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Automated Commercial Vehicle Permitting

Study SD2001-09 Executive Summary

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16. Abstract This study documents the functional and data requirements for automated routing and permitting and evaluated software and hardware solutions to meet those requirements. The SDDOT, in cooperation with other state permitting agencies, initiated the development and deployment of the South Dakota Automated Permitting System (SDAPS) that issues oversize/overweight, fuel, commercial license, extended period, books of ten, and Public Utilities Commission (PUC) operating authority permits for Commercial Vehicle Operations (CVO) within the State of South Dakota.			
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EXECUTIVE SUMMARY

PURPOSE OF STUDY

The public roadway system in the State of South Dakota was developed and is maintained to provide a means of transportation, as well as promote intra-state and inter-state commerce. Due to inherent safety risk factors and the large State and Federal investment in the State highway system, the South Dakota legislature has enacted statutes regulating its use. Many of these regulations are concerned with the licensing of drivers and vehicles. Another area that the legislation addresses is the establishment and enforcement of legal size and weight limitations for highway and bridge usage. This second area is the concern of the *Motor Carrier Enforcement Division* within the South Dakota Highway Patrol.

In general, all vehicles that exceed any of the maximum legal dimensions and/or weight established by the statute must obtain and carry a permit in order to travel and transport on the State highway system. Vehicles that exceed these maximums, 8' 6" wide; 14' high; maximum lengths of 45' to 80' depending upon the vehicle configuration; and 80,000 pounds on the Interstate Highway system; or greater than the complete Bridge Gross Weight Formula limits on the remainder of the State system must obtain a permit. Vehicles that exceed the legal tire weight limits must also obtain a permit.

When a carrier wishes to transport a load exceeding legal dimension and/or weight limits, a permit is requested either via an agent (wire service or permit agency) or directly from a Port of Entry (POE) or a Highway Patrol Office. These Offices issue four general classes of permits:

- Single Trip Permits,
- Single Trip Permit Books of 10, and
- Extended Period Permits -- 30 day and Annual.

These permit classes are further subdivided by the type of cargo being transported and other limitations.

SDDOT currently has a system in place to issue oversize and overweight permits. This system is a manual system. It has a number of limitations when compared with a state-of-the-art automated permit process. The primary shortcoming of the current permit system is the lack of any centralized database. Data entry and verification, route approval, payment approval, permit production and permit delivery are all separate steps performed with no automated assistance. Also, permit reporting is a manual process. As such, the SDDOT, in cooperation with other state permitting agencies, initiated the development and deployment of the South Dakota Automated Permitting System (SDAPS) that issues oversize/overweight, fuel, commercial license, extended period, books of ten, and Public Utilities Commission (PUC) operating authority permits for Commercial Vehicle Operations (CVO) within the State of South Dakota.

The requested SDAPS was to include automated processes to input, review, and approve permits, including 1) required information (license #'s, registration #'s, origin-destination, etc.); 2) truck and load configurations (input lengths, tire sizes & truck configurations, etc.); 3) automatically routing vehicles within and through the state; 4) performing bridge structural analysis in a real time automatic manner as an integral part of the checking of the vehicle route for clearances and other restrictions; and 5)

graphically displaying, on a map of the state, routing alternatives for road and bridge approved routing. The SDAPS was also to be capable of creating billings and collecting payments including: 1) fee calculation; 2) providing for a secure billing system to present charges for payment; 3) providing for secure recording for payment received (cash, credit card, or payments on account); and 4) allowing for records and internal audit reviews and full reviews by certain state agency staff (SDHP, certain SDDOT staff, etc.), and individual company review of their records by password admitted user. The SDAPS was to identify rules and laws prohibiting certain routing applications and document the rules on each printed permit. It was also to be consistent and compatible with the Commercial Vehicle Information Systems and Networks (CVISN) architecture and the operational deployment of CVISN. Finally, the South Dakota Automated Permitting System (SDAPS) was to be accessible to the trucking industry and permitting agencies through the Internet, and to state permitting agencies through the Wide Area Network.

C.W. Beilfuss and Associates was awarded the contract for the study based on its proposal to use its SUPERLOAD permitting, routing, and bridge analysis system to meet all of the South Dakota Automated Permit System requirements.

OBJECTIVES

The Project Proposal, which reflected the basic directives of the Request for Proposal (RFP), for the Automated Commercial Vehicle Permitting System, defined three objectives. Those objectives are restated here.

1. Re-evaluate the requirements identified in Research Project SD96-07, "Feasibility of Automated Routing and Permitting of Oversize/Overweight Vehicles", verify and confirm the findings and recommend updates as necessary.
2. Design, document, and construct a CVISN compliant web-based automatic routing and permitting system.
3. Recommend procedures and provide training necessary to maintain and operate the system.

The primary objective of the study is encapsulated in the second objective in that a working system was to be provided to move South Dakota from a manual form of permit issuance to a fully automated process including route, bridge, and temporary restriction analysis as mandated in the requirements.

RESEARCH TASKS

The Proposal defined fifteen (15) research or project tasks as guiding steps to fulfill the three project objectives it also defined. These project tasks are restated here.

1. Meet with the project's technical panel to review the project's scope and work plan.
2. Review and summarize literature, including other states' experiences, pertinent to automated routing and permitting.

3. Interview technical panel members, representatives from the trucking industry, Licensing Agents, and others necessary to update the requirements that were identified in the SD96-07 Final Report.
4. Update the requirements identified in the SD96-07 study with the detailed information obtained in Task 3 and meet with the technical panel for approval.
5. Design the automated routing and permitting system, identify interfaces and data fields, determine phases and cost breakdowns for each deliverable including agency costs, and present them to the technical panel for approval.
6. Develop, test, and seek technical panel approval for a web based permit application, processing, and billing system with a Graphical User Interface (GUI).
7. Develop, test, and seek technical panel approval on query and report formatting capabilities.
8. Develop, test, and seek technical panel approval for a geographical database that defines the South Dakota State Highway and Bridge Network and links to information on roadway and bridge widths, clearances, and other attributes needed to support routing decisions.
9. Develop, test, and seek technical panel approval for an Application Program Interface (API) to the Bridge Analysis Rating System (VIRTIS AASHTO ware or BARS), and other Department databases.
10. Develop, test, and seek technical panel approval for a Map Generation Routing Engine (IMS Internet Map Server) capable of looking at origin/destinations, and providing alternative routes.
11. Provide, test, and deliver the fully operational automated commercial vehicle permitting system.
12. Provide initial training, documentation, a comprehensive users manual, and online help capabilities.
13. Provide a plan for the technical panel's approval that describes annual support and maintenance activities necessary to keep the system operational including costs and licensing.
14. Submit a final report and executive summary including findings, methods, maintenance plan, conclusions and recommendations.
15. Make an executive presentation to the technical panel, and the Research Review Board at the conclusion of the project.

SIGNIFICANT FINDINGS

Though structured as a research project, the primary objective of the work was to provide an automated permitting system to meet the requirements of all the agencies involved in the permitting process. To meet this objective, each of the research tasks above were executed. The first five tasks resulted in the detailed understanding of the South Dakota permitting rules, policies, and processes. This working knowledge allowed for the detailed design of the automated permitting system. A key concept in the CWB proposal was that CWB's permitting and routing software suite, SUPERLOAD, would be customized to meet the needs specifically defined for South Dakota. The detailed design document provided the basis for the SUPERLOAD customizations to be performed.

CWB views the overall permitting process to be composed of several steps including but not limited to

- permit application entry
- permit application completeness and compliance review
- permit application technical review (route review) including:
 - route continuity
 - clearance checking
 - live load structural analysis
 - temporary restriction review
- permit issuance
- permit conveyance
- “back office” processes including reporting and financial system integration

CWB has produced individual software components that together comprise the SUPERLOAD suite to address specific steps in the process. The CWB components used for the SDAPS include

- PASS (Permit Administration Software System) for all in-state entry, review, issuance, conveyance, and back office permit processes
- ePASS for all Internet-based application entry, review, issuance, and conveyance
- Route for all route analysis
- Bridge for all live load structural analysis
- Restriction Manager for the management and analysis of temporary restrictions
- Maintenance Manager for the management of the Route Network and Bridge Database files

To provide the solution to meet the requirements and design for SDAPS, CWB customized the SUPERLOAD products and built the SUPERLOAD data models from South Dakota data sources.

At this time, a complete solution has been provided that does meet the requirements for SDAPS. However, several issues significantly impacted the ease with which the work was completed. Those issues include the following.

- Extent and Complexity of Permits and Rules

As the requirements and design steps were executed, numerous additional permits and permit rules were added to the scope of the system. Such scope additions even continued through a significant portion of the system customization. Though nothing prevented the additions from being accommodated, each scope change did affect the project in terms of the amount of effort required and the time needed for the additional customization and testing.
- Changes to Permitting Rules

At the onset of the project, it was expected that several rule changes were going to be made to state statutes as well as more generalized rules and regulations. CWB was directed to use those rules. The system was initially designed and customized to use those rules. As the project proceeded, it became evident that formal rule changes were unlikely and most of the system customizations were re-done to reflect the formally approved statutes, rules, and regulations.

- Changes to Source Data

Various data sources were provided as the data to be used for the route and bridge analysis as the project proposal was prepared and presented. When the work began, a totally new set of GIS data was made available. This data became the desired source for all of the mapping processes as the DOT viewed it as the future of all GIS within the Department. This change, though preferred for future use, caused significant problems in the implementation as it was incomplete when provided and did not contain some of the primary linear referencing available in the other data sources that had been provided at proposal time. Though the data was completed over time and most of the required linear referencing data was associated, significant extra effort and time was required. Though a problem at the time, this should be viewed to be beneficial for the future as no future re-working is expected.

- Distributed Computing Infrastructure

The SDAPS solution is being used at Ports of Entry around the state, as well as in Pierre in several offices. The distribution of the processes, especially on differently configured hardware with various connectivity and accessibility capabilities impacted the ability to initially deploy, test, and support the solution. It is believed that all such issues have been resolved and support will now turn to maintaining the configurations, though this too may require more involvement than in a slightly more standardized, accessible environment.

As mentioned above, though these items have impacted the ease with which the SUPERLOAD software customizations, data usage, and implementation were performed, all of the difficulties have been overcome and a complete system has been provided.

CONCLUSIONS

The work performed through the various research tasks to meet the objectives of the proposal have resulted in the deployment of the SDAPS. This system places South Dakota at the forefront of permitting automation as the state is now able to not only more efficiently perform permitting tasks with state personnel, but is also now able to allow permit applicants across the country 24 hour a day access to a fully automated system that is able to take their application, verify it, perform the route, bridge, and temporary restriction analysis, and if allowed by South Dakota maintainable rules, automatically issue the applicant a permit without any human intervention. It is believed the system will be very maintainable and may be expanded in the future to accommodate additional goals such as additional integration and verification of data about applicants and their vehicles, as well as expansions to the routing network to allow for analysis of permit movements on routes beyond the state system.

RECOMMENDATIONS

Based on the findings and conclusions of this study, the researchers recommend the following to the South Dakota Department of Transportation:

1. CWB recommends that a Maintenance Agreement for Software Maintenance and User Support Services be implemented with the South Dakota Department of Transportation.
2. CWB recommends that regular “IT” maintenance be conducted including backups, server monitoring, and software installations.
3. CWB recommends that the SDDOT should define a schedule and responsibilities for normal data maintenance, and verify that the source data and constructed SUPERLOAD modules are correct.
4. CWB recommends that maintenance of the SUPERLOAD Permit Administration module be completed by the South Dakota Highway Patrol.
5. CWB recommends that the SDDOT Office of Bridge Design in cooperation with the Office of Data Inventory, and Office of Operations Support complete maintenance of the SUPERLOAD Routing Network module.
6. CWB recommends that maintenance of the SUPERLOAD Bridge Analysis module be completed by the SDDOT Office of Bridge Design.
7. CWB Recommends that the SDDOT Office of Operations Support complete maintenance of the Restriction Manager module.
8. CWB recommends that maintenance of the SUPERLOAD Software and User Support is completed by CWB.
9. CWB recommends that End User Training be completed by CWB through additional contracts.
10. CWB recommends that the SDAPS be marketed to ensure extensive Internet use by Carriers and Permit Services.
11. CWB recommends that training be conducted to ensure State staff is trained, and also to make sure “customers” can use all Internet processes.
12. CWB recommends that a project extension be granted to allow extra effort for GIS and Permit Rules. (This has been done.)
13. CWB recommends that additional software licenses be provided to ensure all end users have access to the SDAPS. (This has been done.)
14. CWB recommends that authorization for additional enhancements be approved to provide livestock permits, off tracking calculations, books of 10 tracking, and additional reporting options. (This has been done.)
15. CWB recommends that the South Dakota Automated Permitting System be deployed as soon as possible. (This has been done.)