Applying Practical Design Methods to Multi-Modal Supply Chains

Problem Statement
Gaps in knowledge persist as to the quantity and diversity of products, their value, and supply chain characteristics and needs of commodities moving on significant statewide freight corridors. Readily available data does a great job of denoting origin and final destination but frequently fails to address the path freight products take, especially when freight is dependent upon intermodal movements. These gaps constrain transportation agencies ability to fully account for the costs and benefits of freight corridor investment and to positively affect freight multimodal connectivity. Constraints such as these ultimately impact the efficiency by which local and regional commerce operates within a state, by restricting our ability to identify appropriate multi-modal connections and investments – whether they are public or private investments.

Purpose, Objectives, & Outcomes
This paper provides transportation agencies with a significant and defensible mechanism for understanding the supply chain needs of freight users on their highway network, and develops the capacity of the agency to effectively and efficiently account for the interactions of its highway system to regional partners on other modes.

The U.S. 95 corridor within the state of Idaho (United States) serves as the basis of analysis development from which subsequent corridors may be evaluated. Given the size, regional importance, and diversity on this corridor, it serves as a strong model for the pilot study.

Through the development of a corridor based freight study pilot program, future efficiencies may be generated when considering the benefits of highway investment, as well as developing the knowledge base for expected impacts on the highway system by investment on behalf of other related modes, jurisdictions, and industries.

To address the issues raised in the problem statement above, this paper reports on research that addresses the following objectives:

- Identify and examine the supply chain along the full extent of the highly visible U.S.-95 corridor.

- Evaluate freight movement along all modes of freight travel operate within this corridor.
To accomplish the above objectives, this research has developed a conceptual understanding and framework of the economic and geographic parameters that define a 'corridor'. With this definition at hand, the network of industrial interactions with the corridor are established from existing data sources and in depth sequential interviews with multiple key stakeholders contributing to the activity in the corridor.

The US-95 corridor can be readily broken down into its component parts (links) based off of expected interplay with other highways and modes. Each segment offers its own unique set of factors that contribute to the functioning of the entire corridor as a system. Similarly, each corridor segment presents its own potential set of planning goals, as well as a set common to all. Thus by breaking down each segment to the relevant factors contained within, feasible and applicable performance metrics may be generated that are relevant to the array of concerned stakeholders. Such performance metrics include:

- Current and expected freight flows in the corridor;
- Location and growth expectations of intermodal facilities and distribution/warehousing centers;
- Accident incidents involving freight movement (truck-car, car-rail);
- Seasonality of freight movement or expected growth in freight movement;
- Current and future bottleneck potentials;
- Freight flow through urban areas;
- Land use changes;
- Emergency response and impacts of road closures; and
- Funding opportunities for infrastructure investment.¹

As the component parts are broken out to evaluate their influence upon the broader system, this paper then re-aggregates the components in a manner that enables a practical design application. Practical design is a decision making approach promoting cost-effective strategies that seek to maximize results within a limited funding opportunity (shrinking budgets). From a Supply Chain perspective, this enables the most constraining elements to be addressed from a systems perspective as opposed to a link perspective. The end result of this paper is a toolkit by which agency personnel may be better equipped to efficiently prioritize corridor level freight planning.

¹ Categories drawn from NCHRP 661.