressing spills.

Snow Removal: This standard ensures that all snow and ice build up is removed from the shoulder area in front of rail, "New Jersey" barriers, bridge barriers and safety attenuators and that snow and ice build-up from ditches, catchbasins and culverts are addressed. The detailed specifications for this standard pertains to response times for snow removal, snow build up covering manholes and catch basins grates, blockages and ponding of water on the highway.

Snow Fence and Hedges: This standard ensures that provisions are put in place to ensure that the Operator monitors areas impacted by drifting snow and incorporates any required fence or hedges in to their winter operations plan.

Supply, Mixing and Stock Piling of Winter Sand and Salt: This standard ensures that the Operator has an adequate and proper supply of sand and salt through out the winter season. The detailed specification for this standard pertains to the submission of a plan, initial quantities and the specifications of the materials.

2.3. OMR Plans

During the proposal stage, BHOI was provided with a copy of the Project Agreements. As part of the submission requirements, a winter plan was developed to meet the specific requirements of the OMR Agreement. Details such as equipment, facility locations, staffing, condition monitoring, snow and ice control and organization structure were all described.

The winter plan now forms part of the OMR Agreement which ensures that BHOI carries out its activities in accordance with all submitted plans. In cases where adjustments are required, BHOI is allowed to modify the plans with the approval of the Subsidiary.

2.4. Quality Management

To ensure that the standards including the winter maintenance standards are consistently adhered to throughout the OMR period, a number of quality management requirements were made part of the OMR Agreement.

From the on set of the project, the Operator is required to implement and maintain an ISO 9001 certified Quality Management System (QMS) through to the end of the OMR period in 2033.

The QMS is to ensure that the OMR standards and requirements are consistently met throughout the duration of the project. The QMS is to document all critical activities

undertaken by the Operator for which they are required to apply in accordance with the QMS.

The requirements of the QMS which ensures that all standards and requirements are met include:

Management Responsibility: A quality manager position is required to manage the QMS. The role of the quality manager is to develop, implement and maintain the QMS in accordance with ISO certified system requirements.

QMS Documentation: The QMS is required to include documentation clearly outlining processes regarding the QMS policies, system, project plans, project procedures and records.

Management of subcontractors: A documented process is required to ensure that all activities, services and/or supplies provided by Subcontractors are acceptable and in accordance with the requirements of the OMR agreement.

Compliance Monitoring: A documented compliance monitoring processes is required to track compliance with the OMR Agreement. At a minimum, compliance monitoring reporting is to occur on a monthly basis.

Internal Audits: A documented internal auditing process is required to confirm activities carried out by the Operator are performed in compliance with the processes documented in the QMS and to identify all necessary corrective/preventive actions.

Continual Improvement: The Operator is to initiate measures to continually improve the QMS and the delivery of the OMR work. This process is required to accurately record details of nonconformity identification and implementation of corrective and/or preventive action.

QMS Reporting, Meetings and Review: In order to ensure that all of the QMS requirements are being followed a number of weekly and monthly reports are to be submitted to the Subsidiary as part of the QMS plan. In addition, a number of meetings with the Subsidiary and internal reviews are required to ensure compliance and continual improvement.

2.5. Compliance Monitoring

The final part of the auditing process defined in the OMR agreement is the Subsidiary's audit protocol which outlines the general audit program it follows during the OMR period.

The types of audits carried out by the Subsidiary are as follows:

Scheduled Site Audits: These audits are carried out on a regular and continuing basis for the duration of the OMR Period. During these audits the Subsidiary reviews the performance of the Operator in carrying out the OMR work.

Scheduled Management System Audits: These audits are carried out to determine whether the activities and records associated with the OMR work are in accordance with the all management systems including the QMS.

Site Visits: Where the Subsidiary's auditors observe an activity or project output that is believed not to be in accordance with OMR Agreement, the details are recorded.

Follow-up Audits: The Subsidiary may, at its discretion, undertake follow-up audits where it believes there is a need to do so to ensure all necessary corrective and preventive action is undertaken.

2.6. Non-Conformance Management

Where an audit reveals that the Operator's activities do not meet the applicable OMR standard or requirement, the Subsidiary can issue a Non-Conformance Notice (NCN). Where the number of active NCNs issued by the Subsidiary reaches fifteen or more, the Operator is subject to a \$10,000 per day payment adjustment for each day that this number remains at or over fifteen.

The Subsidiary can also issue observation notices when it is established that a breach in the OMR standards or requirements has not yet occurred; but, it is expected to soon occur. Observation notices that are not addressed usually result in an NCN being issued. Observation notices are not counted when monitoring the Operator's non-conformance performance.

3. BHOI'S COMMITMENT TO THE TCHP

BHOI is committed to providing winter maintenance service in accordance with the OMR Standards. The level of service delivered to the road users is described in the OMR Agreement. Within the framework of the integrated management system (IMS) and focusing on a desire for continuous improvement BHOI upholds the following commitments to sustain the level of service:

- Maintain a safe, passable facility of highway users.
- Meet or exceed the required level of service at all times throughout the winter season.
- Reduce hazards to the traveling public from icy and snow-covered road conditions.
- Reduce economic losses to the community, industry & commerce.
- Aid emergency response officials in the handling of emergencies.
- Minimize accident & liability risk to the user, Subsidiary and the Operator.
- Ensure adherence to the Level of Service requirements with the procedures defined in the BHOI Quality System.
- Be responsive to changing weather conditions and road conditions through the Road Weather Information System, highway photos and the Pelmorex hourly forecasts (internal).
- Provide public access to winter road conditions.

4. STRATEGIC PLANNING AND ORGANIZATION

BHOI's response to winter storms is driven by the directives of the OMR Agreement. BHOI uses the framework of an integrated quality, safety and environmental management system to outline the manner in which the highway is operated and maintained during winter operations.

4.1. Operations Control Centre (OCC)

BHOI uses the latest weather forecasting technology (road weather information system (RWIS)) to provide the information needed to make sound winter response decisions.

In order to meet the obligations for winter storm response BHOI operates a 24 hour – 365 day a year OCC. Operations Control Centre Representatives (OCCR) monitor the road weather information stations and receive reports from the patrollers on the highway. The OCC provides the winter operations staff with up-to-the-minute weather and road information.

4.2. District Fleet and Yards

BHOI operates three maintenance depots (District Yards) along the TCH at Meductic, Centreville, and Saint-Léonard. Each of the three maintenance district covers approximately 80 km of four-lane controlled access highway. Each District yard contains a four bay garage, a salt dome, and a sign shed as well as offices for the supervisory personnel. There are two sub-yards with salt domes situated along the facility at Perth Andover and Saint-Basile. Each district yard is equipped with a brine generating station. All maintenance facilities were designed and constructed to minimize & collect salt water runoff. BHOI utilizes the best management practices outlined in the TAC Syntheses of Best Practices Road Salt Management [4] and the BHOI Salt Management Plan to effectively minimize the impact of anti-icing chemicals on the surrounding environment.



Figure 3 –Meductic maintenance depot

BHOI maintains a fleet of twenty three spreader plow combination trucks, ten tow plows, four anti-icing distributors, three ton trucks with reversible plows, three tractor-mounted snow blowers, and five front end loaders. BHOI sub-contracts three spare plows and three graders from local contractors.

The OMR Standard requires plowing to commence prior to 2 cm of accumulation on the travelled lanes. The maximum allowable accumulation is 4 cm.

Normal mainline plowing operations are divided into seven plow routes with fourteen trucks, seven equipped with tow plows. Cycle times on average of 2 hours. In order to meet the requirements for removal of accumulation in the Agreement, when accumulation is forecast to exceed 4 cm per hour enhanced mainline plowing operations is provided by 10 plow routes with 17 trucks and 10 tow plows.

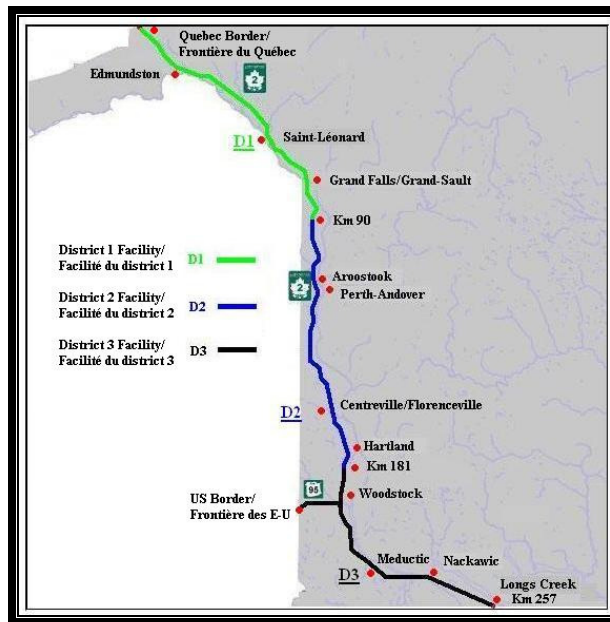


Figure 4 – Map of three districts

The full complement of equipment and personnel must be trained and ready for winter response by October 15. The core winter staffing complement for the three highway districts are comprised of the following: three area managers, three operations technicians, two mechanics, twelve road patrollers and 49 maintenance operators.

Road Patrollers are constantly on the road monitoring the highway and are in communication with the OCC through all the stages of each winter storm event. The OMR Agreement states that entire facility must be inspected twice daily (night, day). However, the highway is patrolled with much greater frequency. When weather conditions change the patroller must relate this knowledge to the OCC. The road patroller has the authority to immediately implement the winter response operations.

The fleet is made ready as soon as accumulation is forecast. Operators are available 24 hours a day with a maximum response time of one hour to reach their respective District Yard and be out on the highway to remove accumulation.

4.3. Contractor Support

BHOI uses local contractors for services where we have an intermittent requirement for the use of equipment, e.g. graders.

BHOI contracts spare plows for the occasions when BHOI equipment is unavailable. These contracted spare plows become a component of the echelon train. By becoming a component of the echelon train, and following the lead of BHOI operators a measure of consistency is achieved. The contractors used by BHOI participate in winter operations training with BHOI Operators each fall.

One of the requirements of the contract is a one hour response time, thus ensuring BHOI may meet the level of service requirements of the OMR Agreement. When the storm event is anticipated to be especially severe, the contractor parks his vehicle in the BHOI yard this allows BHOI operators to use the vehicle if the contractor cannot travel to the facility.

5. RELATIONSHIPS BETWEEN ALL PARTIES

Communications is the key. Communication between all the stakeholders ensures the success of this private public partnership venture.

The success of BHOI in maintaining the facility for safe operations has a direct impact on public safety. It is important that BHOI maintains a safe and secure facility under adverse weather conditions. It is also important that BHOI has developed a system to respond to public concerns and complaints. Maintaining the four-lane TCH exposes BHOI to a high level of public scrutiny and so it is important that BHOI is proactive in seeking ways to assist the public in a safe journey.

During the winter season, the OCC provides three daily road condition reports to the Provincial Mobile Communications Centre. Additional reports may be provided should road conditions change. These reports are communicated to the public through the NBDOT website.

BHOI maintains a website and a toll-free number for public inquiries. All calls are answered by the OCCR. A call log is maintained by the BHOI Communications Manager.

The Communications Manager responds to all media calls. The Communications Manager additionally coordinates media campaigns to provide awareness to the general public of highway safety issues. For example, lane closures for rehabilitation work, facility closure/detours for emergencies on the facility. BHOI is involved with two government-partnered safety campaigns to reduce the potential for road user and highway worker injury (“Snow means Slow” Winter Campaign) and highway worker safety (Work Zone Safety Campaign).

6. COST-BENEFIT: ACHIEVING THE OPTIMUM BALANCE

The contract between BHOI and the Province of New Brunswick is fixed price for the services provided in the OMR Agreement. In order to maintain or increase profits BHOI has to be innovative in delivering services. This is accomplished by becoming increasingly more innovative, effective and efficient. Some of the new and innovative ways in which BHOI has improved services include the tow plow, Investigation of New Compounds for Anti-icing, Flexible Plow Wing.

7. RISK AND CONTINGENCY PLANNING

Risk is an inherent part of winter road maintenance, making decision on how to manage that risk and deliver the required level of service on the facility is a challenge faced by winter operators worldwide.

The method to achieve best success with the risks posed by winter maintenance is to be thoroughly organized and prepared to meet the challenges. BHOI has a registered safety management system following the format of ISO 18000, a proven comprehensive safety management framework. BHOI is externally audited annually by the New Brunswick Construction Safety Association.

8. QUALITY AND PERFORMANCE MANAGEMENT

Level of Service requirements are incorporated by the Integrated Management System in the systems and procedures that have been developed throughout the years of BHOI operation. When there is maintenance work to perform on the highway a work order is opened by calling the OCC. When the work is complete the operator contacts the OCC and the work order is subsequently closed.

All work orders are assigned a category number, for example OMR 603 is salt and sand spreading, OMR 705 is ground mounted signs. The maximum response time to complete the work for each category is set by the OMR Agreement. The BHOI work order software system (PeopleSoft) monitors the time taken from the opening of a work order until successful completion of the task. A report is prepared each business day by the OCC listing all of the open work orders for each district. Items that are approaching the deadline for completion are highlighted according to the proximity to the deadline date.

The ability to meet regulatory requirements is built into the IMS. A complete regulatory review was prepared prior to inception of the IMS manual. This review was prepared by experts in the various regulatory arenas that impact BHOI. Furthermore a system has been established to monitor regulatory changes provincially and federally allowing BHOI to be responsive to regulatory change and quickly incorporate these changes into the management system.

Internal and external audits ensure the system is functioning. There are three levels of auditing performed by BHOI to ensure the commitments to the IMS are met.

8.1. External Audits

Annually ISO 9001/14001 and safety audits are performed by our registrars. BHOI has maintained a great level of success with these processes receives no minor or major non-conformances in the three years of registration.

8.2. Internal Audits

Comprehensive internal audits are performed by SNC Lavalin ProFac head office personnel twice annually.

8.3. Compliance Monitoring

In order to monitor compliance with the OMR Agreement internally BHOI performs compliance road audits monthly by two means:

Each month a compliance audit is performed by the quality manager for each record of work performed by BHOI. Each work order is analyzed to ensure that the work has been completed in a means satisfactory to meeting the operational performance measures of the OMR Agreement.

Compliance Audits are performed by head office personnel on the facility, spot checking various highway maintenance aspects such as snow plowing, salt and sand spreading, snow removal and lighting.

Each year a management review is performed where the records of the IMS are reviewed by senior managers at BHOI. This report card of company statistics regarding corrective actions, continuous improvements, safety achievements and incidents provides an excellent overview for senior managers when analyzing the direction of company progress.

9. CONCLUSION

As with the F-M Highway Project, the TCHP has been proven to be another successful venture between the Provincial Government and the private sector. Once gain, the use of an alternative service delivery mechanism is a proving to be a feasible approach to delivering highway maintenance. Key elements of a successful OMR Agreement require that performance standards are clear and measurable in addition to a high priority being placed on quality management.

BHOI as the operator is positioned to bring new ideas to deliver highway winter maintenance and can quickly mobilize resources to implement new initiatives such as tow plows. With BHOI's commitment to the TCHP, meeting or exceeding the required level of service is the reflected in all aspects of the organization's planning and service delivery.

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