Managing Complexity for Small Highway Projects

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By Carla Lopez del Puerto, Douglas D. Gransberg and Carlos Figueroa

ABSTRACT
To meet the growing demand of the nation’s infrastructure, transportation projects are becoming more complex. Complex projects involve an unusual degree of uncertainty and instability. Decisions must be made in an environment where the project team does not have direct control over many of the critical factors. This paper discusses a five-dimensional project management model (5DPM) and the use of complexity maps as tools to identify and manage the sources of complexity. This paper also details how complexity was managed in four projects valued between $8.0 million and $50 million that were not classified as Federal Highway (FHWA) Major Projects and demonstrates how an agency can determine if a seemingly routine small project is indeed complex. Based on the results of the case study analysis, it can be concluded that both small and large projects benefit from 5DPM and the use of complexity mapping to identify sources of complexity and develop action plans that allow them to address the sources of complexity proactively. The complexity maps also indicate that in small projects, context is the dimension in which the most complexity is observed.

INTRODUCTION
As the pace at which the nation’s infrastructure accelerates, the scope of the national highway renewal effort expands. To meet the growing demand, project delivery periods have been compressed, increasing the impact of external factors such as environmental policy, public scrutiny and availability of construction financing (FHWA 2006). The successful delivery of transportation projects has morphed from a technical exercise which focused on achieving the near-term cost and time objectives to a process with a broader focus using both subjective and objective project performance metrics (Jugdev and Muller 2005). This reorientation of project management philosophy is referred to as “complex project management” (Whitty and Maylor 2009), and the College of Complex Project Managers (CCPM) maintains that it is “an emerging natural extension of traditional project management to create a specialist profession…” (CCPM 2006). The difference between routine projects and complex projects centers around the “… degree of disorder, instability, emergence, non-linearity, recursiveness, uncertainty, irregularity and randomness” found in complex projects. Recent research has recorded dynamic complexity induced by the level of interaction between aspects of the project that are outside the project manager’s direct control (Gransberg et al 2013). Additionally, complex projects entail a high level of “uncertainty about what the objectives are, and/or high uncertainty in how to implement the objectives” (CCPM 2006).

The Federal Highway Administration (FHWA) uses the term “Major Projects” to identify projects that have a “high level of public or congressional interest; are unusually complex; have extraordinary implications for the national transportation system; or are likely to exceed $500 million in total cost.” (FHWA 2010 emphasis added). Major projects are required to prepare a formal Project Management Plan (PMP) as a precursor to receiving federal funding (FHWA 2010). As a result, US agencies tend to associate the term complex project only with large megaprojects (Capka 2004). Research on the topic has shown that project complexity is relative to not only size and scope but also the past experience of the project management team (Owen et al 2011). The
CCPM (2006) maintains that “the level of uncertainty [i.e. complexity] will vary with the maturity of the individual/organisation [sic].” Thus, it is the amount of uncertainty that exists in the project that is beyond the project manager’s control that makes it complex. While size may very well contribute to complexity, it is not the sole parameter that defines whether or not a given project is complex (Gransberg et al 2013). Therefore, the objective of this paper is to detail how complexity was managed in four projects valued between $8.0 million and $50 million that were not classified as FHWA Major Projects and to demonstrate how an agency can determine if a seemingly routine small project is indeed complex.

BACKGROUND

The College of Complex Project Management (CCPM) differentiates between routine projects and complex projects by “the degree of disorder, instability, emergence, nonlinearity, recursiveness, uncertainty, irregularity and randomness, including a high uncertainty about objectives” (CCPM 2008). Decisions must be made in an environment where the project team does not have direct control over many of the critical factors. This leads to iterative planning and design to adjust the project management plan to react to events that create previously unforeseen changes in the project. Project complexity is dynamic and its components interact with each other in different ways that influence the project’s outcome. A complex project’s final scope of work is difficult to determine at early stages of project development. Solutions must be developed to satisfy an uncertain number of external stakeholders that may impact the ability to achieve the complex project’s goals. To address the proliferation of these issues, the Strategic Highway Research Program 2 (SHRP2) commissioned a study entitled: SHRP2 R-10, “Project Management Strategies for Complex Projects.” The major finding of that work was that complex projects require more than the three traditional dimensions of project management: Cost, Schedule, and Technical (Shane et al. 2013). Technical are all the typical engineering requirements including scope of design and construction, quality, and need for integrated delivery. Schedule are the calendar-driven aspects of the project. Cost is quantifying the scope of work in monetary terms. As seen in Figure 1, a complex project requires that the project team manage complexity in five dimensions: the three previously mentioned plus financing and context.
FIGURE 1 Conceptual Dimensional Difference which Routine and Complex Project Management have (Routine figure adapted from Marshall and Rousey 2009).

One of the added dimensions is the situational/geographic context in which the project was delivered, and it literally drives the technical scope by defining the project cost and schedule dimensions. Context encompasses political issues, procurement constraints, environmental requirements, public opinion, acquiring right-of-way, agency preferences/biases, and other similar issues that limit the project development process. The James River Bridge case study project in Virginia discussed later in the paper is an example in which the entire design and construction sequence was developed around a continuous need to minimize disruption to the public, requiring early public information planning to execute a complex self-detour plan.

The financing dimension revolves around the effect that the availability of funding has on the project execution plan. The SHRP2 research found that merely knowing the estimated cost of a given complex project was insufficient. The salient question was how the project is going to be financed (Gransberg et al. 2013). A good example is the New Mexico case study project detailed in a later section. While the estimated project cost is only about $8.0 million, the agency will need to gain FHWA approval for advance construction funding and the local municipality must find financing for utilities that must be relocated during construction. Figure 1 shows that increasing the visibility of context and financing gives the complex PM a framework with which to conceptualize the project’s complexity and develop proactive remedies for factors that are not directly controlled by the project team.

Context factors are typically dealt with during project planning and design in a routine project, and sometimes termed “context sensitive design,” making it an exercise in making technical decisions that allow the final project to better fit into the community. In essence, it is a thoughtful approach to minimizing the impact of the project on the environment in which it is built. A routine project’s financial plan is based on the current cost estimate. The technical requirements of the project are “preeminent over the constraints imposed by context and financing, making the result of the entire process a ‘go-no go’ decision” (Gransberg et al. 2013). Therefore, the routine project’s final design either qualifies for an environmental permit or it does not, and if the requisite construction funding is not available the project development process is suspended until sufficient funding is found. In the five-dimensional project management (5DPM) model shown in Figure 1, the project team approaches context and financing as equal to cost, schedule, and technical. As such, implementing 5DPM attempts to balance the interrelationships in all five dimensions rather than viewing context and/or financing as merely the output values of the design and its estimated cost.

This paper reports the application of 5DPM on small complex projects. It compares the results of three SHRP2 case study projects whose costs were $10.0, $29.8 and $49 million, and one new complex project currently estimated at $8.0 million on which the DOTs have decided to implement 5DPM. The complexity maps for all four studies were used as a tool to identify sources of complexity and rank each source on a relative basis. The product of the complexity mapping tool is a complexity footprint which allows the results to be compared. The three SHRP2 projects were mapped post-construction as part of the previous research; whereas the complexity footprint of the most recent project was mapped in the pre-design phase. The new project was mapped twice within a six month period and provided an opportunity to observe a change in project complexity over time as the project team developed solutions to complexities.
METHODOLOGY
The study replicated the methodology used in the SHRP2 case study project protocol (Shane et al. 2013) to include the case study on the New Mexico project. Case studies can be utilized to look in-depth at a project to focus on attitudes, behaviors, meanings, and experiences by obtaining information from a number of different sources related to a project (Yin 2002). The sources include archival project documents, public records, news and trade publication, journal articles, and personal interviews with project participants.

The case study project selected for this study was included in the first round of the FHWA Implementation Assistance Program for Project Management Strategies for Complex Projects (R10). The Implementation Assistance Program helps DOTs to adopt and implement the solutions developed under the SHRP2 Program. The Implementation Assistance consisted of an initial two day demonstration workshop in which the project team was introduced to the concepts of 5DPM. After 5DPM was discussed, the project management team completed an interactive exercise to develop the initial complexity map for their project. The materials used in the exercise were the same as were used in the previous research to develop the retrospective complexity maps.

The complexity maps were created by first examining the sources of complexity of each dimension. The project team was given a non-exhaustive list of possible sources of complexity within each dimension. Table 1 provides a sample list of sources of complexity within each dimension. The project management team was asked to identify the top three sources of complexity for each dimension. The next step consisted of ranking each dimension in order of complexity where 5 = most complex dimension and 1 = least complex dimension. The final step consisted of assigning a relative complexity value between 0 and 100 for each dimension. The team was instructed to arrive at a value based on rating a typical project with normal complexity in a given dimension having a value of 50. Thus, if the team believes that their project is more complex than a routine project, they would assign a value higher than 50. The values were then back-checked to ensure consistency with the dimensional complexity rankings in the previous step. For example if context is ranked higher than schedule, its numerical value also has to be higher. After the values are assigned, the data is plotted on a radar diagram and the area of the resultant pentagon is calculated. A routine project where each dimension is valued at 50 has an area of 5,944 units. The maximum area if all five dimensions are rated at 100 equals 23,776 units. The area is termed the complexity footprint and provides a measure of the given project’s complexity.

<table>
<thead>
<tr>
<th>Cost Factors</th>
<th>Schedule Factors</th>
<th>Technical Factors</th>
<th>Context Factors</th>
<th>Financing Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contingency usage</td>
<td>Timeline requirements</td>
<td>Scope of the project</td>
<td>Public</td>
<td>Legislative process</td>
</tr>
<tr>
<td>Risk analysis</td>
<td>Risk analysis</td>
<td>Owner’s internal structure</td>
<td>Political</td>
<td>Uniformity restrictions</td>
</tr>
<tr>
<td>Estimate formation</td>
<td>Milestones</td>
<td>Prequalification of bidders</td>
<td>Owner</td>
<td>Revenue generation</td>
</tr>
<tr>
<td>Owner resource cost allocation</td>
<td>Schedule control</td>
<td>Warranties</td>
<td>Marketing</td>
<td>Carbon credit sales</td>
</tr>
<tr>
<td>Cost control</td>
<td>Optimization’s impact on schedule</td>
<td>Disputes</td>
<td>Cultural impacts</td>
<td>Public-private partnerships</td>
</tr>
</tbody>
</table>

The complexity footprint provides a relative metric to evaluate the change in complexity over time. Ideally a project team that is actively addressing the sources of complexity will see the footprint shrink as they develop solutions to the issues that arise during project development and
execution. It is also quite possible that the area may expand if the solution to one issue interacts with another increasing the complexity rating in that dimension. An example would be a design change that resolves an environmental permitting problem but increases the project’s costs to a point where additional financing must be sought. While the complexity footprint is by no means a measure of some tangible property like project cost, it does act as a dashboard for the project team to assess the relative success of its efforts to adequately address the sources of complexity.

The project management team spent a considerable amount of time discussing the sources of complexity in each dimension and reaching a consensus on the values that were assigned to each dimension. Approximately six months after the initial workshop, a one-day workshop was conducted to investigate the progress of the project and to develop a second complexity footprint that was compared to the first complexity footprint to identify changes in the sources of complexity. After the complexity maps were developed, the project team for the case study conducted in this research defined critical project success factors. The critical success factors are “critical at a higher order than those typically formalized in a project mission statement or project chapter” (Shane et al. 2013).

The critical project success factors are typically comprised of both subjective and objective inputs. When narrowing down the list of critical success factors the project team was asked to consider if the critical success factors are measurable, justifiable, related to the long-term success of the transportation asset, related to the short-term success of the transportation asset, supported within the DOT/ FHWA, supported outside the DOT/FHWA and addressed a unique source of complexity on the project (Shane et al. 2013). The project team also discussed the interactions between success factors.

**CASE STUDY DETAILS**

The primary objective of this paper is to highlight that complexity can be independent of project size and value and that 5DPM principles can benefit both large and small complex projects. Complex projects, regardless of their size, benefit from using complexity mapping to identify sources of complexity and develop action plans that allow them to address the sources of complexity proactively.

Case studies of four projects are included in this study. The selection criteria included projects that were smaller than the value required to being classified as major projects by FHWA. Out of the 18 projects included as part of the study funded by the U.S. National Academies’ SHRP2 Program entitled: “Project Management Strategies for Complex Projects.”, three projects are not considered major projects by FHWA. Out of the 4 projects included as part of the Implementation Assistant Program for “Project Management Strategies for Complex Projects (R10)”, one project is not considered a major project by FHWA. The objective of this section is to portray the breadth and depth of the case study project population.

**James River Bridge/I95 Richmond**

Project Description: The project involved replacing the 0.75 mile James River Bridge on the section of I-95 that transited the central business district of Richmond, Virginia. The project was built in 1958 with a capacity of only a third of the 110,000 vehicles per day it carried when it was rebuilt in 2002 to six lanes in width (Shane et al. 2013). The contractor proposed to use prefabricated composite units which consisted of concrete deck over steel girders fabricated off-site and brought to the project by truck. The contractor sequenced the work so that the old bridge
spans were removed in segments, the resulting gaps were prepared, and a new composite unit was placed in a single night. Traffic was returned the next morning.

**Complexity:** The location, volume of traffic, and potential impact on the public made this a difficult project through which to maintaining traffic during construction. Its proximity to both the state legislative offices and the Virginia DOT Central Office gave it unprecedented visibility to both the public and the project team’s chain of command. The need to minimize traffic disruption on the main freight trucking route on the US East Coast pushed the work into the night and the agency implemented an untried incentive/disincentive contracting method to address the requirement.

**Critical Success Factors:** The critical success factor was to minimize impact to the public during construction, making context the most complex dimension. The agency implemented a robust public information plan to encourage self-detours for commercial truckers that was successful in significantly reducing the level of truck traffic through the work zone.

**Lewis and Clark Bridge**

**Project Description:** The Lewis and Clark Bridge spans the Columbia River and the state line between Washington and Oregon, providing a link for motorists between the states. The cost of the deck replacement was split 50-50 between the two states. The bridge is slightly over one mile long composed of 34 spans that carry 21,000 vehicles per day. Built in 1929, it was the longest and highest cantilever steel truss bridge in the nation at that point in time. The new project’s objective was to extend the existing bridge’s service life by at least 25 years. A full-depth precast deck replacement was designed and constructed. The project cost about $24 million and was completed in 2004 (Shane et al. 2013).

**Complexity:** The Lewis and Clark Bridge is the only point to cross the Columbia River from Washington to Oregon. The nearest detour adds a minimum of hour to the crossing and a hospital on one side of the crossing serviced the local population in both states. Thus, the context dimension was the most complex. Construction sequencing solutions to minimize impact on the traveling public was the primary driver on this project (Shane et al. 2013). Among other tools, WSDOT developed an incentive contract to minimize full daytime closures and shift those required to the night or weekends. The bridge also utilized off-site fabrication of precast deck replacement panels to accelerate the construction. Lastly, the project was highly unpopular within the impacted communities, which drove the agency to implement an extensive public relations and information plan to manage public opinion.

**Critical Success Factors:** There were two major factors. First, the minimization of daytime construction traffic disruption through a carefully design construction sequence of work. The second was an extensive public information plan to identify and address public concerns as well as provide a mechanism to gain access to current traffic status for individual drivers via live webcams, a continuously up-dated website and other media.

**Green Street Road Rehabilitation**

**Project Description:** The City of Saskatoon, Saskatchewan, Canada decided to become the “greenest city in Canada” with regard to sustainable infrastructure. As a result, this project was
developed to maximize the recycling of asphalt and Portland cement concrete rubble created in the
reconstruction of city streets. The project’s technical dimension focused on developing high value
substructure aggregates that are structurally superior to conventional aggregates through recycling.
Scope also included implementing newly developed Canadian mechanistic-based structural asset
management and pavement design protocols.

**Complexity:** The use of recycled rubble as structural material at this scale was unproven and
required a considerable adjustment of conventional road building practice to implement. This issue
required the project to develop and execute an untried procurement practice that was termed
“design-supply-build” in order to incorporate the newly adopted mechanistic design procedures
along with a system to conduct field validation. The result was that the design consultant held the
prime contract for both the design and the construction.

**Critical Success Factors:** Maximizing the amount of recycling demanded that the performance risk
for the rehabilitated pavement be assigned to the designer.

As previously mentioned, these three projects were analyzed by their project teams after
the projects had been completed. Thus, they represent a retrospective evaluation of dimensional
complexity. The New Mexico Highway 90 (NM 90) expansion project is an example of a project
team evaluating complexity before the project’s design is begun. Therefore, the amount of
detailed information available to the team to make its rankings is much less than the other three.
Intuitively, as the project’s design advances, new information on dimensional complexity must
be expected to be uncovered, which given the interactions between dimensions, could change the
way the team ranks each dimension. Table 2 summarizes the complexity rankings for the four
case study projects. The next section will discuss the details found during the implementation of
5DPM on the NM 90 project.

### TABLE 2 Case Study Project Summary

<table>
<thead>
<tr>
<th>Timing</th>
<th>Case Study Project</th>
<th>Budget</th>
<th>Ranking by Dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-construction</td>
<td>James River Bridge</td>
<td>$49 M</td>
<td>2 5 4 1 4</td>
</tr>
<tr>
<td>Ranking</td>
<td>Lewis and Clark Bridge</td>
<td>$29.8 M</td>
<td>2 3 4 5 1</td>
</tr>
<tr>
<td></td>
<td>Green Street</td>
<td>Canadi an $10.0 M</td>
<td>4 3 5 2 1</td>
</tr>
<tr>
<td>Pre-design</td>
<td>NM 90 2013 rank</td>
<td>$7.2M</td>
<td>2 4 3 5 1</td>
</tr>
<tr>
<td>Ranking</td>
<td>NM 90, 2014 rank</td>
<td>$8.0M</td>
<td>2 3 4 5 1</td>
</tr>
</tbody>
</table>

**New Mexico Highway 90 Expansion Project**

**Project Description:** The project consists of a mile long expansion of NM 90 in Silver City. The
final project will result in bicycle lanes and sidewalks to be added to the existing two lanes of
traffic. Special architectural features will be installed to create a “gateway” to Silver City that can
be used as the start/finish line for an annual international cycle race. To accomplish the expansion, additional right of way must be acquired and a number of utilities must be relocated.

**Complexity:** A large number of properties will be impacted by this project. Right of way acquisition will drive the project schedule. The New Mexico DOT will provide the lighting fixtures but the city of Silver City will pay the utility bills which requires coordination regarding the type of lighting used to minimize maintenance cost and agree on the amount of energy that the city is able to afford. Additionally, the City’s utility budget may not be sufficient to cover the cost of relocating the utilities in the area. Lastly, the new alignment may require a FHWA waiver of Americans with Disabilities Act (ADA) design standards regarding maximum grades at driveways and other locations.

**Critical Success Factors:** The project management team identified two critical success factors during the first workshop: ROW acquisition and general office commitment to support project milestones. In the second workshop, which occurred approximately six months after the first workshop, the project team had more information about the project and had become comfortable with 5DPM. Table 2 shows that new information gained in the six month period between the two complexity mapping exercises caused the team to rank technical over schedule, reversing the first ranking. The reason for the change was the current design for the road’s cross-section caused previously unforeseen constraints on ROW. In short, the upper half of the project only had half the available width in which to locate the expanded roadway, cycle lanes, sidewalks and relocated utilities, and the topography made it difficult to meet ADA constraints on wheelchair accessible grades.

**Complexity Mapping**

This section analyzes the sources of complexity and the results of the complexity footprints for the case study projects. The format has been standardized for each project to enable each project to be compared with all other projects in the sample. Figure 2 contains the complexity maps developed by the New Mexico DOT project team in 2013 at the initial project meeting and in 2014 at the project kick-off meeting. It shows that the area of the complexity footprint increased by 14% as the project advanced in its development process.

![Silver City 2013 Complexity Map](image1)

![Silver City 2014 Complexity Map](image2)

**FIGURE 2 Complexity Footprints of the NM 90 case study**
Table 3 shows that complexity increased during that period in three of five dimensions. Context remained the most complex dimension and its rating increased due to the increased issues with available ROW, the need to potentially receive a waiver for ADA design requirements from FHWA, and DOT-City agreement requirements surrounding the operations and maintenance of the “gateway” features of work. Technical had the largest increase due to the need to deal with the horizontal and vertical alignment issues, the “gateway” features, and geotechnical investigations to quantify the amount of rock required to be excavated. Cost increased due to the need for more ROW and the potential for rock excavation to exceed early estimates. Comparing the NM 90 complexity footprint to the other three projects shows that even though it is the least cost case study project, its most recent footprint makes it the second most complex. It is interesting to note that the most complex of the four was the replacement of a bridge on a 6-lane interstate highway in an urban setting. The comparison leads one to infer that complexity is independent of most factors regarding size and scale.

### TABLE 3 Rated Case Study Project Complexity by Dimension and Complexity Footprint Area

<table>
<thead>
<tr>
<th>Timing</th>
<th>Case Study Project</th>
<th>Complexity Rating by Dimension</th>
<th>Complexity Area (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-construction</td>
<td>James River Bridge</td>
<td>Cost 60 Schedule 95 Technical 90 Context 55 Financing 90</td>
<td>14,551</td>
</tr>
<tr>
<td></td>
<td>Lewis and Clark Bridge</td>
<td>Cost 30 Schedule 55 Technical 85 Context 100 Financing 5</td>
<td>4,874</td>
</tr>
<tr>
<td>Pre-design</td>
<td>Green Street</td>
<td>Cost 82 Schedule 55 Technical 100 Context 20 Financing 10</td>
<td>6,111</td>
</tr>
<tr>
<td></td>
<td>NM 90, 2013</td>
<td>Cost 65 Schedule 75 Technical 70 Context 85 Financing 50</td>
<td>11,127</td>
</tr>
<tr>
<td></td>
<td>NM 90, 2014</td>
<td>Cost 70 Schedule 75 Technical 85 Context 90 Financing 50</td>
<td>12,685</td>
</tr>
</tbody>
</table>

Table 4 is a pairwise comparison of the dimensional complexity for the four projects. The bold font is used when context is ranked higher than one of the other four dimensions. A glance at the table provides the major finding of this paper. In small to medium projects, context is the dimension in which the most complexity is observed.

### TABLE 4 Pairwise Comparison of Small Case Study Project Complexity by Dimension

<table>
<thead>
<tr>
<th>Case Study Project</th>
<th>Technical vs Context</th>
<th>Schedule vs Context</th>
<th>Cost vs Context</th>
<th>Technical vs Financing</th>
<th>Schedule vs Financing</th>
<th>Cost vs Financing</th>
<th>Context vs Financing</th>
</tr>
</thead>
<tbody>
<tr>
<td>James River Bridge</td>
<td>Context</td>
<td>Context</td>
<td>Context</td>
<td>Technical</td>
<td>Schedule</td>
<td>Cost</td>
<td>Context</td>
</tr>
<tr>
<td>Lewis and Clark Bridge</td>
<td>Context</td>
<td>Context</td>
<td>Context</td>
<td>Technical</td>
<td>Schedule</td>
<td>Cost</td>
<td>Context</td>
</tr>
<tr>
<td>Green Street</td>
<td>Technical</td>
<td>Schedule</td>
<td>Cost</td>
<td>Technical</td>
<td>Schedule</td>
<td>Cost</td>
<td>Context</td>
</tr>
<tr>
<td>NM 90, 2013</td>
<td>Context</td>
<td>Context</td>
<td>Context</td>
<td>Technical</td>
<td>Schedule</td>
<td>Cost</td>
<td>Context</td>
</tr>
<tr>
<td>NM 90, 2014</td>
<td>Context</td>
<td>Context</td>
<td>Context</td>
<td>Technical</td>
<td>Schedule</td>
<td>Cost</td>
<td>Context</td>
</tr>
</tbody>
</table>

### CONCLUSIONS

Based on the results of the case study analysis, it can be concluded that both small and large projects benefit from 5DPM and the use of complexity mapping to identify sources of complexity and develop action plans that allow them to address the sources of complexity proactively. It can be inferred that complexity is independent of most factors regarding size and scale. It can also be concluded that the complexity footprint is a snapshot in time and that
Complex projects require that the project team manage complexity in five dimensions: Cost, Schedule, Technical, Context and Finance. By elevating Content and Finance to the same level as the three traditional dimensions of project management, the project team is able to raise the visibility of the issues related to these two dimensions before they slip to uncontrollable disorder. In small to medium projects, context is the dimension in which the most complexity is observed. This is logical. Projects of magnitudes similar to those presented in this paper ($8.0 to $49 million) are commonly encountered and as such will not likely need to search for innovative financing. Their technical challenges will likely not be much more than the routine project’s design, and because of their size, they will be able to be executed in a single construction season. Thus, the major opportunity for disruption of the normal project development process will come from factors that are outside the control of the agency, e.g. context factors.

REFERENCES


