

The benefit/cost analysis
was performed in 1997



JTRP/INDOT RESEARCH PROGRAM

Research Pays Off

Improving Snow Removal Routes Structures

The State of Indiana expends considerable money and manpower on snow removal each winter. The state has 1100 service vehicles, covering 1000 snow removal (also salting or sanding) routes. Seven to twelve snow routes are serviced by trucks dispatched from 117 service units distributed throughout the state. While the state uses the same trucks for both summer and winter work on roads, snow removal requirements call for about 20% more trucks than are needed for summer work (L. Goode, IN-DOT).

This research was to evaluate snow route designs using computer techniques that allowed each district and sub-district or service area to examine and improve the efficiency of their snow removal operation. The software is interactive and provides an opportunity for

those involved in setting (and driving) the routes to develop more efficient routes, while at the same time, providing equivalent snow removal with less passes, reduced travel time and less dead-head mileage.

Removal of a snow route translates into reducing the fleet by one truck and further operational savings in equipment maintenance, fuel and labor expended in non-productive driving (dead head). Because the drivers are INDOT employees on other assignments during the summer, there will be some reduction in labor reassignment although no employee reduction is expected. However, more efficient routes reduce dead head time, which accounts for some labor savings.

Research Findings and Implementation

The software (called Computer Aided System for Planning Efficient Routes or CASPER) was developed by JTRP and its use examined in close conjunction with the LaPorte, Crawfordsville and Fort Wayne districts. Routes in the urban areas of Gary and Fort Wayne were not revised. The user friendly software allows the drivers in each sub-district to try various approaches to redesign their routes. Initially, 2 routes were identified as being consolidated within other routes. The new routes were tried during two winter seasons. After experience was gained from using the new route structure, it was found that ac-

ceptance by the drivers in the field was about 72%. Thus a redesign of routes occurred in which 9 routes were added back with final savings resulting from elimination of 17 routes.

The estimate (from Mr. Goode, INDOT) is that when fully implemented the project should eliminate 50 routes. It takes about three years to fully implement routes developed using CASPER considering the need to try the routes during two winters before fully accepting them or redesigning to eliminate unacceptable situations that occur in the field.

Benefits

In addition to the savings listed in the table below, better use of experienced personnel is possible. Reduced dead head time and, in some cases, higher service speed are also possible. The following cost savings accrue for each route that is eliminated:

*Cost of Research \$238,027 and
\$805,825 Development*

Savings from Single Route Elimination

Items Eliminated	One Time Savings	Annual Savings per Route
Replacement cost of one truck (ten year life)	\$75,000	
Truck Maintenance		\$3,500
Maintenance on the Plow and Spreader Cost		\$700
Fuel Cost		\$400
Labor Cost for Dead Head Miles @\$7.80/hr		\$2,520
TOTAL	\$75,000	\$7,130

Estimated Economic Value Over 20 Years At 5% Discount Rate

Number of Routes Eliminated	Annual Savings	Discounted Savings (20 years)	Benefit/Cost Ratio
50	\$854,930	\$10,654,323	10.21

References

- Goode, L. (INDOT), 1996, conversation and notes
- Wright, J. R. (JTRP Project Manager), 1996, conversation
- Wright, J. R., "The Computer Aided System for Planning Efficient Routes," Joint Highway Research Project FHWA/IN/JHRP-93/8 Final Report, April 1994