TRAVIS Multi-Jurisdiction Oversize Vehicle Permitting System

Imants Krumins, M.Sc., P.Eng.
Transport Engineer, Alberta Transportation

Kerry Leslie, B.A.
TRAVIS Specialist, Alberta Transportation

Abstract

In Alberta, oversize vehicles require both provincial and municipal approvals, so carriers often require multiple transactions for each move. The TRAVIS (Transportation Routing and Vehicle Information System) Multi-Jurisdiction (MJ) permitting system was developed by Alberta Transportation to support industry's need for a simplified permitting process. TRAVIS provides a single point of contact for applicants, with multi-point approvals.

The MJ permitting process begins with a client submitting an application using TRAVIS Web. The application includes carrier information, dates, vehicle data and requested route. TRAVIS can generate an optimal route if required. TRAVIS contains bridge capacities, dimensional, road ban and construction restriction data, and applies the restrictions as required.

TRAVIS runs the application data through the business rule module and decides if it can be auto-approved or requires manual review. TRAVIS Proper is used for provincial reviews. Once provincial approval is granted, municipal business rules are applied to decide on automatic or manual review. If municipal review is required, municipalities review the application in MJ, adding conditions as required and approving or rejecting the application.

TRAVIS produces a single permit document, including all approvals and conditions, saving industry and enforcement the effort of managing multiple documents.

TRAVIS processed over 158,000 permits in 2010.

Future enhancements include further web-based tools and expansion to include utilities, railroads and resource companies in the permitting process.

Alberta is interested in partnering with interested governments to promote and expand the use of TRAVIS. TRAVIS or compatible permitting systems could facilitate expanding the multi-jurisdiction concept to inter-provincial travel.

Background

Many sectors of the Alberta economy depend on the movement of oversize and overweight vehicles, including oil and gas, forestry, mining and construction. Alberta Transportation monitors, controls and issues permits for the movement of all commercial vehicles, including oversize and overweight vehicles. Alberta Transportation establishes maximum vehicle weight and dimension limits for any vehicle using public roads and makes provisions for the movement of oversize and overweight loads by issuing oversize and overweight permits. The business drivers are:

- To ensure the safety of the traveling public;
- To minimize inconvenience to the traveling public;
- To minimize damage to the roadway infrastructure;
- To facilitate the movement of commodities which are non-divisible, deemed impractical to divide, or uneconomical to transport at legal dimensions;
- To establish and communicate to the carrier a set of conditions for the safe movement of the load;
- To prevent damage to the carrier's vehicles and load.

In Alberta, both rural and urban municipalities have control over the roads in their jurisdiction. Therefore, the movement of permitted loads on municipal roads requires permission from both the Province and the municipality. Until the introduction of TRAVIS Multi-Jurisdiction, the provincial and municipal processes were completely independent.

Oversize Permitting in Alberta – Evolution of Processes and Technology

As in most jurisdictions, manual processes with paper records were initially used for issuing oversize vehicle permits for the Province of Alberta.

In 1988, a permits module was added to the MOVES vehicle registration mainframe system and the process was semi-automated. Truckers were required to phone in to the Central Permit Office or a weigh scale, where trained clerks or enforcement officers entered the required data into MOVES. Most complex permit applications were manually reviewed and approved by the permits supervisor. Permit documents were created by manually adding the required permit conditions on the system and then the permits were printed and mailed to the clients.

In 2001, the first iteration of TRAVIS (Transportation Routing and Vehicle Information System) was developed and implemented into production. TRAVIS replaced the functionality of the MOVES mainframe permits module with a server-based Oracle-forms system. New functions included a business rules engine that could automatically add permit conditions and evaluate approval levels, pdf permit documents that could be sent via email or electronic fax, as well as numerous improvements to vehicle classification and weight allowance calculations. Routes were still manually reviewed.

In 2002, TRAVIS Web was introduced. The web interface allowed clients to apply for permits online, with manual review continuing to be done by the permit office. Use of the Web interface was optional, and the Central Permit Office (CPO) still did the majority of the data entry. A $5 discount was applied to web permits as an incentive to use the on-line service.

In 2003, the functionality for automatic approval of permits was developed. System route checking was very primitive, using a list of provincial highway intersections to ensure that the requested routes were feasible.

The volume of phone calls was overwhelming the resources of the CPO, leading to unreasonably long wait times for clients requiring a permit. In July of 2006, the decision was taken to cease taking phone applications and require that all permit applications be submitted via TRAVIS Web, except for a few types that were not web-enabled.

Moving to an all-web business model meant that the system reliability and availability needed to be upgraded to assure client that they would be able to access TRAVIS as required. To achieve this, a duplicate (fail-over) system was constructed and housed in a separate facility. The fail-over system seamlessly takes over operations in the event of primary system failure and has contributed importantly to the availability of TRAVIS.

A more sophisticated router was introduced in 2007, based on Intergraph technology, with WebMap as the mapping web interface. While it was a major technological improvement, performance issues caused it to be poorly received by industry.

In 2008/09, a new custom routing module was written and implemented to address the performance issues. At the same time, an innovative mapping solution using the Google Maps API and Alberta Transportation road network was developed. This greatly improved the performance and user interface of the system and enabled the development of the current system – TRAVIS Multi-Jurisdiction.

The Business Case for Multi-Jurisdiction Permitting

As noted earlier, carriers wishing to move an oversize or overweight vehicle must obtain a provincial permit and then contact all affected municipalities to get their approval to move. This process can be time consuming and inefficient, as the same information must be provided multiple times and many municipalities are not open for business evenings and weekends.

In 2000, a joint provincial, municipal and industry committee met and recommended that the province create a system to provide a "one-window" permitting solution. The vision outstripped the technology and the available budget at the time. However, the stated goals remained in place and were taken into consideration as TRAVIS was developed and improved.

In 2008, development of TRAVIS Multi-Jurisdiction (MJ) was commenced. The high level requirements were for a system that could:

1. provide a "one-window" permitting system for all road authorities,
2. route vehicles on the full Alberta road network, considering all bridge and roadway capacities,
3. manage multiple business rule sets,
4. feature web-enabled rule and network data maintenance tools,
5. apportion permit fees on a pro-rated basis,
6. have 365/7/24 availability.

System Development

TRAVIS has been developed under the iterative (or agile) methodology. The fundamental concept was to deliver business benefits as quickly as possible, in an environment where business needs and technology were both evolving at a fast pace.

The concept was to have a small, highly motivated team of developers working in close contact with the business manager and key staff. This helped to ensure that developers understood the business and that the business understood the system from the beginning. Enhancements were developed, tested and put into production as quickly as possible.

TRAVIS Web

TRAVIS Web has been in production since 2002 and the core code has not changed significantly since then. The main new features were the introduction of the WebMap module in 2007 and then the Google-based mapping solution in 2009.

Since TRAVIS Web went into production, over 750,000 permits have been issued on the system, with over 300,000 auto-approvals (about 40%). Over 158,000 were issued in 2010 and 2011 figures are tracking for a 15% increase as economic activity increases in Alberta.

Figures 1-5 show samples of the route creation screens of TRAVIS Web.

TRAVIS MJ

The TRAVIS MJ module was written from scratch to provide a web-based approval and data maintenance tool for the province and municipalities. It interfaces with the other modules of TRAVIS to proved seamless data exchange.

Once a municipality is registered to use TRAVIS MJ, they have access to a web-based permits monitor that shows any applications that require manual review. Figure 6 shows a sample of the application monitor, with three applications awaiting municipal review.

Clicking on an application link in the monitor brings up the permit application approval screen, which shows all of the required information on the applicant, commodity, vehicle and route. See Figures 7-10 for an example of the approval screen. Note that the figures depict a single, scrollable screen. The map in Figure 9 is dynamic, so approvers can pan and zoom as required.

The key component that makes TRAVIS MJ unique is the ability to manage multiple business rule sets. Each participating municipality can customize the approval and permit condition rules for any requested move. The business rules module is both powerful and flexible; ensuring that current or desired permit processes can be enforced within TRAVIS.

For example, any desired combination of permit type, vehicle dimensions, commodity, client groups or road segment collections can be used to trigger specific permit conditions, alerts, approval levels or notifications (via email). Figure 11 shows one of the business (policy) rule data entry screens from TRAVIS MJ.

A key feature of TRAVIS MJ is a browser based road network maintenance tool that is used to create road segment groups, place road bans or construction restrictions, set seasons for axle weight purposes or to define truck routes. Figure 12 shows a sample screen depicting a typical construction restriction.

TRAVIS evaluates each permit application against the relevant business rules and road restrictions and then performs the assigned tasks to ensure that all approvals are done according to the requirements of the road authority.

Automatic approval is the default action for all applications, unless a rule is in place to require manual review.

Benefits of a Multi-Jurisdiction Permitting System

The use of a multi-jurisdiction permitting system such as TRAVIS can provide significant benefits to all users.

Industry benefits by having access to a one-window permits system:
- Eliminates duplication of effort (an industry survey returned an estimated savings of 30 minutes per permit – with a value of $3 million annually),
- Provides a single document with all required approvals and conditions,
- Faster approvals due to auto-approval capability,
- 7/24 access for all road authorities.

Municipalities benefit through:
- Having access to a sophisticated permit system at no direct cost,
- Automated referral of all permit applications (a high percentage of moves do not currently seek or receive municipal approval),
- Customized reporting of trucking activities on local roads,

- Reduced manpower requirements for permit reviews, using automated processes for simple moves.

Enforcement agencies benefit by:
- A single permit document, with all approvals and permit conditions clearly marked.
- Access to the permit database for customized searches,
- Advance electronic notification of moves (easily set up in the policy rules forms).

The Province benefits from:
- Improved industrial efficiency,
- Improved infrastructure protection,
- Improved enforcement efficiency,
- Improved inter-agency cooperation.

Pilot Project

In order to test the ability of TRAVIS MJ to operate in a real-world scenario, an extended pilot/proof of concept project was commenced in June of 2009. The City of Grande Prairie, County of Grande Prairie, Saddle Hills County and the MD of Spirit River volunteered to participate in testing TRAVIS MJ. Three towns; Beaverlodge, Wembley and Spirit River, joined the pilot in December of 2009.

Routing for the pilot project was limited to the provincial road network and the municipal networks of the participating municipalities.

The pilot project showed that the technology of TRAVIS MJ was robust enough to handle the workload of multiple jurisdictions, although a few issues with road network connectivity and routing logic were identified and addressed. Many new features were incorporated as well, to facilitate both industry and municipality functionality.

Version 2 of TRAVIS MJ was put into production in November of 2010.
After running for a month to ensure that the system was operating properly, the task of integrating the remaining municipalities commenced and is ongoing.

Ongoing Tasks

The current iteration of TRAVIS MJ is fully capable of meeting its goal of processing and creating multi-jurisdictional permits for Alberta and its municipalities.

However, given the iterative development process, there are a number of features that had to be delayed according to their priority.

Two tasks are currently being done in parallel. The first is to complete a number of enhancements and documentation tasks in the system itself. The second is a project to convince all of the municipalities in Alberta to join the TMJ initiative. Six cities and

counties have joined since December 2010 and numerous more are in the final stages of preparation. It is anticipated that most municipalities will be using TRAVIS by the end of 2011.

Challenges

Developing and implementing a multi-jurisdiction permitting system has a number of technical and procedural challenges.

As the system is only as good as the underlying data, the biggest challenge is to ensure that the roadway network and address data are as accurate and current as possible. This includes roadway location and attributes, bridge structural data and street addresses. It is vital that sufficient resources be available to ensure the data is maintained.

The historic independence of Alberta municipalities and their concern over losing control of their roads was a procedural challenge in getting acceptance of the TRAVIS Multi-Jurisdiction permitting initiative. The system was designed to ensure that full municipal control was maintained and an extensive communications effort was undertaken to assure all stakeholders that the benefits of using TRAVIS outweighed any concerns.

Future Plans

It is anticipated that the development of TRAVIS will continue, as existing outstanding requirements are addressed, new requirements are identified and/or new technical capabilities become available.

It is expected that many of the current multi-trip permits will be switched to single trip format, which will dramatically increase the number of permits issued with TRAVIS.

A joint provincial, municipal and industry advisory committee is being formed to assist with the task of defining and prioritizing future TRAVIS enhancements.

Enhancements currently under development or consideration include further web-based GIS-type tools for management and expansion to include owners of utilities, railroads and resource roads in the permitting process.

British Columbia is already using the TRAVIS Proper application for their provincial permitting. They developed their own web application and are currently considering adding routing to their system. Representatives from Quebec, Ontario, Saskatchewan and the Northwest Territories have visited to see TRAVIS and an inquiry was received form Australia.

Alberta is interested in partnering with interested governments to promote and expand the use of TRAVIS. The intellectual property of TRAVIS is wholly owned by the

province, and is available at no charge to government agencies that may wish to take advantage of this leading-edge Alberta technology.

As provinces and countries strive to lower barriers to trade and improve efficiency, there is a need to examine the permitting process. The unique multi-jurisdiction capabilities of TRAVIS MJ could be employed to support inter-provincial permitting – allowing truckers to get all of the approvals required for their trip in a single transaction.

Figures and Illustrations

Descriptions:

The figures and illustrations posted below are actual screen shots of TRAVIS Web and MJ.

Figure 1 shows where the carrier is required to enter the origin and destination of the move by entering a Legal Land Description, Address & Municipality or Named Location. A 'Named Location' is a name created by a TRAVIS user to describe a legal land description.

Figure 2 is the trip detail screen where the route is entered. By pressing the 'Verify/Create Route' button, this allows TRAVIS Web to generate a route or create the requested route.

Figure 3 is an example of how the route will appear on the map. The generated or requested route is highlighted in bright pink. A route returned will be the shortest traveled route from origin to destination with the fewest restrictions.

Figure 4 is a representation of a route that consists of height restrictions. A clickable icon appears on a route when there is width or height restriction, road ban, structure restriction, season restriction and track width restriction.

Figure 5 shows an example of a detailed description of a restriction which depicts where the restriction is located, the value of the restriction, the contact information and the start and end date. There is the option of bypassing the restriction, in which TRAVIS will regenerate a new route.

Figure 6 displays the TRAVIS Multi Jurisdiction monitor, in which applications that require approval from the municipality will appear. It is color coded depending on the length of time the application has been waiting for approval.

Figures 7, 8, 9 & 10 together show the MJ screen used by municipalities to review a permit application. The application consists of the commodity the carrier is hauling, the weights & dimensions of the load, vehicle information, the origin and destination, the route, a dynamic map that zooms directly to the municipality that is approving the application, travel time and date, conditions, alerts and the approval or rejection buttons.

Figure 11 is the policy rule entry screen, which allows policies to be entered concerning restrictions, loaded vehicles and road rules within the municipality. A policy rule will trigger the system to automatically create alerts, manual approvals, permit conditions and permit notification.

Figure 12 is a screen shot from the Road Network Maintenance Tool. This tool is used to create road segment groups, road bans, truck routes or construction restrictions on provincial or municipal roads. The impacted segments, shown in blue, are selected by clicking directly on the map or drawing a rectangle and selecting included segments.

Figure 1: TRAVIS Web - Origin and Destination Input Screen

Figure 2: Sample Requested Route Input Screen

Figure 3: Sample Route Map
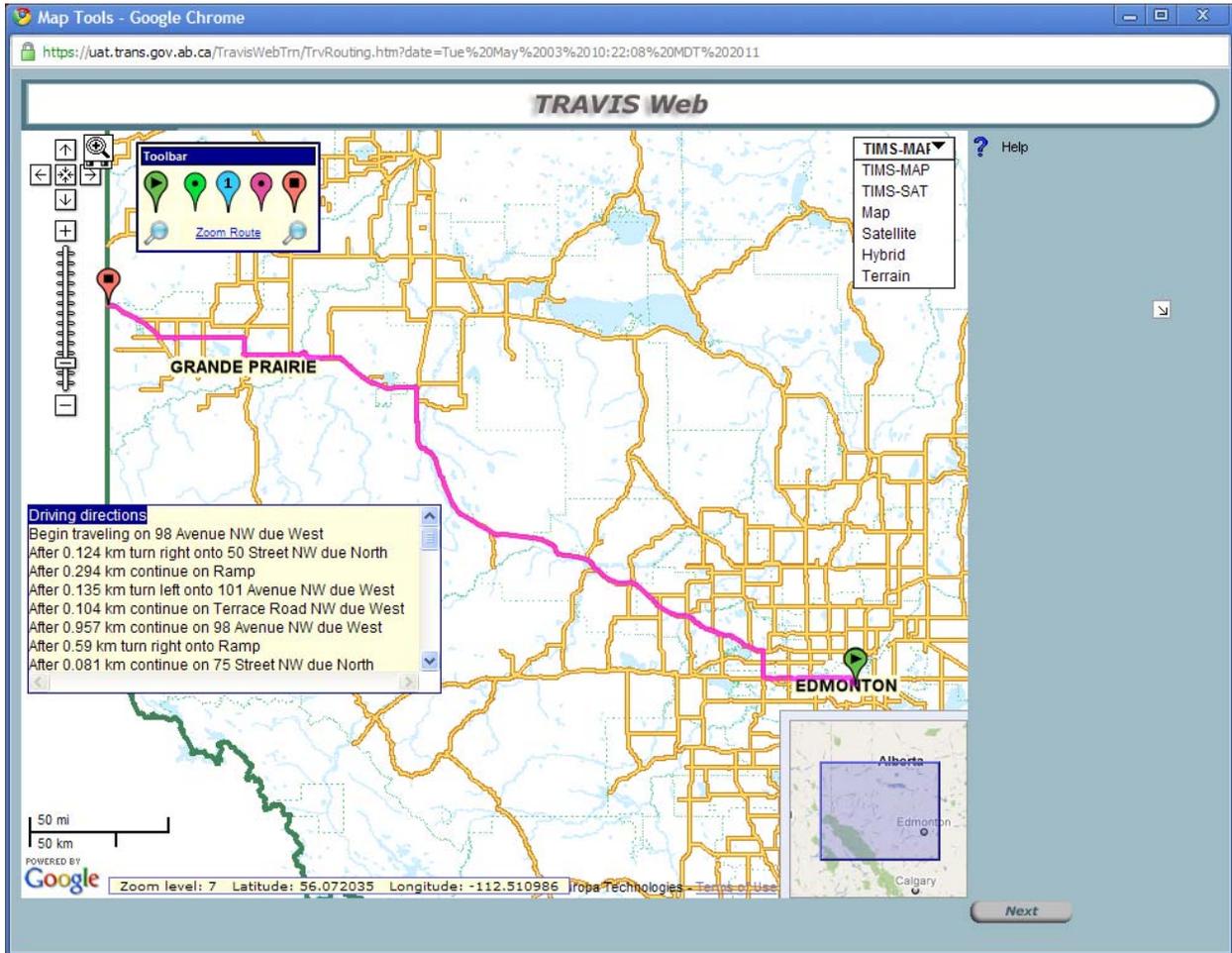
Figure 4: Sample route map showing restrictions
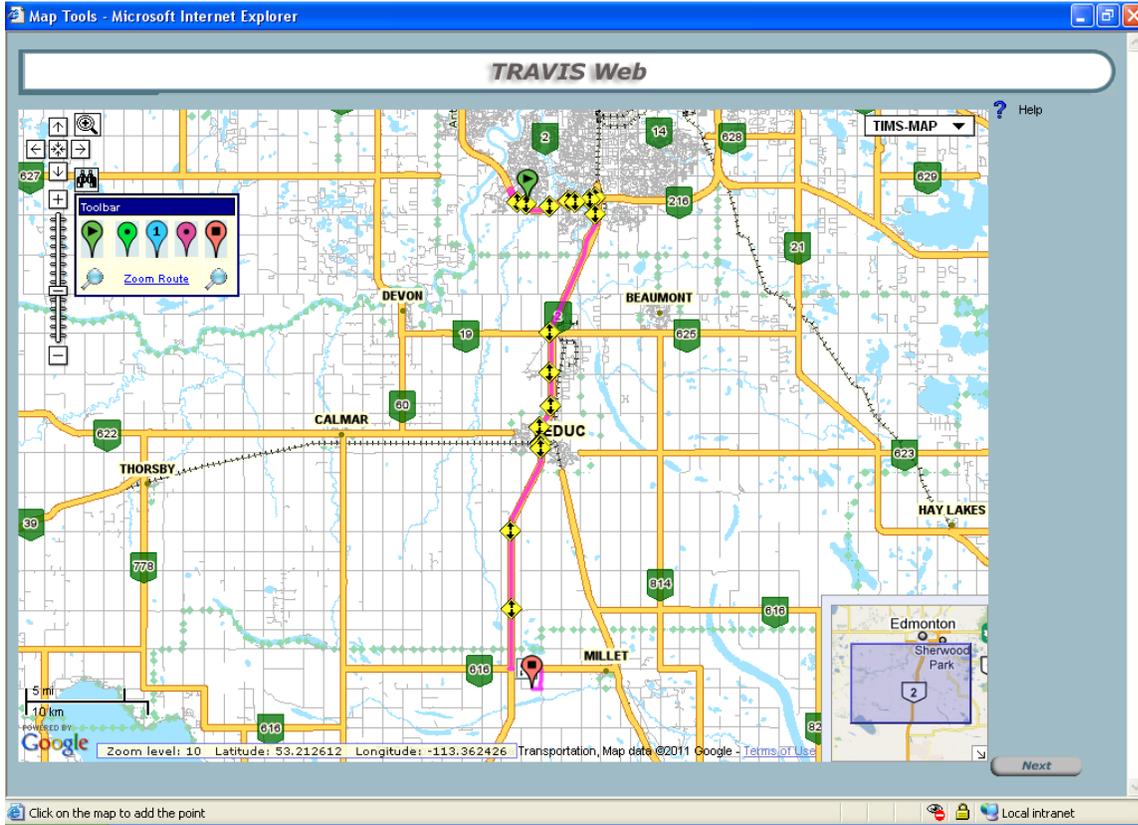
Figure 5: Sample map showing restriction details
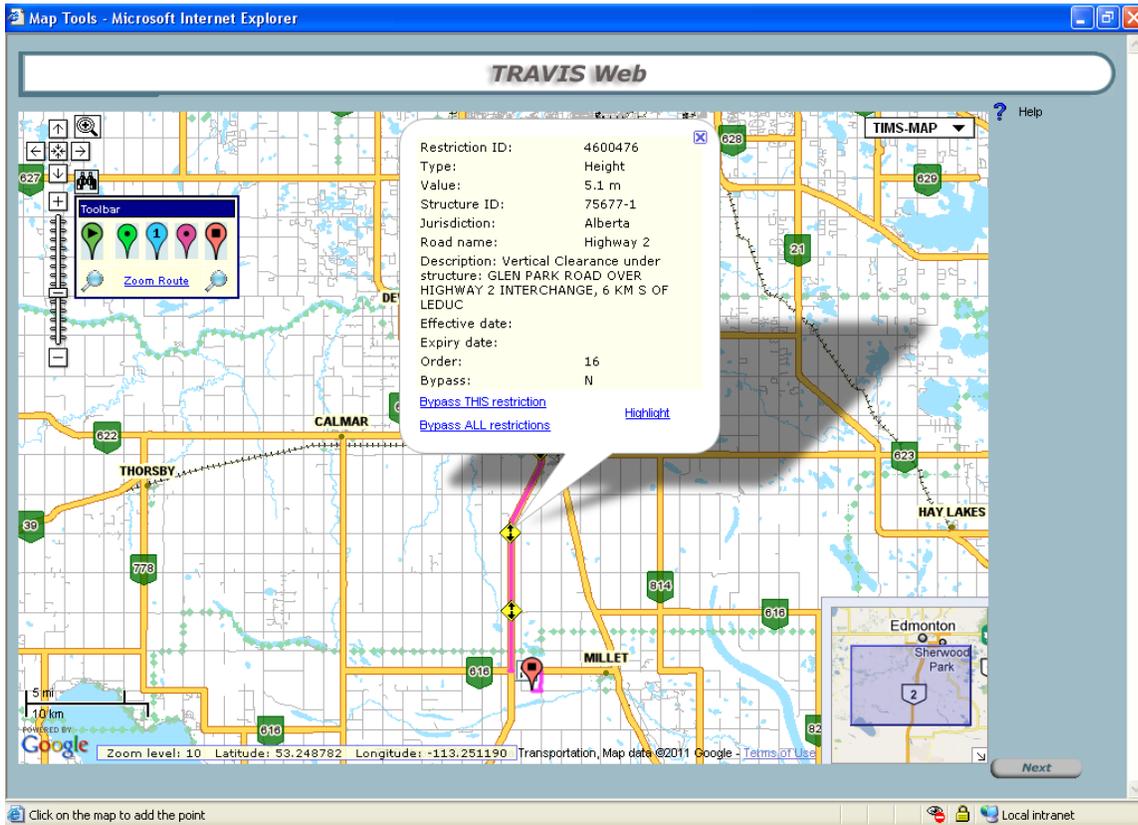
Figure 6 – TRAVIS MJ permits monitor
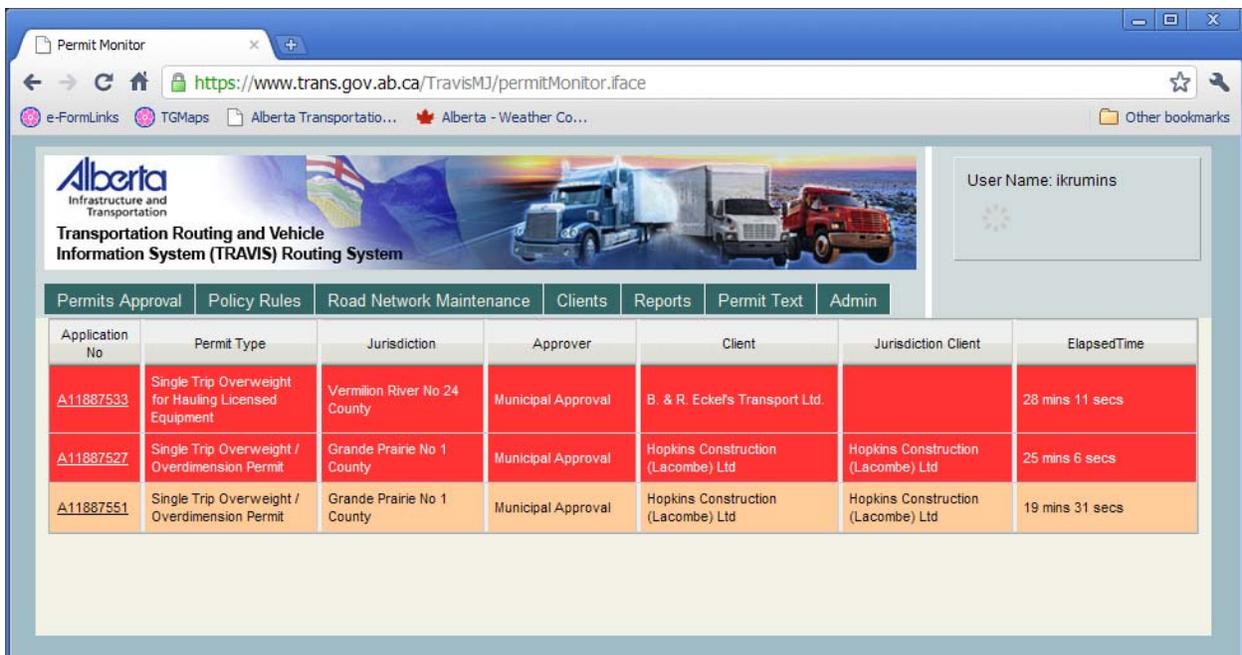
Figure 7: Permit Approval Screen Shot 1

Figure 8: Permit Approval Screen Shot 2

Figure 9: Permit Approval Screen Shot 3

Figure 10: Permit Approval Screen Shot 4

Figure 11: Sample Policy Rule Entry Screen

Figure 12: Sample Road Network Maintenance Screen – Construction Restriction for Vehicle Width