RSG INC.
RESOURCE SYSTEMS GROUP, INC.

Briefing Paper:

FLEXIBLE STANDARDS IN TRANSPORTATION PROJECT DEVELOPMENT

Prepared for:

Chittenden County Metropolitan Planning Organization

October 2007

60 Lake Street, Unit 1E ▪ Burlington, Vermont 05401

1.0 PURPOSE AND BACKGROUND

1.1 PURPOSE

The purpose of this briefing paper is to explore different mechanisms that are being employed across the nation to reduce project cost, improve project turn around time, and minimize environmental impacts by implementing flexibility in standards in the planning and construction of transportation projects. It is one of a series of four papers that explore dimensions of innovative transportation finance for Chittenden County and Vermont as a whole.

1.2 BACKGROUND

As our the need to address our nation's transportation needs becomes more pressing, complex and costly, interest is growing in finding new and better techniques to expedite implementation of transportation projects. A focus on design standards and how to build transportation projects that more efficiently and cost-effectively fit or relate to their surroundings began to take shape in the early 1990s. Much of the movement has focused on implementing agencies' ability to move beyond the AASHTO "Green Book" for highway standards and develop design guidelines unique to particular situations. For federal-aid projects, the Federal Highway Administration (FHWA) requires that all exceptions from accepted guidelines and policies be justified and documented and requires that states seek formal approval several controlling criteria. Several factors contribute to the desire for increased flexibility in our design and implementation standards. These include:

- Maintaining community character and relevance of the highway in the local context
- Reducing environmental impact of highway projects
- Mitigating the rapidly increasing construction costs for highway projects

2.0 OPTIONS AND OPPORTUNITIES

The majority of experience and literature on flexible design and implementation standards pertains to highway projects; however, it is clear that some of the approaches and concepts discussed below could be applied to non-highway construction situations. While this paper is not an exhaustive inventory of these approaches, it does present a cross-section of the options and opportunities existing today for embracing more flexibility in transportation project development. These options may be loosely grouped into two categories: Use of longer-life materials; and Reducing implementation costs of the infrastructure.

2.1 USE OF LONGER LIFE MATERIALS

States and transportation agencies have begun to use new and different types of construction materials in an effort to both expedite projects and extend those projects' lives, thereby reducing the frequency of rehabilitations and rebuildings. In addition, as the cost of construction materials continues to climb, the interest in alternatives to traditional materials and methods is growing.

For example, in California, the Department of Transportation (Caltrans) has been implementing a program to re-build high volume freeways with concrete rather than the cheaper, quicker, bituminous asphalt. Caltrans began implementing the Long-Life Pavement Rehabilitation Strategies (LLPRS) program in 1998. While LLPRS is not specifically an accelerated construction strategy, many of the projects that have been completed as part of the program have used a variety of strategies to accelerate construction. The goal of the LLPRS program -- which also addresses the state's need for cost effective approaches for rebuilding the aging pavements in its urban highway network -- is to rebuild approximately 2,800 lane-km of high volume urban freeway with pavements that are designed to last more than 30 years with minimal maintenance. Use of these materials reduces the number of times traffic is affected for maintenance and can reduce the life-cycle cost of the highway, ultimately preserving public resources for future generations of road users.

2.2 REDUCING INFRASTRUCTURE IMPLEMENTATION COSTS

2.2.1 Alternative Contracting Techniques

Alternative (or innovative) contracting techniques are intended to improve construction quality, speed project delivery, and improve the administration of highway construction projects. The primary goal is to improve project delivery without compromising safety or quality while providing cost effective solutions. For federal-aid highway projects, any contract which utilizes a method of award other than the lowest responsive bid is considered to be an alternative contract. In recent years, FHWA has approved cost-plus-time bidding, lane rental, and warranty procedures as non-experimental contracting procedures:

- **Cost-plus-Time Bidding -** Cost-plus-time bidding is a procedure that selects the low bidder based on a monetary combination of the contract bid items (A) and the time (B) needed to complete the critical portion of the project. This procedure is intended to provide a contractual incentive for the contractor to minimize delivery time for high priority and congested roadways by offering incentives for early completion and assessing disincentives for late completion.
- **Lane Rental** - Lane rental is the practice of charging the contractor a fee for occupying lanes or shoulders during construction. Charges are based on hourly or daily rates and can vary with time of day, amount of traffic, and other measures of user costs. Similar to cost-plus-time bidding, lane rental provides a contractual incentive for early completion.
- **Warranty Clauses** - Warranties are intended to increase the quality of a product thereby giving the contractor responsibility for replacement or repair of deficiencies. FHWA's current policy in Title 23 Code of Federal Regulations 635.413 permits warranties on National Highway System projects for specific construction products or features. Routine maintenance items are still not eligible for Federal participation, and warranty items must be within the control of contractors.

According to the Transportation Research Board, areas of transportation system development that could benefit from the application of innovative, time-reducing design concepts and construction technologies include design configurations, materials, construction equipment, design and construction sequences, repair methods, automated systems, modularization, and preassembly.

2.2.2 Use of Prefabricated Elements

According to the FHWA, construction uses of prefabricated materials can significantly reduce the project delivery timeline while providing a number of additional benefits including:

- Improving construction zone safety
- Making construction less disruptive for the environment
- Making bridge designs more constructible
- Increasing quality and lowing life-cycle costs

Prefabrication of bridge elements and systems can be accomplished in a controlled environment without concern for job-site limitations, which increases quality and can lower costs. Prefabricated bridge elements especially tend to reduce costs where use of sophisticated techniques would be needed for cast-in-place, such as in long water crossings or higher structures, like multi-level interchanges.

2.2.3 Low-Impact Design

"Low-Impact Design" is a philosophy of designing a facility to provide the lowest life-cycle cost to implement the required amount of infrastructure to accommodate the estimated demands. "Low-Impact Design" can decrease project costs, improve public perception, and reduce environmental impacts of the infrastructure development. According to the Metropolitan Area Planning Council (MAPC) in Boston, which has developed a design practice to educate and encourage developers and communities to practice low-impact development, low-impact roadways use a narrower, more traditional design that enhances neighborhood character.

Basic strategies include low-impact roadway layouts, narrow road widths, shared driveways, and open-section roadways. Alternative road and parking designs may offer cost savings for developers, because there is less pavement to construct and less stormwater runoff to treat. In some cases, more compact parking may allow higher site densities. Narrower roadways, smaller parking areas, and smaller stormwater management systems result in lower site development costs. In addition, narrower streets and smaller parking lots cost less than conventional streets because less grading, base material, and pavement are required. Open section roadways cost considerably less than standard designs due to the elimination of curbs and gutters. Designs that reduce the amount of parking and break it up into multiple smaller lots separated by vegetation create more attractive developments.

Low-impact Design can also give designers with flexibility provided by narrower roadways, smaller parking areas, and techniques that also help to satisfy site landscaping and open space requirements. This technique is also considered a cost-effective way to increase a project's environmental sustainability because the emphasis on preservation of natural areas creates attractive, marketable developments that enhance a portfolio. Finally, low impact techniques provide communities and property owners with opportunities to reduce runoff through retrofits, before they resort to expensive storm sewer upgrades.

2.2.4 Context Sensitive Solutions & Context Sensitive Design

Context Sensitive Solutions (CSS) is a collaborative, interdisciplinary approach that involves all stakeholders to develop a transportation facility that fits its physical setting and preserves scenic, aesthetic, historic and environmental resources, while maintaining safety and mobility. CSS is an approach that considers the total context within which a transportation improvement project will exist.

Context Sensitive Design (CSD) is a dimension of CSS related to individual projects. CSD has been defined as the art of creating public works projects that meet the needs of the users, the neighboring communities, and the environment. It integrates projects into the context or setting in a sensitive manner through careful planning, consideration of different perspectives, and tailoring designs to particular project circumstances. Context Sensitive Design uses a collaborative, interdisciplinary approach that includes early involvement of key stakeholders to ensure that transportation projects

are not only "moving safely and efficiently," but are also in harmony with the natural, social, economic, and cultural environment. CSD requires an early and continuous commitment to public involvement, flexibility in exploring new solutions, and an openness to new ideas. Early public involvement can help reduce expensive and time-consuming rework later on and thus contributes to more efficient project development.

According to the National Cooperative Highway Research Program (NCHRP), transportation agencies that have institutionalized CSS and CSD confirm that real, measurable benefits accrue to the agency and ultimately the taxpayers and constituents of their states. The benefits can be broadly categorized as reducing agency costs of doing business, as delivering projects on schedule (avoiding delays or project halts that were previously common), and as improving the relationship with their customers. Efficiencies and savings are also evident in the development of processes established by context-sensitive organizations (e.g., new GIS tools to help predict or identify potential archaeological sites in Minnesota).

To the extent that business as usual can be expected to result in a continuation of project failures and multi-year delays, not addressing the underlying reasons (which are invariably related to one or more aspects of CSD/CSS) will result in continued inefficiencies. Another cost of delays that may not be counted by an agency, but may be felt by the state or region in which it works, is the loss of value associated with a project not delivered on time (or at all). Every project is intended to address one or more problems, whether they are related to mobility (hours of delay), safety (lives lost, injuries suffered), or economic development (jobs created, property values enhanced). When investment in a transportation project is halted or delayed, the stream of benefits that completion would have produced is lost forever.

3.0 SELECTED VERMONT EXAMPLES

Vermont was among the pioneers nationally to officially embrace flexibility in highway design standards. In 1997, VTrans revised its standards to provide a much wider degree of flexibility in highway design than had previously been allowed. This flexibility allowed VTrans and municipalities to develop highway projects with reduced lane widths, reduced or wider shoulder widths, traffic calming improvements, etc. These standards provide for a fair amount of flexibility in designing highways that can meet the capacity needs of the system while reducing the cost, environmental impacts, and even improving the public perception of the project – all of which can facilitate the

speed of project approval. Although Vermont does not have an explicit Context Sensitive Design (or Context Sensitive Solutions – CSS) policy, VTrans' standards do allow much of the design flexibility found in CSS policies around the nation.

Some believe that design requirement and permitting process variations across jurisdictions within the state have limited the ability to fully embrace flexible standards in Vermont to date. Despite this, there have been some notable success stories in design flexibility and CSS/CSD in the state:

- In Danville, a final design for upgrading road conditions through the a small rural village was approved by VTrans and the Town in late 2002, after clearing several regulatory hurdles in near-record time, and with demonstrably lower costs in hours and actual dollars to all parties. The underlying methodology is collaborative in nature and draws on Vermont traditions of public meetings, civic dialog and representative democracy. A unique and successful aspect of the effort was the first-ever partnering between the Vermont Arts Council and VTrans to develop a Context Sensitive Design (CSD) process in which artists were engaged to help residents articulate a community vision for the road's redesign to help break the decades-old impasse.
- The City of Burlington has embraced flexibility in transportation facility design in its recent draft Burlington Transportation Plan Update. For example, the Plan seeks to apply many elements of the ITE Publication *CSS in Designing Major Urban Thoroughfares for Walkable Communities,* which focuses on roadway improvement projects in places where community objectives support walkable communities -- compact development, mixed land uses and support for pedestrians and bicyclists --whether it already exists or is a goal for the future. In addition, the Plan Update calls for a CSD-oriented focus on "Complete Streets," a concept in which roadways are designed and operated to enable safe access for all users. Pedestrians, bicyclists, motorists and transit riders of all ages and abilities are able to safely move along and across a complete street. A Complete Streets approach can be cost-effective since integrating sidewalks, bike lanes, transit amenities and safe crossings into the initial design of a project may eliminated the need for later and more costly retrofits.