# Optimising drayage operations by combining column generation and branch-and-cut

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**Abstract**

Port drayage operations account for between 20% and 80% of the total transportation cost for a shipping container, despite covering the shorter distances of the container's trip. In addition to being expensive, truck movements around urban areas are often blamed for increasing road congestion, environmental pollution, and road safety risks in the service area. Such factors make improvement of drayage operations desirable to port authorities. This has led to increased attention from researchers interested in solving such problems through optimisation models for drayage operations.

There are many studies which seek to optimise drayage operations, but many of these make simplifying assumptions which may impact the quality of solutions found. Some of these assumptions are one truck one container, homogeneous fleet of trucks, one container size, single shipping terminal, and live loading/unloading where a truck must stay with the container for all legs of a journey. We present a flexible request model that does not make any of the above assumptions. This allows us to find solutions of higher quality when compared to models with less flexibility.

We demonstrate that our model is capable of solving instances of reasonable size, and discuss our current work where we implement an *a priori* column generation method for finding solutions to larger and more difficult instances. This method involves generating portions of feasible routes and connecting them together in a branch-and-cut framework.

**Keywords:** Drayage, Pickup and Delivery, Integer programming, Branch and cut

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