

Identifying Best Practices for Snowplow Route Optimization

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Route Optimization: Benefits and Challenges

Well-designed winter maintenance routes result in snow and ice control service that is both more effective, because roads are cleared more rapidly, and more cost-efficient, because deadheading, route overlap and other inefficiencies are reduced or eliminated. There are an increasing number of computerized tools to facilitate the routing process, but these tools are not yet widely used by winter maintenance practitioners.

Different route optimization projects have reported route length improvements on the order of 5% to 10%, with savings as high as 50% reported in one case but other optimization projects never reach the implementation stage. The purpose of this project was to provide practitioners with an overview of computerized route optimization processes and concrete recommendations about best practices to ensure that route improvement efforts produce actionable results

Route Optimization Process & Goals

Route optimization projects can be divided into five steps:

1. Selection of project team/tools
2. Preparation of input data
3. Utilization of optimization tool
4. Review and revision of routes
5. Implementation of routes

Routes can be optimized to minimize total service or to minimize the time required to service all roadways in a service territory (also known as cycle time). The first objective is commonly used for private-sector applications but the second objective may be more relevant to winter maintenance agencies.

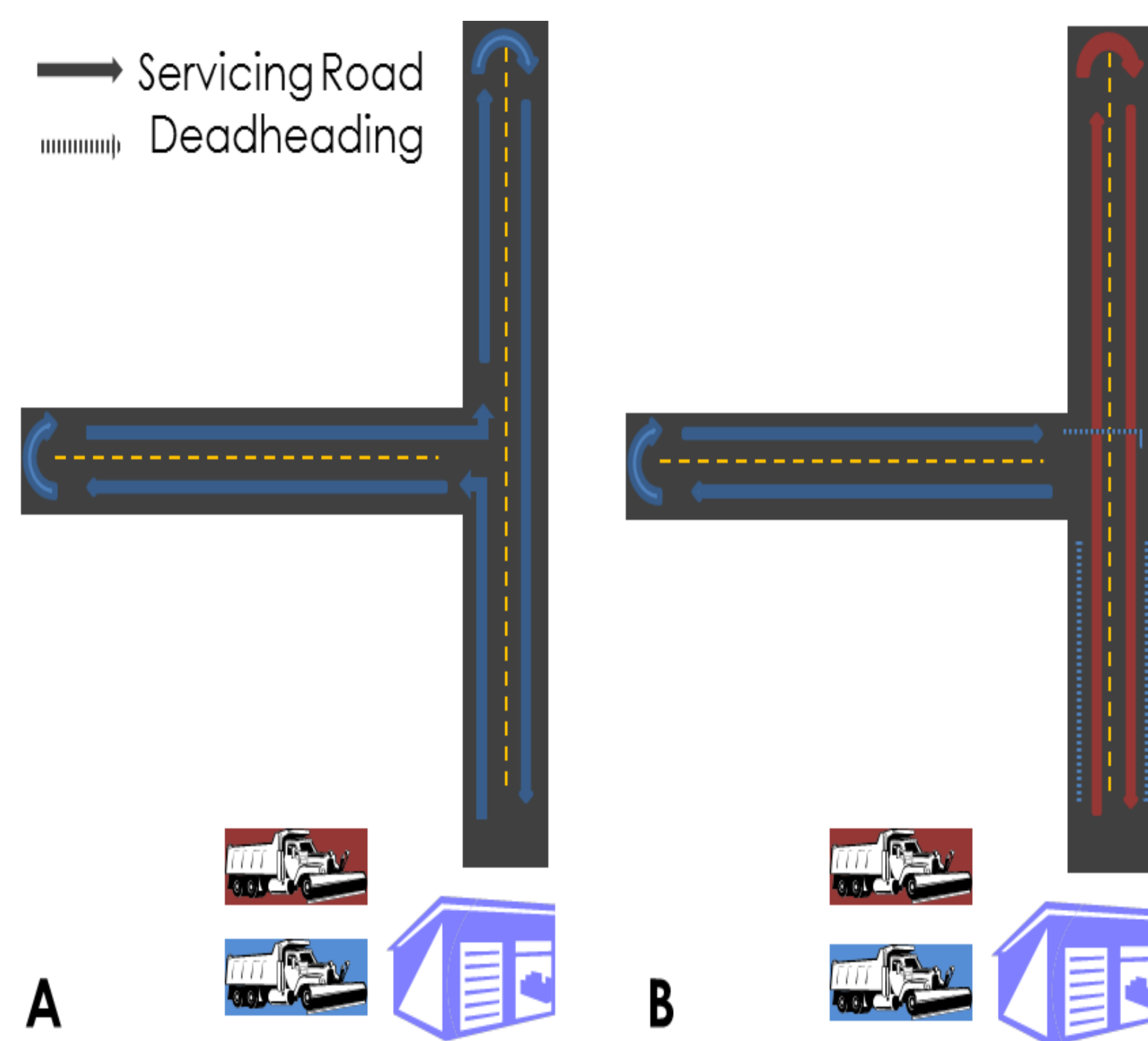


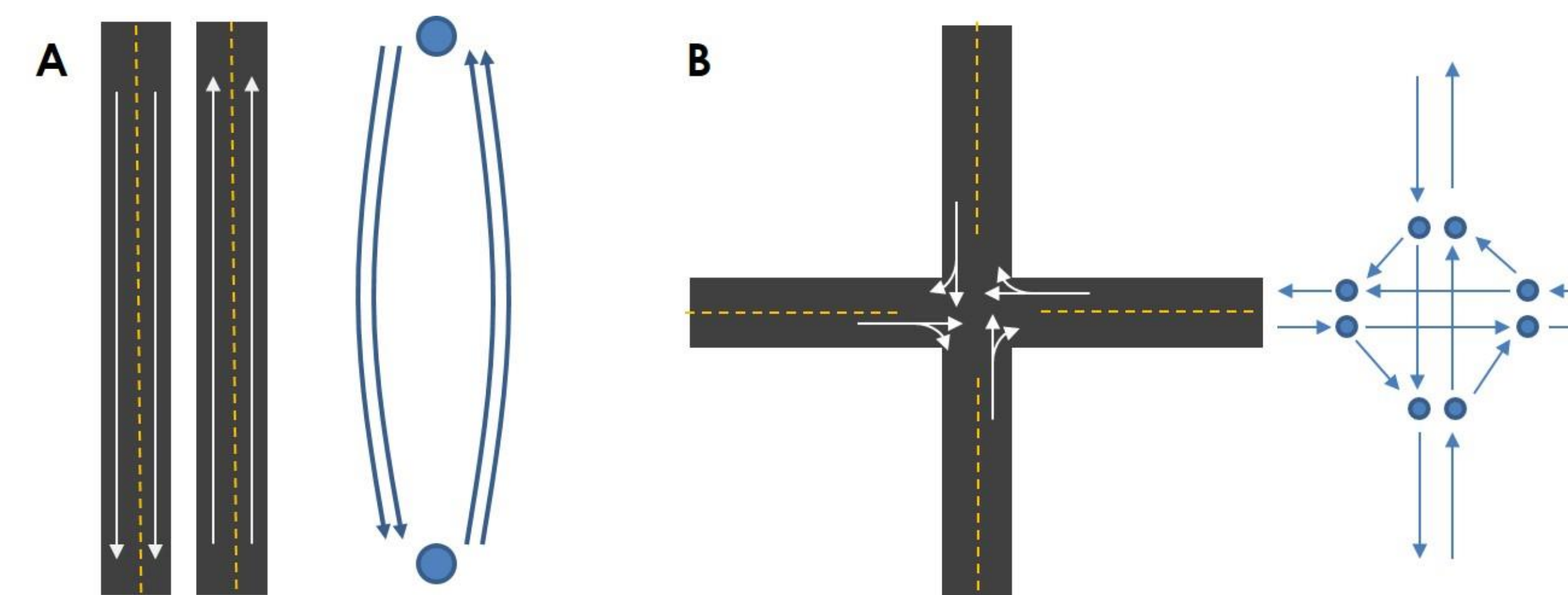
Figure 1. Snow and ice controls routes optimized to minimize A) total vehicle operating time and B) cycle time

Preparation of Input Data

In addition to detailed information about the vehicle fleet, accurate road networks are required and must be represented in a manner that is with the problem formulation.

For example, route optimization frequently requires that individual lanes be included separately in the model of the road network (bottom left). Similarly, any limits on the turning motions that are possible or allowable at road segment intersection must also be represented in the road network (bottom right).

Finally, failure to include features like highway crossovers (above) and safe



turnaround areas at the edge of service territory boundaries will result in routes that are impractical and potentially unsafe.

Best Practices for Route Optimization

1. Close cooperation between experienced winter maintenance professionals and the route optimization modelers is essential during all project phases.
2. Route optimization requires a highly accurate, base routing networks created specifically for snowplow route optimization.
3. Computer generated routes are never perfect; successful projects include time to review and revise new routes to identify potential problem spots prior to implementation.
4. AVL/GPS systems are highly complementary to route optimization and route review projects.

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