

## SHRP2 Solution Case Study: Benefits of a Customizable Risk Management Process

Managing Risk in Rapid Renewal Projects, also known as R09, is a risk management tool that transportation agencies can use to anticipate, assess, and manage risks for projects of any size and type. This case study provides a post-construction overview of two very different projects that both benefited from implementing the R09 risk management process.



### Arizona Department of Transportation



Figure 1: Newly constructed US-60/Bell Road Interchange in Surprise, Arizona (Photo Credit: City of Surprise)

#### ADOT's US-60/Bell Road Interchange Improvements

In Surprise, AZ, the Arizona Department of Transportation (ADOT) used R09 on a project aimed at easing congestion and increasing capacity at a busy intersection. The project provided a grade-separated interchange to elevate Bell Road over Grand Avenue, (US-60).

- Project Budget: **\$60.7 Million**
- Delivery Method: **Design-Build**
- Estimated Construction Time: **24 months**
- Benefit: Closed Bell Road to traffic to maximize cost and schedule savings



### Oregon Department of Transportation



Figure 2: Recently reconstructed Ochoco Creek Bridge in Prineville, Oregon (Photo Credit: Oregon Department of Transportation)

#### ODOT's Ochoco Creek Bridge Replacement

In Prineville, OR, the Oregon Department of Transportation (ODOT) used R09 to replace a structurally deficient single-span two-lane bridge over Ochoco Creek on the Paulina Highway (Hwy. 380, MP 0.11, Bridge #07282).

- Project Budget: **\$2.5 Million**
- Delivery Method: **Design-Bid-Build**
- Estimated Construction Time: **5.9 months**
- Benefit: Used Accelerated Bridge Construction (ABC) to minimize disruption

## R09 Assesses Risk on Projects of Any Size and Complexity

R09 is a flexible risk management tool that can be applied to both large and small projects. Developed as part of the Federal Highway Administration's (FHWA) second Strategic Highway Research Program (SHRP2), several states have already used R09 in the planning and execution of projects. Risk management is an important step in the development of any project, because it allows project teams to identify, assess, and plan for risks (both threats and opportunities) up front, which can significantly improve project outcomes.

## R09 Enables In-House Risk Management

R09 uses a seven-step process to incorporate risk management into project development. A spreadsheet-based **template** guides project teams through the process, which includes confirming the project scope, strategy, and conditions; identifying, assessing, and prioritizing risk; and ultimately developing a strategy to mitigate the identified risks. In addition, the accompanying **R09 Guidebook** provides tools to assist with each step.



Figure 3: R09 GoSHRP2 website, [www.fhwa.dot.gov/GoSHRP2/Solutions/Renewal/R09](http://www.fhwa.dot.gov/GoSHRP2/Solutions/Renewal/R09)

Figure 4: R09 Risk Management Process

## Results

### AZ ADOT's US-60/Bell Road Interchange Improvements

By integrating risk management into project development, ADOT mitigated critical threats and implemented opportunities. ADOT used R09 to bring together stakeholders for this large project early on, exposing unexpected opportunities that led to significant cost and schedule performance improvements.

#### Comparison of Anticipated and Actual Project Performance

	Anticipated Performance*	Actual Performance	Savings
Cost (Year of Expenditures)	\$60.7M	\$49.8M	<b>\$10.9M</b>
Construction Duration	24 months†	14 months	<b>10 months</b>

\* Unmitigated cost estimate (base + risk) as of December 2014 R09 workshop. This unmitigated cost estimate includes anticipated risks without mitigations.  
 † Duration assumed at the time of procurement.

### OR ODOT's Ochoco Creek Bridge Replacement

With some assistance from FHWA, ODOT was able to use R09's free template to implement a risk management process quickly and at low cost. The R09 process helped ODOT select the design alternative with the quickest construction time and lowest cost, accelerated bridge construction (ABC).

#### Comparison of Anticipated and Actual Project Performance

	Anticipated Performance*	Actual Performance	Savings
Cost (Year of Expenditures)	\$2.5M	\$1.9M	<b>\$600,000</b>
Construction Duration	5.9 months	5 months	<b>0.9 months</b>

\* Unmitigated cost estimate (base + risk) as of November 2014 R09 workshop. This unmitigated cost estimate includes anticipated risks without mitigations.

“ R09 let our project management team own the whole risk-management process so we were able to evaluate threats and opportunities upfront to build a more realistic schedule. ” – Madhu Reddy, ADOT

“ The R09 process helped achieve buy-in from all stakeholders that lasted throughout the development of the project. ” – Lea Ann Hart-Chambers, ODOT

## Benefits of R09



ADOT used the R09 process to identify and seize opportunities, like closing Bell Road during construction, which led to \$10.9 million in savings and a 10 month schedule reduction.

- **Opportunity:** Proposal to close Bell Road for 6 months to expedite construction
- **Opportunity:** Modify 134<sup>th</sup> Drive/Avenue to avoid Right of Way (ROW) impacts to local businesses
- **Threat:** ROW and utility relocation impacts to local businesses
  - **Response:** Modified alignment of Town Center Drive to minimize ROW impacts to local businesses.
- **Risk:** Past Mechanically Stabilized Earth (MSE) wall performance issues in other ADOT projects.
  - **Response:** ADOT tightened specifications for MSE walls



ODOT aimed to minimize cost, schedule, and traffic disruption through construction. The R09 process allowed ODOT to implement risk management techniques at low cost, and identify and evaluate two design alternatives:

- Accelerated Bridge Construction (ABC)
- Short Detour

The ODOT project team compared the short detour option to the ABC alternative. Ultimately the ABC alternative was chosen because it had the lowest cost and shortest schedule when mitigations were considered.

## R09 Improves the Project Development Process

R09 brings stakeholders together during project development to discuss the planned approach, alternatives, funding, technical conditions affecting the project, performance (cost and schedule) estimates, and other factors — fostering organizational improvements that can last beyond the project duration.



### ▶ Effectively assemble the entire project team (both internal and external)

- Since this was a relatively large project with many stakeholders and potentially major impacts to the public, it was important for the entire team to come together to discuss all potential project risks and potential risk response strategies to positively influence project outcomes. The risk management process allowed the team to better understand each other's interests and challenges, and helped them work together toward project success.
- The fact that the entire project team from ADOT was involved in decisions from the onset of the project gave the team a sense of ownership. It also sparked ideas, and allowed ADOT to identify opportunities that led to substantial cost and schedule savings.
- ADOT identified the City of Surprise as an important stakeholder, and was able to work with them and local businesses to reroute utilities and condense the construction schedule, mitigating impact to local businesses.

### ▶ Familiarize Project Details

- The risk management process helped familiarize the team with potential risks, and allowed them to better anticipate and address these risks.
- A greater understanding of the project details and challenges allowed the team to better communicate the rationale for decisions to stakeholders, local businesses, and the public.
- As a better collective understanding of the project was achieved, more opportunities were identified and better mitigation strategies were developed.

### ▶ Formal Decision-Making Process

- As a result of the risk management process, the project team gained an unbiased and quantitative basis for making a strategic decision to close Bell Road during construction. Although the team was originally opposed to this idea because of the potential impact to the traveling public, this opportunity could not be ignored once the anticipated cost and schedule savings were evaluated.



### ▶ Effectively assemble the entire project team (both internal and external)

- Disruption of emergency services was a concern due to nearby schools and a newly built hospital and fire services. Because of this, local leaders and stakeholders were encouraged to and did ultimately participate in the process.
- Stakeholder involvement created a sustainable and direct means of communication and coordination as well as a better collective understanding of ODOT project decisions.
- Involving key knowledge sources helped the team arrive at well-informed answers to potential risk questions right away.

### ▶ Familiarize Project Details

- Through familiarizing themselves with the risks, costs, and construction schedules of the design alternatives, ODOT was able to select the ABC method as the most appropriate for the project.
- The risk management process and the resulting prioritized list of risks (threats and opportunities) drew the project team's attention to the most significant issues that could affect project performance.

### ▶ Formal Decision-Making Process

- Since the first step of the R09 process encourages teams to come together for a thorough discussion of the project scope, strategy, and conditions, ODOT was able to discuss project alternatives as a full team. Decisions were formally documented, and the project team did not have to revisit their decisions throughout project development.
- The R09 process allowed ODOT to make a decision about which design alternative would be most likely to have the lowest cost and shortest schedule while also considering impacts to traffic disruption. Because the R09 risk management process is structured and formal, it was an ideal approach for a relatively small project.



## R09 Adapts to Fit Different Project Considerations

R09’s flexible risk management process adapts to fit both large and small projects. Although ADOT and ODOT used R09 on projects with differences in scope and budget, they both experienced positive benefits.

Project Consideration	ADOT – Differences	ODOT – Differences
<b>Project Size and Type</b>	<ul style="list-style-type: none"> <li>• Larger budget and schedule</li> <li>• New interchange project</li> </ul>	<ul style="list-style-type: none"> <li>• Smaller budget and schedule</li> <li>• Bridge replacement project</li> </ul>
<b>Project Complexities</b>	<ul style="list-style-type: none"> <li>• Highly publicized and politically significant project</li> <li>• Major impacts to the traveling public</li> <li>• Multiple ROW and utility relocation impacts</li> </ul>	<ul style="list-style-type: none"> <li>• Project considerations included maintaining access to the nearby hospital, avoiding disruption of utilities, protecting endangered fish, and avoiding impacts to a nearby historic railroad</li> </ul>
<b>Public and Stakeholder Concerns</b>	<ul style="list-style-type: none"> <li>• Worked closely with the City of Surprise and local business owners to maintain access to businesses during construction</li> </ul>	<ul style="list-style-type: none"> <li>• Leveraged ABC technology to minimize traffic disruption</li> </ul>
<b>Risk Management Outcome</b>	<ul style="list-style-type: none"> <li>• Identified and seized opportunities (such as the closing of Bell Road) to expedite construction and save money</li> </ul>	<ul style="list-style-type: none"> <li>• Selected the most cost-efficient option out of two possibilities</li> </ul>

Similarities	
R09 risk management process saved time and money for both projects	Both DOTs avoided or mitigated potential risks by planning ahead, which resulted in cost and schedule savings
Although the projects varied in size, they both had unique complexities and risks	Both DOTs gathered the project teams upfront, which created open channels of communication and a formal decision-making process.
Planning ahead helped both DOTs address concerns from stakeholders and the public	The free, online template guided both teams through a structured and relatively easy risk management process.



**Save Lives**



**Save Money**



**Save Time**

### Resources to Help You Use R09 Managing Risk in Rapid Renewal Projects

To download the R09 guidebook and template, read case studies, and view a video, visit <https://www.fhwa.dot.gov/GoSHRP2/Solutions/Renewal/R09>

To learn more about the R09 process contact:

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### Implementing SHRP2

The second Strategic Highway Research Program (SHRP2) is a national partnership of the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the Transportation Research Board. Together, these partners conducted research and are deploying resulting products to help the transportation community enhance productivity, boost efficiency, increase safety, and improve the reliability of the Nation’s highway system.

The Arizona Department of Transportation (ADOT) and the Oregon Department of Transportation (ODOT) applied Managing Risk in Rapid Renewal Projects on US-60/Bell Road Interchange Improvements and Ochoco Creek Bridge Replacement projects as part of the [SHRP2 Implementation Assistance Program](#).